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The design, development, implementation and evaluation of the Gaelic4Girls intervention

Thesis presented by

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AUTHOR DECLARATION:

This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism.

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"Non nobis solum nati sumus. (Not for ourselves alone are we born.)"

– Marcus Tullius Cicero

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'*Surround yourself with people who will lift you higher'*

- Oprah Winfrey

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LIST OF ABBREVIATIONS

BMI = body mass index

CPD = continuous professional development

DEIS = delivering equality of opportunity in schools

FG = focus group

G4G = Gaelic4Girls

HSD = honest significance difference

ICC = intra-class correlation coefficient

LGFA = Ladies Gaelic Football Association

LOM = locomotor

M = mean

MNM = mastery and near mastery

MVPA = moderate-to-vigorous-physical activity

OC = object-control

OYS = organised youth sport

PA = physical activity

PACE = Physician-based Assessment and Counseling for Exercise

PAQ-C = Physical Activity Questionnaire for Older Children

PE = physical education

PPSC = physical performance self-concept

PSC = perceived physical self-confidence

SD = standard deviation

SDT = self-determination theory

SE = self-efficacy

SEM = social ecological model

SREC = social research ethical committee

TGMD-2 = test of gross motor development-2

UCC = University College Cork

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ABSTRACT

Background: It is widely reported that girls are less physically active than boys throughout childhood, and the age-related decline in physical activity (PA) participation, particularly from early adolescence onwards, is steeper for girls than for boys. Correlates of PA, such as fundamental movement skills (FMS), club-based participation in organised youth sport (OYS), psychological correlates (self-efficacy, enjoyment, PA attitudes), and social support structures (family and peer support) during childhood and adolescence contributes considerably to leisure-time PA for health-enhancing benefits in young girls.

Purpose: The purpose of this study was to design, develop, implement and evaluate a multi-component community sports-based PA intervention, specifically tailored for 8- to 12- year old girls in Ladies Gaelic Football (LGF) clubs in Ireland. The existing programme, known as Gaelic4Girls (G4G), was re-designed and revised using the theoretical underpinnings of the Self-Determination Theory (SDT) and elements of the Social Ecological Model (SEM).

Methodology: Data for this PhD thesis were gathered from participants (n= 568), using a mixed-methods research design. At baseline, information was gathered on participants (n = 331) levels of PA (self-report questionnaire), FMS proficiency (live assessment of motor skills), and psychological correlates of PA (self-report questionnaire), using validated and reliable protocol. A sub-sample of participants (n = 37) also participated in focus group interviews to explore their perceptions of PA and sport participation. Based on this data, and an exploration of the literature, a revised G4G intervention was developed. A quasi-experimental, non-randomised controlled trial involving three community sports clubs (group 1 - revised G4G intervention; group 2 - existing G4G programme; and group 3 - control condition) was then implemented to evaluate the revised G4G intervention's efficacy. Participants' data (n=120) was collected at pre and post time points on the following variables; PA levels, FMS proficiency, and psychological correlates of PA. Focus group data (n = 6) was collected at post-intervention to explore perceptions of the revised G4G intervention.

Results: Following a 2 (pre to post) by 3 (group 1, 2 and 3) mixed-model ANOVA, it was highlighted over time that the revised G4G intervention group 1 significantly increased in PA (mean change = 39.7, SD = 81.66, p=.003), FMS proficiency (mean

change = 1.86, SD = 4.78, p=.005) and their associated psychological correlates of PA (namely self-efficacy (p<.002), perceived self-confidence (p<.002), enjoyment (p<.003), attitudes towards PA (p<.003), and family social support (p<.002). FG findings reported positive findings for the revised G4G intervention group 1 participants, specifically the heightened psychological wellbeing for girls, and the establishment of emerging friendships between peers.

Conclusion: The findings demonstrate that the 10-week specifically tailored, research-informed and revised G4G intervention is a feasible and efficacious programme, leading to a positive effect on the physical and psychological wellbeing of pre-adolescent Irish girls, as relative to the traditionally delivered existing G4G comparative programme, and control group conditions. Further research involving a randomised controlled trial, with a larger sample size is warranted.

PUBLICATIONS AND CONFERENCE PROCEEDINGS RELATED TO THE RESEARCH

Published Journal Articles:

Farmer, O., Belton, S., & O'Brien, W. (2017). The Relationship between Actual Fundamental Motor Skill Proficiency, Perceived Motor Skill Confidence and Competence, and Physical Activity in 8–12-Year-Old Irish Female Youth. *Sports*, *5*(74). https://doi.org/10.3390/sports5040074

O'Brien, W., Duncan, M. J., Farmer, O., & Lester, D. (2018). Do Irish adolescents have adequate functional movement skill and confidence? *Journal of Motor Learning and Development*, *6*(s2), S301–S319. https://doi.org/10.1123/jmld.2016-0067

Farmer, O., Duffy, D., Cahill, K., Lester, D., Belton, S., & O'Brien, W. (2018). Enhancing the evidence base for Irish female youth participation in physical activity - the development of the Gaelic4Girls program. *Women in Sport and Physical Activity Journal*, *26*(2), 111–123. https://doi.org/10.1123/wspaj.2017-0046

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Farmer, O., Cahill, K., & O'Brien, W. (2020). Gaelic4Girls—The Effectiveness of a 10-Week Multicomponent Community Sports-Based Physical Activity Intervention for 8 to 12-Year-Old Girls. *International Journal of Environmental Research and Public Health, 17*(6928). https://doi.org/10.3390/ijerph17186928

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Poster Presentations:

O' Brien, W. (2019) 'Gaelic4Girls' (G4G) - evaluating the effectiveness of a 10-week multi-component community-sports based physical activity intervention for 8-12-year-old girls'. *International Motor Development Research Consortium (I-MDRC) The Healthy and Active Children Symposium*, Verona Italy (September 2019).

Farmer, O. (2018) 'Gaelic4Girls' for increased physical activity participation: A multi-component, pilot intervention: study design and protocol. *Physical Education, Physical Activity and Youth Sport (PEPAYS) Forum,* University of Limerick Ireland (November 2018).

Farmer, O. (2018) 'Gaelic4Girls' for increased physical activity participation: A multi-component, pilot intervention: study design and protocol. *International Society for Physical Activity and Health (ISPAH),* London (October 2018).

O'Brien, W., & Farmer, O (2018). 'Gaelic4Girls' for increased physical activity participation – a multi-component, pilot intervention: Study design and protocol. *North American Society for the Psychology of Sport and Physical*

Activity' (NASPSPA) International Conference, Denver USA (June 2018).

Farmer, O. (2017) 'The Design, Development, Implementation & Evaluation of the Gaelic4Girl's Programme'. *16th Meeting of The International Society for Behavioural Nutrition and Physical Activity (ISBNPA) Conference,* Victoria, Canada (June 2017).

Farmer, O. (2017) 'Gaelic for Girls': The Design, Development, Implementation and Evaluation of the G4G's Programme'. *GAA Researches Exhibition – GAA Games Development Conference*, Croke Park Dublin (January 2017).

Farmer, O. (2016) 'Gaelic for Girls': Rationale, Study Protocol & Methodological Considerations'. *15th Meeting of The International Society of Behavioural Nutrition & Physical Activity (ISBNPA) Conference,* Cape Town South Africa (June 2016).

Farmer, O. (2016) 'Gaelic for Girls': Rationale, Study Protocol & Methodological Considerations'. *Psychology, Health & Medicine Conference*, University College Cork, Ireland (May 2016).

Farmer, O. (2016) 'Gaelic for Girls': Rationale, Study Protocol & Methodological Considerations'. *PEPAYS Forum*, Tralee Institute of Technology, Ireland (May 2016).

Oral Presentations:

Farmer, O. (2019) 'Gaelic4Girls' (G4G) – evaluating the effectiveness of a 10-week multi-component community-sports based physical activity intervention for 8-12-year-old girls. *International Physical Literacy (IPLC)* Conference, Winnipeg, Canada (May 2019).

Farmer, O. (2019) 'Gaelic4Girls' (G4G) – evaluating the effectiveness of a 10-week multi-component community-sports based physical activity intervention for 8-12-year-old girls. *Physical and Health Education (PHE) Conference*, Montreal (May 2019).

Farmer, O. (2019). 'The design, development, implementation and evaluation of the 'Gaelic4Girls' Intervention'. *Motor Competence: The Forgotten Pathway to Childhood Health Symposium*, University College Cork Ireland (January 2019).

Farmer, O. (2018). 'The design, development, implementation and evaluation of the 'Gaelic4Girls' Intervention'. *Children's Motor Competence and its Impact on Physical Activity, Exercise, Sport and Health Symposium*, Coventry University UK (January 2018).

Farmer, O. (2017). Enhancing the evidence-base for Irish female youth participation in physical activity – the development of the 'Gaelic for Girls' programme. *Physical Education, Physical Activity and Youth Sport (PEPAYS) Research Forum*, Limerick, Ireland (June 2017).

Farmer, O. (2016) 'The design, development, implementation, and evaluation of the Gaelic4Girls intervention'. *PhD Symposium 2016 – At the forefront of Contemporary Research with Children and Young People in Ireland*. Maynooth University (September 2016).

Farmer, O. (2015) Rationale and proposed study protocol of the 'Gaelic4Girls' (G4G) programme. *The Graduate School, College of Arts, Celtic Studies & Social Sciences Postgraduate Research Conference,* University College Cork (December 2015).

Keynote Presentations:

Farmer, O. (2020) 'Gaelic Games for physical activity and sport promotion in Ireland for at-risk, drop-out girls'. *National GAA Games Development Conference*, Croke Park, Dublin (January 2020).

Farmer, O. (2019) 'Gaelic4Girls – an avenue to increase physical activity participation and psychological wellbeing in young girls'. *Sligo GAA Health & Wellbeing Conference,* Sligo Institute of Technology (March 2019).

Webinars:

Farmer, O. (2020). iCoach Kids Europe Shares Webinar Series *'To Play or Not to Play'.* April 2020

Workshops:

Farmer, O. (2017-2019) 'Gaelic4Teens' National workshops,

- 'Coach the Teenager Roadshow'
- 'Lifestyle planning for teenage girls'
- 'The 'importance of the psychosocial element of female youth physical activity participation'.
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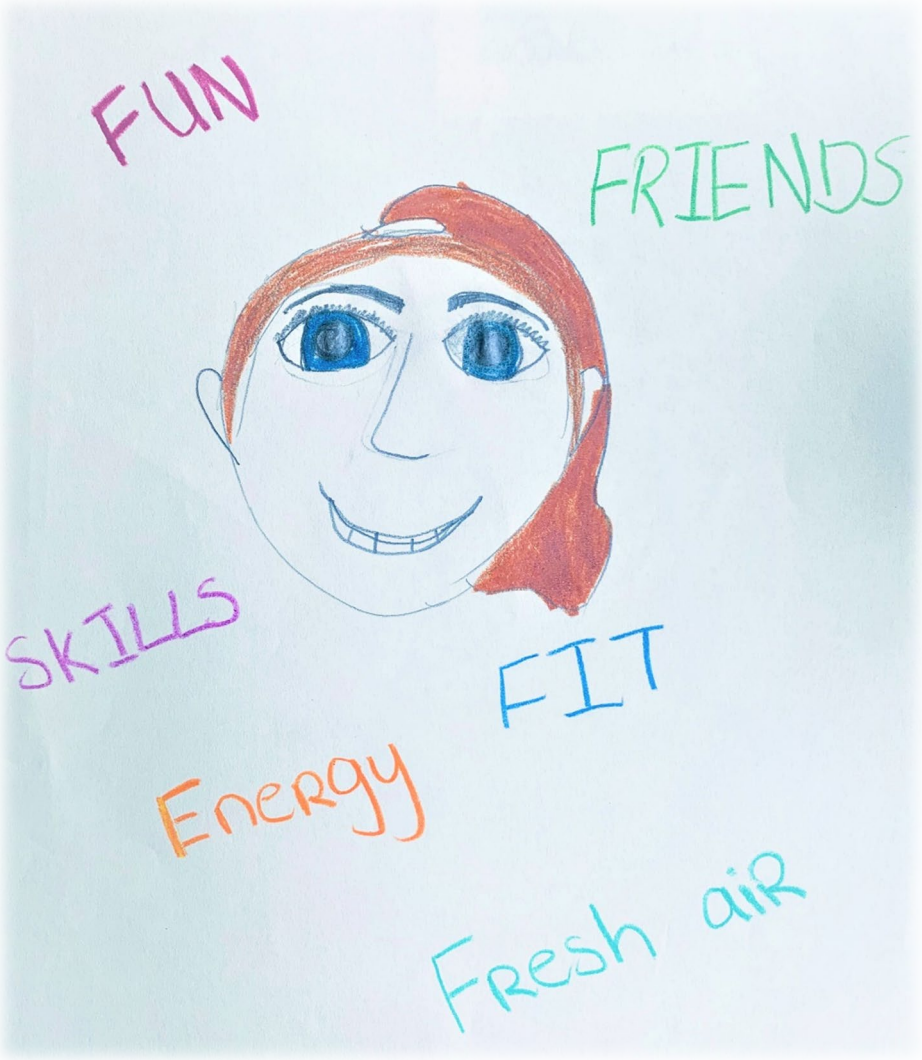
CHAPTER 1

INTRODUCTION TO THE THESIS



1.1 INTRODUCTION

This chapter provides the context, rationale and justification for the design, development, implementation and evaluation of the 'Gaelic4Girls' (G4G) intervention – a multi-component physical activity (PA) community sports-based intervention for 8 to 12-year-old girls. This includes the wide range of benefits gained from engaging in PA and organised youth sport (OYS), the current global physical inactivity levels of pre-adolescent girls, interventions designed to increase PA and sport participation levels, fundamental movement skill (FMS) proficiency and psychological wellbeing in this cohort and the current gaps in the literature. This introductory chapter presents an overview of the dissertation. Initially, the chapter outlines the focus of the study, by drawing on salient themes within the field, and provides a background to the existing Ladies Gaelic Football (LGF) G4G programme. In doing so, this chapter identifies gaps in the literature, and documents the key research considerations that underpin the basis of the study. Thereafter, the significance and originality of the study is highlighted. Finally, the chapter concludes by presenting the research aims, objectives, research questions and structure of the thesis to follow.

1.1.1 Rationale for thesis

It is well established that regular participation in PA is imperative for good health (Eime et al., 2013), and is associated with an array of physical, psychological and social health benefits (Biddle et al., 2019; Janssen & Leblanc, 2010) for children and young people aged 5 to 18 years old. Despite the widely-known health benefits of PA participation, studies continue to show that lack of PA participation among children and adolescents has become a global health concern (Guthold et al., 2019; Tremblay et al., 2016). Most recent nationally representative Irish data (n = 6,651; mean age=13.8 ± 2 years) from the 'Children's Sport Participation and Physical Activity Study' (CSPPA) (Woods et al., 2018) found that only 17% of children aged 9- to 11- years old, and 10% of adolescents aged 12- to 17- years old self-reported meeting the recommended 60-minute moderate-to-vigorous PA (MVPA) daily. These low levels of PA among children and adolescents are in line with global trends (Sallis et al., 2016).

It is widely reported that girls are less physically active than boys throughout childhood (Sallis et al., 2016; Van Hecke et al., 2016), and the age-related decline in PA participation, particularly from early adolescence onwards, is steeper for girls when compared to boys (Beltran-Valls et al., 2019; Dumith et al., 2011; Farooq et al., 2018; Owen et al., 2017). Within the general population, pre-adolescent children are a sub-group of the general population that warrant particular focus (Biddle et al., 2014). This cohort of children are considered the most active segment of society, however, there remains concern that even for this age group, many children, particularly girls, have PA levels lower than those recommended for good health (Jekauc et al., 2013; Kalman et al., 2015; Van Hecke et al., 2016). In an Irish context, the Health Behaviour in School-Aged Children (HBSC) main study (Költő et al., 2020), children from 5th class to 5th year who were aged 10 to 17 years found that 32% of females aged 10- to 11- years, and 42% of males the same age (N= 12,002) self-reported accumulating at least 60 minutes of MVPA daily. Most recent research shows that fewer Irish girls aged 9- to 11- years old meet the MVPA recommended guidelines when compared to boys (13% vs. 23%) (Woods et al., 2018). These differences are meaningful across child and pre-adolescent age groups for girls in nearly all countries and regions (Demetriou et al., 2019; Inchley et al., 2020; Ishii et al., 2015). Based on the consistently reported research-informed literature, 8 to 12-year-old girls have been identified as a high priority population for childhood PA promotion (Biddle et al., 2014).

To combat the high physical inactivity levels of this population, several interventions have been designed and implemented, particularly in school settings, in an effort to increase young girls PA levels (Robbins et al., 2019; Sutherland et al., 2016). The effects of these interventions, however, have remained modest (Pearson et al., 2015) and the quantification of intervention effectiveness for this age group of girls have not been adequately reported (Biddle et al., 2014). Besides, there is a lack of effective intervention strategies to promote sustainable PA participation in female youth (Anokye et al., 2018), particularly within a sporting context (Whitley et al., 2019). OYS participation is one such strategy with the existing potential to increase overall PA levels in young people (Hebert et al., 2015), and is positively associated with an increased likelihood of complying with national PA and sedentary behaviour guidelines (Vella et al., 2013). Sports club membership predicts higher levels of

leisure-time PA engagement, specifically among girls (Marques et al., 2016). Participation in club-based OYS during childhood and adolescence contributes considerably to leisure-time PA for health-enhancing benefits (Eime et al., 2013), and has the potential to increase overall PA levels (Dalene et al., 2018; Fröberg et al., 2020; Lee et al., 2018), physical fitness (Drenowatz et al., 2019), and improve FMS competence (Holfelder & Schott, 2014; O' Connor et al., 2018) in young people. The International Society for PA and Health (Trost et al., 2014) has identified participation in sports as one of the seven worldwide "investments that work" for improving youth PA levels, and for these reasons, community-sports based settings are recognised as key health settings in promoting knowledge of PA (Beets et al., 2016), and healthy lifestyle behaviours (Finch & Donaldson, 2010; Kokko, 2014).

Encouragingly, sport occupies a prominent place in Ireland's national cultural identity (Federation of Irish Sport, 2013), which is reflected in the high prevalence of primary school children (75%) aged 10- to 12- years old who reported being members of at least one community sports club (Woods et al., 2018). A further 80% of primary school children reported participating in community sport at least once a week (Woods et al., 2018). Ireland has a very specific sporting culture, with the Gaelic Athletic Association (GAA), a sporting organisation which promotes Gaelic games (such as Hurling (Camogie), Gaelic Football, Rounders, and Handball), dominating a large portion of our PA culture in school and community settings. LGF, the women's equivalent of Gaelic football is a team sport organised by the Ladies Gaelic Football Association (LGFA). Founded in 1974, LGF is recognised as one of the fastest-growing female sports in Europe, with most recent Irish research revealing LGF as the most popular sport among Irish 9- to 11-year- old primary school girls (Woods et al., 2018). It is also important to note that LGF (like hurling and camogie), has garnered massive interest and reach worldwide with Ireland's Gaelic games played in Africa, Asia, Great Britain, Canada, Europe, South America, the United States, New Zealand, and Australia. Gaelic games are high-intensity sports that require players to use sport-specific and specialised FMS movement sequences, such as running, jumping, catching, turning, kicking, tackling, and soloing (kick the ball to yourself while running).

FMS are the building blocks for movement and form the foundation for many of the specialised movement skills needed to participate successfully in sport and PA (Goodway et al., 2020). There is evidence emerging that developing FMS during childhood may be a significant step towards establishing a lifelong commitment to PA (Burns et al., 2017; Logan et al., 2015; Nilsen et al., 2020). As well as sustained engagement in PA, FMS proficiency is also positively associated with a range of health, fitness and academic outcomes, and participation in organised sports (Bolger et al., 2019; Jaakkola et al., 2015; Jones et al., 2020; Robinson et al., 2015; Stodden et al., 2014). Despite the benefits, a growing body of literature illustrates that children and adolescent youth do not obtain proficiency in FMS development (Bardid et al., 2016; Lester et al., 2017; Mukherjee et al., 2017), with current FMS proficiency levels of children worldwide being reported as low (Behan et al., 2019; Bryant et al., 2014; Rainer & Jarvis, 2015). Females have been found to consistently underperform in FMS, when compared to males (Eather et al., 2018; Kelly et al., 2019; O' Brien et al., 2016a; Spessato et al., 2013).

In Ireland, at primary school level, recent studies (Behan et al., 2019; Bolger et al., 2018; Kelly et al., 2019) reported that children, particularly girls, are performing below their developmental potential. At secondary school level, O' Brien et al. (2016a) revealed that only 11% of adolescents achieved advanced FMS proficiency across a range of basic FMS, with gender differences present. These findings specifically suggest that in the context of FMS, Irish 8 to 12-year-old girls are performing below their expected developmental capability and are transitioning to adolescence without prior acquisition of basic FMS. There is a distinct lack of data published regarding FMS proficiency levels of Irish children, particularly among girls, and therefore it may not be appropriate to generalise international findings to an Irish context due to different cultural, educational, and traditional sporting pursuits in Ireland (O' Connor et al., 2018).

Based on the results of previous literature, the potential impact of developing FMS through OYS may be important for promoting long-term health-enhancing PA across childhood (Clarke & Metcalfe, 2002; Lubans et al., 2010). In Ireland, there is a noticeable absence of data concerning 8 to 12-year-old girl's FMS proficiency within an OYS setting, clearly indicating a gap within the literature. Findings from a recent Irish study found that Irish juvenile Gaelic game players (9.9 ± 1.3 years)

display higher FMS mastery than their age-matched, general population peers (O' Connor et al., 2018). Despite the low numbers in this study (N = 63), this suggests that participation in Gaelic games facilitates FMS development in children. Therefore, low FMS proficiency levels among 8 to 12-year-old girls highlight the need for coaches to incorporate FMS development in coaching sessions (Morgan et al., 2013; Tompsett et al., 2017).

Empirical studies have found that OYS coaches who participated in non-formal coach training programmes enhanced their ability to improve their team's environment, build positive coach-athlete relationships, and foster positive outcomes in their athletes (Koh et al., 2014; Mansfield et al., 2018). There are currently no evidence-based studies regarding coach education and the provision of coach Continuous Professional Development (CPD) opportunities within the existing LGFA organisational context in Ireland. Due to the amateur nature of Ireland's national game (GAA and LGFA), many coaches, parents, and guardians are voluntarily coaching, and this may lead to a lack of confidence for effective coach pedagogy (Gearity, 2012). The potential for LGF and the G4G programme, therefore, to develop children's FMS skills may offer an important opportunity for enhancing multiple aspects of children's movement skill competence, as well as developing the complex skills which are essential for ongoing participation in PA.

In an Irish context, despite the national policies such as i) the National Physical Activity Plan (Department of Health, 2016), ii) the National Sports Policy 2018 – 2027 (Department of Transport, Tourism, and Sport, 2018), and iii) Sport Ireland's (2019) Women in Sport policy, specifically to promote PA participation through the medium of sport, minimal evaluations of 8 to 12-year old girls within a community sports-based setting exist. In order to develop and implement targeted strategies to increase team sport participation and, consequently, PA levels among 8 to 12-year-old girls, there is a need to understand trends in, and influences on, girls' participation in a team sport setting (Allison et al., 2017). Equally, researchers and practitioners must be aware of the factors that discourage or prevent their participation in PA (Coleman et al., 2008). Factors influencing girls' PA levels and participation include psychological correlates, such as perceived competence and confidence, self-efficacy motivation, attitude and enjoyment of PA, as well as external socioecological factors such as family, peer and coach support (Howie et al.,

2018; Laird et al., 2018; Sheridan et al., 2014; Sterdt et al., 2014). As illustrated by socioecological model approaches (Sallis et al., 2006), it is, therefore, important to consider a wide range of correlates from multiple domains, given that focusing on a single domain may give rise to inaccurate conclusions (Brodersen et al., 2005). Despite this, there are a lack of studies simultaneously exploring a range of potential correlates from multiple domains (Van Sluijs et al., 2013), specifically among girls in an OYS setting.

The majority of research conducted to-date has taken place in school settings, with little attention given to multi-component OYS interventions, incorporating psychological and socioecological factors in the development and reinforcement of healthy PA behaviours (Morgan et al., 2019). This is an important consideration, as community sports-based interventions among girls (Pearson et al., 2015) found that greater intervention effectiveness appears to result from interventions that are

1) multi-component, theory-based, (Van Sluijs et al., 2007),
2) focused on girls only (Camacho-Minano et al., 2011),
3) facilitated to ensure they are meeting the needs of this age group (James et al., 2018),
4) include combinations of support components (i.e. coaches, family, friends, etc.) (Laird et al., 2018; Sheridan et al., 2014), and
5) include a non-formal coach education element (Koh et al., 2014) including FMS coach support strategies (Lubans et al., 2017).

Considering the dearth of research in an Irish OYS setting, specifically multi-component interventions targeting 8 to 12-year-old girls in the Gaelic Games context, this is an area that merits exploration. As far as the researchers are aware, this is the first study that has been conducted in Ireland aiming to increase PA levels, FMS proficiency and psychological wellbeing of 8- to 12-year- old girls within an OYS setting. The existing G4G programme, as run by the LGFA, has no evidence-base behind their programme and has potential to be tailored to increase participation levels among 8 to 12-year-old Irish girls. With the recently documented low levels of PA and FMS proficiency in young girls in Ireland, and the high drop-out rate from sport approaching the adolescent years, the initiation

of the revised research-informed G4G intervention is warranted, innovative and indeed novel.

As previously highlighted, childhood and particularly pre-adolescence is a critical period of change in the PA participation levels of girls (Biddle et al., 2014), and finding ways to help girls to become more physically active at this age is important for short and long-term health. It is during these years that children are developmentally ready to learn motor skill competence, confidence and PA behaviours, that will give them the best chance of engaging in lifelong, health-enhancing PA (Balyi et al., 2013). The question about effective strategies to address and increase young girls' PA is an important public health topic that has yet to be adequately explored and it remains unclear how-to best address low levels and declines in PA among 8 to 12-year-old girls (Biddle et al., 2014).

1.1.2 Background to Gaelic4Girls in an Irish context

G4G is an existing nationally run LGFA 12-week programme consisting of fun, non-competitive coaching sessions aimed at increasing participation in LGF. The programme, which runs annually (usually between March and May) targets girls aged between 8- to 12- years old who are not currently registered with a LGF club. In essence, G4G is a tool to attract new players in a club, specifically those who have never played before, supporting a club in increasing their number of players (https://ladiesgaelic.ie/learn/games-development-initiatives/gaelic4girls/). The programme is run on an application basis, and any interested LGF club in Ireland can apply, and clubs which meet the criterion, as outlined on the LGFA annual application form, are selected (e.g. established clubs with low numbers, and/or newly established clubs).

- The first 8 weeks of the programme is aimed at introducing the girls to the skills of LGF through a fun, non-competitive game-based approach. After the 8 weeks, the integration of new players into existing teams within the specific age-groups in the club takes place. By the end of the 12 weeks, the G4G programme aims to register all new players to the club.

- Upon completion of the programme, the new players get an opportunity to execute their newly-acquired skills in fun cluster blitzes with G4G participants from other surrounding Provisional counties.
- G4G coaches are also supported throughout the 12-week programme with a Coach Manual resource booklet and are required to attend one Provisional training day, prior to the start of the programme. The coach component of the programme helps to reinvigorate, grow and sustain the clubs well into the future.

The G4G programme is an example of what Cote et al. (2009) describe as a modified sports 'entry-level' programme for sports organisations (clubs and governing bodies), offered to engage children in play activities designed, among other things, to develop FMS and sport-specific skills for future participation. These programmes are modified to match the developmental capacity of children and are aimed at the development of FMS and sport-specific skills, rather than competition (Eime et al., 2018). This is the essence of the G4G programme, whereby young girls are introduced to the skills of LGF through a fun, non-competitive games-based approach to increase participation in LGF. Essentially, the sport is modified to match the developmental capabilities of children, by adapting games and activities through changes to the rules, equipment, and/or physical space to encourage inclusion and maximise participation (Eime et al., 2018). One example of a recently developed modified sports programme in Ireland within the GAA context is the 'GAA Super Games Centre' initiative, a theoretically-grounded social support intervention delivered and evaluated for youth participants (N = 103) aged 12 to 16 years over a 24-week period (Lavallee et al., 2019). The Super Game Centres has introduced planned modifications to the standard rules and were informed from six values (i.e., positive feedback, empowerment, belonging, effort, respect, and enjoyment) that have been shown to positively impact youth engagement in sport (Sheridan et al., 2014).

Modified sports programmes should be encouraged in an Irish youth sporting context, as recent findings reveal a high proportion of Irish children participate in organised sport. LGF has recently been recognised as the most attractive sport for 9-11-year-old girls in Ireland (Woods et al., 2018) and the G4G programme which has been running with 12 years, has proven hugely successful in recruiting new young

LGF players since its inception in 2008. To date, the G4G programme has reached 401 clubs with over 12,000 8- to 12- year-old participants (LGFA, 2020). In 2019, 38 LGF clubs representing 22 counties across Ireland and Britain took part in the G4G programme, with over 1600 girls aged between 8- to 12- years old involved. The documented G4G figures are a testimony to the success of the programme, exposing a significant number of young players to LGF and a club setting for the first time. It is, however, important to note a high dropout rate exists with increasing age among young Irish girls (Harrington et al., 2016; Woods et al., 2018). Furthermore, it is not yet fully understood how OYS in female youth could be optimised to facilitate continued participation and increased PA, specifically in a female sport context such as LGF. With no current evidence-base behind the existing G4G programme, coupled with the sharp decline in sport participation evident among young Irish girls, calls for further investigation are warranted.

It is important to note that the existing G4G programme, as run by the LGFA since 2008, is not theoretically designed using research-informed coaching principles. As there is no previous evidence-base behind the existing G4G programme, the Gaelic4Girls intervention study is the first of its kind adding significance to the field. Differences between the existing G4G programme and the revised research-informed G4G intervention study are presented in Table 1.1.

Table 1.1: Differences between the existing G4G programme and revised programme

G4G Components	Existing G4G programme	Revised Research informed G4G study
Player	• 12 x 60-minute weekly sessions • 6 rotatory LGF skills stations (no research-informed sport pedagogy approach) • No weekly LGF Skill Cards • No specific FMS and Team Challenge stations • No participation in dance activities	• 10 x 60-minute weekly sessions • 6 rotatory LGF skills stations (i.e. adopting a TGfU sport pedagogy approach) • Weekly LGF Skill Cards • Specific FMS and Team Challenge stations • Participation in an innovative LGF and FMS dance
Coach	• One Provisional training workshop prior to programme initiation, not theoretical in design • No provision of CPD • No on-demand 'WhatsApp' instant messaging service • G4G Coaching Manual (hardcopy) with no research-informed principles	• One initial 2-hour Coach Education Workshop followed by 8-weekly 1-hour sessions, theoretical in design • Provision of CPD • Utilisation of SAAFE and SHARP research-informed coaching principles (see Figure 6.1) • On-demand 'WhatsApp' instant messaging service • G4G Coaching Manual (hardcopy and electronic resources)
Parent/ Guardian	• Parents/guardian evening (not theoretical in nature) on week 4 • No technological resources available for parents • No parental involvement in sessions	• Parents/guardian evening (theoretical in nature) on week 4 • Technological resources – 'WhatsApp' instant messaging and 'Facebook' • Parental involvement in session activities with daughters (week 8)

G4G: Gaelic4Girls; LGF: Ladies Gaelic Football; FMS: fundamental movement skills; TGfU: Teaching Games for Understanding; CPD: continuous professional development

1.1.3 Summary and significance of G4G study

In Ireland, this PhD research study is a unique first of its kind exploratory intervention trial describing the design, development, implementation, and evaluation of the community sports-based revised G4G programme to increase PA participation, FMS proficiency and psychological wellbeing amongst 8 to 12-year-oldIrish girls. Specifically, the combined integration of the player, coach, parent/guardian, community and efficacy of intervention resources are rich in originality and embedded within previously successful intervention evidence. This feasible and cost-efficient intervention programme, which will be discussed more specifically in a later stage of the thesis, is the first of its kind in an Irish 8 to 12-year-old LGF population. The revised programme is warranted, innovative and indeed novel and simultaneously targets the increase of PA and FMS proficiency, alongside the enhancement of psychological wellbeing through the deliverable mechanism of weekly LGF sessions, by club coaches, assisted through research-informed coach educational workshops. The G4G study was initiated at University College Cork in 2016, in accordance with the Medical Research Council (MRC) (2000) framework for trials of complex interventions. Specifically, this framework (as shown in Figure 2.2 in Chapter 2) served as a template for the phases of investigation in the evaluation of the revised G4G intervention programme. This PhD will address the Pre-clinical, Phase 1 (Modelling) and Phase 2 (Exploratory Trial) of this MRC framework.

1.2 AIMS AND OBJECTIVES

The overall aim and objectives of this thesis are presented below. Information relating to the rationale aims, and objectives of specific studies can be found in their respective chapters (Chapter 4, Chapter 5, Chapter 6, and Chapter 7).

Aim of Research

To design, develop, implement, and evaluate a targeted community sports-based intervention, designed to promote the quantity and quality of participation in PA within and outside of school among 8- to 12- year old Irish girls.

Primary Objectives

1. To collect baseline data (2016) from a socio-ecological perspective on PA levels, FMS proficiency, and psychological correlates of PA of 8- to 12- year-old Irish girls (chapters 4 and 5).

2. To use information gathered (from baseline studies) to clarify the relative importance of different types of correlates (psychological, social and environmental variables) and design a theory-based, multi-component, community sports-based Gaelic4Girls'(G4G) intervention, to suit the specific needs for increasing 8- to 12-year-old Irish girl's PA levels, FMS proficiency, and psychological well-being (chapter 6).

3. To evaluate if involvement in the 10-week research-informed G4G intervention leads to an overall increase in PA participation, FMS proficiency, and psychological wellbeing of the experimental group receiving the intervention, in comparison to a second intervention group (receiving the existing LGFA programme) and control group (chapter 7).

4. To establish a research-informed evidence base for the G4G programme and identify potential improvements to the G4G intervention structure through focus group discussion with G4G participants (chapter 7).

Secondary Objectives

1. To examine if an overall relationship between actual FMS proficiency, perceived motor confidence and competence, and PA existed among 8- to 12-year old girls (baseline data, chapter 4).

1.3 RESEARCH QUESTIONS

1. What are the PA levels, FMS proficiency levels of Irish girls aged 8- to 12- years (at baseline, 2016)?

2. What is the relationship between actual FMS proficiency, perceived motor skill confidence and competence, and PA levels among 8- to 12- year-old girls (at baseline, 2016)?

3. What are the psychological correlates of PA (enablers and inhibitors) amongst a sample of rural and urban Irish 8- to 12- year-old girls (again at baseline, 2016)?

4. What are the essential components required for developing, designing, and implementing an Irish LGF revised programme G4G, as guided by the literature and baseline data measurements)?

5. Is it possible to increase levels of PA participation, FMS proficiency and enhance psychological wellbeing over time (pre-post-test) in 8- to 12-year-old girls through the G4G intervention, utilising coach pedagogies and parental support structures?

6. What are the potential improvements to the G4G intervention structure among G4G participants post-intervention through focus group discussion with G4G participants?

1.4 STRUCTURE OF THE THESIS

This thesis contains eight chapters along with additional references and appendices. This chapter provides a brief introduction and rationale for the thesis, with further details being provided in Chapter 2. Chapter 2 critically reviews the currently available evidence-based literature on youth PA and sport participation. Chapter 3 provides an overview of the various methods used in the studies, described in Chapter 4 to Chapter 7. Chapter 4 is a cross-sectional baseline study informing the design and development of the research-informed G4G intervention study, and is considered a secondary outcome objective of this thesis. Chapters 5 to 7 are the primary objectives of this thesis consisting of studies relating to the design, development, implementation, and evaluation of the G4G intervention amongst girls aged 8 to 12 years old in Ireland.

Each study includes a brief rationale of the purpose of the chapter and its contribution to the field, the author's contribution to the paper, abstract, keywords, introduction, methods, results, discussion, and a chapter conclusion. Any relevant supplementary material (questionnaires, G4G intervention material etc.) are available in the appendices. The studies presented in Chapters 4 and 5 are peer-reviewed published articles. Chapters 6 and 7 are currently under review for publication in Journals.

The following is a breakdown of the specific chapter contents:

Chapter 1: *Introduction*

A brief introduction to the phenomenon of physical inactivity among 8- to 12- year-old girls and details of intervention gaps within the literature, conducted to date. The background to the G4G programme within an Irish OYS context is outlined. The overarching aim and objectives of the thesis are also presented at the end of the chapter.

Chapter 2: *Critical Review of Literature*

Chapter two presents a critical review of the available literature and is presented in four parts. Part A; details the current high physical inactivity levels of 8- to 12- year-old girls and how the field of sport is a potential avenue to increase PA participation, Part B; highlights the personal and social correlates of PA, Part C; details the importance of FMS proficiency and highlights the current low levels of motor skill proficiency among young girls, and Part D; examines the interventions which have been conducted to-date with this sample, examining both school and community-based interventions. Potential gaps in the evidence are highlighted, and recommendations from other research are considered, justifying the research undertaken in this thesis.

Chapter 3: *Research Methodology*

Chapter 3 describes in further detail some of the methods used across the studies described in Chapters 4 to 7, including details on the study population, ethical considerations, setting, data collection methods, and analysis procedures.

Chapter 4: *The relationship between actual Fundamental Motor Skill Proficiency, Perceived Motor Skill Confidence and Competence, and Physical Activity in preadolescent girls*

This is a cross-sectional study conducted across three all-female primary schools examining the relationship between actual FMS proficiency, perceived motor confidence and competence, and PA in a sample (n=160) of 8- to 12- year-old pre-adolescent girls. One of the main pillars for the G4G intervention was FMS integration; for this reason, the levels of FMS proficiency and the association of perceived competence and confidence needed to be assessed amongst an Irish pre-adolescent cohort to inform the development of the 'G4G' intervention.

Chapter 5: *Enhancing the Evidence Base for Irish female youth participation in physical activity the development of the Gaelic4Girls programme.*

This chapter describes a mixed-method study conducted across three all-female primary schools examining the baseline PA, FMS, and various psychological correlates of PA data of 8- to 12- year-old Irish pre-adolescent youth. Focus group interviews were then used to explore PA barriers and motivators of the cohort. Based on the data analysis, chapter 5 introduces the reader to the development of the 'G4G' intervention, specifically tailored to the needs of this age group. The unique PA, FMS, and psychological component analysis of this chapter has guided the research team and helped inform the development of the G4G intervention, specifically the delivery of the pedagogical coaching approaches utilised as part of the G4G intervention study. Collectively, chapters 4 and 5 combined provided meaningful information for the overall design and development of the G4G intervention.

Chapter 6: *An overview of the G4G intervention – the theory-based design, study components and content.*

Chapter 6 introduces the reader to the rationale for the G4G intervention and most importantly, gives an accurate and descriptive account of the intervention components. In chapter 6, the reader will be introduced to the guiding principles of the community sports-based G4G intervention, specifically the participant, parental/guardian and coach education focus.

Chapter 7: *Evidence for the effectiveness of the G4G intervention*

Chapter 7 assesses the effectiveness (pre-post) of the multi-component 10-week G4G intervention on PA levels, FMS proficiency and the psychological wellbeing of 8- to 12- year old girls, when compared to a second intervention group (the traditionally delivered, national G4G programme, as run by the LGFA), and a third control condition (received no G4G intervention). G4G programme acceptability was also assessed via focus group interviews.

Chapter 8: *Discussion and Thesis Conclusion*

In this final chapter, the findings from the individual studies conducted as part of this thesis are considered and common themes across studies are discussed. The contribution to the current evidence base is highlighted, along with areas for future research and recommendations for policy and practice.

1.6 DEFINITION OF TERMS

Correlates of Physical Activity: The determinants/factors which influence physical activity behaviour and participation. They are classified into demographic, personal and biological factors (e.g. age), behavioural factors (e.g. activity history), psychological/cognitive/emotional factors (e.g. attitudes, self-efficacy), social environment factors (support from family and friends) and physical environment factors (e.g. access to facilities) (Martins et al., 2017; Van Der Horst et al., 2007).

Fundamental Movement Skills: Fundamental movement skills are the basic observable patterns of locomotor, manipulative, or stability movements underlying more complex sport-specific skills (Gallahue & Ozmun, 2012). Examples, exhibited during PE and PA, include running, hopping, skipping (locomotor), balancing, twisting, dodging (stability), throwing, catching and kicking (object control) (Stodden et al., 2008).

Ladies Gaelic Football Association: The Ladies' Gaelic Football Association (Irish: Cumann Peil Gael na mBan) is the main governing body for Ladies' Gaelic football. The Ladies Gaelic Football Association (LGFA), founded in 1974, oversees club registration and organises the National league and championship competitions in Ireland.

Locomotor Subtest: In the context of FMS, the locomotor subtest measures the gross motor skills that require fluid coordinated movements of the body as the child moves in one direction or the other (Ulrich, 2000).

Mastery/Near Mastery: In the context of FMS, 'mastery' is defined as the correct performance of all components of a skill (Van Beurden et al., 2002). 'Near mastery' is defined as the correct performance of all components but one (Van Beurden et al., 2002).

Moderate to vigorous-intensity physical activity (MVPA): MVPA is any activity with a metabolic equivalent (MET) value of between 3 and 5.9 and vigorous-intensity physical activity as ≥6 MET. Energy expenditure or METs are the measures of the amount of oxygen consumed while at rest (Ainsworth et al., 2011).

Object-Control Subtest: In the context of FMS, the object control subtest measures gross motor skills that demonstrate efficient throwing, striking, and catching movements (Ulrich, 2000).

Organised Youth Sport: Organised youth sport is defined as PA that is directed by adult or youth leaders/coaches and involves rules and formal practice and competition (Logan et al., 2019). Community club sports are included in this definition.

Physical Activity: Physical activity is described as any bodily movement produced by the skeletal muscles resulting in a substantial increase over resting energy expenditure (Caspersen et al., 1985). Examples of physical activity include play, lifestyle activities such as walking and cycling (active transport), sport and recreational activities, domestic tasks such as household chores and gardening (WHO, 2018).

Physical Inactivity: Physical inactivity is defined as engaging in insufficient levels of PA and not meeting the current PA recommendations (Tremblay et al., 2017).

Preadolescence: Preadolescence is defined as a stage of human development following early childhood and preceding adolescence. It commonly ends with the beginning of puberty. For example, the age range is commonly designated as 9- to–13- years old (McNeely & Blanchard, 2009).

Psychological Correlates of Physical Activity: Factors influencing girls' PA levels and participation such as perceived competence, self-efficacy motivation, attitude and enjoyment of PA, as well as external factors such as competing priorities, friendship group changes, 'sporty' stereotypes, and family and peer support (Telford et al., 2016; Gillison et al., 2012). In the literature, the terms 'psychological' (Uijtdewilligen et al., 2011) and 'psychosocial' are often used interchangeably when examining the PA correlates amongst youth.

Reliability: Reliability refers to the degree to which an instrument yields consistent result (Haradhan, 2017).

Static Balance: In the context of FMS, the static balance on one foot is an important non-locomotor skill that is used in gymnastics, dance, diving and many team sports and is defined as being able to maintain a stationary position throughout the movement (NSW Department of Education and Training, 2000).

Test of Gross Motor Development 2: A criterion- and norm-referenced FMS instrument designed to measure the process of how children coordinate their trunk and limbs performing FMS (a movement task) rather than assessing the end product result (Ulrich, 2000).

Validity: Validity refers to the degree to which an instrument accurately measures what it intends to measure (Liu, 2010).

1.7 G4G SCHEMATIC OVERVIEW

In summary, Figure 1.1 provides a visual map of the thesis highlighting the eight chapters and four associated studies (articles).

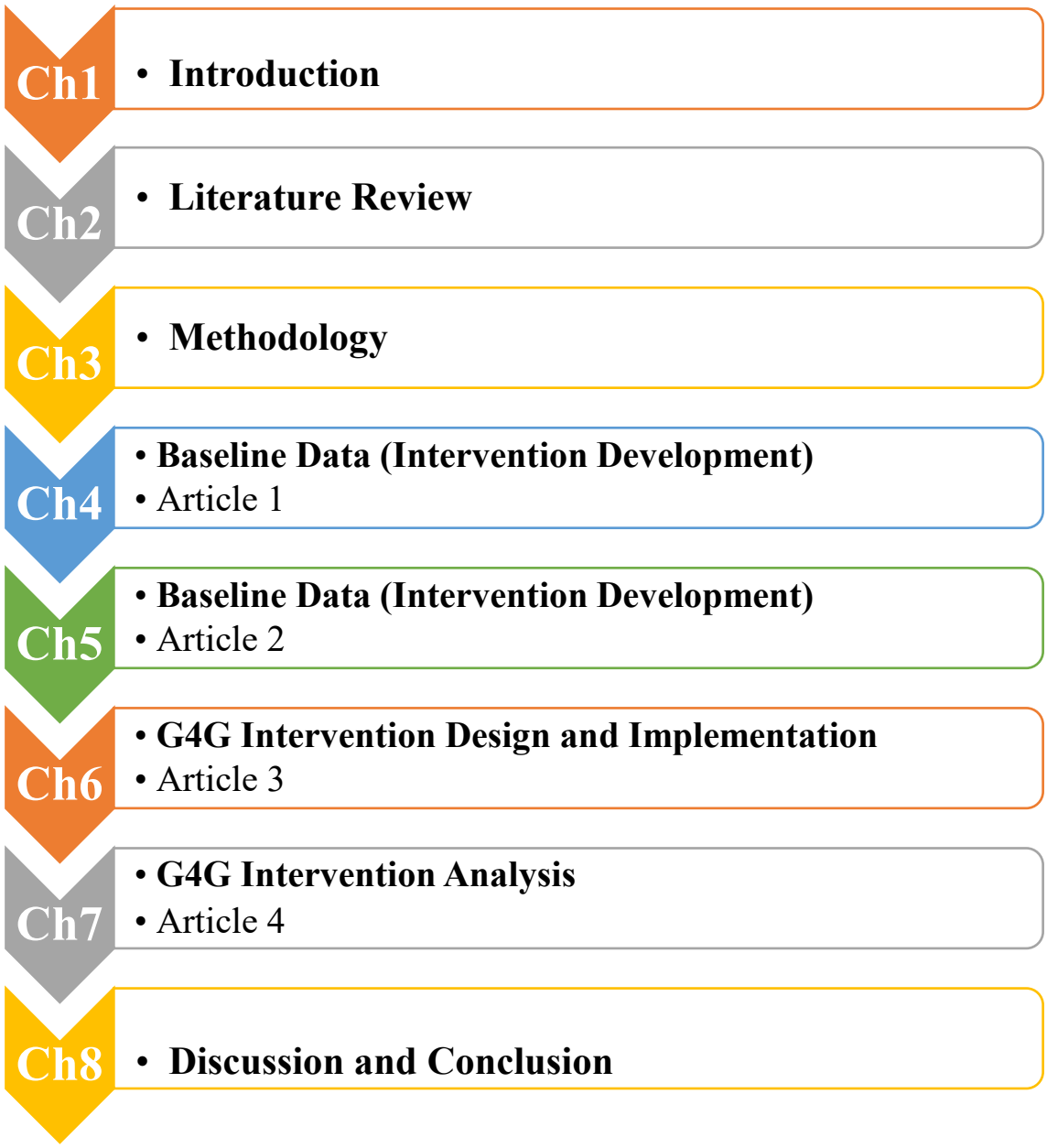


Figure 1.1 G4G schematic overview

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter aims to examine pertinent literature in addressing the aims of this study. This literature review will provide an overview of the importance and prevalence of physical activity (PA) and sport participation in children, specifically among young girls. The chapter comprises four main sections. First, the benefits of being physically active, partaking in organised youth sport (OYS), and the associated health risks if not undertaken will also be considered. The second section reviews the correlates of PA and sport participation among youth, with a particular focus on psychological correlates. The third section reviews the importance of fundamental movement skills (FMS) and its association with PA findings, motor development in children will also be discussed. The fourth and final section summarises the effectiveness of school-based and community sports-based intervention strategies that target the promotion of PA among children, specifically girls. Finally, the theoretical frameworks utilised within this study, and an outline of the theoretical approach and evaluation framework for the intervention will be provided.

2.2 PHYSICAL ACTIVITY AND HEALTH

2.2.1 The importance of physical activity

The World Health Organisation (WHO) (2014) defines physical activity (PA) as any bodily movement produced by the skeletal muscles that substantially increases energy expenditure. PA can be undertaken in many different ways: walking, cycling, sports, active forms of recreation (such as dance, yoga), work (lifting, carrying or other active tasks), and as part of domestic tasks around the home (cleaning, care duties). Indeed regular participation in PA is imperative for good health (Eime et al., 2013), and is associated with an array of physical, psychological and social health benefits (Biddle et al., 2019; Janssen & Leblanc, 2010) for children and young people aged 5 to 18 years old.

It is well established that PA plays a key preventive role in the physical and mental health of children and adolescents (Biddle et al., 2019) including the management, prevention and treatment of the leading non-communicable diseases (NCDs), namely heart disease, stroke, diabetes and breast and colon cancer (WHO,

2010) and chronic conditions such as obesity and depression (Beaulac et al., 2011). PA is also linked to lower rates of antisocial behaviours, increased participation in pro-social activities, improved educational progress (Budd, 2016; Mavilidi et al., 2019) and aspirations (Gray et al., 2014), improved mental health (Schuch et al., 2016), and improved quality of life and well-being (Das & Horton, 2012).

2.2.2 Physical activity (PA) guidelines

Whilst PA of any type will deliver health benefits and consequently should be encouraged, it is preferable to achieve a certain level of activity to deliver sufficient benefits (Healthy Ireland Survey, 2015). The WHO (2010) endorse the PA guidelines, stipulating that in order to enhance health, youth (5-17 years) should accumulate at least 60 minutes of moderate-to-vigorous PA (MVPA) daily. The current Irish PA guidelines for health specify that all children and young people (2-18 years) should be active, at a moderate to vigorous level, for at least 60 minutes every day incorporating muscle strengthening, flexibility and bone-strengthening exercises up to 3 times a week (Department of Health, 2016). Other European countries align with the WHO guidelines including France, Norway, Sweden, and the United Kingdom (UK) (Davies et al., 2019; Kahlmeier et al., 2015).

Compared to the WHO (2010) recommendation, the minimum recommended duration of PA for children and young people (5-18 years) is lower in Malta (30-60 minutes) (Micaleff, 2010) and higher in Finland (1-2 hours) (Gråstén et al., 2014). Switzerland (Martin et al., 2009) and the United Kingdom (UK) (Davies et al., 2019) also recommended more PA for young children, which are, however, not included in the WHO recommendations. In addition to this, the most recent Australian 24-Hour Movement Guidelines for Children (5-12 years) and Young People (13-17 years) endorse an accumulation of 60 minutes of MVPA daily (Australian Department of Health, 2019). Likewise, the most recent Canadian 24-Hour Movement Guidelines for Children advocate corresponding guidelines for children and youth (5-11 years), recommending at least 60 min/day of MVPA for disease prevention and health promotion (Lau et al., 2016). Similarly, the most recent and widely endorsed PA guideline for children and young people in the USA stipulates that to enhance health and fitness benefits, youth should accumulate at least 60 minutes of MVPA daily (Department of Health & Human Services, 2018).

To summarise, many of the recent PA guidelines worldwide for children and youth have seen the commonality of a minimum of 60 minutes PA per day, with some countries endorsing recommendations of more and less PA, and other countries advocating the inclusion of activities to strengthen muscle and bone.

2.2.3 Global prevalence of PA in children and youth

Globally, according to recent data obtained from 146 countries, 81·0% of children (77·6% of boys and 84·7% of girls) aged 11 to 17 years fail to meet the recommended public health guidelines of 60 minutes of MVPA per day (Guthold et al., 2019). According to WHO (2018) worldwide, 1 in 4 adults, and 3 in 4 adolescents (aged 11–17 years), do not currently meet the global recommendations for PA. Results and analysis from 49 countries in the most recent Global Matrix 3.0 of Report Card Grades on PA for Children and Youth (Aubert et al., 2018) reported that an average low grade of "C−," D+," and "C−" was obtained for the low and medium Human Development Index (HDI) countries (e.g. India and South Africa), high HDI countries (e.g. China, Mexico, Thailand), and very high HDI countries (Australia, England, USA), respectively. The C- and D+ grades reported specifically indicate that between 34-46% of children and youth from the participating 49 countries met the recommended minimum PA guidelines for health (Aubert et al., 2018). In line with this, according to Tremblay et al. (2016), overall grades for children's PA in a worldwide report card were low/poor.

In an Irish context, the most recent 2016 Report Card on PA (a national document, containing all data on indicators related to children's PA levels from Northern and Southern Ireland), awarded children and youth an overall grade of 'D' for low PA participation (Harrington et al., 2016). These findings are accumulative national evidence, which specifically indicates that only 25% of 9-year-olds and a further 19% of primary school children in Ireland are meeting the recommended minimum PA guidelines for health (Harrington et al., 2014, 2016). Most recent nationally representative Irish data (n=6,651; mean age=13.8 ± 2 years) from the 'Children's Sport Participation and Physical Activity Study' (CSPPA) (Woods et al., 2018) found that only 17% of children (n=6,651) aged 9-11 and 10% of adolescents

aged 12 to 17 years old self-reported meeting the recommended 60-minute MVPA daily. Other findings from the most recent Health Behaviour in School-Aged Children (HBSC) study (Költő et al., 2020) found that in Ireland, only 23% of children from 5th class to 5th year who were aged 10 to 17 years (N = 12,002) report being physically active. Growing Up in Ireland national longitudinal study of children found that only one-quarter (25%) of 9-year-olds met the recommended level of PA – 60+ minutes every day. The percentage meeting this recommended level of PA was even lower for girls (22% compared to 28% of boys).

Similarly, a systematic review of PA levels in Canada and the US observed between 26.5% (self-report) to 45.7% (pedometry/accelerometry) of youth (<18 years) meeting the recommended guidelines (Foulds et al., 2013). The newly released 2018 United States Report Card on PA for Children and Youth findings align with Irish studies reporting approximately 24% of children 6 to 17 years of age participating in the recommended 60 minutes of PA every day, earning a D- in overall PA (Katzmarzyk et al., 2018). Similarly, according to Australian data from the Active Healthy Kids Report (2014), less than one-fifth of Australian youth aged 5 to 17 years old are meeting the recommended PA guidelines. The prevalence of PA amongst Irish adolescents is also very low when compared in a European context with 35.9% of adolescents (14.45 ± 0.67 years) in France and Spain meet the 60-minute guidelines (Aibar et al., 2013) when measured by ActiGraph GT3X accelerometry. The most recent 2016 Report Card on PA in Belgium awarded children and youth a lower overall grade of 'F+' for overall PA levels (Wijtzes & Verloigne, 2016), indicating that less than 20% of children and youth are sufficiently active and are not meeting the recommended PA guidelines.

Regarding the reported levels of youth PA across European countries, a recent systematic literature review (Van Hecke et al., 2016), inclusive of 30 articles of cross-European studies, reported that there is substantial variability between countries in overall levels of PA and in the prevalence of compliance to recommended PA levels in youth (Van Hecke et al., 2016). Specifically, results revealed large differences between countries in the prevalence of compliance to PA recommendations (i.e. 60 min of daily MVPA) measured subjectively (5 to 47%) and objectively (ranged from 0 to 60%, with accelerometer measured minutes of daily MVPA ranging from 23 to 200 min) among

children and adolescents. Overall, boys and children were more active than girls and adolescents (Van Hecke et al., 2016).

2.2.4 Gender differentials in PA

Further to these low levels of youth PA participation, global (Inchley et al., 2020; Marques et al., 2016; Pearce et al., 2012; Silva et al., 2013; Telford et al., 2016; Van Hecke et al., 2016) and Irish (Költő et al., 2020; Woods et al., 2018) specific evidence has shown a consistent gender-based disparity, whereby girls are significantly less active than boys (Marques et al., 2016; Pearce et al., 2012; Silva et al., 2013; Telford et al., 2016; Van Hecke et al., 2016). These differences are meaningful across all age groups and in nearly all countries and regions (Demetrio et al., 2019). Interestingly, the difference in PA is greatest for vigorous PA, less marked for moderate PA and does not exist for light PA (Bucksch et al., 2014). A clear decrease in PA participation during adolescence has been further observed (Cooper et al., 2015; Jago et al., 2017), with a higher risk of decline amongst girls (Owen et al., 2017; Ortega et al., 2013).

2.2.4.1 Declining levels of PA from childhood to adolescence

Many international studies acknowledge age-related differences in PA levels, with a noticeable decline occurring during adolescence and into adulthood (Kemp et al., 2019; O'Donovan et al., 2010), specifically for girls (Van Hecke et al., 2016). For example, the Health Behaviour in School-Aged Children (HBSC) study (Gavin et al., 2015) found that 31% of females aged 11 years old and 41% of males the same age (N=13,611; mean age: 13.5) self-reported accumulating at least 60 minutes of MVPA daily. By age 14, a substantially lower 19% of females and 32% of males report meeting this PA guideline (Gavin et al., 2015). In Ireland's most recent HBSC study (Költő et al., 2020), a higher percentage of boys (28%) aged 10 to 17 years are more likely than girls (18%) of the same age to report being physically active on 7 days in the last week (n=12,002). Further to this, self-report data from the 2018 Active Healthy Kids Australia (AHKA) PA Report Card, show 18% of 12-17-year-olds; 6-22% of 15-17-year-olds; and 15-41% of 5-17-year-olds accumulate 60 mins of MVPA every day (or on average) in the past week (Schranz et al., 2018).

Nevertheless, while levels of MVPA among adolescents are typically much lower than recommended (Hallal et al., 2012) there is very little evidence that MVPA declines with the onset of adolescence, or that adolescent declines in MVPA are more marked in girls than boys (Farooq et al., 2018). Dumith et al.'s (2011) systematic review (with 26 eligible longitudinal studies) of changes in PA during adolescence aligns with this statement. Findings indicated that although the decline among girls was higher in younger ages (9–12 years), it was higher in older ages (13–16 years) among boys. Of these eligible studies the majority were assessed by questionnaire; only 2/26 included objective measures of the intensity of PA (accelerometry), most (16/26) were from the USA, and the representativeness of the samples in the eligible studies was usually unclear (Dumith et al., 2011). In addition to this, the National Centre for Health Statistics (2014) reported that 27% of boys engaged in MVPA for at least 60 minutes a day, compared with 22.5% of girls, further highlighting the gender disparity in PA.

2.2.4.2 Gender division during primary and post-primary school years

In the Irish CSPPA study (Woods et al., 2018), only 13% of CSPPA participants reported meeting the national PA guidelines of at least 60 minutes of MVPA daily. This 13% was made up of 17% of primary pupils and 10% of post-primary pupils, with fewer girls meeting the PA guidelines, compared to boys (9% vs. 17%). This gender difference was evident at primary school (13% vs. 23%) and post-primary school (7% vs. 14%). Telford et al, (2016) investigated gender differentials in PA across 29 schools in a recent Australian youth study (N=276 boys, 279 girls; aged 8 to 12 years old) and reported that males were significantly ($p<0.001$) more active than female youth. In addition to this, the National Centre for Health Statistics (2014) reported that 27% of boys engaged in MVPA for at least 60 minutes a day, compared with 22.5% of girls, further highlighting the gender disparity in physical activity. Similarly, a recent Chinese adolescent study (N=250, mean age = 15.55 ± 0.72 years), reported that 80% of participants were insufficiently active (Chen et al, 2014) with males significantly more active than females with regard to meeting the PA guidelines (25.1% male, when compared to 14.6% females) (Chen et al., 2014).

Key findings from the Girls Active Survey (2017) from 138 secondary schools in England and Northern Ireland also reported low levels of PA, revealing that only

8% of girls, compared to 16% of boys (aged 11-18 years) meet the Chief Medical Officer's recommendation that young people aged 5 -18 should do 60 minutes of PA every day (n= 26,000) (Youth Sport Trust, 2017). Consistently, research indicates the low levels of PA, the associated age-related decline in PA, and the apparent gender differences of girls being significantly less active than boys worldwide (Ishii et al., 2015; Pearce et al, 2012; Sallis et al., 2016). Based on the consistently reported research informed literature, girls have been identified as a high priority population for childhood PA promotion (Biddle, et al, 2014).

2.2.5 Physical inactivity

Despite the widely-known health benefits of PA and recommended guidelines, studies continue to show that physical inactivity, defined as engaging in insufficient levels of PA and not meeting the current PA recommendations (Tremblay et al., 2017), has become a global health concern among children and adolescents (Guthold et al., 2019). Physical inactivity (PI) has been well established as one of the leading risk factors for non-communicable (not contagious and is non-transmissible) disease (Andersen et al., 2016) and has been strongly associated with many major diseases worldwide, such as obesity, diabetes, cardiovascular disease and some cancers) (Lee et al, 2012; Haileamlak, 2019).

PI among school-aged children and youth has found to be associated with a myriad of unfavourable and adverse physical, mental, social, and cognitive health outcomes (Janssen & LeBlanc, 2010; McMahon et al., 2017; Poitras et al., 2016), lower physical fitness, and lower PA levels in later life (Telama et al., 2005). PI is the fourth leading cause of death worldwide (Kohl et al., 2000), and is estimated to be associated with one million deaths per year in the European Region and five million deaths annually worldwide (Guthold et al., 2018). Globally, PI is estimated to cost INT$ 54 billion in direct health care, in 2013, of which 57% is incurred by the public sector and an additional INT$ 14 billion is attributable to lost productivity (Ding et al., 2016). A recent systemic review (de Moraes et al., 2013) showed that the worldwide prevalence of insufficient physical activity (IPA) varied from 18.7% to 90.6%, with a median of 79.7%.

2.2.5.1 Sedentary Behaviour

As previously mentioned, recent evidence also highlights that the amount of time spent being sedentary is an important risk factor for several aspects of ill health, including being overweight, obesity and associated metabolic diseases (Lavie et al., 2019). Sedentary Behaviour (SB) has been defined as any waking behaviour characterised by a low energy expenditure ≤1.5 metabolic equivalents of task (METs), while in a seated, reclined or lying posture (Tremblay et al., 2017) (e.g., prolonged sitting, seated screen time, motorised transportation). Interestingly, as levels of MVPA decrease during childhood (Nadar, 2008), the time children engage in sedentary leisure-time pursuits increases (Pate et al., 2011).

Several guidelines are recommending less than two hours of recreational screen time per day in youth (Arundell et al., 2016; Australia's Physical Activity and Sedentary Behaviour Guidelines and the Australian 24-Hour Movement Guidelines, 2019; Tremblay et al., 2011). Likewise, the UK guidelines recommend minimising the time spent sedentary for extended periods (UK Chief Medical Officers' Physical Activity Guidelines, 2019). Most recently, the Australian 24-Hour Movement Guidelines for Children (5-12 years) and Young People (13-17 years) advocate that children and young people (aged 5–17 years) should limit sedentary recreational screen time to no more than 2 hours per day for optimal health benefits (Australian Government Department of Health, 2019). Despite these recommendations, many studies now provide evidence that a high proportion of children and adolescent youth engage in high amounts of daily television viewing, video games, with screen time recreation (defined as two or more hours of television, computer and/or video game usage) being the most common (Barnett et al., 2018; Houghton et al., 2015; Robinson et al., 2017; Suchert et al., 2016).

Findings from the American Heart Association Scientific Statement found that school-aged children are sedentary for 8 of their daily waking hours on average; most are engaging in excessive screen time (Barnett et al., 2018). In Ireland, the CSPPA 2018 study (Woods et al., 2018) reported that the average sedentary leisure time was 5.1 hours/day for primary school children (n = 1549) and 6.6 hours/day for post-primary children (n = 5102) with 63% percent of primary and 42% of post-primary pupils met the sedentary screen time guideline of no more than 120 minutes (Woods

et al., 2018). Similar findings were reported in Ireland's 2014 and 2016 Report Cards (Harrington et al., 2014; Harrington et al., 2016), with SB awarded a grade C-, highlighting that 46% of children watching < 2hrs TV/day and SB awarded a grade C-. The literature suggests that there is a clear need to increase the current PA levels and decrease sedentary behaviours among children and adolescents worldwide (Guthold et al., 2019; Kumar et al., 2015; Woods et al., 2018).

It is important to note that screen time increases substantially with age, most notably during preadolescence and according to a scientific statement from the American Heart Association, adolescents are the most sedentary of paediatric populations and are engaging in the most total recreational screen-based media (Barnett et al., 2019). According to recent projections by the WHO Regional Office for Europe, collaborating with the UK Health Forum, levels of obesity are forecast to increase globally, and Ireland could have one of the highest rates of obesity in Europe by 2030 (Bel-Serrat et al., 2017). Evidence in Ireland and worldwide, highlight that there is a need to develop specified SB guidelines for children and youth (Bull et al., 2020; Woods et al., 2010). This is particularly important in Ireland and for girls, as no current recommendations on the maximum amount of sedentary time exist.

2.2.6 Participation in Organised Youth Sport (OYS) – an avenue to increase youth PA

Sport is a popular type of leisure-time PA, especially for children (Basterfield et al., 2015; Eime et al., 2016) which is often organised, usually competitive and played as part of a team or as an individual (Eime et al., 2013). Organised youth sport (OYS) participation is one such strategy with the existing potential to increase overall PA levels in young people (Howie et al., 2018; Wiium & Säfvenbom, 2019), and is positively associated with an increased likelihood of complying with national PA and SB guidelines (Dalene et al., 2019;Vella et al., 2013). Specifically, participation in OYS has been recommended as an opportunity to increase young peoples' MVPA levels (Guagliano, 2014; Lee et al., 2018), and was identified by the International Society for PA and Health as "an investment that works" to promote PA (Trost et al., 2014).

Community sport participation during leisure time promotes PA for children and adolescents; hence findings associating it with improved physical health, and positive psychological and social health outcomes (Eime, 2013). Sports club membership predicts higher levels of leisure-time PA engagement, specifically among girls (Marques et al., 2016), and OYS participation increases the likelihood of meeting daily PA recommendations for improved health (Kokko et al., 2018). In a recent study (Marques et al, 2016), specifically investigating associations between OYS participation and objectively measured PA (N=973, mean age = 14.1±2.4), results reported that those who were engaged in OYS were more likely to achieve PA guidelines ($p<0.01$), spend more time in moderate PA (MPA) ($p<0.01$), vigorous PA (VPA) ($p<0.001$) and MVPA ($p<0.001$), than those who did not participate in OYS. Further to this, more boys (51.3%) than girls (28.3%) were reported to be involved in OYS participation ($p<0.001$).

Organised sports have a prominent place in the Irish identity (Federation of Irish Sport, 2013). Encouragingly most recent Irish representative data revealed that 75% of primary school children (aged 10-12 years) and 67% of post-primary children (aged 12-18 years) reported being members of at least one community sports club (Woods et al 2018). A further 80% of primary and 58% of post-primary school pupils reported participating in community sport at least once a week (Woods et al., 2018). Organised sport participation was graded at a C- in Ireland's 2014 and 2016 Report Cards (Harrington et al., 2014; Harrington et al., 2016), indicating between 33 – 64% of children participating in OYS. In a European context, Kokko et al., (2018) study, comparing sports club participation in children and adolescents across six European countries, namely Belgium (Flanders), Czech Republic, Finland, France, Ireland and Sweden indicated that approximately two-thirds of children and adolescents take part in sports club activities in the given countries.

2.2.6.1 Community club sport and PA

It is also argued that early participation in specific types of OYS in childhood is associated with higher levels of PA during adolescence (Basterfield et al., 2015; Gallant et al., 2017) and into adulthood (Bélanger et al., 2015; Hirvensalo & Lintunen,

2011). Although it does not necessarily prevent the decline in PA during adolescence (Belanger et al., 2009), youth participation in organised PA such as hockey, soccer, volleyball, martial arts, track and field, dancing and gymnastics is associated with higher PA levels in adulthood (Telama et al., 2005; Kjønniksen et al., 2008). For example, Kjønniksen and colleagues (2008) conclude that if young people are members of sports clubs from an early age, they are more likely to be physically active in early adulthood, especially if they also are members during adolescence (Maillane-Vanegas et al., 2017).

Similarly, results from a 13-year study (Belanger et al., 2015) on 12-13-year-old Canadian adolescents (N = 673), revealed a positive linear relationship between the number of years participating in sports and running in adolescence and PA level at age 24 years (β (95 % confidence interval) = 0.09 (0.04-0.15); 0.08 (0.01-0.15), respectively). Authors of this study suggest that efforts to establish the habit of participation in sports and running in adolescence may promote higher PA levels in adulthood (Belanger et al., 2015). Engström (2008), in a 38-year follow-up study, found different results, concluding that neither membership nor amount of time spent on sports at the age of 15 has any significant association with exercise habits in middle age. Engström's study instead indicates that a broad and varied experience of sports during childhood and adolescence has an impact on exercise habits later on in life.

2.2.6.2 OYS participatory benefits

Participation in OYS during childhood and adolescence has important benefits for physical, psychological, and social health (Eime et al, 2013; Mills et al., 2019). Such benefits include, higher rates of physical fitness (Hoffman et al., 2005), greater involvement in PA over time (Nelson et al., 2011), lower rates of sedentary behaviour (Vella et al., 2013), higher rates of self-esteem, improved skill development, heightened levels of muscular strength and endurance (Felfe et al., 2016), more positive social interaction, decreased levels of depressive symptoms (Eime et al, 2013) and lower rates of obesity (Drake et al, 2012). In addition to this, OYS can be an avenue for children to develop increased positive social skills like cooperation, responsibility, empathy and self-control, as well as promoting good citizenship,

positive peer relations, leadership skills, and a sense of initiative (Bailey et al., 2009; Coté et al,.2006; Fraser-Thomas et al., 2005).

A number of studies have recently been published examining OYS clubs as a setting to promote health (Geidne et al, 2013; Kokko et al., 2019; Moeijes et al., 2019). Many studies suggest that childhood participation in community-based sport or PA may lead to enhanced psychosocial development and physical health outcomes (Cairney & Veldhuizen, 2017; Moeijes et al., 2018). One longitudinal study of club sport participation over a three-year period during adolescence in Germany, as well as identifying physical benefits, showed that sport club activities had a positive influence on the development of self-esteem, with girls discovering sports as a source of self-esteem earlier than boys (Brettschneider, 2001). Similarly, in a qualitative parental study of young people participating in sport, a range of personal, social, and physical benefits factors, as well as life skills and self-concept, were stated as benefits of participation (Neely & Holt, 2014).

2.2.6.3 Declining participation rates among youth

Despite the associated benefits, there is extensive research showing that participation in OYS and PA dramatically decreases during adolescence (Beltran-Valls et al., 2019; Eime et al., 2016; Farooq et al., 2018). There is evidence that participation in sport peaks at around 11 to 13 years of age, before declining through adolescence (Zimmermann-Sloutskis et al., 2010). Similarly, Eime et al. (2013) propose there is evidence that sports participation is a young persons' activity, with reports that participation levels peak at ages 12–13 years (Olds et al., 2009). In Ireland, the majority of children participate in organised sport, and most begin before 10 years of age (Woods et al., 2018). However, research indicates that dropping out from OYS increases during adolescence in Ireland, as in other countries globally (Bélanger et al., 2009; Eime et al., 2019; Lagestad & Sorensen, 2018).

In an Australian study of a total of 465,403 sport participants, it was reported that the participation rate per resident population in Victoria, Australia was 40% for ages 10–14 and 23% for 15–19 years (Eime et al., 2016). In the Eime et al., (2013)

study, older adolescent (16–18 years) females (n = 732) shifted their participation away from organised, competitive modes and settings towards non-organised and non-competitive modes and settings and were more likely to then participate in individual types of PA. Another study by Eime et al., (2016), reported that from a peak through ages 10– 14 (28% of all participants), participation declined dramatically during ages 15–19 years (15% of all participants) (Eime et al., 2016). Similar findings were revealed in a study in Europe focusing on children aged 9 to 15 years showed sports participation decreased across all ages in all countries (Riddoch et al., 2004). A recent longitudinal study (Eime et al., 2020) including registered women and girls of all ages (4–96 years at baseline) in an almost exclusively female sport, found that most participation (almost one third) occurs between the ages 4-14 years. This proportion diminished through ages at commencement from 10 to 19, reaching a low point of 4% for ages 15–19, then rebounded slightly, reaching 7% for ages 30+. In general, the above research provides evidence that as age increases participation in sport decreases. However, these studies are often limited to self-report sample surveys and/or to specific age ranges (Eime et al., 2016).

In Ireland, even though a high proportion of children participate in organised sport, a high dropout rate exists with increasing age (Harrington et al., 2016; Woods et al., 2018). For instance, new data from Woods et al., (2018) reveal that similar to active participation in community sport, club membership levels also decline, in overall terms and the numbers of clubs, as children progress through their school years. While less than one quarter (24%) of pupils in first year (aged 12-13) of post-primary are not members of a sports club this has increased to 47% by the time they get to sixth year (ages 17-19).

2.2.6.4 Gender differences in OYS among youth

Gender differences favouring boys are especially prevalent with regard to structured PA and sports or vigorous PA (Pizarro et al., 2017; Schmidt et al., 2019). Furthermore, boys participate in sport more frequently than girls and are more physically active from childhood into adolescence (Owen et al., 2017; Trang et al., 2012), and girls have been shown to participate less in organised sport (Vella et al., 2014). Data from HBSC

showed that 75% of 10 to 14-year-old boys report playing with a club compared to 59% of girls (Gavin et al., 2015). In an Irish context, at post-primary level, 38% of pupils reported never participating in community sport, with non-participation among girls now standing at 45% (Woods et al., 2018). Results from the "Keeping Them in The Game" study (Lunn et al., 2013) in Ireland report that 1 in 10 girls drop out of playing regular sports during the primary to secondary school transition (12–13 years old). This constitutes a tremendous dropout rate and is especially pronounced among girls and adolescents (Eime et al., 2020). To prevent dropouts, identifying and understanding the precise factors that contribute to dropping out among 8- to 12- year-old girls is critical.

2.2.7 Factors influencing 'drop-out' in OYS

The extant literature has found that dropouts may be attributed to a lack of enjoyment, lack of the opportunity to play, lower perceptions of competence, poor performance, social pressure, slower maturation, injuries, lack of fulfilment of basic psychological needs, and poor relationships with teammates and/or coaches (Crane & Temple, 2014; Lagestad & Sorensen, 2018). Basterfield et al. (2016) longitudinal study of children and adolescents perceived barriers to sports participation in the Gateshead Millennium Study (n>500) found that at 12 years, perceived barriers were predominantly classed as intrapersonal ('they're boring') or social environmental ('my friends don't go'). Similarly, in a recent systematic review (Somerset & Hoare, 2018) on barriers to voluntary participation in sport for children (up to 18 years of age), frequently reported barriers across both quantitative and qualitative studies (n=22) included 'time, 'cost, 'opportunity/accessibility' and 'friends', 'not being good at sport' (n = 6) and 'fear of being judged/embarrassed'. Results from a systematic review of dropout from organised sport among children and youth (n = 1125, 001) revealed five major areas emerged: 1) lack of enjoyment, 2) perceptions of competence, 3) social pressures, 4) competing priorities and 5) physical factors (maturation and injuries) (Crane & Temple, 2014).

2.2.7.1 The 'problem' with girls' – motivators and barriers to sport participation

Underlying motivators and barriers to whether or not an individual engages in PA is important to investigate (Hoare et al., 2017), particularly for girls as it is widely reported that girls are less physically active than boys throughout childhood (Sallis et al., 2016), and the age-related decline in PA participation, particularly from early adolescence onwards, is steeper for girls than for boys (Owen et al., 2017). Current research on female youth reveals that having fun (Pawlowski et al., 2014; Visek et al., 2015), keeping fit, and being with friends (Carlin et al., 2015) are key motivators for female youth PA participation. Girls' perception of benefits of PA (e.g. the benefit of being healthy and body image) has also shown to be positively associated with PA (Cheng et al., 2003; Haerens et al., 2007).

Other studies have shown that internal factors such as confidence, pressure, embarrassment, or negative self-belief, and external factors such as lack of female role models, and other hobbies or commitments that result in a lack of time or preference for sport are the main barriers for female youth (Wetton et al., 2013). Additionally, the weather (Pawlowski et al., 2014), access to facilities, and lack of enjoyment have also been shown to be key barriers among female youth. Similarly, self-report and focus group findings from numerous studies (Perry et al., 2011; Verloigne et al., 2016) indicate that social pressures, namely parents, coaches, and peers, are reported as participatory barriers. Finally, a higher perception of barriers to be active is associated with less PA among girls (Zaragoza et al., 2011). Moreover, resources facilitating (positive encouragement/praise) or impeding engagement (negative coach relationship) among 8–12-year-old female youth are deemed important findings in the context of participatory barriers in OYS (Battaglia et al., 2017; Fenton et al., 2017; Laird et al., 2018).

In order to develop and implement targeted strategies to increase team sport participation and, consequently, PA levels among young girls, there is a need to understand trends in, and influences on, 8- to 12- year-old girls' participation in team sport (Allison et al., 2017). Examining girls' PA perceptions, motivations, barriers, and psychological correlates (for example, self-efficacy and attitudes) through in-depth qualitative and quantitative research allows for greater understanding of the rationale behind their PA-related choices (Whitehead & Biddle, 2008).

In the introductory section to this literature review, PA for youth, with a specific focus on female youth, was contextualised and rationalised under specific sub-headings. The findings strongly indicate that participation in regular PA by those aged 5-18- years of age is associated with an array of physical, psychological and social health benefits (Biddle & Assare, 2011; Das & Horton, 2012; Owen et al., 2017). In terms of the recommended PA guidelines for health, it has become widely accepted in the literature and across many countries that all children and young people should engage in moderate to vigorous intensity PA for at least 60 minutes every day (Australian Department of Health, 2019; Kahlmeier et al., 2015). The review progressed on to assessing the current global levels of PA among youth and gender differentials and evidence suggests that levels of PA among youth remain low (Woods et al., 2018; Guthold et al., 2019). Most notably, levels of PA decline dramatically during adolescence (Kemp et al., 2019), specifically for girls (Van Hecke et al., 2016; Woods et al., 2018). Most recent evidence highlights that the decline in MVPA and increased sedentary time observed from childhood to adolescence are of concern and might increase the risk of developing obesity and other chronic diseases later in life (Ortega et al., 2013).

OYS as an avenue to promote PA among youth was also discussed, specifically outlining the participatory benefits, with many studies suggesting that childhood participation in community-based sport or PA may lead to enhanced psychosocial development and physical health outcomes (Felfe et al., 2016); Moeijes et al., 2018). In Ireland, even though a high proportion of children participate in organised sport, a high dropout rate exists with increasing age (Harrington et al., 2016; Woods et al., 2018), with a higher rate of decline among girls. Finally, underlying motivators and barriers to whether or not girls engage in PA were investigated in section 2.2.8. Furthermore, to develop and implement targeted strategies to increase team sport participation and, consequently, PA levels among girls, there is a need to understand trends in, and influences on, pre-adolescent girls' participation in a team sport (Allison et al., 2017), specifically the correlates of PA, in particular, the psychological (psychosocial), social support and FMS influences on PA participation.

2.3 CORRELATES OF PA (PERSONAL AND SOCIAL FACTORS)

2.3.1 An introduction to PA correlates

To design more effective intervention programmes and strategies to promote physically active lifestyles, especially in the community club sport environment, it is important to know the main 'determinants' (correlates) associated with PA behaviour in youth (Lounsbery & McKenzie, 2015). Although there are several reviews (Van Der Horst et al., 2007) and reviews of reviews (Bauman et al., 2012; Sterdt et al., 2014) regarding the main correlates of PA, few studies summarise the findings connecting them to community sport and lack a clear identification of correlates for girls. The correlates of PA identified in the reviews amongst youth have been classified into the following factors:

1) Demographic, personal and biological (age, sex, ethnicity, genetic influences, overweight/obesity).
2) Behavioural (activity history, dietary habits, processes of change, coping skills).
3) Psychological/cognitive/emotional (attitudes, perceived barriers, enjoyment, intention to be active, self-efficacy, perceived competence, self-motivation)
4) Social environment (support from family friends, parent PA).
5) Physical environment (access to facilities, availability of conducive environments) (Liangruenrom et al., 2019; Van Der Horst et al., 2007).

Many variables affect youth PA participation, with substantial evidence documenting how children and young people are influenced by their parents, peers, and siblings (Laird et al., 2018; Reimers et al., 2019; Salvy et al., 2012), as well as their environment (Pouliou et al., 2015; Van Der Horst et al., 2007). Determinants of PA are increasingly being understood using socio-ecological models, whereby intrapersonal/individual (e.g., biological, psychological, and behavioural aspects), interpersonal (e.g., relationships with parents, relatives, peers, and socio-cultural networks), environmental (e.g., access/availability of tools/services, and proximal/distal built/natural surroundings), and policy (e.g., organisational and governmental aspects) variables are identified as influences on participation (Martins et al., 2017; Niemistö et al., 2019; Vancampfort et al., 2019).

However, heterogeneity in the design of correlates research has hampered understanding of those factors that are most consistently predictive of PA in young people, with studies differing according to sample characteristics, measurement instrumentation and the context of PA under examination (Atkin et al., 2016). For example, correlates of PA have been shown to vary according to gender (Lawman et al., 2011; Sterdt et al., 2014), age (Van Sluijs et al., 2007), and socioeconomic status (SES) of study samples (Stanley et al., 2012). Correlates are also shown to differ according to the approach to PA assessment, such as objective measures and self-report (Wenthe et al., 2009), and PA contexts, such as free play and organised sport (Stanley et al., 2014). Despite this, analysing the correlates of PA from a socioecological perspective may help to identify factors that promote versus discourage PA (Wilkie et al., 2018). It is important to note that pre-adolescence and adolescence is a crucial period of life during which important shifts in psychosocial behaviour occur and many future health behaviours are established (Mohamadian & Ghannaee Arani, 2014).

2.3.2 Psychological correlates of PA - factors influencing girl's PA engagement and experiences

Factors influencing girls' PA levels and participation include psychological correlates, such as perceived competence, self-efficacy motivation, attitude and enjoyment of PA, as well as external factors such as competing priorities, friendship group changes, 'sporty' stereotypes, and family and peer support (Gillison et al., 2011; Reimers et al., 2019; Telford et al., 2016; Slater & Tiggemann, 2010). In the literature, the terms 'psychological' (Uijtdewilligen et al., 2011) and 'psychosocial' are often used interchangeably when examining the PA correlates amongst youth, however for this literature review and thesis, the specific terms as used in each of the individual research papers will be referenced. Systematic reviews have synthesised evidence on correlates associated with PA in adolescent girls (Biddle et al., 2011; Laird et al., 2016). These reviews have identified personal and demographic, psychological, environmental and social correlates to be consistently associated with adolescent girls' PA behaviour. A better understanding of the factors associated with PA in girls aged 8

to 12-years specifically may inform more effective intervention design for this vulnerable population (Sallis et al., 2000).

Nonetheless, this area of research is complex given the number of settings likely to influence children's PA behaviour (e.g. home, school and neighbourhood environments), as illustrated by socioecological model approaches (Sallis et al., 2006). It is therefore important to consider a wide range of correlates from multiple domains, given that focusing on a single domain may give rise to inaccurate conclusions (Brodersen et al., 2005). Despite this, there is a lack of studies simultaneously exploring a range of potential correlates from multiple domains (van Sluijs et al., 2013). One personal factor that may be particularly important for young girls is self-efficacy (Roesch et al., 2013).

Over the past decade social-cognitive research has specifically identified self-efficacy (SE) for PA as a strong correlate of PA among children, youth and adults (Dishman et al., 2005; Liangruenrom et al., 2019; Vitali et al., 2019). Perceived SE is defined as *"a judgment of one's capability to accomplish a certain level of performance"* (Bandura, 1986, p. 391). SE with respect to PA stands for a child's belief concerning his or her skills for successfully completing the task associated with PA (Ray & Henry, 2011). Increasing SE through PA is considered to be an important part of health improvement efforts against physical inactivity (Bauman & Craig, 2005). In other words, improved SE may lead to higher levels of PA at some later point in time (Pekmezi et al., 2009).

In the context of OYS, SE has been extensively examined (Li et al., 2018; Morano et al., 2019; Plotnikoff et al., 2014; Schroeder et al., 2020). Results from a systematic review of reviews (Sterdt et al., 2014) reported that three reviews (Biddle et al., 2005; Lubans et al., 2008; Van der Horst et al., 2007) found a consistently positive association between SE and participation in sport by adolescents. In Wang et al. (2016) recent study of 8–13-year-old Chinese children (n = 449; 252 males, 197 females), SE was positively related to PAQ-C and objective MVPA (r: 0.22–0.63). Additionally, Bauman et al. (2012) also considered SE a significant determinant in PA of children and adolescents. Results from a recent Canadian longitudinal study (Li et al., 2018), examining the relationship between generalised SE and PA in school-aged children (n= 2278; 1120 girls and 1158 boys), showed that children with high

perceived SE had higher free play and organised activity participation relative to other children over time.

De Bourdeaudhuij and Sallis (2002) demonstrated that psychosocial variables, including SE, vary in importance according to sex and age groups. SE beliefs, in general, have been shown to influence girls' PA (Duncan et al., 2005; Motl et al., 2002; Morano et al., 2019; Neissaar & Raudsepp, 2011), and has indeed been identified as one of the most important correlates of adolescent girls' PA (Graham et al., 2014): a higher feeling of SE, or beliefs in one's capability to be physically active, was related to more PA among girls. Findings from the Lubans et al (2012) study on 1518 adolescent girls, observed that SE was the most strongly associated correlate with PA self-reported PA behaviour. Furthermore, SE appears to be particularly salient for adolescent girls (Chen et al., 2017; Young et al., 2014). Dishman and colleagues (2005) reported that the positive effect of a PA intervention targeting adolescent girls was partially mediated by increased efficacy beliefs about PA participation. According to Bandura (1997), SE not only influences whether a person will engage in a particular behaviour but also whether he or she will persist in their efforts in the face of barriers. Thus, SE may be an important mediator for girls' enjoyment and engagement in PA and warrants further investigation (Spence, 2010).

A less-studied PA correlate is enjoyment (Silva et al., 2012), although it is one of the main reasons why people perform PA (Granero-Gallegos et al., 2017). Enjoyment is often cited as an important correlate or predictor of PA participation and it is included in many health promotion models and behaviour motivation theories (Dacey, 2009). Enjoyment is an intrinsic and affective component of motivation (Sallis et al., 2000) that leads directly to behaviour changes (Vallerand et al., 1987). In the PA and sport domains, enjoyment is conceptualised as a positive affective response resulting from participation that reflects generalised feelings typically described as pleasure, liking, and fun (Kimiecik & Harris, 1998).

Within the PA context, enjoyment represents a positive attitude toward PA practice (Wankel, 1993) and constitutes one of the most important correlates for PA participation (Gavin et al., 2014), particularly for girls. An important source of enjoyment is the degree to which PA participation results in the satisfaction of individuals' basic psychological needs of competence, relatedness, and autonomy

(Teques et al., 2017). Previous studies have acknowledged the experience of enjoyment as a critical factor in motivating young girls to continue participating in activity environments (Brazendale et al., 2015; Cairney et al., 2012). Enjoyment of PA is positively correlated with PA participation levels for children and adolescents (Woods et al., 2012; Sallis et al., 2000) more specifically, among girls during early adolescence (Budd et al., 2018; Post & Palacios, 2019) and sustained PA throughout adulthood (Budd et al., 2016). For example, in Robbins et al. (2019) 'Girl on the Move' 17-week intervention study, enjoyment had a positive direct effect ($B = 24.48$, $p < .001$) on young girl's (M age: 12.05 years ($SD = 1.01$; $N = 1519$), MVPA from baseline to post-intervention. Contrastingly, Budd et al. (2018) study, examining the role of PA enjoyment as a mediator of social and physical environments to MVPA of early adolescent girls, found that there was no relationship between PA enjoyment among 1721 sixth grade girls.

Enjoyment in youth sport is considered the greatest predictor of commitment and lack of enjoyment is the most frequently cited predictor of dropout among young girls (Crane & Temple, 2014; Visek et al, 2015). Enjoyment is consistently associated with continued sport participation (Gardner et al., 2017; MacDonald et al., 2011; Wetton et al., 2013). A recent Australian qualitative study (Litchfield & Elliott, 2020) exploring how Netball clubs and organisations utilise enjoyment to attract and retain girls' participation. Interestingly, findings indicate that clubs and organisations appreciated the importance of enjoyment, however, their current practices did not consistently reflect this understanding. The experience of enjoyment during physical education (PE) classes is associated with enhanced intrinsic motivation, increased PA participation, and the adoption of active and healthy lifestyles (Dishman et al., 2005; Jaakkola et al., 2017; Morano et al., 2019; Vitali et al., 2019). Thus, understanding enjoyment motives and other variables are known to influence PA levels, successful motor experiences, and improvement of physical fitness can help researchers and practitioners design more effective intervention strategies to promote healthy lifestyles among school-aged children (Morano et al., 2019). Dzewaltowski (2002) suggests that to promote the enjoyment and SE (as previously discussed), environments should be structured to encourage: connection, autonomy, skill-building, and healthy norms (CASH). Specifically, girls should be engaged in environments where the group norm

is healthy behaviour and where they have a sense of belonging and control while allowing them to develop their skills (Spence et al., 2010).

2.3.3 Social influences on PA

Social networks, or specific sets of linkages between people (Mitchell, 1969), can influence PA through various mechanisms (Laird et al., 2018). Social support has been defined as resources provided from interactions with significant others (e.g., parents, friends) within a social network that can influence behaviour (Langford et al., 1997). Social support for PA has been identified as an important social correlate of PA in young girls (Laird et al., 2016; Liangruenrom et al., 2019; Shen et al., 2018), and even considered by some a key process promoting and facilitating PA among adolescents (Ren et al., 2020). Social support can be emotional (e.g., encouragement, praise), instrumental (e.g., logistic support), informational (e.g., instruction), or co-participation (e.g., engaging in PA with child) (Yao & Rhodes, 2015). Additionally, social support can be perceived (e.g., the support a person thinks that they get) or received (e.g., the support a provider thinks that they give) (Laird et al., 2018). Within the PA literature, modelling (e.g. associations between activity levels of provider and child) and co-participation (e.g. performing physical activities together) have also been considered forms of social support (Reimers et al., 2019; Yao & Rhodes, 2015).

Some recent evidence would suggest that social support is a potentially important mediator of increased PA in young girls (Casey et al., 2009; Coen et al., 2018; Ren et al., 2020; Van Lippevelde et al., 2012), and has been targeted by several intervention programmes (Cowley et al., 2021; Eather et al., 2013; Story et al., 2017). Numerous studies have focused on girl's social support for PA in children and adolescents and these have also been systematically reviewed (Beets et al., 2010; Maturo & Cunningham, 2013; Mendonça et al., 2014; Yao & Rhodes, 2015). Most of these reviews have focused on parental influences with results suggesting positive significant associations between parent support and child and adolescent PA (Beets et al., 2010; Liszewska et al., 2018; Petersen et al., 2020; Yao & Rhodes, 2015). Regarding the influence of environmental factors, it has been shown that particularly

the social environment, and more specifically peers and parents, can have an important impact on girls' PA levels (Verloigne et al., 2016).

2.3.3.1 Parental PA influences

Research has documented parents' many and important roles in OYS (Fyfe-Johnson et al., 2019; Petersen et al., 2020). Studies have found parents to be initiators of sport participation and motivators for further activity (MacPhail & Kirk, 2006; Wheeler, 2012). They contribute as providers of resources and transport, as role models and interpreters (Smoll et al., 2011). The influence of parents on adolescent girls' PA level can occur through modelling and co-participation (Timperio et al., 2013), but especially through supporting them, such as encouraging them or by providing logistic support (Beets et al., 2010; Sebire et al., 2013). Furthermore, parental modelling and social support are considered to enable or to foster PA participation in children and youth (Reimers, 2019). Parental modelling of activity is positively related to children's participation in PA like outdoor play, sports or walking for transport (Rodrigues et al., 2017; Schoeppe et al., 2017; Mutz & Albrecht, 2017). For example, the provision of instrumental support like driving a child to places where they can play sports or buy equipment are necessary assistances to engage in some sporting activities (Reimers, 2019). Interestingly, in a study of fifth-grade students from Germany, Schoeppe et al. (2016) confirmed the same-sex imitation hypotheses by finding relationships between girls' leisure-time PA and maternal sport participation and between boys' activity and paternal sport participation. Similar results were found by Lijuan et al. (2016) in Chinese children, by Kirby et al. (2013) in Scottish adolescents, and by Cheng et al. (2014) in Brazilian adolescents.

Edwardson and Gorely's (2010) review (including 96 studies by intensities and types of PA), examining parental support of PA for young people, found that for children, parental involvement (overall PA and leisure-time PA), and overall support (organised PA) were associated with types of activity, whereas for adolescents, the main associations were for parental support (MVPA, vigorous PA, overall PA), attitudes/beliefs (MVPA, overall PA), transport (MVPA, organised PA), and encouragement (PA frequency). This review investigated cross-sectional and

longitudinal studies and their data was analysed separately by children and adolescents. Results from a recent study in the Western Cape in South Africa, investigating factors influencing participation in PA among 11-13-year-old school children (n= 348), reported parental influence as the strongest predictor ($r = 0.236$, $p < 0.01$). Similarly, Pugliese and Tinsley (2007) found in their meta-analysis a small significant positive association for parental behaviour ($p < .001$). The results showed that encouragement ($p < .01$), instrumental behaviour (e.g. paying membership dues; $p < .05$) and modelling ($p < .001$) were significantly positively related to children's PA (Pugliese & Tinsley, 2007).

Parental support and direct help from parents have previously been correlated with PA in female youth (Carlin et al., 2015; Eddolls et al., 2016; Kirby et al., 2013). For example, in a recent study of 226 girls (mean age 16.0 ± 1.0 years), higher parental modelling, co-participation, and encouragement related to a higher PA level (self-reported) among adolescent girls ($p<0.05$) (Verloigne et al., 2016). However, results from one meta-analysis suggest that social support is not a strong predictor of PA in adolescent girls (10 to 19 years), although parents and friends may have a role in enhancing PA (Laird et al., 2016). Findings from Laird et al.'s (2016) systematic review and meta-analysis both support and contest the findings from another recent meta-analysis by Yao and Rhodes (2015), who identified positive associations between parent support and PA in children and adolescents ($r=.38$). Laird's systematic review and meta-analysis identified more modest effect sizes than Yao and Rhodes (2015) for parent support on adolescent girls' PA ($r =.19$), which aligns more closely with a meta-analysis by Pugliese and Tinsley (2007) ($r =.17$). These differences could be attributed to the fact that Yao and Rhodes (2015) and Pugliese and Tinsley (2007) considered all children and adolescents, whereas Laird et al (2016) only synthesised associations reported for adolescent girls.

Most recently, Morgan et al. (2019) novel Dads And Daughters Exercising and Empowered (DADEE) programme in Australia provides evidence that efforts to increase PA behaviour in young girls (n=153; 4 to 12 years) would benefit from a meaningful engagement of fathers (n=115; 29-23 years). Significant effects ($p < .05$) were identified for daughters' FMS competence (objective: $d = 1.1–1.2$; perceived: $d = 0.4–0.6$), a range of fathers' PA parenting practices ($d = 0.3–0.8$), and screen-time

for daughters (d = 0.5–0.8) and fathers (d = 0.4–0.6) at post-intervention and follow-up. As previously highlighted, parents already play an important role in influencing girls' health behaviour at a younger age (Edwardson & Gorely, 2010), but the influence of peers may increase when girls move toward adolescence (Kirby et al., 2011) (roughly the period between ages 10 and 19 years), they spend increased time with peers enhancing the potential for the norms and behaviours of peers to influence their PA levels (Duncan et al., 2007).

2.3.3.2 Peer PA influence

Children live in peer-rich worlds and spend significant amounts of time with peers and friends at school, on playgrounds, and while participating in organised activities such as sport (Stearns et al., 2019). It has even been suggested that peers or friends are more important than parents in influencing adolescent girls' PA levels (Lytle et al., 2009). The nature of the relationship between children and their parents transforms significantly during pre-adolescence to adolescence (Smetana et al., 2006). As adolescent girls spend less time with their parents and more time with their friends (Larson et al., 2002), friends might be better positioned to influence adolescent girls' PA than parents (Laird et al., 2016).

The influence of friends and the importance of having someone to participate is a key emergent theme among children, and these are key factors in young female's participation in PA (Carlin et al., 2015). Children like doing PA with friends rather than alone (Bristow & Saunders, 2014), and describe their friends as influencing their PA in various ways such as modelling, co-participation, and encouragement (Jago et al., 2009). Some studies also indicated the role of social support and social modelling from peers predicting PA in children and adolescents (Reimers, 2019). The presence of peers and the presence of peers being physically active were associated with an increase in PA in a wide range of children and adolescents from the age of 3–5 to 15 years old (Lau et al., 2016; Ward et al., 2017).

Friends' PA is consistently related to youth PA (Stearns et al., 2019; Beets et al.; Voorhees et al., 2005). Maturo & Cunningham (2013) systematic review

(including 106 studies) on the influence of friends found that children's PA was positively associated with encouragement from friends (43 of 55 studies indicating a positive relationship), friends' own PA (30 of the 35 identified studies), and engagement with friends in PA (9 of the 10 identified studies). A study by Jago et al (2009) examined whether the number of friends in an adolescent's social circle was associated with PA in a sample of 10 to 11-year-old children, and found that an increase in the number of friends was associated with an increase in adolescent PA. Besides support from parents, children who have supportive friends and peers have also been found to be more physically active (Fitzgerald et al., 2012), whereas those who experience negative peer interactions may become less physically active (Salvy et al., 2012).

Peer-influence, which increases as girls transition from childhood to adolescence (Davison & Jago, 2009), plays a pivotal role in girls' PA (Fitzgerald et al., 2012), and can comprise social support, presence of peers during PA, peer norms, friendship quality, changes to friendship groups, activity preferences of peers, affiliation to peer groups, and peer victimisation (Fitzgerald et al., 2012; Cavallo et al., 2014). Despite being a key part of the complexity of girls' PA, until recently, peers have been relatively overlooked in many PA interventions (Ginis et al., 2013). A recent longitudinal study (Basterfield et al., 2016) on perceived barriers to sports participation were collected from a birth cohort, the Gateshead Millennium Study (n>500) at ages 9 and 12 years. The 12-year-olds' concerns relating to their social environment, emphasising the importance of friendship groups at this age: *'I don't take part in any outside school clubs, because none of my friends do'* (ID15, girl, 12 years). Some of the findings of this study echo those of Stanley et al. (2012) with children aged 10–13 years in Australia highlighting the importance of friends and parental support concerning PA (not specifically sport participation). This emerges during early adolescence, as they become more aware of what their friends think of them, and the need to feel accepted and similar (Erdvik et al., 2019).

Peer acceptance and friendship quality are two important dimensions of peer influence that have been linked with an increased commitment to sports, greater enjoyment, and improved psychosocial wellbeing among adolescents (Fitzgerald et al., 2012; Stearns et al., 2019). There is evidence that suggests friends may have a

direct impact on adolescent girls' attitudes and beliefs toward PA, and that adolescents are more likely to either choose friends who have similar PA behaviour or alter their PA behaviour in response to their friends (Salvy et al., 2012; Marks et al., 2015). Findings from the recent Corr (2019) systematic review of qualitative studies on adolescent girls' perceptions of PA found that for some girls, if their friends were involved in PA, then it became a motivating factor for them to be active too as well as increasing enjoyment levels and providing positive activity experiences: '*My best friend dances with me and it's way more motivating cause then you know you won't be alone when you need to go somewhere, and you tell yourself it's going to be real fun'* (Bélanger et al., 2011). In Corr et al.'s (2019) systematic review of qualitative studies on adolescent girls' perceptions of PA, girls discussed how they failed to participate in PA because 1) their friends didn't, 2) if they participated, it meant they missed opportunities to spend time with friends, 3) fear of ridicule from friends, and 4) friends teasing them and excluding them from conversations.

Peers are a potential key source of support for adolescent PA and for PA efficacy beliefs (Duncan et al., 2005; Duncan et al., 2007). Peer support may serve several different functions (e.g., social integration in PA, emotional support, informational support, tangible aid, a reassurance of worth), which may help bolster a youth's PA efficacy beliefs and assist in overcoming perceived barriers to PA participation (Duncan et al., 2015). Evidence also suggests that adolescent girls socialise in groups with similar PA levels and, over time, their PA behaviours reflect those of their peers (Macdonald-Wallis et al., 2011). Weiss et al. (1996) found some evidence to suggest that friends influence perceptions of self-esteem, enjoyment and performance in sports. A focus group study by Jago et al. (2009) found that support from friends encouraged young people to try new physical activities, and co-participation with friends was linked with enjoyment of PA. Whilst these findings give some indication of the possible ways in which social support influences PA, it is important to note that the majority of these studies considered boys and girls together. Considering potential gender differences, a specific focus on how social support influences adolescent girls' PA may be important to inform targeted PA interventions for adolescent girls (Laird et al., 2018). Peer-based interventions could be an effective means of helping adolescent girls become more physically active (Fitzgerald et al., 2012; Willis et al., 2019).

Studies have examined both friend and family support for PA, and results have shown that some studies have found a positive association (Beets et al., 2010; Reimers et al., 2019), while others have not (Cohen et al., 2015). Seabra et al.'s (2012) study examining correlates of PA in school-children aged 8-10 years, found perceived acceptance by peers in games and sports and parental encouragement were positively and significantly related to PA in girls (n= 683). Additionally, a study by Jago et al. (2009) found that children reported friends influencing their activity behaviour through 3 main mechanisms: 1) modelling of PA, 2) verbal encouragement of PA, and (3) co-participation in PA with participants. Peer social support had a direct effect on MVPA ($\beta = .33$, $p < .05$), also significantly influenced levels of enjoyment ($\beta = .47$, $p < .01$) and self-efficacy ($\beta = .67$, $p < .01$).

Although several reviews have considered the role of social networks, in particular social support, on PA in children and adolescents (e.g., Beets, et al., 2010; Edwardson & Gorely, 2010; Yao & Rhodes, 2015), only one focused specifically on adolescent girls (Laird et al., 2016). This review identified significant positive associations between social support from friends and family and adolescent girls' PA. The review also highlighted the complexity of the relationship between social support and PA, with numerous types and providers of support identified, and varying effect sizes for these associations with PA identified between studies. Further, according to socio-ecological models (Kremers et al., 2006; Verloigne et al., 2016), these associations between peer and parental factors and adolescent girls' PA could be mediated by personal factors, which means that peer and parental factors may influence girls' PA indirectly through personal factors. This implies that these personal factors are also associated with adolescent girls' PA, specifically self-efficacy (Morano et al., 2019; Vitali et al., 2019), as noted previously.

Strategic advice by Woods et al. (2018) on increasing the PA participation levels of Irish children and youth indicates that family and peer support are crucial influences for developing PA opportunities. Given the continued influence parents and peers play as children move into adolescence (Eddolls et al., 2016; Van Der Horst et al., 2007), it would be prudent for female OYS interventions to consider active peer and parental involvement, as these reinforcing factors may positively influence girls' PA participation (both directly and indirectly) through the internalisation of several

personal and psychological variables (Verloigne et al., 2016). Other social agents, such as youth sport coaches and coordinators, can structure the PA environment to maximise feelings of competence and personal mastery, with children more likely to enjoy the activity, maintain interest in involvement, and commitment to the activity (Granero-Gallegos et al., 2017). Studies have reported that youth who feel socially connected to their coach, or other children in a sports team (Carlin et al., 2015; Farmer et al., 2018) tend to have greater satisfaction and positive emotions in the context of youth sport.

2.3.3.3 Coach influences

Social agents, such as OYS coaches can be viewed as important role models that could influence young players' PA developmental experiences (Santos et al., 2019), empowering or enabling participants to take part in PA within an OYS context (Griffiths & Armour, 2014). Coaches can offer support and guidance to athletes that ultimately facilitate the formation of strong bonds (Rhind & Jowett, 2010). This support has been shown to impact enjoyment, motivation and the development of key competences (MacDoanld et al., 2011). A systematic review on social support in youth sport (Sheridan et al., 2014) of 73 studies revealed that coaches were identified as the most prevalent provider of social support through offering participants unique forms of tangible, informational, emotional and esteem support. Furthermore, authors of this review concluded that coach, (along with parent and peer) support plays a significant role in shaping youth sport experiences both from a positive (athlete motivation levels, elite sport participation) and negative (drop-out) perspective (Sheridan et al., 2014).

It is of particular importance that every coach (volunteer, part-time and full time) should engage with coach education and receive adequate training (Côté & Gilbert, 2009), reinforcing the coaches' influence on children's involvement and development in sport (Trudel et al., 2010). Based on Côté and Gilbert's (2009) understanding of effective coaching, it is necessary to systematically integrate coaches' knowledge to increase athletes' confidence, competence, connections and character given the particular characteristics of a sports context (i.e. aims, age group, and coaching domain) (Côté & Gilbert, 2009; Flett et al., 2013).

Previous studies (Sullivan et al., 2012) show that coaches who participated in coach education programmes positively affected coaches' efficacy beliefs, knowledge, and behaviours (Trudel et al., 2010). A review on the effectiveness of coach education in OYS indicated that non-formal learning methods within coach education (such as continuous professional development (CPD), clinics, workshops or seminars (Maclean & Lorimer, 2016) addressed specific topics that are more authentic, meaningful, and contextualised to a coach (Mallett et al., 2009). Empirical studies that found OYS coaches who participated in non-formal coach training programmes enhanced their ability to improve their team's environment, build positive coach-athlete relationships and foster positive outcomes in their athletes (Koh et al., 2014; Walker et al., 2018), including enhanced participation rate and performance (Galatti et al., 2016).

Furthermore, an important element of OYS participation is the coach education component (Owen et al., 2018; Robbins et al., 2013, 2019). The literature widely acknowledges that youth PA interventions through the provision of non-formal coach education, such as Continuous Professional Development (CPD) opportunities (training, resource manual, and opportunities to work with coaches and instructors) can positively support programme implementation, and childhood engagement in PA (Casey et al., 2014; Koh et al., 2014). Despite research on the effectiveness of non-formal coach training programmes, little is known about how knowledge is incorporated and transmitted in these programmes (Trudel et al., 2010). As a result, it has been argued that there is a need for innovative coach education approaches that can better equip coaches with the professional competencies needed to deal with the dynamic nature of coaching within an OYS setting (Morgan et al., 2013). Hence, quality of interactions and relationships with parents, coaches, and teammates - whom young girls look up to as models, rely upon for support and seek out for performance feedback, social reinforcement, and skill instruction - hold the key to whether sport's potential to optimise positive outcomes is realised (Weiss et al., 2012).

From the outlined studies and research, there appears to be robust evidence that parental, peer and coach support, can positively contribute towards youth PA participation. Similar to the domain of OYS, with parental, peer and coach influences, fundamental movement skills (FMS) have been shown to have a positive association

with PA (Robinson et al., 2015), indicating that FMS may be a potentially viable correlate of youth PA participation.

2.3.4 Fundamental Movement Skill (FMS) influences on PA

Research suggests that actual movement competency (e.g., fundamental movement skill (FMS) proficiency) in early childhood may be an important prerequisite for engagement in PA later in life (Loprinzi et al., 2015). A fundamental movement pattern is an observable performance of basic locomotor, manipulative, or stability movements, that involves combining movement patterns of two or more body segments, and the integration of developmentally appropriate arm, trunk, and leg actions (Gallahue & Ozmun, 2012). They can be broken down into two main categories: locomotor skills (LS) and object control skills (OS). LS require the fluid coordination of the body as it moves in one direction or another and includes skills such as running, galloping, jumping, hopping, leaping and skipping. OS require the efficient control of another object such as a bat or ball and includes skills such as throwing, catching, kicking, rolling, striking and dribbling (Department of Education Victoria, 1996; Gallahue and Ozmun, 2006; Stodden et al., 2008). Balance (stability) is also identified as a measure of FMS (Ulrich, 2013). These basic movement skills are essentially the groundwork and 'building blocks' that underpin all movement (Babic et al., 2014; Barnett et al., 2016).

FMS proficiency leads to specialised movement sequences required for adequate participation in many organised and non-organised physical activities for children, adolescents and adults (Goodway et al., 2020; Hardy et al., 2010). Studies suggest that in both pre-schoolers (Cliff et al., 2009) and school-aged children (Luban et al., 2010) there is a positive relationship between FMS competence and increased levels of PA. A systematic review by Logan et al. (2015) found relationships between FMS and PA in early through to late childhood in cross-sectional studies. Additionally, a recent systematic review and meta-analysis, exploring the relationship between FMS interventions and PA levels in children, found significant improvement in FMS with teacher-led interventions of three or more sessions per week (Engel et al., 2018). Furthermore, developing FMS during childhood may be a significant step towards establishing a lifelong commitment to PA (Nilsen et al., 2020). One correlate which

requires additional examination in the literature is the levels of FMS proficiency amongst young people, specifically young girls, and this association with PA (see section 2.4 for a complete discussion of FMS).

In section 2.3 the correlates of PA amongst youth were examined, with a specific focus on female youth. The identification of SE, parental, peer and coach influence and perceived skill competence (FMS) are considered to be the potentially important mechanisms promoting PA. SE was the only psychological correlate which was consistently associated with PA and sport participation in many of the most recent reviews for children and youth over the last decade (Sterdt et al., 2014; Uijtdewilligen et al., 2011; Van Der Horst et al., 2007; Wang et al., 2016). A plethora of research has shown that parental support and direct help from parents have previously been correlated with PA in female youth (Carlin et al., 2015; Eddolls et al., 2016; Kirby et al., 2013; Petersen et al., 2020). Peer-influence, which increases as girls' transition from childhood to adolescence (Davison & Jago, 2009), plays a pivotal role in girls' PA (Fitzgerald et al., 2012; Stearns et al., 2019). Furthermore, peer-based interventions could be an effective means of helping adolescents become more physically active (Willis et al., 2019).

Other social agents, such as OYS coaches who can also be viewed as important role models that could influence young players' PA developmental experiences (Santos et al., 2019), empowering or enabling participants to take part in PA within an OYS context (Griffiths & Armour, 2014). To enhance coach influence, the literature widely acknowledges that youth PA interventions through the provision of non-formal coach education, such as CPD opportunities (training, resource manual, and opportunities to work with coaches and instructors) can positively support programme implementation, and childhood engagement in PA (Casey et al., 2014; Engel et al., 2014; Koh et al., 014). Understanding how social support influences PA behaviour is imperative to inform the development of PA intervention strategies aimed at engaging inactive girls in PA (Laird et al., 2018). Finally, FMS as an important and viable correlate for youth PA engagement with positive associations found in the literature (Lubans et al., 2010). There is evidence emerging that developing FMS during childhood may be a significant step towards establishing a lifelong commitment to PA (Burns et al., 2017; Logan et al., 2015).

2.4 FUNDAMENTAL MOVEMENT SKILLS (FMS)

The purpose of section 2.4 is to review the relevant literature regarding the development of FMS proficiency and assessment in children and young people. The first theme explored is an overall introduction and description of FMS.

2.4.1 Introduction and description of FMS

As explained previously in section 2.3.5, FMS have been described as the building blocks for movement and form the foundation for many of the specialised movement skills needed to participate successfully in sport and PA (Gallahue and Ozmun, 2006). Zuvela et al. (2011) described FMS as basic motor skills underlying more complex sport-specific skills. These skills are also regarded as the foundation of body movements (Barnett et al., 2013). In essence, FMS are basic abilities and skills of a child to perform an organised series of basic movements (locomotor, manipulative, or stability movements), that involve various body parts and provide the basis of achieving a high level of motor competence to develop normally, maintain health, and gain athletic excellence (Gallahue & Ozmun, 2012; Lloyd et al., 2014).

A more contemporary view is that the term 'fundamental' is too narrow and does not sum up the full range of skills that may promote continued PA participation across the lifespan (Hulteen et al., 2018). Skills involved in activities such as swimming, or cycling, require competency in specific coordinative movement patterns (e.g., swimming strokes) that do not easily fit into the traditional classifications of FMS (i.e., locomotor, object control, stability skills) and therefore have not been widely addressed in the literature base (Hulteen et al., 2015). Hulteen and colleagues (2018) suggest that the term 'foundational movement skills' better reflects the wide variety of skills of which an individual should develop competency. Foundational movement skills are defined as goal-directed movement patterns that directly and indirectly impact an individual's capability to be physically active and can be developed to enhance PA participation and promote health across the lifespan (Hulteen et al., 2018). Proficiency in a range of FMS is considered to be the foundation for an active lifestyle (Cattuzzo et al. 2016), and the primary school window (5 to 12 years old) represent the "golden years" of motor skill development (Clark & Metcalfe, 2002).

A helpful heuristic device describing the sequential progression of motor development across the lifespan can be highlighted in Gallahue & Ozmun's (2012) hourglass model; this model, conceptualises, describes, and provides explanations of the rate of movement skill acquisition from infancy throughout life (see Figure 2.1 below).

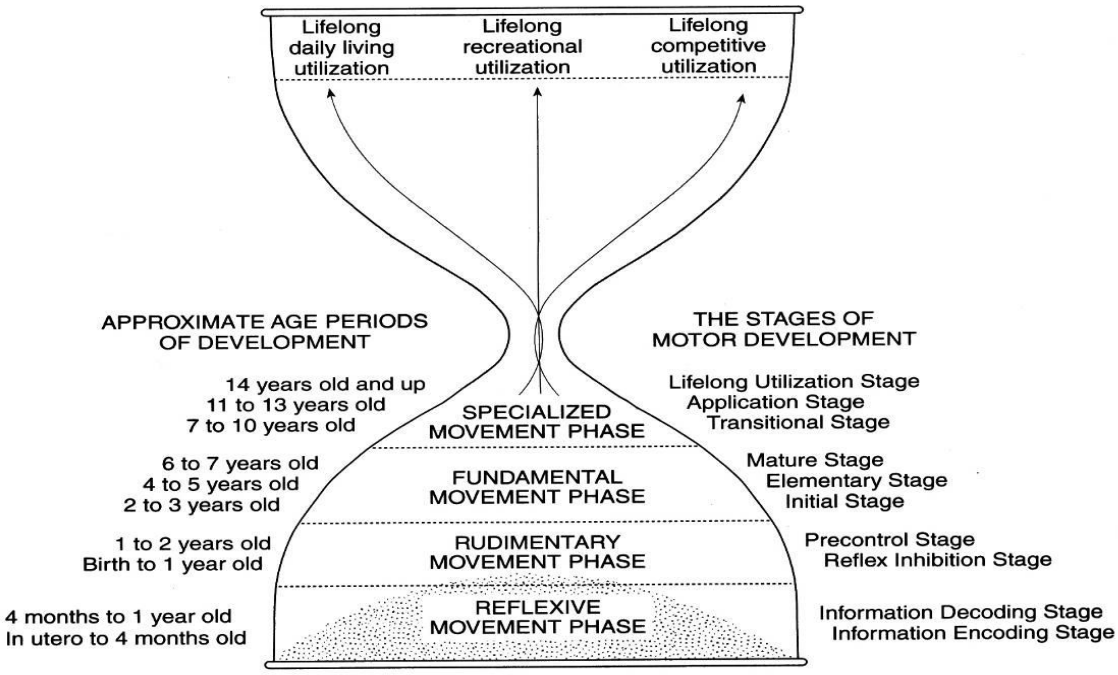


Figure 2. 1: The phases and stages of motor development (taken from Gallahue and Ozmun, 2012).

The development of FMS is subdivided into three stages of development (Pienaar et al., 2016). The initial phase describes the execution of these skills in an uncoordinated manner. Children are typically in this phase of development between the ages of 2 and 3 years. Children are generally in the elementary phase, the second phase of development, between the ages of 4 and 5 years, typifying a child displaying improved coordination and rhythm, exerting finer control over movement during the execution on these skills, albeit not yet fluent (Gallahue & Ozmun, 2006). A child can execute a fundamental movement skill in a well-coordinated, mechanically correct and fluent manner (Gallahue & Ozmun, 2006) in the mature phase of development, usually occurring between the ages of 6 and 7 years old.

Motor development refers to the continuous, age-related changes in movement that occur across one's lifespan and the interacting individual, task, and environmental factors that underlie these changes (Clark & Whithall, 1989). Pope et al. (2011) defined the fundamental movement phase as the period when motor skills are obtained, by a progressive improvement of coordination. Gallahue and Ozmun's (2006) hourglass model for motor skill development suggests that both boys and girls have the potential to demonstrate mastery of FMS (i.e., perform the skill(s) correctly) between the ages of five to seven years. To achieve such mastery, these movement skills must be learned and practiced and reinforced (Robinson and Goodway, 2009); they are not acquired naturally (Pang & Fong, 2009). Developing proficiency in any FMS can take a long time – up to 10 hours of quality teaching (Hands, 2012). Therefore, the early years (± 3–7 years) are a critical period in the development of these skills (Gallahue et al., 2012). Stodden et al. (2008) report that FMS are important skills to master during the childhood years, as they will be used later in their lives for sport-specific application and lifelong utilisation. Oliver et al. (2011) and Jukic et al. (2019) further propose the development of FMS is necessary to become competent in more advanced PA contexts such as sports. Not only this, but there is also a growing body of work that explores the connections between early movement skill development and an array of health-related outcomes including social, cognitive, and emotional development (Hendrix et al., 2014; Iivonen & Sääkslahti, 2014).

2.4.2 Benefits of FMS

FMS contribute to the general development and wellbeing of young children (Pienaar et al., 2013), which is a prerequisite for daily life skills (Stodden et al., 2008) and therefore impact children's physical, social and cognitive development (Iivonen & Sääkslahti, 2014). FMS proficiency is positively associated with many physiological, psychological, and behavioural benefits (Lubans et al., 2010), including fitness (Burns et al., 2017) and PA levels (Burns et al., 2017; Logan et al., 2015). Previous research has demonstrated positive associations between FMS and areas of health including PA, fitness, healthy body composition, self-concept, and executive functioning (Lubans et al., 2010; Hendrix et al.,, 2014). Childhood is a critical time for FMS development as recent reviews have found FMS proficiency to be positively

associated with a range of benefits, including health, fitness, academic outcomes, participation in organised sports and sustained engagement in PA (Hardy et al., 2012; Jaakkola et al., 2015; Lubans et al., 2010; Nilsen et al., 2020; Stodden et al., 2014). In a systematic review of the literature, Lubans et al. (2010), demonstrated the numerous health benefits of FMS proficiency including increased PA and fitness, a lower body mass index (BMI), and improved mental health outcomes. However, the majority of the articles included in the review were cross-sectional; thus, the causal relationship between these skills and health-related variables is not yet fully understood (Lubans et al., 2010).

2.4.3 The relationship between FMS and PA

Children develop their FMS through engagement in PA (Figueroa & An, 2016), as increased PA provides more opportunities to promote neuromotor development, which in turn promotes FMS development (Fisher et al., 2005). At the same time, learning to move is a necessary skill underlying PA (Stodden et al., 2008). Based on the conceptual model introduced by Stodden et al. in 2008 (Stodden et al., 2008), the relationship between FMS and PA is likely to be bi-directional. In addition, the relationship may differ at different stages of a child's development. While Stodden et al. (2008) hypothesised engagement in PA to be important for the development of FMS during the early years, FMS levels were hypothesised to become more important for PA participation as the child gets older (and becomes more motor competent) (Stodden et al., 2008). So far, only a few studies are examining the causal relationship between the quality of FMS and PA (Barnett et al., 2011; Jaakkola & Washington, 2013; Xin et al., 2020), i.e. that having high FMS level may increase options for participation in PA, as well as increased participation leading to further development of motor skills. Some studies suggest a reciprocal relationship between PA and FMS (Barnett et al., 2011; Kambas et al., 2012; Stodden et al., 2008).

Lloyd and colleagues (2014) conducted a 20-year follow-up study of the long-term association between motor skills at age 6 and PA at age 26. They found that in females, overall motor skill proficiency at 6 years of age was positively related to leisure time PA at 26 years of age (Lloyd et al., 2014). In a review article, Logan et al. (2015) reported a small-to-moderate positive relationship between FMS and PA

among 6- to 12-year-olds. It should be noted however, that only one of the 13 studies included was conducted in Europe and self-report PA questionnaires were used in the majority of the studies. Numerous studies have examined the cross-sectional relationship between FMS and PA in children, supporting a low to moderate, positive association ($r<0.50$) between FMS and levels of total PA (TPA), light PA (LPA), and MVPA (Robinson et al., 2015; Lubans et al., 2010). Cross-sectional studies among pre-schoolers (Barnett et al., 2013; Roscoe et al., 2019), children (Barnett et al., 2011; Bolger et al., 2018; Jaakkola & Washington, 2013), and adolescents (Okely et al, 2002) have identified FMS proficiency as an important correlate of PA participation (Lubans et al, 2010). Notably, longitudinal evidence indicates that childhood motor proficiency is also predictive of child (Nilsen et al., 2020) and adolescent (Barnett et al., 2008; Larsen et al., 2015) PA participation.

In Ireland, findings from a recent study by Bolger et al. (2019) among 7-10 year old (n=296) primary school Irish children (Bolger et al., 2019) revealed small positive correlations between FMS and moderate PA ($r(71) = .259$, $p < .05$), and between FMS and total PA ($r(71) = .355$, $p < .05$). Engel et al. (2018) recent systematic review and meta-analysis, investigated the relationship between FMS and PA in pre-schoolers (3-5 years) and primary-school-aged children (5-12 years) following an FMS intervention and found a significant improvement in overall FMS, PA, MVPA, and SB among 18 studies. Holfelder & Schott (2014) systematic review, investigating the relationship between FMS and PA in children and adolescents found strong evidence from cross-sectional studies for a positive relationship between FMS and organised physical activities. This may foster lifelong PA participation amongst children (Field & Temple, 2017), providing greater opportunity for children to engage in a variety of physical activities, games, and sport. Nevertheless, evidence is emerging from the literature that FMS and physical fitness are declining in children internationally (Behan et al., 2019; Bolger et al., 2019; Foulkes et al., 2015; Pienaar et al., 2015).

2.4.4 FMS proficiency levels among youth

Ample literature consistently illustrates that children and adolescents do not obtain proficiency in FMS development (Behan et al., 2019; Bolger et al., 2019; Farmer et

al., 2018; McGrane et al., 2016; Hardy et al., 2010; Mitchell et al., 2013; O' Brien et al., 2016a) and are falling below the expected FMS proficiency levels for their age group (Duncan et al., 2017; Eather et al., 2018; Hardy et al., 2013). As a result, this may affect their sports-specific skill development, and their PA participation (Gallahue et al., 2012; Robinson et al., 2015). Current FMS proficiency levels of children worldwide have been reported to be low (Bardid et al., 2016; Belton et al., 2014; Bryant et al., 2014; Lester et al., 2017; Mitchell et al., 2013; Roscoe et al., 2019; Spessato et al., 2013). Recent studies and trends indicate less FMS proficiency among children when compared to a previous generation (Bardid et al., 2016; Spessato et al., 2013).

On a national level, findings from a recent Irish study (Behan et al., 2019), examining FMS proficiency across the full range of Irish primary school children (n = 2098, 47% girls, age range 5–12 years) found that FMS mastery or near mastery of skills ranged from 16% for the overhand throw, to 75.3% for run. Similarly, Kelly et al. (2019) examined FMS proficiency among male (N = 216) and female (N = 198) Irish primary school pupils from Year 2 to Year 7 (9.0 ± 1.7 years) and reported that the percentage mastery ranged between 1.4% (gallop) and 35.7% (slide), indicating that Irish children's FMS proficiency is consistently low. Worryingly, another Irish study has highlighted that children are entering adolescence lacking in basic FMS (O'Brien et al., 2016a), which is expected to have a subsequent effect on their sport-specific skill development and consequently their PA participation (Field & Temple, 2017; Gallahue et al., 2012).

In other countries, similar trends have been observed, for example, there is evidence to suggest that proficiency levels of FMS among children are generally quite low in an Australian study carried out by Okely and Booth (2004) reporting that the prevalence of mastery and near mastery across a range of FMS was generally low. The proportion of students who displayed mastery of skill did not exceed 35% for any of the FMS (Okely & Booth, 2004). This finding is supported by more recent studies amongst Australian primary school children (Hardy et al., 2013; Hardy et al., 2016) which indicate that children's FMS proficiency is consistently low. In a recent national PA report card, where an 'A' represented the highest score (81–100% mastery), Australian children received a D (21–40% mastery) for 'movement skills' (Schranz et al., 2018). Similar representative studies of children from Brazil and the United States

recorded a low prevalence of mastery for each FMS assessed (Goodway et al. 2010; Spessato et al., 2013).

In the UK, a large proportion of 10-11-year old children rated as non-proficient in overall FMS competency levels (Foweather, 2010), and in Singapore the majority of children aged 6–9 years old score 'below average' or 'poor' on both locomotor and object control skills (Mukherjee et al., 2017). Similarly, research carried out by Mitchell et al. (2013), in a study on 5-13-year-olds in the Waikato region of New Zealand, found that less than half of the participants exhibited proficiency in striking (40%), throwing (31%) and kicking (21%). Likewise, results from O'Brien et al.'s (2016a) study in Ireland found that 11% of early adolescents assessed achieving mastery or near mastery on the nine FMS assessed. The FMS proficiency of Hong Kong children, however, is considerably higher than the aforementioned studies (Goodway et al. 2010; Okely and Booth, 2004), with 24% of participants achieving mastery in a range of 12 FMS (Pang & Fong, 2000).

It is reasonable to state that a growing body of literature illustrates that children and adolescent youth do not obtain proficiency in FMS development (Duncan et al., 2017; Farmer et al., 2017; Hardy et al., 2010; Mitchell et al., 2013; Mukherjee et al., 2017; Okely and Booth, 2004; Roscoe et al., 2019). The fact that FMS proficiency is consistently low amongst primary school children indicates the importance of early intervention programmes in primary school (Hardy et al., 2010), particularly for at-risk vulnerable populations including girls. Further to this, research reports gender differences in the execution of FMS (Barnett et al., 2016; Bolger et al., 2018; Eather et al., 2018), with girls performing lower in object control skills, involving catching, kicking, and throwing, in comparison to boys (Barnett et al. 2016; Butterfield et al., 2012).

2.4.5 Gender differences in youth FMS

Both age and sex have been found to influence FMS proficiency among children (Bardid et al., 2016; Bryant et al., 2014; Freitas et al., 2015; Spessato et al., 2013). Older children typically exhibit superior FMS proficiency than their younger counterparts (Bardid et al., 2016; Freitas et al., 2015; Mitchell et al., 2013; Spessato et

al., 2013) as a result of natural maturation and additional instruction, practice, and feedback (Lander et al., 2015). Gender differences in FMS children are well established (Eather et al., 2018; Barnett et al., 2013; Bolger et al., 2018; O' Brien et al., 2018). In terms of overall FMS proficiency levels, research indicates that boys have commonly been found to demonstrate higher levels of overall FMS compared to girls (Behan et al., 2019; Cohen et al., 2015), although some studies have reported no sex-related differences within overall FMS performance (Hardy et al., 2010; Kordi et al., 2012).

More specifically, research reports gender differences in the execution of FMS (Barnett et al., 2016; Hardy et al., 2010), with girls performing less well in object control skills, involving catching, kicking and throwing, in comparison to boys (Barnett et al., 2016; Butterfield et al., 2012; Eather et al., 2018). In an Irish context, research conducted on 8-12 -year old primary school girls (n = 331; mean age 10.92±1.22) reported 98.1% did not achieve the FMS proficiency expected for their age (Farmer et al., 2018). Additionally, low, moderately, and highly active participants differed significantly in terms of overall FMS ($p = .03$), and locomotor control scores ($p = .03$) (Farmer et al., 2018). Similarly, research that was conducted on primary school children (between ages of 5-14 years) both in New South Wales and America showed that girls performed less well in object control skills, involving catching, kicking and throwing, in comparison to boys (Barnett et al., 2010; Butterfield et al., 2012). Recent Australian research shows girls consistently demonstrate poorer FMS proficiency than boys, particularly for object-control skills. For example, only 14% of Australian girls have mastered the kick and over-arm throw upon entering secondary school, compared to 52% and 53% of boys (respectively) (Hardy et al., 2017).

2.4.5.1 Gender differences in object control (OC) skills

More specifically, further research was carried out to examine gender differences within locomotor and object control subtests (Barnett et al. 2013; Hardy et al, 2010). Boys have been found to perform better in object control skills – catch, throw, strike, kick, bounce and roll (Bardid et al., 2016; Behan et al., 2019; Hardy et al., 2010; Lin & Yang, 2015; O'Brien et al., 2018; Spessato et al., 2013). In a recent Australian study,

an investigation of OC skill execution in 4 to 12-year-old primary-school-aged girls on 153 girls (n= 153; M age =7.7 years old, SD=1.8) reported <5% (of the total group, 4 to 8-year-olds or 9 to 12-year-olds) demonstrated mastery or advanced skill level in the strike, stationary dribble, overhand throw or kick (Eather et al., 2018). These findings are in agreement with previous research among primary school children of all ages including 3- to 10-year-old Brazilian children (Spessato et al., 2013), 7- to 10-year-old Portuguese children (Freitas et al., 2015), and among Australian primary school children (van Beurden et al., 2002). Findings from Eather et al.'s (2018) study demonstrate that the vast majority of girls failed to master any of the OC skills irrespective of age-group, and although mastery levels for the catch were highest, only 34% of girls mastered or displayed near mastery skill level in this skill. These results add to the growing body of research highlighting low FMS levels in girls – especially OC skills (Foweather, 2010; Hardy et al., 2017; Mitchell et al., 2013; Mukherjee et al., 2017; O'Brien et al., 2016; Pang and Fong, 2009). Foulkes et al. (2015) reported better kicking and overhand throwing skills in boys aged 3–5 years in North-west England, while girls were more competent in the run, hop, and gallop. Foulkes and colleagues argue that the gender differences may be due to 1) the influence of socio-cultural or environmental factors, and 2) boys and girls are likely to participate in differing games and physical activities that may contribute to observed sex differences in competence (Foulkes et al., 2015). Evidence indicates that similar patterns exist among older children (Barnett et al., 2010; LeGear et al., 2012; Okely & Booth, 2004; van Beurden et al., 2002) and adolescents (McGrane et al., 2016; O' Brien et al., 2016b; O'Brien et al., 2018), indicating that sex differences in OC skills are established in early childhood and may track into later childhood and adolescence.

2.4.5.2 Gender differences in locomotor (LOM) skills

On the contrary, several studies suggest that girls are likely to display greater proficiency levels in LOM skills (Bolger et al., 2018; Field & Temple, 2017; Roscoe et al., 2019). However, findings regarding LOM skill proficiency are not consistent with some studies reporting no sex-related differences (Bakhtiar, 2014; Kordi et al., 2012). A study conducted by Robinson (2011) found that boys are better than girls in locomotor skills, and in other studies that girls are better than boys (Cliff et al., 2009;

Hardy et al., 2010). The greater LOM proficiency among girls has been previously accounted for by the types of activities that girls are more likely to participate in such as dance (Smyth, 2016), a trend that is also evident in an Irish context (Woods et al., 2018).

2.4.5.3 Causes for gender differences in FMS proficiency

Several studies have reported that an increase in FMS gender differences are observed during puberty and adolescence (Barnett et al., 2010; Bolger et al., 2018; Spessato et al., 2013). The varying levels of FMS proficiency between boys and girls are attributed to a variety of factors including body size, strength, growth, and maturation as well as social and environmental factors (Beunen et al., 2006; Kohl & Cook, 2013). Prior to puberty, however, boys and girls are very similar physically with little differences in biological characteristics including body type, body composition, strength, and limb length (Hardy et al., 2010). Sex differences in FMS proficiency have been explained by the type of activities that children undertake, with boys and girls possessing very similar biological characteristics such as genotype, body composition, strength, and limb length before puberty (Hoffman, 2009). However, differences in motor skill performance at pre-pubertal stages are still widely reported to be present, which would suggest that these differences are due to social and environmental factors such as the influence of family, peers, teachers, and the physical environment rather than biological (Hardy et al, 2010; Junaid & Fellowes, 2006).

Researchers have attempted to explain the extensive differences between sexes, especially in OC related activities such, with some researchers suggesting that environmental and socio-cultural factors explain why boys generally outperform girls at OC skills (as boys generally spend more time participating in different ball games and gross motor activities) (Deaner et al., 2012; Niemistö et al., 2019). Research has shown that boys participate more in ball sports (OC related activities) while girls participate more in dance and gymnastics (LOM related activities) (Bardid et al., 2016; Hardy et al., 2010; Lunn, 2010; Woods et al., 2018). Hardy et al. (2012) reported that the observed gender difference in skills may be accounted to gender norms that preference children's activities, or that girls are not exposed or provided with

reinforcing opportunities to develop OC skills. Indeed, a culturally relevant Irish national study investigating the childhood PA participation levels found that boys are much more likely to participate in team sports/invasion games, such as soccer, GAA, and rugby (Wood et al. 2018) which could be a credible reason for their increased OC FMS proficiency. Additionally, girls were reported to have higher participation levels in dance, swimming, and gymnastics (Wood et al. 2018), therefore explaining their higher competency in LOM skills.

Evidence from previous studies indicates that gender differences in FMS development across the age spectrum do exist (Barnett et al. 2013; Behan et al., 2019; Bolger et al., 2018; Eather et al., 2018; Gromeier et al., 2017). To cater to the needs of both boys and girls, researchers also need to understand these gender differences. Additionally, researchers need to examine whether there is consistency in these gender differences in order to tailor FMS intervention programmes that are unique to the child's developmental requirements (Goodway et al., 2010). Understanding patterns and consistency of FMS acquisition across developmental time for boys and girls is important, as it can help determine how to intervene to improve motor skill proficiency (Barnett et al. 2013). To maximise learning experiences for girls, it is important that researchers not only identify FMS component mastery levels, but that evidence-based and age-appropriate FMS programmes are developed that specifically target areas of need (Hardy et al., 2012).

The fact that FMS proficiency is consistently low amongst primary school children indicates the importance of early FMS intervention programmes in primary school (Hardy et al., 2010), particularly for at-risk vulnerable populations including girls. These low levels of FMS proficiency may translate into a lack of confidence in performing specific skills (Feltz, 1988). Research suggests that without FMS proficiency and a positive perception of such, children may be less likely to engage in PA (Lubans et al., 2010). To better understand the acquisition of FMS alongside levels of PA, it is crucial to consider mediators, such as confidence, that may account for the motor development of children (Lubans et al., 2010).

2.4.6 Perceived motor competence and confidence

Within the realm of motor development, various terms such as “self-confidence”, “self-efficacy”, “perceived ability”, and “perceived competence” have been used to describe one's perceived capability to accomplish a certain level of performance (Feltz, 1988). As previously mentioned, motor skill competence (MSC) is a mastery of physical skills and movement patterns that enable enjoyable participation in physical activities (Castelli & Valley, 2007). Numerous studies have confirmed the proposed positive relationship between children’s motor competence and their PA levels (e.g., Holfelder & Schott, 2014; Logan et al., 2015; Lubans et al., 2010). Perceived skill competence (PSC) refers to an individual’s perception of their actual movement capabilities (Harter, 1999). In other words, an individual’s awareness and belief of their capability to perform both gross and fine motor tasks (Rudisil et al., 1993). Stodden et al. (2008) postulates that when children reach middle-to-late childhood (7–10 years old) their cognitive ability has developed to a stage where they can compare themselves to their peers (Harter, 1982). Furthermore, children who obtain a higher PMC due to a higher actual motor competence (AMC) will perceive tasks as being easier and are more likely to engage in them. This engagement in PA will allow a child to practice and develop their AMC, sustain their FMS proficiency and PA level (Stodden & Goodway et al., 2008).

Similarly, self-confidence (SC) refers to the perceived ability to accomplish a certain level of performance (Feltz, 1988). Research carried out in this field suggests that as children gain confidence in performing fine and gross motor skills, and build a sufficiently diverse movement repertoire, they acquire a high level of movement proficiency that is positively associated with the quality of their psychomotor and cognitive health (Chaddock-heyman et al., 2013). Various studies have been conducted assessing the relationship between perceived movement and actual movement competence (Babic et al., 2014; De Meester et al., 2016; Robinson, 2010) among children, while far fewer refer to perceived confidence (perception of ability/SE) (Robinson, 2010; Barnett et al., 2008), and specifically so within the female childhood population. A recent Irish study investigating the relationship between FMS proficiency and perceived physical self-confidence (PSC) levels among adolescents found a significant correlation ($r = 0.305$) between both variables for

females (McGrane et al. 2016). The McGrane et al., (2016) findings suggest that if a female has low actual FMS proficiency, she may in turn have low PSC levels or vice versa. Another recent Irish study (Farmer et al., 2017), investigating the relationship between PA, FMS proficiency and perceived PSC among pre-adolescent girls (n =160; M age = 10.69 ± 1.40 years) found that while there were high levels of perceived PSC reported, there was no significant correlation between actual FMS proficiency and perceived PSC among the cohort. However, results reported that perceived PSC is a significant predictor (beta = 0.183) of the pre-adolescent participants' overall PA level.

Vedul-Kjelsås et al. (2012) also found that FMS and self- perception was most strongly correlated among girls (r = 0.312, mean age 11.46 years). Viholainen et al.'s study (2014) on self-concept, FMS, and psychosocial well-being also found that FMS proficiency is connected to self-concept and psychosocial well-being among adolescent girls. In contrast to this, Mclntyre et al. (2010) compared the influence of both PMC and MSC on children's PA and found that MSC but not PMC, influenced children's PA behaviour significantly and explained 9% variance of 9-year-olds girl's PA level. It is important to note that it is considered 'normative' for young children to overestimate their abilities, because of cognitive limitations in finding it hard to distinguish between their 'ideal' in terms of competence, and their reality (Harter, 1984). Nonetheless, research suggests that inflated PSC can drive the acquisition of movement skills because children will continue to engage in mastery attempts in activities for which they believe they are skilful (Stodden et al., 2008). Furthermore, this early period has been termed a 'window of opportunity', as children (even if low skilled) can still be keen participators in PA (LeGear et al., 2012). It is, therefore, imperative to gather quantitative information about the actual and perceived movement skill level of the child (Hands, 2008) to allow for the implementation of interventions during this early period. Furthermore, the assessment of FMS (actual MSC) and PSC is particularly important during the preschool and school years as it monitors developmental changes and identifies developmental delays in children (Gallahue & Ozmun, 2006).

2.4.7 FMS assessment in youth

Instruments which assess a child's FMS proficiency would provide opportunities for professionals working with young children in the context of sport and PE to 1) have a more objective understanding of children's skills, 2) better meet children's developmental demands, and 3) analyse the effectiveness of their interventions (Platvoet et al., 2018). Nevertheless, although monitoring children's FMS is considered to have numerous advantages, currently the implementation of FMS measurement in settings like sports training and PE is rather limited and the number of large-scale longitudinal studies on this topic are scarce (Lloyd et al., 2014). Platvoet and colleagues (2018) postulate that most FMS assessment instruments focus on identifying children with FMS development disorders in a clinical setting (one-on-one setting) and are rather time-consuming. Consequently, most existing instruments do not cover the whole performance spectrum (from low to high performance), making it difficult to differentiate between performance levels (Platvoet et al., 2018).

There is no gold standard of motor assessment for children and the available tests vary in their ease of use and interpretability in clinical and research settings (Piek et al, 2008). Griffiths et al., (2018) systematic review of seven movement skill assessment tools, defines these measurement instruments as either norm- or criterion-referenced (Logan et al., 2011). Criterion-referenced tests are designed to be scored as items or criteria are demonstrated; meaning that the score is a reflection of a child's competence on the test items (Griffiths et al., 2018). Most available assessments, however, are norm-referenced, meaning that a child's results are reported concerning a specific population (Spittle et al., 2013). Currently, there are several instruments, which can measure children's FMS performance level, e.g., the Movement Assessment Battery for Children 2 (Henderson et al., 2008), the Bruininks-Oseretsky Test for Motor Proficiency 2 (Bruininks & Bruininks, 2005), and the Test of Gross Motor Development (Ulrich, 1985, 2000). For the purpose of this literature review, the TGMD-2 and Get Skilled Get Active FMS assessment instruments will be discussed.

The Test for Gross Motor Development-2 (TGMD-2) has been extensively used as a process assessment tool of children's motor skill performance (3–10 years old) (Issartel et al., 2017; Barnett et al., 2014). This process-orientated tool consists of six locomotor skill subtests (run, gallop, jump, slide, hop, and leap) and six object

control subtests (striking a stationary ball, stationary dribble, catch, kick, overhand throw, and underhand roll) (Ulrich, 2000). The TGMD-2 is the only tool that assesses gross motor skills in isolation and that focusses on quality of performance (Griffiths et al., 2018). For each of the skills, there are between three and five performance criteria (Ulrich, 2000). Participants perform each of the 12 FMS with each gross motor skill including several behavioural components presented as performance criteria (Ulrich, 2000). The TGMD-2 is notable for the inclusion of credit towards incomplete skills in the scoring system, in which points are awarded for the quality of the action performed, instead of satisfactory completion of the task only. These actions include preparatory movements prior to running and jumping, or arm position during movements (Griffiths et al., 2018). The TGMD-2 is designed to assess the FMS in children and has been used in many studies (Farmer et al., 2018; Mitchell et al., 2013; Rudd et al., 2016; Slykerman et al., 2016), due to its empirically determined reliability and established validity (Barnett et al., 2014; Houwen et al., 2010; Issartel et al., 2017; Lopes et al., 2016).

Lopes et al.'s (2016) study investigated the reliability and construct validity study of the test of TGMD-2 in 5-10-year-old Portuguese children and found that the test-retest reliability analysis was good, with an agreement ratio of .96 (.09) for 12 skills. Cronbach's alpha values showed acceptable internal consistency (.69 for 12 items, .46 for locomotor skills, and .64 for object control skills). Results from this study provide strong support for the construct validity of the TGMD with correlations between the object control and locomotor factors yielding a high positive value (0.82). Kim et al. (2014) study investigated the reliability and validity of the TGMD-2 for South Korean children. The composite reliability of locomotor (.91) and object control (.85) factors highlights that the TGMD-2 is a usable process-orientated gross motor assessment. Finally, Valentini (2012) further evaluated the reliability and validity of the TGMD-2 in 3,124 Brazilian children; all factor loadings were again statistically significant with construct validity evident.

In recent years, the TGMD has been revised to its third edition, the TGMD-3, to accommodate potential changes in the normative population, as well as to incorporate recommendations from experts in the field of motor development and practitioners who frequently use the assessment (Ulrich, 2013). Noticeable changes

included dropping two skills from the TGMD-2, the leap, and underhand roll, and replacing these with the skip, underhand throw, and one-hand strike in the TGMD-3. Validity and reliability of the TGMD-3 have been recently reported among children providing confidence for the usage and collection of new norms (Magistro et al., 2020; Valentini et al., 2017; Webster & Ulrich, 2017).

An Australian FMS measurement tool ‘Get Skilled: Get Active’ has been developed to help support teachers with the increase of primary school students' levels of gross motor skill proficiency (NSW Department of Education and Training, 2000). This process-orientated FMS instrument consists of 12 FMS; a unique strength of the ‘Get Skilled: Get Active’ resource is that all categories of FMS are included within this assessment protocol (locomotor, object- control and stability) (Gallahue and Ozmun, 2006; Haywood and Getchell, 2009). These 12 skills (run, balance, vertical jump, catch, hop, side gallop, skip, overarm throw, leap, kick, two-handed strike and dodge) were selected because collectively, they represent a platform for the development of 65 specialised skills, enabling students to participate in a wide range of physical activities (NSW Department of Education and Training, 2000).

All 12 FMS are composed of observable, behavioural components that together constitute a mature performance of the skill (Okely and Booth, 2004). Each FMS has been broken down into individual components that are developed at different stages of learning; checklists for teachers also exist to help identify student performance (NSW Department of Education and Training, 2000). A substantial amount of evidence in Australia highlights that the ‘Get Skilled: Get Active’ FMS assessment protocol is an appropriate, reliable, culturally acceptable and valid instrument for measuring levels of gross motor skill proficiency amongst children and adolescents (Barnett et al., 2010; Hardy et al., 2010; Okely & Booth, 2004).

In summary, the TGMD-2 and Get Skilled Get Active are designed to assess the gross motor functioning in children 3 through 10 years of age and as mentioned previously, has empirically determined reliability and validity for this age cohort (Barnett et al., 2014; Issartel et al., 2017; Lopes et al., 2016). Monitoring children's FMS is considered to have several advantages, however currently the implementation of FMS measurement in settings like sports training and PE is rather limited and the number of large-scale longitudinal studies on this topic are scarce (Lloyd et al., 2014).

Nevertheless, the assessment and teaching of FMS in young children is an important core component of many early childhood PA and sport interventions (Hands & McIntyre, 2015). The assessment of movement skills is a critical component of many disciplines and professions (Basman, 2019). Although the specific contexts and applications may vary, the basic concepts and strategies are similar to plan efficient and effective movement programmes or to support the involvement of a child with special needs in the wider community (Hands, 2012).

2.4.8 Advancing towards specialised movement skills in a youth sporting context – the relationship between sports participation and the level of motor coordination in childhood.

A positive relationship between participation in organised sport and motor performance in children exists (Elhakeem et al., 2018; Hardy et al., 2014; Kokstejn et al., 2019; Larsen et al., 2015). Motor performance is a combination of FMS and fitness-related components (Biddle, 2007), and is likely an important factor in developing good sports-specific skills and physical activities (Jiménez-Díaz et al., 2019; Okely et al., 2011). Recent evidence shows that motor performance in children predicts PA levels three years later (Larsen et al., 2015) and that early life motor performance predicts engagement with sport and exercise throughout life to older adulthood (Elhakeem et al., 2018). For example, Hardy et al. (2014), using a cross-sectional design, found that participation in organised PA was positively associated with fundamental motor skill performance in 10–16-year-olds. In a prospective longitudinal study, children with high motor competence had greater levels of participation in organised sport at a two-year follow-up than children with low motor competence (Fransen et al., 2014).

Additionally, in a longitudinal study investigating the relationship between sports participation and the level of motor coordination among 6-9-year-old children (n=371), with two-time points, children who reported participating in organised club sport had better motor coordination than children who partially participated or did not participate in organised club sport (Vandrope et al., 2012). Vandrope and colleagues reported that the basic level of motor coordination and the amount of club sports

participation significantly predicted sports participation two years later (Vandorpe et al., 2012). Recent findings from the Vallence et al., (2019) CHAMPS Study-DK complement the above findings, showing that participation in organised sport from 1067 Danish school-aged children (6 to 12 years) is positively associated with motor performance across the coordination fitness spectrum. In particular, participation in organised handball and gymnastics was positively associated with coordination-related and fitness-related motor performance. Despite the limitation of the lack of process-oriented outcomes in this study, the findings from Vallence et al. (2019) suggest that participation in organised handball and gymnastics, or any sport requiring coordination, agility, and fitness, could be a promising method for improving motor performance in children.

Findings from previous community sports-based youth interventions (Camiré & Trudel, 2014; Chan et al., 2019; Koh et al., 2014; Lubans et al., 2017; Santos et al., 2019) provide evidence that FMS coach support strategies may be an effective way to improve FMS competencies and mastery. The acquisition of FMS is not only achieved through natural development and maturation, but also through continuous interaction with a stimulating and supportive social and physical environment including attractive and sufficient space, a stimulating social attitude, as well as a professional instructional approach (Chambers & Gregg, 2016; Wick et al., 2017). As such, a variety of evidenced-based approaches have been used to teach FMS utilising a variety of pedagogical approaches. Thus, a broad range of both 'instructional models' (Gurvitch & Metzler, 2013), as well as teaching strategies (Lee et al., 2020; Rogers et al., 2020), can be implemented when teaching FMS. FMS can be taught and practiced within a game-like environment, where gameplay, either structured or non-structured is integrated into the curriculum or practice environment (Barnett et al., 2016).

For example, Launder and Piltz (2013) in their Play Practice Model suggest expertise in skills can be taught within the game context. Additionally, sport-specific skills, through a Teaching Games for Understanding (TGFU) instructional model-approach (Sheppard, 2014) has been shown to empower young children, deepen their knowledge of game tactics, help improve skills, and contribute to enjoyment levels (Butler & Griffen, 2010). The important point to note when motor skills are taught together/within game components is that FMS contributes to the development and

provide a framework for instruction within integrated models of instruction (especially for non-specialist PE teachers in primary schools) (Barnett et al., 2016). A less studied phenomenon is that FMS in children can also be developed and improved through the medium of dance Lykesas et al., 2014; Robertson-Wilson et al., 2016). Creative dance is currently an exceptional contemporary pedagogical and teaching approach that assists and supports significantly the harmonious kinetic development of individuals (Lykesas et al., 2014). Among youth, dance programmes have facilitated changes in physical outcomes, such as fitness (e.g., Connolly et al., 2011; Urmston et al., 2012), as well as in psychological outcomes (e.g., Connolly et al., 2011; Duberg et al., 2013; Tsompanaki et al., 2019; Urmston et al., 2012).

A variety of intervention models have been trialled with school children to enhance children's FMS (e.g., (Bryant et al., 2016; Duncan et al., 2017; Fagenbaum et al., 2013; Robinson et al., 2015). These aforementioned interventions have had success but largely focus on the practice of FMS skills in isolation and without the context of sports performance (Duncan et al., 2020). However, motor coordination is not the sole determent and the initiation and continuation of sport participation in childhood (Vandorpe et al., 2012). Weiss (1993) postulates that 1) developing and demonstrating competence (skill, fitness etc.), 2) gaining social acceptance and support (parents, peers, coach etc.), and 3) enjoyment derived from participation are the major motives essential to initiating and maintaining involvement in OYS. Evidence indicates that planned instructional programmes emphasising practice on skill acquisition in early childhood and the transition into middle childhood can enhance the development of basic movement patterns in children 4 and 5 years of age and more complex skills in older children (Malina, 2012). Guided instruction by specialists, trained parents or qualified coaches, appropriate motor task sequences, adequate time for practice, and constructive feedback and guidance are essential components of successful instructional programmes at young ages (Kohl et al., 2013; Pearson et al., 2015).

The importance of FMS acquisition among youth in the PA and sporting contexts was rationalised in this section. The literature and research evidence strongly suggests that FMS proficiency have a significantly positive role to play in the development of sport-specific skills (Hardy et al., 2012; Jaakkola et al., 2015; Stodden et al., 2008), and increasing habitual PA level amongst children and adolescents (Lee

et al., 2018; Logan et al., 2015; Lubans et al., 2010; Robinson et al., 2015). A recent systematic review of the health benefits associated with FMS competency found strong evidence for a positive association between FMS competency and PA in children (Engel et al, 2018). It is evident in the recent literature that the causal relationship between FMS and PA is a subject that continues to be addressed by current research, and further studies would strengthen the evidence base (Bremer & Cairney, 2018).

Despite the numerous associated benefits, it has become evident that a poor trend of skill execution and low proficiency levels exists amongst children and young people worldwide (Bardid et al., 2016; Bryant et al., 2014; Eather et al., 2018; Lester et al., 2017; Mitchell et al., 2013). Gender differences in FMS among children also exist (Eather et al., 2018; Barnett et al., 2013; Bolger et al., 2018), and research indicates that boys have commonly been found to demonstrate higher levels of overall FMS compared to girls (Behan et al., 2018; Barnett et al., 2016). It is, therefore, essential for researchers to examine whether there is consistency in these gender differences to tailor FMS intervention programmes that are unique to the child's developmental requirements (Goodway et al., 2013). Research suggests that without FMS proficiency and a positive perception of such, children may be less likely to engage in PA (Lubans et al., 2010), and this is of particular importance for vulnerable at-risk girls. When children perceive themselves as confident in performing FMS, and build a sufficiently diverse movement repertoire, they acquire a high level of movement proficiency that is positively associated with PA (Chaddock-Heyman et al., 2013).

Assessing a child's FMS proficiency would provide opportunities for professionals working with young children in the context of sport to (1) have a more objective understanding of children's skills, (2) better meet children's developmental demands, and (3) analyse the effectiveness of their interventions (Platvoet et al., 2018), as was discussed. Findings from previous community sports-based youth interventions (Lubans et al., 2017; Rogers et al., 2020) provide evidence that FMS coach support strategies may be an effective way to improve FMS competencies and mastery. A variety of evidenced-based approaches have been used to teach FMS utilising a variety of pedagogical approaches including 'instructional models' (Gurvitch & Metzler, 2013) as well as teaching strategies (Rogers et al., 2020), namely TGfU (Sheppard, 2014), the Play Practice Model (Launder & Piltz, 2013), and also

through the medium of dance (Connolly et al., 2011; Robertson-Wilson, 2016). School and community-based programmes that include developmentally appropriate FMS learning experiences delivered by PE specialists or highly trained classroom teachers significantly improve FMS proficiency in youth (Morgan et al., 2013).

2.5 Bridging the Gap: Promoting Girls' PA and Sport Participation

The evidence in this literature review has clearly outlined and emphasised that PA is important to young people for health, specifically on children's physical, psychosocial, and intellectual development (Eime et al., 2013; Sallis et al., 2016; Woods et al., 2018), and for this reason intervention programmes have been designed, developed, implemented and evaluated with the purpose of increasing PA and/or FMS (Costello & Warne, 2020; Chan et al., 2016; Cohen et al., 2015; Mostafavi et al., 2013; Rudd et al., 2016; Sutherland et al., 2013).

2.5.1 Call for multi-component community sports-based PA interventions for girls

Pre-adolescent girls are an important target for PA behavioural change strategies, as this age cohort may enhance tracking into the crucial period of adolescence (Eime et al., 2020). The quantification of PA intervention effectiveness for this age group of girls has not been adequately reported (Biddle et al, 2014). A comprehensive review was reported by Van Sluijs et al (2007), and PA interventions conducted with pre-adolescent children showed no or inconclusive effectiveness when analysed across a variety of settings. Further to this, no distinction was made in the results by gender, thus while we know that PA levels of boys and girls differ, we do not yet know whether targeting girls alone is more effective than a mixed-sex intervention.

Previous systematic reviews (Camacho-Minano et al., 2011; Voskuil et al., 2017; Salmon et al., 2007) and a meta-analysis (Pearson et al., 2015) have assessed interventions to promote PA in adolescent girls across the school and community settings. Voskuil et al. (2017) reported highly variable effect sizes, inferring that PA interventions only had a small effect on objectively measured PA in girls aged 6–18 years (Voskuil et al., 2017). Camacho-Minano et al. (2011) found overall mixed results regarding the effectiveness of PA interventions for adolescent girls aged 5–18 years but, suggested that multicomponent school-based interventions, which included PE that addressed the unique needs of girls were the most effective. Pearson et al. (2015) reported small but significant effects (g= 0.35, $p < 0.001$) for the effectiveness of PA interventions on girls aged 12 to 18 years. Biddle et al, (2014) meta-analysis study, conducted to test whether an intervention to increase PA in young girls (aged 5-11

years), reported a significant small positive treatment effect (p<.001) for experimental groups participating in PA interventions (N=1641). The differential between treatment and control groups indicated that there was an equivalent of 12.17% more PA for girls participating in the treatment conditions.

To develop and implement targeted strategies to increase team sport participation and, consequently, PA levels among pre-adolescent and adolescent girls, there is a need to understand trends in, and influences on, girls' participation in team sport (Eime et al., 2020), based on the above mixed results regarding the effectiveness of PA interventions for girls. Although previous systematic reviews have examined the effectiveness of interventions designed to increase PA in general (Biddle et al., 2014; Cavill et al., 2012; Metcalf et al., 2012; Yuksel et al., 2020), to date there is no known systematic review investigating the effectiveness of PA interventions that aim to promote girl's participation in team sport in a community setting (Allison et al., 2017). Furthermore, efforts specifically focusing on PA promotion are increasing and improving the PA levels of youth has been recognised as an important public health challenge (Sallis et al., 2016).

2.5.2 PA and sport interventions - evidence for successful implementation

2.5.2.1 School-based PA interventions

Schools are an ideal environment to promote PA in children and help them learn how to maintain activity (Trost et al, 2014). Indeed, a recent multi-level, worldwide review highlighted local school contexts as important correlates to PA in children (Gomes et al., 2017). In accord with the WHO (Langford et al., 2015), Booth and Okely (2005) highlighted the compulsory nature of attendance, teachers as credible change agents, and access to facilities as the primary strengths of a school as an intervention setting. Schools have been a popular setting for such interventions, as they offer continuous, intensive contact with children, and the school infrastructure and physical environment, policies, curricula, and staff have the potential to positively influence children's health (Jurak et al., 2013). Research suggests that children exposed to school-based PA interventions are approximately three times more likely to engage in MVPA during the school day than those not exposed (Dobbins et al., 2013). Evidence from systematic reviews (Kreimler et al., 2011; Van Sluijs et al., 2007) shows that the

most effective school-based interventions among adolescents used whole-of-school approaches that link curricula activities with the broader school environment and the local community. School-based interventions that are multi-component, simultaneously targeting curricular, school environment and policy, and community links, are a promising approach for promoting PA (Okely et al, 2011).

A 2015 meta-analysis of PA interventions with adolescent girls showed that public health-focused interventions can be effective, but the intervention effect was enhanced if the interventions included only girls, was school-based and employed a theory of behaviour change (Pearson et al., 2015). Most recently, Owen et al.'s (2017) systematic review and meta-analysis on the effectiveness of school-based PA interventions for adolescent girls found intervention effects were significant but very small ($k = 17$, $g= 0.37$, $p < 0.05$), which indicates that changing PA behaviours in adolescent girls through school-based interventions is challenging. Hence, tailoring interventions to the interests and needs of girls are likely to enhance effectiveness (Jago et al., 2015).

The Biddle et al., (2014) meta-analysis study on interventions seeking to increase PA in young girls (aged 5-11 years), reported a significant small positive treatment effect ($p<.001$) for experimental groups participating in PA interventions (N=1641). In addition to this, Girls on the Run (GOTR) programme (N=877), found statistical significance in participation self-esteem ($p=0.001$), body satisfaction and PA frequency ($p=0.010$) among elementary school girls (Gabriel et al., 2011). In line with the aforementioned studies, TAAG (Trial of Activity for Adolescent Girls) found positive PA outcomes for adolescent girls (n=3504). Results indicated that intervention schools (n=36) were more physically active than girls in control schools (mean difference 10.9 MET-weighted minutes of MVPA, 95% CI=0.52–21.2) (Webber et al., 2008).

In the UK, Harrington et al.'s (2018) recent cluster randomised controlled trial (N=1211), examining the effectiveness of the 'Girls Active' school-based PA programme, found no difference in change in accelerometry measured MVPA (mins/day; 95% confidence intervals) between Girls Active control and intervention schools at 14 months (1.7; -0.8 to 4.3), however, there was at seven months (2.4; 0.1 to 4.7). Dewar et al (2013) Nutrition and Enjoyable Activity for Tween Girls (NEAT) programme in New South Wales, Australia, evaluated the impact of a 12-month

school-based multi-component programme on adolescent girls' (n=357, 13.2 ± 0.5 years) PA from 12 secondary schools. In contrast to the aforementioned studies, results found the intervention did not impact upon any of the PA outcomes or hypothesised mediators of PA behaviour change, and no significant results were found for within or beyond school day PA.

Moreover, other interventions targeting pre-adolescent and adolescent girls have experienced similar challenges in their attempts to improve PA behaviours. For example, Girls in Sport (GIS) study (Okely et al., 2017), a group-randomised trial aiming to prevent a decline in MVPA among adolescent girls (N=1518 girls, mean age 13.6± 0.02) found no statistically significant differences between the intervention and control groups on any of the variables. Similar to Okely et al.'s (2017) GIS study, a more recent school-based PA intervention, specifically identified as 'The Bristol Girls Dance Project' (BGDP) found no significant difference between the intervention and control groups (Jago et al., 2015) among 11 and 12-year-old girls (N=508). Inevitably, there is a need to seek new ways to assist pre-adolescent and adolescent girls to be physically active by identifying ways to support and encourage sustained engagement in PA over the life course (Jago et al., 2015).

The effectiveness of multi-component school-based PA interventions, particularly those that include links to family and community has consistently been demonstrated in reviews (Cleland et al., 2012; Harrington et al., 2018; Kriemler et al., 2011; Okely et al., 2017; Van Sluijs et al., 2007). These interventions have had some success, with short-term improvements in school-based PA, but limited evidence of positive effects on PA outside of school or during leisure time (for example, sport) (Van Sluijs et al., 2007). Multi-component interventions and interventions underpinned by theory may be the most effective approaches to positively change adolescent girls' PA (Owen et al., 2017).

2.5.2.2 Community-based PA interventions for girls

As well as the school environment, the family and community environment are key for young people's behaviour and for promoting PA (Van Sluijs et al., 2011). Community-based programmes have the capacity to involve parents and other adult role models from the community (e.g. relatives, coaches, older players) who can

influence the PA behaviour of children (Legg et al., 2015). For any PA intervention to be sustainable, the primary responsibility for its maintenance and management must come from the community (Draper et al., 2009). Sims et al. (2015), in a recent systematic review and meta-analysis of controlled studies, examined the effectiveness of 22 interventions on sustained childhood PA. Not only did results reveal that males reported higher levels of MVPA than females (2.67mins/day: 95% CL 2.05, 3.28) but community settings were more effective than school settings (1.70 mins/day: 95% CL 4.84, 8.25) for sustained childhood PA interventions, furthermore suggesting that PA community-based PA and sports interventions may open avenues for PA sustainability among vulnerable at-risk girls.

For example, VERBTM Summer Scorecard (VSS), is a community-wide intervention that sought to increase early adolescent PA participation (9–13 years) (R.D DeBate et al., 2009). Results found that the intervention group (n=1,253) was significantly related to meeting recommendations for vigorous PA (VPA) (OR = 2.08, P = 0.0259), being physically active on weekends (OR = 1.84, P = 0.0017), and reporting more days of trying a new game or sport (OR = 1.49, P = 0.046), unlike the comparison group (n=866). Contrary to DeBate et al. (2009) findings, Robbins et al. (2019) evaluated the effect of a 17-week Girls on the Move (GOTM) intervention on increasing MVPA among fifth to eighth-grade girls in 24 schools in Midwestern USA. Findings reported no between-group differences occurred for weighted mean minutes of MVPA per week at post-intervention (B = –0.08, p = .207) or 9-month follow-up (B = –0.09, p = .118) while controlling for baseline MVPA. The Childhood Health Activity and Motor Performance School Study Denmark (CHAMPS-DK), focused on 1124 primary school-aged participants, found children playing soccer at any frequency demonstrated 3 to 15 times increased odds of achieving at least 60 minutes of MVPA per day as compared to children not participating in organised sport (Hebert et al., 2015).

Community sports-based settings play an imperative role in young girls' participation and retention in OYS (Eime et al., 2020; Mäkelä et al., 2017). Club based participation in sport has been associated with higher rates of meeting the PA guidelines compared to those not participating in sport (Hebert et al., 2015; Marques et al., 2016; Vella et al., 2013). Despite this, there is a lack of effective intervention strategies to promote PA in female youth (Anokye et al., 2018; Baker et al., 2011),

and particularly within a sporting context (Whitley et al., 2019). Although previous systematic reviews have examined the effectiveness of interventions designed to increase PA in general (Cavill et al., 2012; Metcalf et al., 2012), to date, there is no known systematic review investigating the effectiveness of PA interventions that aim to promote participation in team sport specifically (Allison et al., 2017). Additionally, evidence on the use of complex interventions delivered by sports organisations to improve sports participation is lacking (Mansfield et al., 2015). Cavill et al.'s (2012) literature review corroborated this finding and particularly emphasised the low quality of studies. This is particularly so for community-based sports interventions (Cavill et al., 2012) which were characterised by sparse evidence (n=6), methodological weakness (e.g. only one data point pre-intervention and post-intervention and/or very small sample sizes), with mixed results or with some evidence relevant to only very specific populations (e.g. men who play football) (Cavill et al., 2012).

Despite the recommendations for multi-level community-wide interventions for increasing PA, interventions focused on the individual level persist, due, in part, to the challenges that community-based programmes present (Elder et al. 2006; Koorts & Gillison, 2015). For example, community-based programmes may require various levels of activities, such as tailoring to specific audiences, developing partnerships, organising community-based events, promoting them through the mass media, and having social support systems that require coordination of planning, implementation, and evaluation (Elder et al. 2006; Reger-Nash et al. 2006). In terms of the opportunities for organised sports participation outside of school hours, Eime et al. (2015) have proposed young children can participate in modified sports programmes as a pathway to club sport competition (Eime et al., 2015).

2.5.2.3 Modified sports programmes – an avenue to increase PA participation

Modified sports programmes are offered to engage children in play activities designed, among other things, to develop FMS and sport-specific skills for future participation (Cote et al., 2009). These programmes are modified to match the developmental capacity of children and are aimed at the development of FMS and sport-specific skills, rather than competition (Eime et al., 2018). Essentially, the sport is modified to match the developmental capabilities of children by adapting games and activities

through changes to the rules, equipment, and/or physical space to encourage inclusion and maximise participation (Eime et al., 2018). Modified sports are entry-level programmes; sports organisations (clubs and governing bodies) should have an interest in retaining players, which requires these young people to transition into club-based competition.

In the Eime et al. (2015) longitudinal study, female players (n= 13,760; aged 4–10 years) of the modified sports programme were followed over 4 years to determine their pattern of transition to club sport competition. Results showed that the majority (59%) transitioned and the peak sport entry age with the highest rates of transition was 7–9 years (Eime et al., 2015). Furthermore, modified sports programmes should be encouraged in an Irish youth sporting context, as recent findings reveal a high proportion of Irish children participate in organised sport, however, a high dropout rate exists with increasing age (Harrington et al., 2016; Woods et al., 2018). Most recent literature has found that less than one quarter (24%) of pupils in 1st year (aged 12-13) of post-primary are not members of a sports club this has increased to 47% by the time they get to 6th year (ages 17-19) (Woods et al., 2018). Therefore, from a health perspective implementation of modified sports programmes continued participation in sport and PA is important (Eime et al., 2018). Consequently, multifaceted interventions that target multiple settings such as schools and communities, and include modified sports programmes are considered important for making positive changes to female youth PA levels (Eime et al., 2015; Murillo Pardo et al., 2013; Van Sluijs et al., 2007).

2.5.3 Effective PA intervention components

A recent systematic review and meta-analysis of PA community sports-based interventions among girls (Pearson et al., 2015) found that greater intervention effectiveness appears to result from multi-component interventions, theory-based, (Sluijs et al., 2007) focused on girls only (Camacho-Minano et al., 2011), target both PA and SB (Pearson et al., 2015), and include a non-formal coach education element (Koh et al., 2014). Based on the available evidence, Ling et al. (2015) concluded that multi-component interventions are more successful than single-component interventions. Multi-component interventions including a number of methods have

proven successful in targeting and improving youth PA participation (Messing et al., 2019; Pearson et al., 2015), namely:

1) combinations of support components (i.e. coaches, family, friends, etc.)
2) individual components (i.e., specifically tailored programmes for individuals/groups)
3) choice components (different options to facilitate behaviour change)
4) educational (i.e., coach education) and environmental components

Other important themes identified as central influences on young people's meaningful experiences and engagement in PA and sport in previous studies include; the social interaction, fun challenges, motor skill focus, non-competitive nature, and personally relevant PA opportunities (Beni et al., 2017; Springer, 2013). James et al. (2018) propose that policy-makers and those involved in PA delivery (e.g., schools, local council and local activity providers) should include young people in designing interventions and facilities to ensure they are meeting the needs of this age group and providing the right opportunities for teenagers to be active. That is unstructured, local, low cost, fun, sociable opportunities and the right facilities to be active (James et al., 2018). Providing girls with such ownership over the intervention design and ensuring sessions are fun and enjoyable, is consistent with multiple principles of the Self-Determination Theory (SDT), including intrinsic motivation, relatedness needs, autonomy support and autonomous motivation (Ryan & Deci, 2000).

Most recently, James and colleagues qualitative study on teenage recommendations to improve PA for their age group (James et al., 2018), identified key recommendations which included 1) make activities more specific to teenagers, 2) give teenagers a choice of activities/increase variety of activity and 3) provide activities that teenage girls enjoy (e.g., fun, sociable and not competitive sport). Furthermore, recommendations made by teenagers to improve activity provision, uptake and sustainability of PA engagement for both themselves and their peers (James et al., 2018). Through doing so, a further understanding can be gained of the current barriers, facilitators and motivation (Patay et al., 2015; Quested et al., 2013; Taylor et al., 2012).

Interventions that had a positive effect on PA behaviour in children integrated structured PA into the formal curriculum (Goh et al., 2016; Martin & Murtagh, 2017; Ward et al., 2010) and one of these components should be a structured PA programme (Innerd et al., 2019). Ward et al. (2010) stated that there is a need for teacher training and that structured PA programmes should be implemented by staff who are specialised and well-trained. Having well-qualified staff could also support skill development and competence in children (Messing et al., 2019). As previously discussed, sports participation can be instrumental in the physical, social and emotional development of children and adolescents (Eime et al., 2013). Yet, the quality of instruction from sports coaches is highly variable, and not all youngsters have positive experiences with sport (Langan et al., 2013; Langan et al., 2015; Merkel, 2013). Indeed, attrition rates for sports participation are substantial (Eime et al., 2019), particularly during the teenage years, and 'lack of enjoyment' and 'problems with the coach' are commonly cited reasons for drop-out (Farmer et al., 2018; Somerset & Hoare, 2018; Wetton et al., 2013). As such, there is scope to improve the quality of instruction across organised PA settings (Fenton et al., 2016).

A systematic review of interventions to promote PA within young and adolescent girls reported that the strongest evidence of success was associated with multi-component school-based interventions that are combined with community opportunities for PA that address multiple levels of influence on behaviour (i.e. as outlined in socio-ecological frameworks) and include enjoyable PE experiences as the main component (Camacho-Miñano et al., 2011). Effective interventions are also reported to consist of both a PA and cognitive component (Demetriou et al., 2019). Peer support strategies are also considered promising; whereas family support has been reported by some as ineffective (Camacho-Miñano et al., 2011). Strategies considered most appropriate for public health agencies and partners to promote PA to adolescents include community-wide campaigns, increased access to places in which to be active, educational information or outreach programmes, and enhanced PE programmes integrated within a socio-ecological perspective (Casey et al., 2014; Mehtälä et al., 2014).

In addition to this, recommendations for school- and community-based PA programmes from various countries have FMS development as an integral aspect of physical education, school and community sport (Morgan et al., 2013; O' Brien et al., 2016b). Recent evidence supports a positive association between competence in FMS

and PA in young people (Hulteen et al., 2018). For example, the effectiveness of a community-based FMS intervention, “Multimove for Kids” project, reported that the intervention group demonstrated a higher gain in both LOM ($\beta = 3.78$, SE = 1.08, $p < 0.001$) and OC ($\beta = 4.46$, SE = 1.06, $p < 0.001$) skills than the control group in children aged 3–8 years (Bardid et al., 2017). Additionally, girls demonstrated a lower gain in OC skills ($\beta = -3.50$, SE = 0.49, $p < 0.001$) and higher gain in LOM skills ($\beta = 1.01$, SE = 0.44, $p = 0.022$) than boys, regardless of group (Bardid et al., 2017). A variety of intervention models have been trialled with school children with a view to enhancing children’s FMS (e.g., (Bryant et al., 2016; Duncan et al., 2017; Robinson et al., 2015). These aforementioned interventions have had success but largely focus on the practice of FMS skills in isolation and without the context of sports performance (Duncan et al., 2020). Findings from previous community sports-based youth interventions (Lubans et al., 2017) provide evidence that FMS coach support strategies may be an effective way to improve FMS competencies and mastery.

With a specific focus on increasing PA amongst girls, research has shown the importance of providing a wide range of appealing activities (Morgan et al., 2019), providing girl-only sessions (Mitchell et al., 2015), and underpinning an intervention framework with theory (Owens et al., 2017). Recognising the importance of motivation for the long-term adoption of a behaviour (Deci & Ryan, 2000), many interventions focus on attempts to promote action by converting motivation into action (Hardcastle et al., 2015). Such motivation can come from observing positive results in others and it has been suggested that role models can inspire for young people to become involved in, or maintain involvement in, sport and PA (Lawler et al., 2020). Meier (2015) specifically recommends the use of female role models within local communities to increase PA among females.

These recommendations also highlight the importance of ensuring sustainable engagement in PA through the development of school and community links (Morgan et al., 2019). Interventions linking the school and wider community have shown to be effective in sustaining changes in PA levels among adolescents (Casey et al., 2014; Van Sluijs et al., 2007), which ultimately requires effective partnership working within communities. That said, there is a need, therefore, to design and implement preventative strategies to help evade the age-related decline in PA that is characteristic of adolescent girls (Morgan et al., 2019).

2.5.4 Research considerations and frameworks for designing and evaluating PA and sport intervention studies

Various frameworks for the development of health promotion interventions have been suggested including intervention mapping, the behavioural epidemiology framework and the MRC (Medical Research Council) framework for developing and evaluating complex interventions (Craig et al., 2008; Fernandez et al., 2019; Sallis et al., 2000). These frameworks generally suggest using behaviour change theory, existing evidence and conducting formative research with the target group (Craig et al., 2008; Fernandez et al., 2019; Sallis et al., 2000).

The original UK Medical Research Council (MRC) framework for evaluating complex interventions recommended sequential phases of development, feasibility testing and evaluation, culminating in the estimation of an effect size via a randomised controlled trial (RCT), prior to wider implementation (Campbell et al., 2000). The 2008 update of the MRC guidance for complex intervention development and evaluation provides a four-phase, cyclical framework advising health researchers to answer a range of sequential questions regarding complex intervention theory, feasibility and acceptability, effectiveness and cost-effectiveness, and sustainability (Craig et al., 2008), as shown in Figure 2.2.

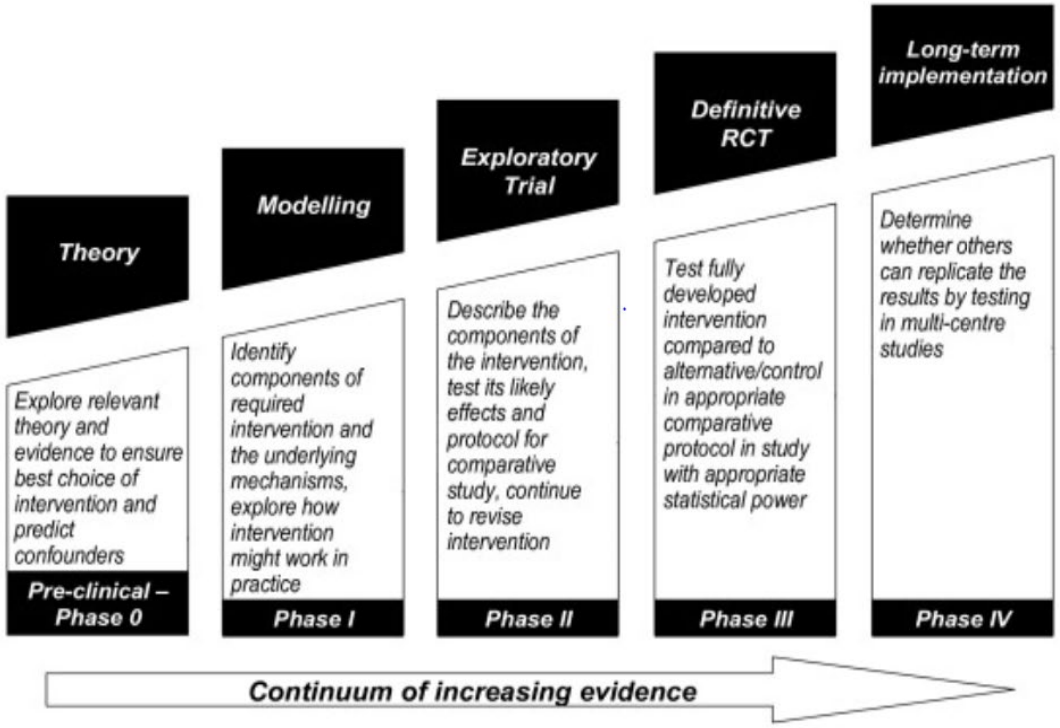


Figure 2.2: Medical Research Council (2000) Framework- Phases of investigation in the evaluation of a complex intervention.

The revised 'Gaelic4Girls' intervention includes the pre-clinical Phase 0, Phase 1 and Phase II, as highlighted in Figure 2,2.

1. *The first phase (intervention development):* involves the development of an intervention's theoretical rationale, often depicted in a 'logic model' describing inputs that the intervention involves, the processes that these initiates, and the mechanisms via which these are intended to realise positive outcomes. This phase should identify underpinning 'active ingredients' and how intervention components are expected to synergistically interact with one another, and with the context of delivery, to generate outcomes (both intended and unintended) (Bonell et al., 2014).

2. *The feasibility and piloting phase:* include testing the feasibility and acceptability of the proposed intervention and its evaluation methods. Although the exact distinction between feasibility and pilot studies is contested (Lancaster, 2015), pilot studies may simply be a smaller version

of the main trial, aiming to implement the intervention and its trial on a smaller scale (for example, with smaller samples, in fewer sites and/or for shorter follow-up periods), while feasibility studies may focus only on select intervention or trial elements about which there is particular uncertainty. Further refinements may be made to the intervention theory after this phase to optimise the intervention design, logic model and the proposed evaluation design prior to testing effectiveness and cost-effectiveness (O'Cathain et al., 2019).

3. *RCTs and 'implementation studies':* Once a well-theorised intervention has been developed and feasibility questions addressed, RCTs are recommended to examine their effectiveness (and cost-effectiveness) whenever randomisation is practicable (Craig et al., 2008). Finally, 'implementation studies' are also needed to address the scale-up of interventions into routine practice (Craig et al., 2008). The cumulative effect of these processes should be the generation of a strong theoretical and evidence base for public health intervention which provides greater confidence that outcomes observed during trials can be replicated in real-world settings, and which supports the ongoing cycle of developing and evaluating complex interventions (Fletcher et al., 2016).

Additionally, according to the MRC (2008), there are some fundamentally important considerations for researchers to take into account developing an intervention including:

- *Being clear about what you are trying to do: what outcome you are aiming for?*
- *How you will bring about change?*
- *Does your intervention have a coherent theoretical basis? Have you used this theory systematically to develop the intervention?*
- *Can you describe the intervention fully, so that it can be implemented properly for your evaluation, and replicated by others?*
- *Does the existing evidence – ideally collated in a systematic review – suggest that it is likely to be effective or cost-effective?*

- *Can it be implemented in a research setting, and is it likely to be widely implementable if the results are favourable?* (Craig et al., 2008)

Sport-based youth development interventions founded on principles of inclusion and participation (Borbee et al., 2019) expand their focus beyond physical health, promoting holistic development in physical, cognitive, affective, social, and lifestyle domains (Hermens et al., 2017). Sport-based youth development interventions underpinned by theoretical frameworks which involve youth in physical activities that intentionally foster developmental assets (e.g., values, commitment to learning, social competencies, positive identity) and surround youth with protective factors (e.g., support, relationships, experiences, resources, opportunities) are important facilitators of health for at-risk youth (Hermens et al., 2017; Holt et al., 2016; Whitley et al., 2019).

2.5.5 Theoretical considerations for successful PA and sportinterventions

Even though quite a few studies refer to a theoretical model (e.g., social cognitive theory, the theory of planned behaviour, transtheoretical model, positive youth development, self-determination theory) to explain PA behaviour and sport participation enhancement (Holt et al., 2016; Michie et al., 2011), very few of them explicitly design and evaluate their intervention based on the respective theory (Demetriou & Höner, 2012; Owen et al., 2017). The current G4G intervention is underpinned by the established SDT (Deci & Ryan, 2002), and elements of the social-ecological model (SEM) (Stokols, 1996), because it's theoretical foundations are concerned with how the psychological and socio-environmental conditions (e.g., created by a coach) can support an individual's motivation (Fortier et al., 2012).

2.5.5.1 Self-Determination Theory (SDT)

SDT (Deci & Ryan, 2000) is a motivational theory that has received significant research attention and support in predicting PA as well as in the development of PA and OYS interventions (Fenton et al., 2016; Fortier et al., 2012). The SDT has been successfully applied in order to understand the psychological processes likely to impact upon PA engagement across many contexts, including youth sport (Fenton et

al., 2014; Fortier et al., 2012; Lawler et al., 2020). SDT is uniquely placed among theories of human motivation to examine the differential effects of qualitatively different types of motivation that can underlie behaviour (Deci & Ryan, 2000). Originating from a humanistic perspective, hence fundamentally centered on the fulfilment of needs, self-actualisation, and the realisation of human potential, SDT is a comprehensive and evolving macro-theory of human personality and motivated behaviour (Deci & Ryan, 2000). Specifically, three psychological needs are hypothesised which are considered to be psychological nutrients for autonomous motivation and psychological well-being (Sebire et al, 2013). The needs are autonomy (i.e., to be choiceful and the origin of one's action), competence (i.e., to feel effective and confident in one's abilities and actions) and relatedness (i.e., to feel a sense of meaningful and mutual connectedness with others) (Deci & Ryan, 2000; Fortier et al., 2012).

According to this theory, the level of satisfaction of the basic psychological needs of competence, relatedness and autonomy decides whether a person is intrinsically motivated to engage in a certain behaviour or not (Demetriou & Bachner, 2019). As Player (2010) posits, one advance in the process of creating the right environment in OYS is supporting a child's intrinsic motivation. Among different theories used to understand PA behaviours, Deci & Ryan's (1985) SDT proposes that meeting participant's three psychological needs will help them remain intrinsically motivated in an activity (Deci & Ryan., 2008; Fortier et al., 2012; Guzman & Kingston, 2012). According to SDT theorists, the importance of the individual fulfilling the needs of competence, relatedness, and autonomy determines the degree to which an individual will be self-motivated (Baric et al., 2014). Furthermore, Deci and Ryan asserted that fulfilment of basic needs leads to greater intrinsic motivation or the pleasure and enjoyment experienced by engaging in an activity rather than the goal associated with the behaviour (Deci & Ryan, 2000).

Most cross-sectional studies have confirmed the positive influence of intrinsic motivation on PA (Sebire et al., 2016; Ntoumanis et al., 2020; Demetriou & Bachner, 2019). Results from Sebire et al. (2013) cross-sectional school-based intervention study, based on SDT to promote girls' PA, found the girl's (n=600) motivation that is based on enjoyment and inherent satisfaction of PA is associated with their objectively-assessed PA. Additionally, such motivation was positively associated with perceptions of psychological need satisfaction (Sebire et al, 2013). It is less clear though if positive

changes in intrinsic motivation – and more precisely in the three underlying basic psychological needs – can serve as significant mediators in interventions trying to promote PA of children and adolescents (Owen et al., 2014). However, a few longitudinal studies are pointing to the promotion of the basic psychological needs as a promising means for increasing PA in youth (Demetriou & Bachner, 2019; Laroche et al., 2019; Lawler, 2016). For example, in a study by McDavid et al. (2014) examining early adolescents over a period of three years, students' satisfaction of autonomy and relatedness as well as their intrinsic motivation in the context of PE significantly predicted the development of leisure-time PA. SDT is particularly appropriate for understanding pre-adolescent girls' PA participation viewpoints (Player, 2010) because the theoretical framework focusses on understanding the quality of an individual's motivation (e.g. how self-determined their reasons for PA participation are). Previous research suggests that more autonomous PA motivation is positively associated with child and adolescent PA participation (Fenton et al., 2016; Dishman et al., 2016), and positive psychological outcomes (such as quality of life and physical self-concept etc.) (Standage et al., 2012; White et al., 2018). This hypothesis is supported by empirical research among children (Demetriou & Bachner, 2019; Sebire et al., 2013) and adolescents (Owen et al., 2014). Within SDT, people's psychological needs can be supported or undermined by the motivational climate that an authority figure (e.g., teacher/coach) creates through their motivating or teaching style (Deci & Ryan, 2008; Su & Reeve, 2011). Need supportive styles are underpinned by the provision of autonomy support, structure and involvement which is reflected in how teachers' (or sports coaches) conduct their classes and interact with pupils/players (Keegan et al., 2010; Occhino et al., 2014).

SDT advocates finding ways in which young girls can develop a sense of choice and ownership over their own PA (autonomy), feel capable engaging in PA (competence), and are supported within a broader social context (relatedness) that will foster more self-determined forms of motivation (e.g. participating for fun or personally valued benefits), which are in turn positively associated with heightened PA levels (Sebire et al., 2016). SDT, therefore, suggests that PA interventions, such as the current G4G programme, which target enjoyable and valued activities, and foster perceptions of ownership, competence and belonging, are more likely to result in a sustained behaviour change (Demetriou & Bachner, 2019; Schneider et al., 2018; Sebire et al., 2013).

2.5.5.2 Social Ecological Model (SEM)

The revised G4G intervention was also designed using elements of the Social Ecological Model (SEM) (Stokols, 1996), grounded in three key elements (organisational, interpersonal and individual). An ecological model used to examine levels of PA in youth may reasonably examine intrapersonal factors (for example, attitudes and opinions youth hold about being active), their own behavioural experiences (for example, the extent to which being physically active is part of their behavioural routine), their social environment (for example the types of role models and encouragement that they receive from others to be active) and factors in the physical environments of their neighbourhoods (such as how safe it is to play outside or the availability of parks and recreational areas (Hearst et al., 2012).

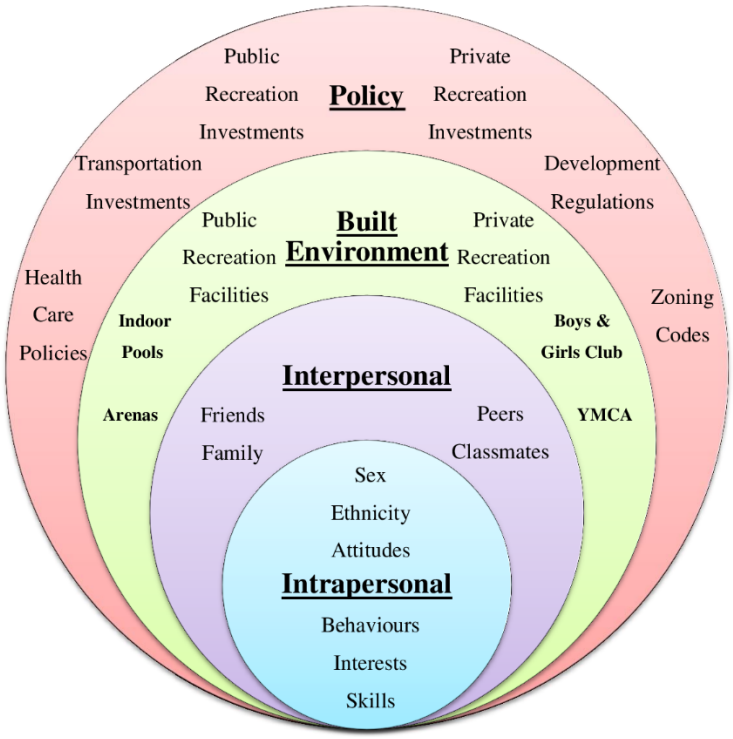


Figure 2. 3: Social-ecological model of children's participation in physical activity programmes - adapted from Sallis, Owen, & Fisher (2008).

The SEM provides an overarching framework for understanding the impediments and enablers to PA behaviour as it not only focuses on individual characteristics but also considers the social and physical environment context which can include family, friends, neighbourhood associates, formal and informal organisations, design of urban environment and facilities which promote or prevent PA (Fleury & Lee, 2006; Giles-corti & Donovan, 2002). As shown in Figure 2.3, the individual and his/her

knowledge, skills, and attitudes are at the centre of the model. Layers of the model emanate from the individual to levels of the environment. Interpersonal factors including family, friends, and social networks, organisations and social institutions, and community relationships between organisations form the levels of the model. The outermost layer is society, encompassing public policy reflected in national, state, and local laws and regulations (Solmon, 2015). There is a reciprocal nature to the relationships between the layers, and to design environments that promote PA and other health behaviours, it is necessary to consider how multiple levels of the model interact (Solmon, 2015).

In order to structure relevant determinants, the conceptual framework for this research adopted Bronfenbrenner's ecological model of child development and well-being (Bronfenbrenner, 1994, 1977; Spence, 2003). This model proposes that a child's development is affected by multiple levels of influencers including the micro-system which includes direct influencers such as family, school and neighbourhood (Bronfenbrenner, 1994). Bronfenbrenner's model advocates the need to address factors at multiple levels to understand and change PA behaviours (Cadogan et al., 2014). Multi-level approaches derived from such ecological models have been recommended to examine PA determinants (Sallis et al., 2011). The SEM has been applied in a variety of settings to identify key elements for success and to guide efforts to promote PA including community-based PA interventions (Haggis et al., 2013), and PE (Elder et al., 2006; Langille & Rodgers, 2010; Martins et al., 2017; Belton et al., 2019). For example, the Sigue la Huella PA intervention (Murillo Pardo, 2014) on 12-15-year-old adolescents (n=368) was underpinned by the SEM, findings reported that MVPA increased in the experimental group ($\beta = 7.02$, 95% confidence interval (CI) = 1.27 to 12.78, $p = 0.017$). A recent study by Zeng et al. (2019) on social-ecological correlates of FMS among preschool-aged children in Colorado found positive associations on a child, family, and environmental level. Child perceived cognitive competence, parent education, and the physical environment were positively associated with locomotor skills ($p= 0.02$) and explained 5.5% of the variance at the environmental level (Zeng et al., 2019).

Ultimately, a social ecological perspective provides an innovative theoretical framework to guide the investigation of multiple factors influencing PA behaviour change (Stokols, 1996; Sallis et al., 2008). Given the fact that PA must take place in

specific physical settings that are likely to influence an individual's choice to be physically active, a social ecological perspective is particularly suited for studying PA (Zhang et al., 2012)

2.5.5.3 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) (Ajzen, 1985), an extension of the Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975), is another prominent psychological model that has been proven to be effective, and versatile for examining the antecedents of PA behaviour among children and adolescents (Hagger et al., 2002; Cousson-Gélie et al., 2019; Darabi et al., 2017; Wang & Wang, 2015). According to TPB, behavioural intention is influenced by attitude, subjective norms, and perceived behavioural control (PBC) (Ajzen, 1985; Azjen, 1991). Moreover, human behaviour is guided by different subjective probabilities (e.g. Fishbein/Ajzen, 1975), that means beliefs about the consequences of the behaviour, beliefs about the normative expectations of other people and beliefs about the presence of factors which may facilitate or impede the performance of the behaviour (Sommer, 2011). Beliefs are based on a wide range of background factors. In their aggregates, behavioural beliefs produce attitude towards behaviour, normative beliefs result in subjective norms and control beliefs generate perceived behaviour control. The combination of all these elements leads to the formation of a behavioural intention (Ajzen 2002, p. 107). The behavioural intention could be described as *"... instructions that people give to themselves to behave in a certain way*" (Triandis 1980, p. 203). In other words, intention represents the motivation of an individual's conscious plan to exert effort to perform the behaviour. The intention could be understood as an immediate antecedent to behaviour (Ajzen 2002, p. 107). Figure 2.4 presents an overview of the interplay between the so-called background factors, beliefs, aggregates, intention and behaviour (Ajzen 2005, p. 135).

The relation between intention and behaviour could be described as follows (Sheeran 2002, p. 1): *"People do what they intend to do and do not do what they do not intend".* In the present G4G thesis, attitude represents the positive or negative evaluation of engagement in MVPA, whereas subjective norms reflect perceived social pressures to perform MVPA. PBC refers to resources and obstacles that facilitate or impede engagement in MVPA behaviour (Ajzen, 1985; Azjen, 1991). Wang & Wang (2015) postulate that children who have high motivation to engage in MVPA are more

likely to have high MVPA levels. Second, children who express strong feelings of control over their PA are likely to be engaged in more MVPA (Wang & Wang, 2015).

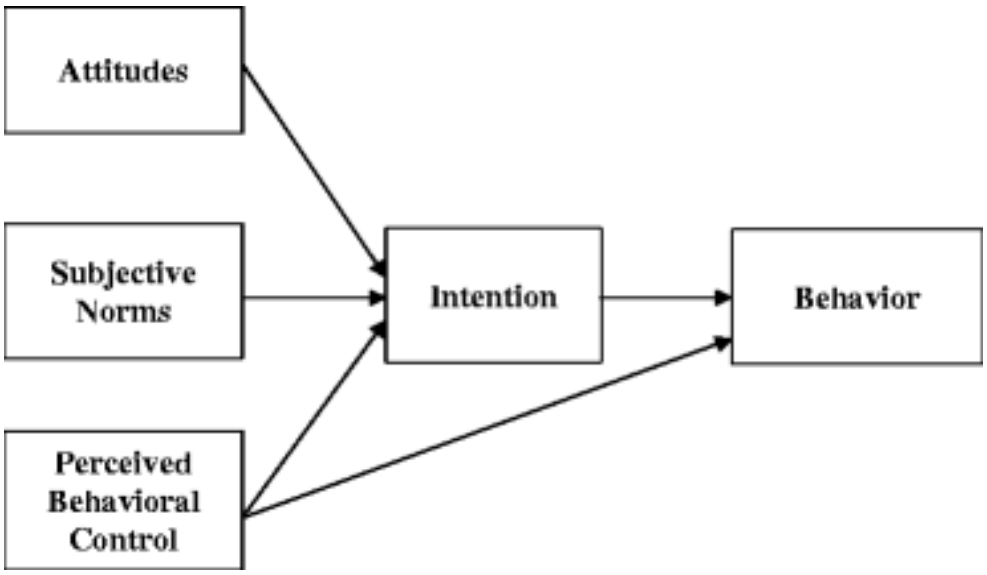


Figure 2. 4: Theory of Planned Behaviour. Source: Ajzen (2005) p.135

Consistent with the TPB, intentions are powerful predictors of behaviour in PA contexts (Hagger et al., 2002) and thus are used as indicators of future sports participation behaviour (Atkins et al., 2013; Chuan et al., 2014; Gardner et al., 2017). Gardner et al. (2017) explored whether enjoyment and behavioural intentions to continue in OYS predicted participation and dropout behaviour among 327 adolescent children (mean age = 13.01 y at baseline). At one-year follow-up, findings revealed that 247 children (75.5%) continued participating in their main sport and 26 individuals (8%) dropped out, with both enjoyment and intentions inversely associated with dropout. However, further research is needed to determine whether these findings generalize across a range of sports to support the use of behavioural intentions as a valid and reliable indicator within youth sport research (Sommer, 2011).

TPB has been applied to examine the PA of children and adolescents from numerous countries (Duncan et al., 2012; Gourlan et al., 2015; Cousson-Gélie et al., 2019; Kuen & Mok, 2013). Kuen and Mok (2013) case study on the application of TPB predicting the PA intention and behaviour of secondary school students (n=486; 11-18-year-olds) in Hong Kong, found the variables of TPB explained 53.1% of PA intention with significant factors of subjective norm and perceived behavioural control

(PBC), increasing to 56.2%. When predicting PA behaviour, the TPB accounted for 26.6% of the variance (Kuen & Mok, 2013). Most recently, Lee et al.'s (2019) longitudinal study revealed that the TPB significantly predicted Taiwanese children's exercise intentions and behaviours (both $p < .05$) during a 6-month interval. A systematic review of 237 independent prospective tests found that the TPB accounted for 19.3% of the variability in health behaviour with intention being the strongest predictor (McEachan et al., 2011). It was also found that the TPB was considerably less predictive of behaviour when studies used a longitudinal rather than a 'shortitudinal' design, and when outcome measures were taken objectively rather than as a self-report.

The TPB is one of the most widely tested models of the factors influencing health-related behaviours (Glanz & Bishop, 2010) and has been shown to be particularly suited to the prediction of PA (McEachan et al., 2011). Findings support the use of behavioural intentions as indicators of sport participation/dropout behaviour and may aid the development of interventions aimed at preventing future dropout (Gardner et al., 2017). As guided by the aforementioned studies, it is encouraged that clinical practitioners, teacher and coaches working with children can help youth engage in regular exercise by enhancing their intentions and perceived behavioural control, and cultivating positive attitudes and subjective norms when planning exercise intervention programmes (Lee et al, 2019).

Understanding the psychological, social, and environmental factors that influence the behaviour of children and adolescents is a crucial component in designing any PA intervention (Eime et al., 2013; Van Der Horst et al., 2007). In this literature review, the author has predominantly examined the significance of PA, sports participation and PA correlates, including FMS amongst young people, as potentially successful contributors for community-based sports programmes (Camacho-Minano, 2011; Pearson et al., 2015; Robinson et al., 2015; Van Sluijs et al., 2011; Woods et al., 2018). Due to the pronounced gender differences in PA during adolescent years and the great disparity for girls between the reality and the targets of the recommended PA level, it is appropriate that pre-adolescent girls are identified as a high priority group for PA promotion (Camino-Macho, 2011).

In this final stage of the literature review, specifically, section 2.5, the evidence highlighted the call for multi-component community sports-based interventions to increase youth PA (Pearson et al., 2015; Voskuil et al., 2017; Jones et al., 2020) among young girls as an important public health challenge (Sallis et al., 2019; Woods et al., 2018). Recent findings from many comprehensive review articles have found that the community sports-based setting provides an ideal opportunity to increase PA among youth; sufficient evidence is now available to recommend global implementation of multi-component community sports-based programmes (Jones et al., 2020; Salmon et al., 2007; Voskuil et al., 2017;). Community-based programmes may require various levels of activities, such as tailoring to specific audiences (namely at-risk of drop-out adolescent girls), and Eime et al. (2015) have proposed young children can participate in modified sports programmes as a pathway to club sport competition. Specifically, a recent systematic review and meta-analysis of PA community sports-based interventions among girls (Pearson et al., 2015) found that greater intervention effectiveness appears to result from multi-component interventions, theory-based, (Sluijs et al., 2007) focused on girls only (Camacho-Minano et al., 2011), target both PA and sedentary behaviour (Pearson et al., 2015), provide activities that teenage girls enjoy (e.g., fun, sociable and not competitive sport), include a FMS development and a non-formal coach education element (Trudel et al., 2010).

Despite this, there is a lack of effective intervention strategies to promote PA in female youth (Anokye et al., 2018), particularly within a sporting context (Whitley et al., 2019), with no known systematic review investigating the effectiveness of PA interventions that aim to promote participation in team sport specifically (Allison et al., 2017). From this review of literature, it is evident that the scientific knowledge of what works is still evolving, and this author agrees it is critical that:

'The conduct and publication of well-designed evaluations of well-defined interventions is crucial to advance the field of youth physical activity promotion and make us better understand which intervention strategies may or may not work, why, and for whom'. (Van Sluijs & Kriemler, 2016, p.1).

CHAPTER 3

METHODOLOGY

3.1 OVERVIEW OF CHAPTER

This chapter presents the description of the research process, providing information concerning the methodological approach adopted as well as a justification of the various methods used in the studies conducted as part of this thesis. The chapter also describes the various stages of the research, which include ethical considerations, the selection of participants, the data collection process, and the process of data analysis. The chapter ends with a discussion of validity and reliability in both quantitative and qualitative research and discusses how these two requirements were met in the current study along with the role of the researcher in qualitative research concerning reflexivity.

As part of this research investigating PA, FMS, and psychological correlates among 8 to 12-year-old girls, four distinct, but connected, studies were undertaken. These included;

- A cross-sectional baseline study (quantitative only) in a school-based setting (Chapter 4), specifically focusing on actual and perceived FMS and the relationship with PA among 8 to 12-year-old pre-adolescent girls;
- A second cross-sectional baseline study investigating PA levels, FMS proficiency and psychological correlates of 8 to 12-year-old pre-adolescent girls in a school-based setting (Chapter 5);
- A mixed-methods intervention protocol study conducted in a community-sports based setting (Chapter 6);
- A non-randomised controlled three-arm exploratory before-and-after study in three community sports-based settings (Chapter 7). Further details of the individual studies can be seen in Table 3.1.

Table 3. 1: Characteristics of studies conducted as part of the thesis

	Study 1	Study 2	Study 3	Study 4
Chapter	**4**	**5**	**6**	**7**
Study Type	Cross-sectional	Cross-sectional	Quasi-experimental intervention protocol study	Non-randomised controlled, three-armed exploratory, before-and-after
Study Design	Quantitative	Mixed methods	Mixed methods	Mixed methods
Sample Size	N= 160	N= 331	N=117	N=120
Data Collection Dates	March to May 2016	March to May 2016	March to June 2017	March to June 2018
Focus Groups	N/A	6 x FG with child participants (n=37)	N/A	1 x FG G4G participants (group 1) n = 6
Primary Outcome Measures	PA using PAQ-C PSC using PSC scale PPSC using a modified version of the Athletic Competence sub-scale	PA using PAQ-C and PACE FMS using TGMD, TGMD-2, and GSGA 9 x Psychological correlates (explained in 3.3)	PA using PAQ-C and PACE FMS using TGMD, TGMD-2, and GSGA Psychological correlates (see Table 3.2)	
Other outcomes	N/A	BMI -Mass using Seca weighing scales -Height using a portable stadiometer	BMI -Mass using Seca 761 dual-platform weighing scales -Height using a portable stadiometer	

PA: Physical Activity; PAQ-C: Physical Activity Questionnaire for Older Children, PACE: Physician-based Assessment and Counseling for Exercise, FMS: Fundamental Movement Skills; TGMD: Test of Gross Motor Development, GSGA: Get Skilled Get Active, BMI: Body Mass Index

3.2 RESEARCH PHILOSOPHY AND PARADIGM

The term research philosophy refers to a system of beliefs and assumptions about the development of knowledge (Saunders et al., 2009). It is important when undertaking research for the researcher to make clear their philosophical position regarding their understanding of what it means to be in the world (ontology) and how they know what they know (epistemology). Prior to choosing the research methodology, the lead researcher underwent the process of exploring and understanding their research philosophy honing the skill of reflexivity, that is, to question your thinking and actions, and learn to examine your own beliefs with the same scrutiny as you would apply to the beliefs of others (Gouldner & House, 1971).

As a researcher, it is required to develop your reflexivity, to become aware of and actively shape the relationship between your philosophical position and how you undertake your research (Alvesson & Sköldberg, 2000). Subsequently, the lead researcher utilised a reflexive tool called Heightening your Awareness of your Research Philosophy (HARP), designed by Bristow & Saunders (2014) to help with the exploration of research philosophy. HARP consists of six sections, each comprising of five statements (a total of 30 statements). Each section considers one aspect within the philosophical beliefs (ontology, epistemology, the purpose of research, the meaningfulness of data and structure), with each statement epitomising a particular research philosophy's position. The lead researcher indicated her agreement or disagreement with each statement, and thus discovered similarities and differences with different aspects of each research philosophy. More specifically, the HARP tool was used within this thesis as a starting point and enabled the lead researcher to ask oneself more refined questions about how they see research and help think about their values and beliefs concerning research. Ultimately, this helped the lead researcher make their values and assumptions more explicit while considering the potential fit between their own beliefs and those of the four major philosophies used in research (the positivist, the interpretivist, the pragmatist, and the realistic research philosophies).

As guided by the HARP research reflexive tool, the current thesis uses a pragmatic paradigm approach following both positivism and interpretivism to seek the answers to the research questions. One philosophical position is 'positivism', which implies that the goal of the research is to produce objective knowledge

through direct observation (Madill et al., 2000). Interpretivist research, on the other hand, implies that the goal of the research is to create new, richer understandings and interpretations of social worlds and contexts (Saunders, 2009). As a research paradigm, pragmatism is based on the proposition that researchers should use the philosophical and/or methodological approach that works best for the particular research problem that is being investigated (Teddlie & Tashakkori, 2009). It is often associated with mixed-methods or multiple-methods (Creswell, 2013), where the focus is on the consequences of research and the research questions rather than on the methods.

Pragmatism as a research paradigm accepts that there can be single or multiple realities that are open to empirical inquiry (Creswell & Clark, 2011). Pragmatist scholars have offered their opinion that there is an objective reality that exists apart from human experience. However, this reality is grounded in the environment and can only be encountered through human experience (Goles & Hirschheim, 2000; Morgan, 2014; Teddlie & Tashakkori, 2009).

3.2.1 Justification of the pragmatic approach

A major underpinning of pragmatist epistemology is that knowledge is always based on experience, and reality is based on beliefs and habits that are socially constructed (Yefimov, 2004). One's perceptions of the world are influenced by our social experiences. Each person's knowledge is unique as it is created by her/his unique experiences. Nevertheless, much of this knowledge is socially shared, as it is created from socially shared experiences (Kaushik & Walsh, 2019). Therefore, all knowledge is social knowledge (Morgan, 2014). The nature of this thesis explores social knowledge within a community sports-based setting among young girls and coaches within a broader team dynamic system. The interpretivism research philosophy aligns with the design, development, implementation, and evaluation of the G4G intervention programme, with the creation of new, richer understandings and interpretations of social worlds and contexts (Saunders et al., 2009).

3.3 RESEARCH DESIGN

3.3.1 Mixed methods

The studies described in chapters 5 to 7 of this thesis adopt a mixed-methods approach. A mixed methodology has been defined by Tashakkori and Creswell (2007, p.4) as, 'research in which the investigator collects and analyses data, integrates findings and draws inferences using both qualitative and quantitative approaches or methods in a single study or programme of inquiry'. As has been previously established in Chapter 2 of this thesis, community sports-based PA interventions for 8 to 12-year-old girls to date are limited and have only yielded small to moderate changes in PA behaviours. Qualitative data was collected to understand human behaviour, emotions, attitudes, and experiences. This was combined with quantitative data to assess other outcome variables including PA levels, FMS proficiency, and several psychological variables. Collecting data from different sources avoids problems associated with evidentiary inadequacy (Erickson, 1986) and allows triangulation between data sources to support findings and assertions (Glesne, 1999).

3.3.2 Justification of a mixed-methods approach

In Chapter 5, the combined quantitative and qualitative data aided in seeking a current representative baseline picture of pre-adolescent self-reported PA levels, FMS proficiency, and investigated correlates of PA among the target population. Additionally, qualitative data aided in the exploration of PA enablers and barriers, which was necessary to ensure appropriate intervention functions and pedagogical coaching techniques were being selected for the target group when designing the G4G intervention. In Chapter 7 qualitative data was collected post-intervention as a method to gain further insight into participant perceptions of the programme and provide vital opinions that otherwise may not have been detected through quantitative data alone.

Van Maanen et al. (2007) recommends the use of qualitative design when developing an understanding of the lived experiences of others. Because there are multiple perspectives describing experiences and perceptions of the G4G programme

implementation, this approach to the study was most appropriate. This combination of multiple perspectives is a strategy to add rigor, breadth, richness, and depth to inquiry (Flick, 2007). Choy (2014) advocates that a complementary approach between qualitative and quantitative approaches for a research topic may provide better results than using only one isolated methodology. Engaging the intended user groups (i.e., children) within the design, eliciting their perspectives on PA and content is central to a phased approach to complex intervention design, and is deemed essential to their success (Davison et al., 2013). Whilst quantitative approaches report PA prevalence and identify associations (Cooper et al., 2015; Robbins et al., 2019), they provide limited contextual understanding or explanation as to why some children are more active than others and offer little insight into intervention design (Noonan et al., 2016). So whilst we get the broad picture of the impact of a sports-based programme for 8 to 12-year-old girls through the quantitative data, the qualitative aspect provides us with more detailed information on a subset of the group who have successfully changed their PA behaviour and how we can engage other vulnerable girls at-risk of drop out with PA and sport participation.

3.3.3 Cross-sectional design

Chapter 4 of this thesis is cross-sectional in design, investigating the relationship between actual FMS proficiency, perceived self-confidence, and PA of 8 to 12-year-old girls in a school setting. Chapter 5 (same dataset as Chapter 4) also includes a cross-sectional design, investigating self-reported PA levels, FMS proficiency levels, and correlates of pre-adolescent girls in a school setting. For both chapters, a cross-sectional design was used as this method can highlight associations that may exist between certain variables, and therefore can provide justification for the development of future research and interventions (Levin, 2006). Conducting a cross-sectional study is useful as correlations between variables can be identified, however, the design is limited as they do not permit the distinction between cause and effect (Mann, 2003). Despite this limitation, a cross-sectional design is useful in estimating the prevalence of behaviour within a certain population (Sedgwick, 2014),

and therefore was chosen as the method as a baseline representation to assess the primary PA, FMS and psychological PA correlates of 8 to 12-year-old girls.

3.3.4 Intervention protocol study

In Chapter 6, the G4G intervention protocol is reported; a 10 week specifically designed multi-component PA and FMS community sports-based coaching intervention, informed by contextually relevant data (Chapters 4 and 5), targeting 8- to 12- year olds, from a community sports club setting.. The lead researcher was guided by the transparent reporting of evaluations with non-randomised designs (TREND) statement for reporting intervention effects (Reeves & Gaus, 2004).

3.3.5 Quasi-experimental non-randomised controlled trial, three-armed exploratory pre-post design

In Chapter 7, the G4G intervention using a quasi-experimental, non-randomised controlled trial (NCRT) design, assessed the effectiveness of a 10 week specifically tailored multi-component PA and FMS community sports-based coaching intervention, informed by contextually relevant data (Chapter 4 and 5) on improving i) overall PA levels, ii) FMS proficiency, and iii) psychological wellbeing when compared with a second intervention group – the existing G4G national programme (intervention group 2) and a control group 3 receiving no programme. Furthermore, the intervention group 1, intervention group 2, and control group 3 were identified using convenience sampling by the lead researcher, although it was requested that they did not select groups based upon judgements of who might benefit most from being involved in the intervention. Using a quasi-experimental design, the programme is viewed as an 'intervention' in which a treatment – comprising the elements of the programme/policy being evaluated – is tested for how well it achieves its objectives, as measured by a prespecified set of indicators (White & Sabarwal, 2014). Quasi-experimental studies are less expensive and less time consuming than Randomised Controlled Trials (RCTs) (Schweizer et al., 2016), and meet some requirements for causality including temporality, the strength of association and the dose-response (Shadish, 2011).The study followed the

transparent reporting of evaluations with non-randomised designs (TREND) statement for reporting intervention effects (Reeves & Gaus, 2004).

3.4 THEORETICAL FRAMEWORK

The G4G intervention is underpinned by self-determination theory (SDT) (Deci & Ryan, 2008), and elements of the social-ecological model (SEM) (Stokols et al., 1996), and the Theory of Planned Behaviour (TPB) (Ajzen & Madden, 1986), because its theoretical foundations are concerned with how the psychological (behavioural) and socio-environmental conditions (e.g., created by a coach) can support an individual's motivation (Fortier et al., 2012). A detailed description of the theoretical frameworks is presented in the final section of the Literature Review and Chapter 6.

The qualitative aspect within this thesis utilises a theoretical research approach that is phenomenological in nature, whereby the lead researcher describes the lived experiences of individuals about a phenomenon as described by participants (Creswell, 2014). For example, increasing our knowledge about the experiences of 8 to 12-year-old girls, parents, and coaches' psychological correlates of PA and sport and the influence of these experiences on their sport participation and coaching practice. Thematic analysis, a method for identifying, analysing, and reporting patterns (themes) within data (Braun & Clarke, 2006) underpinned the qualitative framework within this thesis. Thematic analysis was carried out in which data were analysed inductively using a constant comparison method (Glaser & Strauss, 1967). Thematic analysis is widely used in the field of PA research (Koh et al., 2014; S. Whitehead & Biddle, 2008) providing a purely qualitative, detailed, and nuanced account of data (Braun & Clarke, 2006). A more detailed description of the thematic analysis of this thesis is presented in the Data Analysis section (3.10).

3.5 ETHICAL CONSIDERATIONS

In accordance with the University's regulations for non-clinical research involving human participants, a research proposal form was completed and submitted to the UCC Social Research Ethics Committee (SREC) on 1st December 2015 for the

current research, ‘The design, development, implementation, and evaluation of the Gaelic4Girls intervention’. This document described the purpose, design, and methodology of the research project. It also gave details of the participants’ involvement in the project and outlined any ethical considerations. Due to the nature of the project, the main ethical issue to be considered was confidentiality. The SREC initially reviewed the submitted proposal, and a report was returned in early January detailing suggested changes and revisions. These revisions were predominantly referring to clarity of terms and procedures. A revised submission was then submitted to SREC on 21st January and approval was granted on the 16th of March (Reference no. log2015-005) (see Appendix A).

3.5.1 Informed consent

Within this thesis, informed consent was required for all students; with students under the age of sixteen requiring parental/guardian consent. When designing the Informed Consent form (Appendix), the researcher consulted the Federal Policy for the Protection of Human Subjects, which lists the policy requirements for research involving human subjects (OHRP, 2001) including;

- A statement that the study involves research, an explanation of the purposes of the research and the expected duration of the subject's participation, a description of the procedures to be followed, and identification of any experimental procedures.
- A statement describing the extent, if any, to which confidentiality of record identifying the subject will be maintained.
- An explanation of whom to contact for answers to pertinent questions about the research and research subjects' rights, and whom to contact in the event of a research-related injury to the subject.
- A description of any reasonably foreseeable risks or discomfort to the subject.
- A statement that participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled, and the subjects may discontinue participation at any time without penalty or loss

of benefits to which the subject is otherwise entitled (Drowatzky, 1996) (Office for Human Research Protections, 2001).

3.5.2 Inclusion criteria:

- Students (female-only) between the ages of 8-12 who are in selected class groups in the selected schools at the time of testing (Chapter 4 and 5). Participants who expressed an intention to attend the G4G programme for its full duration (Chapter 6 and 7).
- Informed parental consent and child assent were the requirements for eligible participation in all studies. Students who give their consent (or if under 16 are given parental consent) to participate in the research study.
- Any student unable to partake in the FMS testing (due to illness/injury) may partake in the other parts of the study.
- For coaches to be eligible to partake in the programme, recognised LGF coaching credentials from the National Ladies Gaelic Football Association (LGFA), and previous experience of coaching girls within the existing community sports-based setting were required.

3.5.3 Exclusion criteria:

- Anyone under the age of 16 without parental consent.
- For the FMS measurement, volunteers were excluded from the research if they:
- Carried an injury or illness that affected their involvement in FMS testing.
- Had a history of clinical conditions that may preclude them from exercise.

3.5.4 Confidentiality and anonymity

Participants were reassured that all information provided would be treated in the strictest of confidence. The anonymity of the participants was respected. All participants were given an ID number, which corresponded to the data collected from that specific point. The data gathered from the study was entered into, and will be stored in, the University College Cork (UCC) Network File Storage (NAS) for the

duration of 7 years following the completion of the study, in line with University regulations for examinations. The data will then be destroyed by the principal investigator. All personal details will be stored in a secure place, which can only be accessed by the named researchers. The ID number on the questionnaire was only used by the researcher to identify a subject, meanwhile maintaining confidentiality from others.

3.5.5 Other ethical considerations

To ensure a duty of care and safeguarding of participants, all members of the research team were trained in handling and responding to sensitive issues that may arise during the data collection process, particularly during interviews/focus groups. All the assistant researchers are pre-service physical education teachers (Sports Studies Physical Education Course at University College Cork) and are Garda-Vetted and trained in field-based research. There was no coercion or undue influence of research participants to take part in the research in the recruitment of participants. All participants were free to withdraw from the research at any stage without penalty and without providing a reason. Participants could also require that their data be withdrawn from the study.

3.6 PARTICIPANTS AND SETTING

In this research, girls approximately 8-12 years old were chosen as the target group. This age group was chosen as girls within this category are attending primary school, giving the researcher easy access to many eligible participants. Given that a systematic review and meta-analysis by Farooq et al. (2018) found that on average there is a significant annual decline in MVPA across all age groups from around age 6 years onwards in girls (−10.2%) and from age 9 among boys (−7.8%), roughly equivalent to a 6 minute per day decline in MVPA per year justifies the need to intervene with this population and promote healthy lifestyle behaviours. Club LGFA coaches (male and female) within the clubs were also chosen as a target group to coach the girls in the G4G programme. The coaches had recognised coaching credentials from the national LGFA, and previous experience of coaching girls within the existing community sports-based setting was required.

3.6.1 Sampling

A convenience sample (based on the researcher's proximity to the schools and clubs) of cross-sectional (n= 331 and n= 160), quasi-experimental (n=117), and NRCT (n=118) data were collected from Irish female youth as part of all four study protocols within this thesis. In Chapters 4 and 5, eligible-primary school pupils, enrolled between second and sixth class (8– 12 years) from three, all-female schools (one rural, and two rural/urban) were invited to participate. A representative socioeconomic status demographic was selected, with the inclusion of one school identified as DEIS (Delivering Equality of opportunity In Schools). For the studies described in Chapter 4 and Chapter 5, a school setting was used as the location for cross-sectional baseline data collection. For both studies' convenience sampling was used to recruit from three female-only primary schools. Research has suggested that single-sex groupings are more beneficial to females when it comes to PA (Bender & Litfin, 2015). The G4G programme specifically targets females only and for this reason, female-only educational primary schools were chosen to seek a current representative picture of current PA levels, FMS proficiency, and psychological perceptions of PA and sport participation without the influence of boys in a co-educational setting.

In Chapter 6 and Chapter 7, the G4G intervention protocol study and G4G NRCT intervention were both conducted in a community sports setting in close proximity to the local designated LGF club and the research team. As outlined in Chapter 2, there is currently a paucity of research focusing on multi-component sport interventions for girls aged 8 to 12-year-old in community settings, with the large majority being conducted in school (i.e. before, after or during school time), therefore, the scientific reporting of a multi-component community sports-based intervention is investigated within this thesis. In Chapter 6, convenience sampling was used to recruit from the five girls' only primary schools (rural and rural/urban) in the County Cork region. All schools were in close proximity to the local designated Ladies Gaelic Football (LGF) club, and the research team. For chapter 7, convenience sampling was used in the NRCT to recruit participants from the eighteen girls' only primary schools (rural and rural/urban), from the three surrounding local LGF clubs in the Cork and Kerry regions (Munster Province,

Ireland). Similar to Chapter 6, all schools were in close proximity to the local designated LGF clubs and the research team.

To be considered eligible for all four studies, participants (girls only) were formally enrolled in between the years of second to sixth class of primary school (aged 8- to 12- years old), and had expressed an interest (via assent and parental consent) to take part in the data collection procedures, and had expressed intention to attend the programme for its full duration (Chapter 6 and 7). As described in the Ethical Consideration section, full written assent and parental/guardian consent prior to participation were required for all four studies. If a participant or their parent/guardian did not consent, they were not permitted to participate in the data collection.

3.7 DATA COLLECTION PROCEDURE

3.7.1 Recruitment

Prior to the commencement of the baseline studies (Chapter 4 and 5), the leading researcher emailed the school Principal from all three selected primary schools, calling for expressions of interest for the lead researcher to visit the school, and specifically to inform the girls about the G4G programme. Subsequent to the granted approval from school Principals, the lead researcher visited the school to meet with the Principal and all classes from second to sixth class, where a full outline of the G4G intervention and the associated data collection measurements were provided. Information leaflets (plain language statements) and informed consent forms (Appendix B) were distributed to students who expressed an interest in taking part in the research data collection process. One class group was randomly selected from each school representing each year group - the rationale for the selection of one class from a year group, as opposed to sampling across the full year group was to minimise interruptions to the schools and the teachers.

The same recruitment process was used for the G4G Intervention studies (Chapter 6 and 7). Clubs were initially contacted by telephone and a meeting was arranged with the club Chairperson/Secretary to outline the project. After the meetings, selected clubs that agreed to take part were provided with an information

sheet. For these studies, the lead researcher, along with the two G4G coordinators (head club coaches from the selected LGF intervention club) visited the primary schools, subsequent to the granted approval from school Principals. Information leaflets and informed consent forms (Appendix B) were handed out to students who expressed an interest in taking part in the research data collection process. For coaches to be eligible to partake in the programme, recognised coaching credentials from the national LGFA, and previous experience of coaching girls within the existing community sports-based setting was required.

3.7.2 Field training

Prior to data collection, field staff underwent a rigorous and robust field researcher training workshop in the measurement protocol associated with FMS, self-report questionnaires, FG discussions, and body composition. To enhance the quality of the data across all collection sites, the research assistants (all pre-service physical education teachers) were formally trained by the lead researcher in the standardised measurement procedures and protocols. In total, from 2016-2018, there were 17 field staff, including the two lead investigators, involved in the study's data collection process. Each research assistant (N=15) attended 2-hour robust field training workshop two weeks prior to data collection and was given detailed manuals, checklists, and scripts to read when informing the participants about the measures. To ensure consistency and accuracy, this protocol manual, which included specific instructions for conducting all assessments, was also developed and used by research assistants to standardise procedures and for quality assurance (See Appendix E). In terms of the research rigour associated with school and club-based measurements, the leading investigators (N=2) for the G4G study are qualified post-primary specialist physical education (PE) teachers, as recognised by the Teaching Council of Ireland.

3.7.3 Procedure

All baseline data (Chapters 4 and 5) were collected on participants within their class groups (max n = 30) during specific school visits over an 8-week period from March

to May 2016. The intervention protocol study (Chapter 6) took place in both a community sports club setting and school setting (pre-test in March 2017 and post-test in May 2017). Objective measurements, such as FMS, and body composition were carried out during a 3-hour timetabled block in the community sports club setting, while subjective self-report measurements and FG interviews were taken during a specific school visit, in a supervised classroom, and computer lab, respectively. Due to the numerous schools (n=18) targeted in Chapter 7, all objective and subjective measurements took place in the community sports club settings for the three intervention groups (pre-test in March 2018 and post-test in May 2018).

During FMS data collection, one trained field staff member provided approximately every eight participants with an accurate demonstration of the FMS to be performed. Procedures outlined in the respective examiners' manuals were closely adhered to. Participants performed the skill on three occasions, including one familiarisation practice and two performance trials, as reported in previous Irish adolescent movement skill data collection (O' Brien et al., 2016a, 2016b), and were recorded using a digital video camera (3 × Canon type Legria FS21 cameras; Canon Inc., Tokyo, Japan) to allow for greater measurement scrutiny and accuracy of measurement precision (Okely et al., 2004) during analysis. To ensure consistency and accuracy in the data collection procedure the same researchers were allocated to the same measure/skill in each school visit.

- Researcher A, station 1 (run and skip)
- Researcher B, station 2 (kick and catch)
- Researcher C, station 3 (vertical jump, bounce, and balance)
- Researcher D, station 4 (weight and height measurements)
- Researcher E, researcher D, and lead researcher, focus group interviews
- Researcher A, B, C, D and lead researcher, questionnaire administration

Self-report data were collected on participants (n = 275) in their class groups, with a ratio of 1 researcher to 10 students, for questionnaire completion. The study was briefly explained, and instructions were provided on how to complete the questionnaire. All questions were completed using the online tool SurveyMonkey (San Mateo, CA), with an ID number assigned. For the final study (Chapter 7), all questionnaires were administered and completed in hard copy format, as it was not

feasible timewise for the research team to visit all 18 included schools from the three clubs. All participant questionnaire data was inputted into the online SurveyMonkey tool manually by the research team and was double-checked by the lead researcher prior to data analysis.

Following the completion of the self-report, anthropometric, and FMS data collection, a sub-sample of participants were randomly selected to participate in FGs for Chapter 7. All FGs were conducted in a school classroom and/or community sports club, under supervision, and lasted 45–50 min each, on average. Prior to FG commencement, all child participants and their parents/guardians received and signed a consent form and a plain language statement providing details of the research. Girls from second to sixth class were invited to participate in the FG study by way of a letter, which explained the purpose of the study. Interested girls were given a letter of introduction and a consent form for their parents. The girls were also asked to sign a consent form on the day of the FG allowing for the sessions to be audiotaped.

3.8 MEASURES/INSTRUMENTS

In section 2.2.2 in Chapter 2, the worldwide recommended PA guidelines for health among children and youth were outlined. In order to monitor trends in PA, examine associations between PA and health outcomes, and evaluate the effectiveness of PA enhancing interventions, valid, reliable, responsive, and feasible measures of PA are needed (Benitez-Porres et al., 2016; Hidding et al., 2018; Jekauc et al., 2013). PA can be assessed in two main ways: by self-report (or parental proxy reports for children aged <10 years) or objectively through using equipment that measures movement and/or physiological responses to physical exertion (Mindell et al., 2014). Ideally, as Trost (2007) posits, a PA measurement tool should provide valid and reliable assessments of all four dimensions of activity behaviour (frequency, duration, intensity and type) in all of the PA domains (leisure-time PA, occupational PA, transportation activity and household-tasks). Moreover, the selection of a method to determine PA must be based on careful consideration of the advantages and disadvantages of the instrument, as well as indications for application and evidence to

support that the instrument is reliable and valid (Haskell et al., 2009; Treuth et al., 2005).

3.8.1 Self-reported PA

Subjective measurement tools for PA consist of self-report questionnaires, self-administered recalls, interviewer-administered recalls, diaries, and proxy reports completed by parents and teachers (Innerd et al., 2015), and are preferred in large epidemiological studies (Bervoets et al., 2014). The Physical Activity Questionnaire for Older Children (PAQ-C), developed in Canada to assess the moderate-vigorous physical activity (MVPA) levels of children of an average age of 8–14 in grades 4–8, is a 7-day recall instrument based on self-reporting (Kowalski et al., 2004). A review by Biddle and colleagues (2011) identified the PAQ-C as one of the most promising self-report tools available in the field (Biddle et al., 2011). The PAQ-C has been identified as one of the very few self-report instruments that has acceptable validity, reliability and practicality for use with children and adolescents (Biddle et al., 2011; Benitez-Porres et al., 2016; Chinapaw et al., 2010).

Self-report measures of PA for 8 to 12-year-old girls was measured using the Physical Activity Questionnaire for Older Children (PAQ-C) in all four studies in this thesis (Kowalski et al., 2004).. It is a 7- day recall questionnaire that provides a summary score of PA derived from 8 items, each scored on a 5-point Likert scale (Kowalski et al. 2004). The PAQ-C for all four studies included 15 physical activities, 10 leisure/free-time activities, activities in school (physical education), transport activities (walking to and from school), and other activities. The participants were told to recall what activities they had engaged in the previous 7 days and how many times and the number of minutes they participated in each of these activities.

Habitual PA was also assessed using two questions from the Physician-based Assessment and Counseling for Exercise (PACE) questionnaire: How many days in the last week (PACE 1) and a usual week (PACE 2) does the subject do at least 60 min of physical activity? The PACE questionnaire presents test-retest reliability assessed by the intraclass correlation coefficient (ICC) of 0.77 (López Sánchez et al., 2016), and, due to its simplicity and ease of understanding, the PACE questionnaire was suitable for the 8–12-year-old cohort (Appendix C). Asking about the habitual

activity (Corder et al., 2008) risks responses reporting ‘most active weeks’ instead of ‘usual’ activity or activity in the specified time period, most commonly for children the previous 7 days. For the baseline studies (Chapter 4 and 5), the compound result was obtained from both questions ((PACE 1 + PACE 2)/2) and students were categorised as low active (meeting guidelines on 0, 1, 2, or 3 days a week), moderately active (meeting on 4 or 5 days), or highly active (meeting on 6 or 7 days) (Prochaska et al., 2001).

Studies that have assessed the validity and reliability of the PAQ-C have been varied in study designs and populations, but have overall been convincing (Aggio et al., 2016; Gobbi et al., 2016; Saint-Maurice et al., 2014). For example, Erdim et al. (2019) recent Turkish study among 9-14-year-old children (N = 784) provided evidence for acceptable reliability and validity of the PAQ-C, with results reporting the Cronbach’s alpha was 0.77 and intra-class correlation coefficient (ICC) was 0.91. Additionally, Wang et al. (2016) validation study of the PAQ-C among 8-13-year-old Chinese children (n = 742) reported the Cronbach alpha coefficient (α=0.79), composite reliability value (ρ=0.81), and the ICC (α=0.82) indicating the satisfactory reliability of the PAQ-C score. This study also found to have a moderate correlation with accelerometry (r=0.33, $p<0.05$), suggesting that this instrument is valid at ranking children’s MVPA.

Nevertheless, Hidding et al., (2018), most recent systematic review of PA questionnaires for youth, found no questionnaires were identified with conclusive evidence for both acceptable validity and reliability, partly due to the low methodological quality of the 162 studies included. Authors of this systematic review (Hidding et al., 2018) further recommend high-quality studies on measurement properties of PA questionnaires as an urgent priority. Despite the well-established psychometric properties and desirable measurement characteristics of the PAQ-C, compared to other self-report measures for youth (Chinapaw et al., 2010), more emphasis on the content validity of PA questionnaires is needed to confirm that questionnaires measure what they intend to measure to heighten the strength of PA accuracy.

Furthermore, structured questionnaires can provide useful insight into PA types and domains, which may be particularly relevant to assess behavioural changes

over time and/or in response to PA interventions (Voss et al., 2013). Self-report tools are commonly used in the research field of PA due to their low cost and convenience in large-scale population surveys (Helmerhorst et al., 2012). However, questionnaires have their limitations as well, such as the potential for social desirability and recall bias, as are memory errors; in children, however, a predominant concern is that their developing cognitive abilities may limit their ability to think abstractly and perform detailed recall, in particular when asked to report time (Welk et al., 2000). Asking about the habitual activity (Corder et al., 2008) risks responses reporting 'most active weeks' instead of 'usual' activity or activity in the specified time period, most commonly for children the previous 7 days (Craig et al., 2009). Shorter time periods give greater recall accuracy but determine irregular activities less accurately. Additional concerns exist over the accuracy of questionnaire data from children under 10 years due to their cognitive underdevelopment (Sallis, 1991) and may translate to poor validity coefficients (Helmerhorst et al., 2012), where a tendency exists for questionnaires to over-report PA levels compared with directly measured PA (Adamo et al., 2009). Nonetheless, PAQ's provide an instrument that can independently collect information in addition to be a supplementary tool to further enrich the information gathered from objective measurement (Kohl et al., 2000; Sallis, 1991). Thus, for measuring PA a combination of the more objective measures such as accelerometers and self-report questionnaires seems most promising.

3.8.2 Objective measures of PA

Objective methods include measures that directly assess one or more dimensions of PA (e.g. Frequency, intensity, time, type), and can capture a variety of metrics such as the number of steps, minutes of activity, the intensity of activity, and bouts of activity (Strath et al., 2013). Although it has been argued that there is no "gold standard" for objective PA measurement, (Kelly et al., 2016; Ridgers & Fairclough, 2011) commonly used tools include wearable monitors (e.g. accelerometers, pedometers, and heart rate monitors) as well as indirect calorimetry (doubly labelled water) and direct observation (Sylvia et al., 2014). PA is a multifaceted and complex behaviour, and research has shown that these objective measures are more precise compared to subjective measures (Freedson et al., 2012), better capture the intricacies of PA dimensions, (Kelly et al., 2016; Prince et al., 2008), and provide

more continuous evaluation of free-living activity (Yang & Hsu, 2010). Of the aforementioned objective techniques for PA measurement, accelerometry will be discussed only for the purpose of this literature review.

Accelerometers are becoming the most widely used measure of PA in public health research (Hildebrand et al., 2016; Trost, 2007; Vale et al., 2015) as they provide an objective assessment of energy expenditure and time spent in different intensities of PA (Crouter et al., 2018). Over the past decade, there has also been increasing use of accelerometry to estimate PA in children (Crouter et al., 2018; Rowlands et al., 2014). Accelerometers are considered an effective PA measurement instrument for children and adolescents because of their small size, robust design and relatively modest cost (Fairclough et al., 2019; Pate et al., 2006; Yildirim et al., 2011), and are considered more reliable and valid in children than alternative methods such as self-report (Rowlands, 2007). Despite this, they are relatively expensive to use, compared to other methods of PA assessment, require more complex data handling and processing techniques to estimate PA and their accuracy in tasks requiring greater use of the upper body, cycling, or non-linear movement is not fully established (Rowlands, 2007). Moreover, acceleration is only an indicator of PA, and accelerometers register more movement (counts) during some activities (e.g. walking) than others (e.g. cycling) (Robertson et al., 2011; Smith et al., 2018).

Accelerometers provide quantitative information relating to the vertical accelerations of the trunk and body segments at a user-specified time (Welk, 2002; Trost et al., 2005), and measure complex movements of children's free play MVPA, including step and non-step movements. Current accelerometer technology has introduced algorithms to measure steps, along with counts (Howe et al., 2018). Raw data produced by accelerometers are transformed using various algorithms into PA summaries, which have different labels (e.g. steps, calories, activity counts) and can be aggregated at different temporal resolutions (e.g. minutes, hours, or days) (Karas et al., 2018). Currently, numerous accelerometer-based (counts/min) prediction equations and cut-points are available for estimating children's PA energy expenditure (PAEE) and PA intensity (Trost et al., 2011; Evenson et al., 2008). To accurately estimate PA in paediatric populations (Duncan et al., 2016; Roscoe et al., 2017) accelerometry derived cut-points are useful in determining the extent to which children meet current PA guidelines for health (Duncan et al., 2019). Determination

of cut-points that are specific to age group (e.g., children), model of accelerometer and wear location are critical in ensuring the accuracy of PA assessment (Duncan et al., 2019).

The ActiGraph™ line is the most commonly used and extensively validated accelerometer in PA research for the measurement of PA levels, particularly in studies involving children and adolescents (Addy et al, 2014; Bingham et al., 2016; Cain et al., 2013; Trost et al., 2005; Trost et al., 2011). These small devices are usually worn at the waist (Bassett & John, 2010; Montove et al., 2016) and should be as close as possible to the body's centre of mass (Trost et al., 2005). One of the most recent versions of the ActiGraph model is the GT3X (John et al., 2010) which measures movement in three planes. Previous studies hypothesised that the triaxial accelerometer may be better at capturing children's activity than a uniaxial accelerometer (De Vries et al., 2011). Most recently, Lynch et al.'s (2019) systematic review, which evaluated the accuracy of tri-axial and omnidirectional accelerometers for measuring PA and sedentary behaviour in children, showed that triaxial and omnidirectional accelerometers accurately categorize sedentary behaviour and PA in children when using energy expenditure, as measured by indirect calorimetry (Lynch et al., 2019).

An important recommendation is for researchers to state their methodological 'decision rules' (i.e. choice of epoch length for recording data, criteria for valid days and number of wearing days, etc.) (Cain et al., 2013). However, even with the use of accelerometers, uncertainties remain with regards to the interpretation of the data generated. With advances in technology, variability in data collection settings has increased, presenting some challenges for comparisons between studies and with historical data (Orme et al., 2014). Accelerometers were historically most often set-up to record body movement at 60-s epochs (Ainsworth et al., 2000). Some studies have investigated the effect of epoch duration on measured time spent in different PA intensities in children (Nilsson et al., 2002) and the consensus is that shorter epochs should be used to obtain a more accurate representation of young people's PA levels (Bailey et al., 1995). The epoch is the amount of time over which activity counts are integrated and recorded, and it affects estimates of MVPA in children (Cook et al., 2012; Nicaise et al., 2011). Because of the limited memory capacities of earlier accelerometer models, a 1-minute epoch has been the most commonly used,

but shorter epochs appear to more accurately record the intermittent, short bursts of PA common in young people (Corder & Van Sluijs, 2010). Regarding the minimum number of valid wear days, recommendations typically range from 3 to 10 days (Cain et al., 2013; Grydeland et al., 2014) and reliability estimates differ by age and sex (Fairclough et al., 2007; Trost 2005). Ward and colleagues (2005) suggested that 7 days might be a reasonable standard for all ages. It is recommended that at least one weekend day is required to obtain reliable estimates (Rowlands, 2007; Trost et al., 2005).

Given the increase in popularity of accelerometry as an assessment tool, there have also been considerable efforts made to calibrate accelerometer cut-off points, which is needed to more accurately estimate PA in paediatric populations (Duncan et al., 2016; Phillips et al., 2014; Roscoe et al., 2017). The precise interpretation of accelerometer-based cadence (steps/min) cut-points is necessary for accurately measuring and tracking children's MVPA (Howe et al., 2018). One major concern is the validation of wear and non-wear time when the accelerometer is worn at the hip (Vanhelst et al., 2019). Additionally, the choice of wear time algorithms may introduce significant errors in PA levels assessment (Aadland et al., 2018; Banda et al., 2016; Chinapaw et al., 2014). Algorithms have been proposed to consider the treatment of consecutive zeros recorded by the accelerometer as an indicator of non-wear times when participant wear at the hip (Vanhelst et al., 2019).

Several cut-offs are used as an indicator of a non-wearing period, such as 10, 15, 20, 30, or 60min of continuous zeros (Cain et al., 2013; Ekelund et al., 2004; Ruiz et al., 2011; Troiano et al., 2008). In a review, similarly, Esliger et al. suggested to use 20min of consecutive zero counts as a criterion in children (Esliger et al., 2005). This conclusion concurs with another study performed in 369,517 children aged 8–13years (Janssen et al., 2015). Authors compared three non-wear time algorithms (10, 20 and 60min of consecutive zero counts) with a data reduction log (Vanhelst et al, 2019), and found that 20min is the more appropriate. Different decision rules for defining non-wearing time further reduce comparability across studies, affecting the number of valid days, sample sizes, and particularly, estimates of sedentary time (Choi et al., 2011).

Over the past decade, there has also been increasing the use of accelerometry to estimate PA in children (Rowlands et al., 2014; Crouter et al., 2018). Several reviews concluded that accelerometers provide an accurate, reliable, and practical objective measure of PA in children and adolescents (Corder et al., 2008; Rowlands, 2007). Such methods provide objective data which is more reliable and valid in children than alternative methods such as self-report (Rowlands, 2007). However, this method has some limitations for data collection and processing criteria decisions.

3.8.3 Psychological correlates of PA

A variety of psychosocial outcomes were assessed using existing questionnaires that have demonstrated reliability and validity for use with this age group. The psychological correlates assessed within this thesis are as follows; self-efficacy (SE), physical self-worth (PSW), physical performance self-concept (PPSC), attitudes, subjective norms, behavioural control, intentions, enjoyment, perceived self-confidence (PSC), perceived motivators and barriers to PA participation and perceived peer and parental social support. All psychological correlates were included as part of the overall G4G questionnaire, which was piloted before administration with a small convenient sample of 8-12-year old girls. Information regarding all psychological correlates for the PA instruments used in the four studies within this thesis is presented in Table 3.2. Any modifications made to questionnaires, along with the internal consistency (scale reliability measure) values and relevant references are also reported in Table 3.2. These internal consistency values were greater than .70, representing acceptable internal consistency values (Nunnally & Bernstein, 1994). Specific detail regarding psychological instruments is highlighted in the instrument section of the methodology in all four chapters. See Appendix C to view questionnaire.

Table 3. 2: G4G psychological correlates of PA assessment instruments and scales, with alpha Cronbach Coefficients

Variable	Instrument	Scale	Max score	Reference (taken from)	A	Study
SE	Modified version of the Children's Physical Activity Self-Efficacy Survey (PASES)	11-items (4-likert)	44	Saunders et al., 1997, adapted by Sherwood et al.,2004	.73	Study 2 Study 4
Perceived Self Confidence	Physical self-confidence scale	15-items	150	McGrane et al., 2017	.93	Study 1 Study 4
PA Enjoyment	Modified version of Choices questionnaire	10-items 5-likert)	50	Motl et al., 2001	.80	Study 4
PA Attitudes	The Fife Active Survey Scale	4-item (4-likert)	16	Rowe & Murtagh, 2012	.82	Study 2 Study 4
Subjective Norms	Taken from Rhodes & Smith (2006) Questionnaire	6-item (4-likert)	24	Rhodes & Smith 2006	.81	Study 2
Behavioural Control		3-item (4-likert)	12		.68	
Intentions		1-item (4-likert)	4		.66	
PA Motivators	Modified version of the Physical Activity Outcome Expectancies Scale	11-item (4-likert)	44	Taylor, Chan, & Cummings, 2004	.74	Study 2
PA Barriers	PASS	10-item (4-likert)	40	Inchley, Kirby, & Currie, 2008	.84	

Physical Performance Self-Concept	Athletic Competence subscale taken from the Self-Perception Profile for Children	5-item (4-likert)	20	Sherwood et al, 2004	.73	Study 1 Study 2
Physical Self-Worth	The Child and Youth Physical Self-Perception Profile (taken from PASS)	5-item (4-likert)	20	Inchley, Kirby, & Currie, 2008	.66	Study 2
Peer/Social Support	Modified version of Choices Questionnaire	5-item (5-likert)	25	Birnbaum et al., 2005 Saunders et al., 1997	.74	Study 4
Family Support		5-item (5-likert)	25		.76	

Abbreviations: PA = physical activity; α = Cronbach's Alpha Coefficient; SE = self-efficacy; PSC = perceived self-confidence; PPSC: physical performance self-concept; PSW: physical self-worth; PASS: Physical Activity in Scottish School age children

3.8.4 FMS assessment

The FMS proficiency of participants across seven-movement skills was assessed in conjunction with the behavioural components from three established instruments, namely the Test of Gross Motor Development (TGMD) (Ulrich, 1985), Test of Gross Motor Development-2 (TGMD-2) (Ulrich, 2000), and the Get Skilled Get Active (GSGA)resource (Ryde, 2000). Four skills (run, stationary dribble, kick, and catch) were assessed using the TGMD- 2. The remaining three skills included the skip and the vertical jump, which were both assessed using the TGMD (Ulrich, 1985), and balance, which was assessed using the GSGA Manual (NSW Department of Education and Training, 2000). Each of these instruments and their associated protocols has established validity and reliability in children and are designed to give an objective measurement of gross motor skill proficiency (Farrokhi et al., 2014; Issartel et al., 2017). The seven-item test included culturally relevant skills to LGF: three locomotor skills (run, skip, and vertical jump), one stability (balance) skill, and three object skills (stationary dribble, catch, kick), all of which are culturally relevant to ladies football and deemed important to Irish sporting culture (Woods et al., 2018).

Each skill comprises three to six performance criteria across the seven selected FMS, which are scored as either present (1) or absent (0) and scored over two test trials (Appendix D). Scores for each child were calculated by totalling the correctly performed criteria for two trials for each skill (i.e., if a skill comprises three performance criteria, the score range is 0–6). The maximum subtest scores for locomotor and object control skills were 30 and 22, respectively, with a minimum of 0. The sum of both subtests yielded the total gross motor skill score (total FMS). Raw scores were used in the data analysis as this is recommended for research purposes (Ulrich, 2000).

3.8.5 Focus groups

FGs were used (Chapter 5 and 7) within the studies described in this thesis for two reasons; to involve participant voice during intervention development stages and to gain further insight into participant perceptions post-intervention. Research to increase PA in children and inform intervention design has, to date, largely

underrepresented children's voices (Bentley et al., 2012; Noonan et al., 2016), justifying the use of child participant FGs within this thesis. The FGs within this thesis used a novel combination of qualitative techniques to explore children, views, experiences, and perceptions of PA, sports participation, and the G4G intervention, as well as offering a formative opinion about future intervention design. FGs were conducted by female researchers who had experience facilitating discussions. In addition, field notes were taken to maintain contextual details and non-verbal expressions for data analysis and interpretation (Tannehill et al., 2013). A semi-structured guide was employed and topic guides and questions (Appendix E, F and G) were used to facilitate discussion.

For all child participant FGs, a write, draw, show, and tell (WDST) qualitative technique was incorporated as an ice-breaker activity to further stimulate children's thinking and facilitate discussion around PA and sport participation (Pearce et al., 2009) (Appendix E, F and G). The inclusion of the WDST technique as an ice breaker task was used at the beginning of each child FG to provide children the opportunity to experience talking aloud to the group and to establish an environment in which sharing and listening was valued (Gibson, 2012).

- Firstly, to allow children to express their perceptions of PA visually, we invited children to independently (i.e., not completed in conjunction with peers) draw (and colour) themselves with their '5 favourite physical activities surrounding them'.
- The drawing took the focus away from direct questioning and consensus, to that of a more child-centred approach that better allowed for the lived experience to be shared (Horstman et al., 2008).
- Children were provided with a blank paper, a pencil, and colours and were further encouraged to write down some key 'buzz words to best describe their favourite physical activities next to the drawings'. Children subsequently provided a verbal explanation of the meaning behind their drawn and written responses. Throughout the write and draw activity, the first author separately engaged children in informal conversations for them to articulate what they were drawing and why.

In-depth and semi-structured interviews explore the experiences of participants and the meanings they attribute to them. Researchers encourage participants to talk about issues pertinent to the research question by asking open-ended questions, usually in one-to-one interviews. In some instances, the interviewer might have reworded, reordered, or clarified the questions to further investigate topics introduced by the respondent (Tong et al., 2007). The semi-structured FG interview style was based on the following qualitative research interview method described by Neuman (2000):

- Questions were pre-planned but are tailored to the participant's situation.
- The interviewer showed interest in responses and encouraged elaboration.
- An interview is like a friendly conversational exchange but with slightly more direction from the interviewer.
- An interview is interspersed with jokes, aside from stories and diversion which are also recorded.
- Open-ended questions are used, and probes are frequent.
- The interviewer and participant jointly control the pace and direction of the interview.
- The interviewer adjusts to the participant's norms and language usage.

All FGs were recorded and transcribed verbatim using pseudonyms to protect participant identities. Further details on the focus groups can be found in the relevant chapters (Chapter 5 and 7).

3.8.6 Body mass index (BMI)

Anthropometric measurements were also assessed as secondary outcome measures in all four studies. Height was measured using a portable stadiometer (Leicester portable height scale; Marsden, Rotherham, UK). Participants were measured with their footwear and any obstructive hair accessories removed. The participant was asked to stand straight, feet together, eyes looking forward and to feel the weight evenly on both feet. At maximum inhalation, the horizontal bar was lowered enough to touch the top of the head (International Society for the Advancement of Kinanthropometry, 2001). Measurement was recorded to the nearest 0.1cm. The process was repeated after repositioning the horizontal bar. As per protocol, if the

first two measures differed by more than 0.5cm, a third measurement was taken. The mean of the two closest values was then used.

Mass was measured using Seca 761 dual-platform (Chino, CA) weighing scales. Participants were measured without footwear and heaving outer clothing was removed. The participant was asked to stand on the scales, look straight ahead, arms by their side, and measured to the nearest 0.1kg. Two measurements were recorded, if the two measurements differed by 0.5kg, a third measurement was taken and the mean of the two closest values was then used. Body mass index (BMI) was calculated using the following equation: weight (kg)/height $(m)^2$. In Chapter 4 and Chapter 5, children were categorised into PA groupings and classified as normal weight, overweight, and obese according to gender and age-specific BMI cut-off values proposed by the (Cole & Lobstein, 2012) classification. Subsequently, underweight/normal weight, overweight, and obese subjects were grouped into three weight cohorts.

3.9 INTERVENTION DESIGN AND COMPONENTS

Chapter 6 outlines a detailed description of the G4G Intervention methodological approach including intervention components, materials, and resources, and the theoretical framework underpinnings of the intervention. Intervention Material (manuals/skill cards etc.) are provided in Appendix I, J, and K.

3.10 DATA ANALYSIS

Various methods of analysis were used concerning the quantitative data collected depending on the aim of the study in question. All PA and FMS data were scored according to their relevant scoring protocol and were managed using Excel (Microsoft Excel, Office 365) and analysed using the statistical software programme SPSS version 20.0 for Windows (IBM, Armonk, NY). Descriptive statistics and frequencies for all FMS, PA, and psychological variables were calculated. Before investigating potential correlations, means, standard deviations and frequencies were assessed to ensure the data was normally distributed. All statistical assumptions were tested for normality, outliers, and homogeneity of variance. In instances where

significant main effects were found, post hoc comparisons were carried out using the Tukey honest significance difference (HSD) to determine where the differences occurred. To calculate effect sizes, Cohen d values (1988) were applied, with d= 0.2 representing a small effect size, 0.5 representing a medium effect size, and 0.8 representing a large effect size. Statistical significance was set at $P < 0.05$. A Bonferroni adjustment to the alpha level was made to reduce the risk of Type I error.

In Chapter 4, a one-way between-groups analysis of variance (ANOVA) was used to explore the impact of PA grouping (low, moderate, or high active) on all psychological correlates. In Chapter 5, which investigates the relationship between actual FMS proficiency, perceived motor skill confidence and competence, and PA in 8–12-year-old girls, a two-way between-groups ANOVA was used to identify any significant correlations and explore the impact of the two variables (perceived PSC, PPSC) and PA grouping (low, moderately, or highly active) on total FMS, LOC, and OC scores. Additionally, a Spearman's correlation coefficient test was used to investigate the relationship between actual FMS proficiency levels and perceived PSC levels. A multiple linear regression was conducted to explore the predictive ability of actual FMS, perceived PSC, and PPSC on PA measurement.

For Chapter 7, assessing the effectiveness of the 10-week multi-component community-sports based PA G4G intervention, a series of mixed-model analyses of variance (i.e. between-within subjects) (MANOVAs) were conducted to assess the impact of the intervention group 1 against the intervention group 2 and control group 3 across the PA, FMS, and psychological variables. A summary table of the statistical data analysis used for each study/chapter (2016, 2017, 2019) is presented in Table 3.3.

Table 3. 3: Summary of study objectives and statistical analysis across all studies

	Study Objective	Statistical Analysis
Study 1	• Analyse the relationship between perceived PSC, PPSC, actual FMS, and PA in Irish female children.	One-way between-groups analysis of variance Two-way between-groups analysis of variance Follow-up Bonferroni-corrected post hoc tests Spearman's correlation coefficient Multiple linear regression
Study 2	• Investigate the PA patterns, FMS proficiency, and psychological factors influencing PA in 8–12-year-old Irish girls • Investigate differences in psychological correlates by physical activity patterns	Descriptive statistics and frequencies One-way between-groups analysis of variance Follow-up Bonferroni-corrected post hoc tests
Study 3	• Reports on the theory-based design protocol of the 'Gaelic4Girls'(G4G) study, a novel, multi-component, community sports-based coaching intervention for increasing 8 to 12-year-old Irish girl's physical activity (PA) levels, fundamental movement skill (FMS) proficiency, and psychosocial well-being.	Statistical analysis not undertaken or warranted for this study.
Study 4	• Assess whether 8 to 12-year-old girls who attended a multi-component research-informed tailored 10-week 'Gaelic4Girls' (G4G) community sports-based intervention, could: i) increase their overall PA levels, ii) FMS proficiency, and iii) psychosocial wellbeing when compared with a second intervention group and a control group	Mixed-model analyses of variance (i.e. between-within subjects) (MANOVAs) Follow-up Bonferroni-corrected post hoc tests

As mentioned previously, the FG audio recordings were transcribed verbatim. The leading author double-checked each transcript against the original recording for robustness and accuracy prior to analysis. Transcripts were analysed using thematic analysis procedures (Braun & Clarke, 2006) involving coding, categorisation, and summarizing (Elo & Kyngäs, 2008). A thematic analysis (Joffe & Yardley, 2003) was carried out in which the data were analysed inductively.

a) Familiarisation with the data: first the transcripts were read and reread. Using an iterative process, meaningful quotes were then identified.
b) Generation of comments and descriptive codes for each transcript: phrases from the transcripts were highlighted and grouped, from which themes and subthemes emerged (Neergaard et al., 2009; Pawlowski et al., 2014).
c) Defining and naming codes: quotes considered to represent the same meaning were clustered together and assigned a code, while quotes considered to represent a different concept were given a new code. All of the data were searched until all meaningful data had been identified, clustered, and coded.
d) Identification of a pattern across all data to derive overarching themes: the resulting labels were then scrutinised and organised into themes, each theme comprising labels considered to be conceptually similar. A constant comparison method (Glaser and Strauss, 1967) was implemented in which quotes were continually compared with one another.
e) Reviewing themes throughout the dataset: following the recommendation of Tesch (1990), the whole process remained flexible, meaning that labels and themes could be modified and refined until the most 'reasonable' reconstruction of the data had been developed (Lincoln & Guba, 1985). The categories that were developed were largely based on the research questions.
f) The last step in the analysis consisted of writing the report and some initiatives were taken to ensure the trustworthiness of the interpretations provided (King & Horrocks, 2010), as outlined below in section 3.10.1.

3.11 RESEARCH RIGOUR, VALIDITY, AND RELIABILITY OF DATA

3.11.1 Cronbach's alpha co-efficient

Within this thesis, all scales utilised in the questionnaires for all four studies were tested for internal consistency. One of the most commonly used indicators of internal consistency is Cronbach's alpha coefficient, that is, how closely related a set of items in a scale are as a group and was assessed as a measure of scale reliability in this thesis. Ideally, the Cronbach alpha coefficient of a scale should be above .7 (DeVillis, 2012). Cronbach alpha values are, however, quite sensitive to the number of items in a scale. Negatively worded items in some of the scales were 'reversed' before checking reliability. Table 3.2 reports the Cronbach alpha coefficient values for all PA, FMS, and psychological variables assessed as part of the four studies.

3.11.2 FMS inter-reliability scoring

Once data collection was completed and prior to data analysis, a minimum of 95% inter-rater, intra-rater reliability, and interobserver agreement was achieved by trained field researchers for all seven FMS. Skills were then analysed as per assessment tool guidelines scoring a "1" if the component of the skills is present and a "0" if it is absent (Ulrich, 2000). For each FMS, the two test trials were added together to get the total score for each skill. Scores were then totalled to give the overall locomotor, overall object. Skill mastery was determined when the child correctly demonstrated each performance criterion of the skill in both trials. If children displayed correct performance on all or all but one skill component, they were classified as having achieved mastery or near mastery, respectively, for that skill (Okely & Booth, 2004). Near mastery was defined as the correct performance of all components but one on both trials (van Beurden et al., 2002).

3.11.3 Trustworthiness of data

The trustworthiness of FG data was established through data triangulation, peer debriefing, and dependability. Data triangulation was implemented by examining data from different respondents but collected using the same method. Data were triangulated between the prospective PE teachers/sports coaches and the lead

researcher to examine if concordances and discrepancies were arising. The research team looked for patterns and contradictions investigating the same problem, which brought about different perceptions of inquiry, helping to reduce bias while strengthening the integrity of the FG findings. The research team sought support (peer debriefing) from other academic professionals (staff within the department) to provide scholarly guidance. Such investigators looked at the study background information, data collection methods and process, data management, transcripts, data analysis procedure, and research findings (Pitney & Parker, 2009). Dependability was implemented through the code recode strategy (code agreement), whereby the researcher coded the same data twice, giving 1- or 2-weeks' period between each coding. The results from the two coding processes were compared to see if the results were the same or different (Ary et al., 2010). Disagreements were discussed until an agreement was reached (Braun & Clarke, 2006; King & Horrocks, 2010). The coding results of this current study were in agreement and therefore enhanced the dependability of the qualitative inquiry. The lead researcher also double-checked each transcript against the original recording for robustness and accuracy prior to analysis.

3.11.4 Reporting of data

For Chapter 6 and 7, the transparent reporting of evaluations with nonrandomised designs (TREND) statement for reporting was used (Reeves & Gaus, 2004). Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist (Tong et al., 2007) developed to promote explicit and comprehensive reporting of qualitative studies (interviews and focus groups) was used by the lead researcher within this thesis. The criteria in the 32-item checklist helped the lead researcher to report important aspects of the research team, study methods, context of the study, findings, analysis, and interpretations. Furthermore, the checklist aims to promote complete and transparent reporting among researchers and indirectly improve the rigour, comprehensiveness, and credibility of the interview and focus-group studies (Tong et al., 2007).

3.11.5 Peer-review process

Chapters 4 and 5 in this thesis are published peer-reviewed articles and therefore underwent the peer-review process with experts in the field of youth PA and sport participation, further establishing the validity of the presented research. Chapters 6 and 7 have been extensively reviewed by both Ph.D. Supervisors and have been submitted to Journals for publication.

3.12 ROLE OF RESEARCHER

Gee (1999) states that the researcher as an interviewer in qualitative research plays an important role in how the interviewees construct their reality. The researcher's outlook on life, his/her life experiences, and observations have a high likelihood of influencing the process of collecting, analysing, and interpreting data. The lead researcher acknowledges that personal characteristics including her sport playing profile and professional occupation may have caused some bias in the selection, data collection, and intervention phases within this thesis. The lead researcher is a senior intercounty LGF player in Cork and is known within the GAA community. In addition to this, the lead researcher played a semi-emic role in the research process for the intervention studies (Chapter 6 and 7), as a partial intervention participant in the provision of coach education weekly workshops.

The lead researcher is also a qualified post-primary Physical Education teacher and has numerous years of teaching and sports coaching experience in the GAA. As a result of the lead researchers known athletic profile and sports education background, it was easier for the researcher to establish rapport with the participants and create a safe environment where the participants could construct the meaning of their experiences without feeling that they were being judged.

Furthermore, the lead researcher was transparent and reflexive about the processes by which data have been collected, analysed, and presented. Specifically, the lead researcher was critically self-reflective about her preconceptions, relationship dynamics, and analytic focus; (Polit & Beck, 2013). Patnaik (2013) postulates that an understanding of one's attitudes, values, and biases is a useful tool in not only gaining deeper insight into the research but also in ensuring that the focus

remains on the research and its participants. Within this thesis, the lead researcher kept a research journal explicating personal reactions and reflections, insights into self and past, in a separate journal. After every interview, the lead researcher spent substantial time noting immediate observations, thoughts, and interpretations before the data was subjected to structured analysis. This enabled the lead researcher to capture in its raw state her attitudes and responses to the participant she had met. The lead researcher utilised introspective reflexivity and acknowledged that the researcher's experiences, attitudes, and emotions affect engagement with the participants and subsequent analysis of data. This attempted to maintain research focus by bracketing biases and attitudes of the researcher to minimise, if not prevent, her influence on the research process (Patnaik, 2013).

3.13 CHAPTER CONCLUSION

This chapter has provided an overview of the methods used in the studies described in this thesis, along with a brief justification for doing so. The next four chapters will provide more detail on the individual studies and the methods used. These upcoming chapters are presented as research articles, two of which are published (Chapter 4 and 5), and the remaining two (Chapters 6 and 7) have been prepared for publication in peer-reviewed journals.

CHAPTER 4

THE RELATIONSHIP BETWEEN ACTUAL FUNDAMENTAL MOTOR SKILL PROFICIENCY, PERCEIVED MOTOR SKILL CONFIDENCE AND COMPETENCE, AND PHYSICAL ACTIVITY IN 8–12-YEAR-OLD IRISH FEMALE YOUTH

Chapter 4: The Relationship between Actual Fundamental Motor Skill Proficiency, Perceived Motor Skill Confidence and Competence, and Physical Activity in 8–12-Year-Old Irish Female Youth

Preamble

The following article reports one of the 'Gaelic4Girls' (G4G) baseline studies on pre-adolescent girls' actual and perceived motor skill confidence and competence, and relationship with PA. This is a published manuscript which has been peer-reviewed and published in the Sports Journal online [September 27th, 2017]. The following is the citation for this article:

Farmer, O., Belton, S., & O'Brien, W. (2017). The Relationship between Actual Fundamental Motor Skill Proficiency, Perceived Motor Skill Confidence and Competence, and Physical Activity in 8–12-Year-Old Irish Female Youth. *Sports*, *5*(74). https://doi.org/10.3390/sports5040074

Statement of authorship;
I hereby declare that I, Orlagh Farmer, am the principal author of this article. The following statements outline my contributions to the work:

- I was the principal investigator responsible for all the data collected (2016) in this chapter. I organised all stages of data collection consisting of timetabling undergraduate students, contacting all primary schools (principals, teachers and students), equipment preparation, data storage, data cleaning and data inputting.
- Organised the rigorous training and protocol workshop for field staff assistants, which was an important component of this baseline study.
- Made substantial contributions to the conception and design of the work; the acquisition, analysis and interpretation of data for the work.
- Wrote the first draft of the full article and contributed significantly to the subsequent redrafts until submission.
- Final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

4.1 PURPOSE OF CHAPTER

4.1.1 Rationale

To date, various studies have been conducted assessing the relationship between perceived movement and actual movement competence (Britton et al., 2020; DeMeester et al., 2016) among children, while far fewer refer to perceived confidence (perception of ability/self-efficacy) (Robinson, 2010; Barnett et al., 2008), and specifically so within the female childhood population. As this area is relatively unexplored, this baseline study aimed to examine the relationship between actual FMS proficiency, perceived motor confidence and competence, and PA in a sample (n=160) of 8- to 12-year-old pre-adolescent girls. One of the main pillars for the G4G intervention was FMS integration; for this reason, the levels of FMS proficiency and the association of perceived competence and confidence needed to be assessed amongst an Irish pre-adolescent cohort to inform the development of the 'G4G' intervention.

4.1.2 Contribution to the field

This study makes an important contribution to the field, demonstrating that despite the low levels of actual FMS proficiency, Irish girls may be inaccurately overestimating their perceived confidence levels for movement. It also adds to the evidence base implying that PA groupings (low-moderate and highly active) may impact perceived PSC levels. From this study, it appears that pre-adolescent females need additional hours of instructional practice towards the acquisition of actual FMS proficiency. This has important implications for researchers and those working with pre-adolescent girls, highlighting the importance of the promotion of autonomous and competence-based FMS activities among PA groupings, particularly targeting low active pre-adolescent girls).

4.2 ABSTRACT

Background: This study examines the relationship between actual fundamental motor skill (FMS) proficiency, perceived motor confidence and competence, and physical activity (PA) among female children (n= 160; mean age = 10.69 ± 1.40 years).

Methods: The Test of Gross Motor Development-2nd Edition (TGMD-2) was used to assess seven FMSs (locomotor, object-control, and stability). Motor confidence and competence were assessed using a valid skill-specific scale, and a modified version of the Self-Perception Profile for Children. PA levels were assessed using self-report (PA Questionnaire for Older Children (PAQ-C)) and classified as low, moderate, and high active. One-way and two-way ANOVAs (post-hoc honest significant difference (HSD)) and correlation coefficients were used to analyse the data.

Results: Findings indicate that the majority of youth (71.8%) were not meeting the minimum 60 min of daily PA recommended for health, and that 98.1% did not achieve the FMS proficiency expected for their age. While there were high levels of perceived physical self-confidence (PSC) reported within FMS skill-specific tasks, there was no significant correlation observed between actual FMS proficiency and perceived PSC among the cohort. Results show that low, moderately, and highly active female participants differ significantly in terms of their overall FMS ($p = 0.03$) and locomotor (LOC) control scores ($p = 0.03$). Results from a two-way between-groups analysis of variance also revealed no statistically significant interaction effect between PA grouping and physical performance self-concept (PPSC) on overall FMS proficiency levels. Results of a multiple linear regression indicate that perceived PSC is a significant predictor (beta = 0.183) of participants' overall PA levels.

Conclusion: Data show a need for targeting low levels of PA, and low FMS proficiency in female youth, and for developing interventions aiming to enhance perceived PSC levels.

Keywords: fundamental movement skills; perceived physical self-confidence; physical performance self-concept; physical activity; female youth.

4.3 INTRODUCTION

Regular participation in physical activity (PA) and sport is positively associated with an array of physical, psychological, and social health benefits (Eime et al., 2013). Despite the widely known positive health benefits of PA, children and adolescents are not meeting the daily recommendations of at least 60 min of moderate to vigorous physical activity (MVPA) (Hallal et al., 2012).

Further to these low levels of PA participation, research consistently indicates a gender-based disparity in PA amongst youth, with girls significantly less active than boys (Telford et al., 2016). Research also demonstrates that PA decreases significantly during the transition from childhood to adolescence, with girls in particular showing sharper declines in participation (Bradley et al., 2011). There is a need to pay attention to girls' PA patterns and influences (E. Budd, 2016). Numerous factors have been shown to influence child PA participation (Loprinzi et al., 2015), and research suggests that actual movement competency (e.g., fundamental movement skill (FMS) proficiency) in early childhood may be an important prerequisite for engagement in PA later in life (Loprinzi et al., 2015).

Actual movement competency, which also has been noted in previous literature as motor coordination, motor skill proficiency, FMS, or motor ability (Robinson et al., 2015), can be defined as the basic observable building blocks (Cohen et al., 2014) for movement. These provide the foundation for the specialised, and sport-specific movement skills (Babic et al., 2014) required for participation in a variety of physical activities including games, sports, and recreational activities. FMS can be categorised as locomotor (e.g., run, skip, jump), object-control (e.g., throw, catch, kick), and stability (e.g., static balance) skills (Gallahue et al., 2012). Children move and engage in PA through the execution of FMS (Cohen et al., 2015). Previous research has demonstrated positive associations between FMS and areas of health including PA, organised youth sport, and self-concept (Lubans et al., 2010). Despite FMS contributing to the general development and wellbeing of young children, literature consistently illustrates that proficiency in FMS among children and adolescents is low (O' Brien et al., 2016a), with only 50% of children demonstrating competency in a broad range of skills (Gallahue et al., 2012; Hardy et al., 2013). By the time children reach 10 years of age, they have developmental capabilities to master FMS performances, (Gallahue et al., 2012) however, this is

often not the case. These lower levels of FMS proficiency may translate into a lack of confidence in performing specific skills (O' Keefe & Smyth, 1999). Research suggests that without FMS proficiency and a positive perception of such, children may be less likely to engage in PA (Lubans et al., 2010). To better understand the acquisition of FMS alongside levels of PA, it is crucial to consider mediators, such as confidence, that may account for the motor development of children (Lubans et al., 2010).

Within the realm of motor development, various terms such as "self-confidence", "self-efficacy", "perceived ability", and "perceived competence" have been used to describe one's perceived capability to accomplish a certain level of performance (Feltz, 1988). Perceived competence refers to an individual's perception of their actual movement capabilities (Harter, 1999). Stodden and Goodway (2008) postulate that higher perceived competencies are related with FMS proficiency, and increased levels of PA. Similarly, self-confidence refers to the perceived ability to accomplish a certain level of performance (Feltz, 1988). Research carried out in this field suggests that as children gain confidence in performing fine and gross motor skills, and build a sufficiently diverse movement repertoire, they acquire a high level of movement proficiency that is positively associated with the quality of their psychomotor and cognitive health (Chaddock-Heyman et al., 2013).

Like self-confidence, research has shown that PA and self-concept are connected in different ways (Planinšec et al., 2004). Physical self-perceptions, including physical performance self-concept (PPSC), are significant correlates of PA in children (Crocker et al., 2000). Indeed, increasing perceptions of competence and levels of FMS proficiency are potential strategies to promote PA.

Various studies have been conducted assessing the relationship between perceived movement and actual movement competence (Babic et al., 2014; DeMeester et al., 2016; Robinson, 2010) among children, while far fewer refer to perceived confidence (perception of ability/self-efficacy) (Barnett et al., 2008; Robinson, 2010), and specifically so within the female childhood population. A recent Irish study investigating the relationship between FMS proficiency and

perceived physical self-confidence (PSC) levels among adolescents found a significant correlation between both variables for females (McGrane et al., 2016).

Little is known regarding the influences of FMS and perceived movement self-confidence on PA among Irish pre-adolescent girls. At present, there are no studies examining the relationship between perceived PSC, PPSC, and actual FMS involving Irish female children. Consequently, the aim of the present study was to analyse the relationship between perceived PSC, PPSC, actual FMS, and PA in Irish female children.

4.4 METHODS

4.4.1 Participants and study design

Two hundred and twenty-one participants from three primary schools were originally invited to participate in the study, with full consent received from 166 participants (75% of total sample). In total, 160 female participants (with a mean age of 10.69 years (SD = ±1.40) had full data available for all measurements, including FMS assessment, the PA questionnaire (PAQ), and the PSC and PPSC scales, as presented in Figure 4.1.

This cross-sectional, mixed methods study was granted full ethical approval by the Institutional Social Research Ethics Committee at University College Cork (Social Research Ethics Committee, UCC) in 2016. Informed assent for participation was granted by all participants and consent from their parent(s)/guardian(s) and the school principals prior to participation; all participants were free to withdraw from the research at any stage.

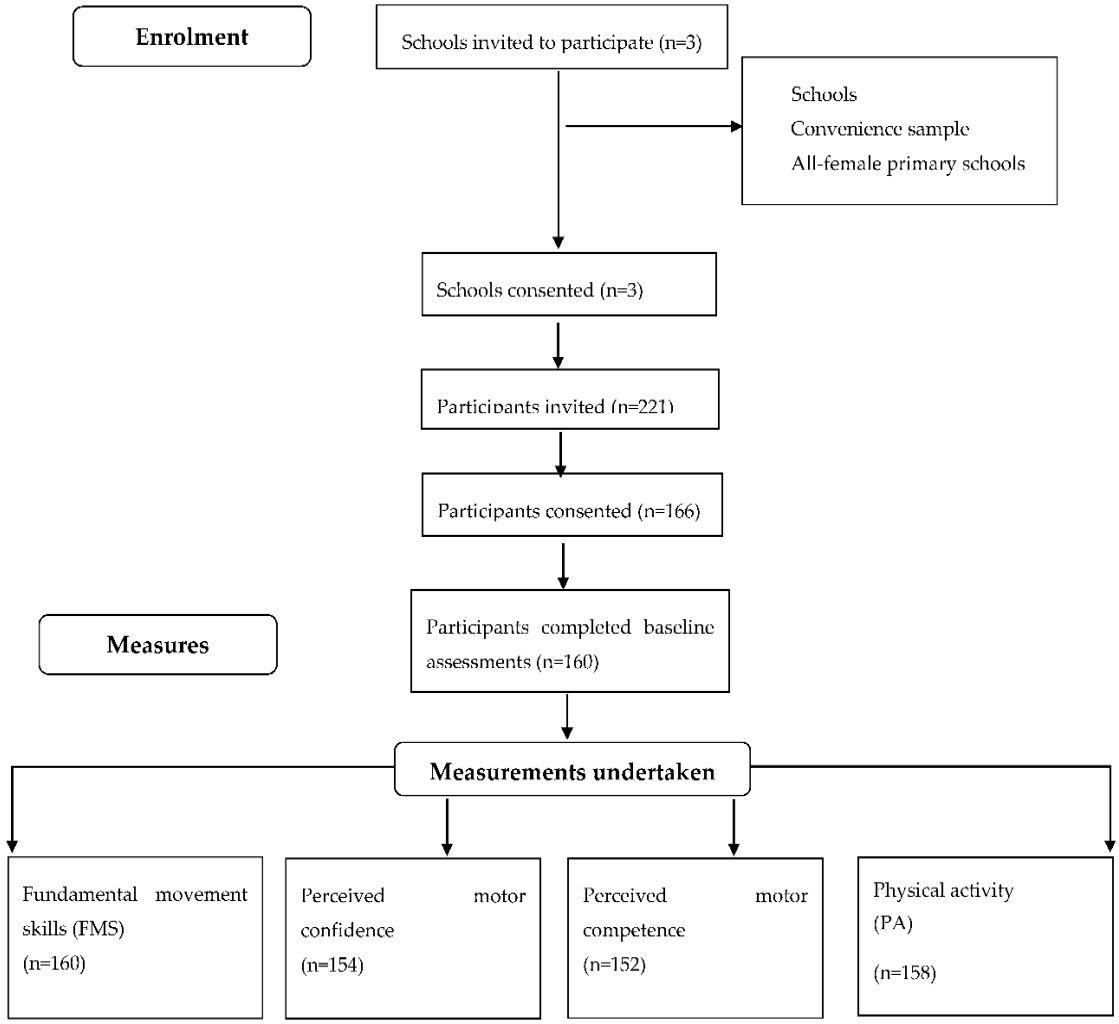


Figure 4.1: Study design and flow of data collection (n = 160).

4.4.2. Recruitment and data collection

Convenience sampling was used to recruit three all-female primary schools (rural and urban) in the Cork region, Ireland. A representative social economic status demographic was selected, with the inclusion of one school identified as 'DEIS' (delivering equality of opportunity in schools). The lead researcher emailed the principals of all three schools, calling for expressions of interest, and written consent to participate in the data collection process. To be eligible for the study, female participants needed to be formally enrolled in between the years of second to sixth class and were required to provide written assent and parental/guardian consent prior to participation. If a participant or their parent/guardian did not consent, they were not permitted to participate in the data collection.

Prior to data collection, ten field staff underwent a rigorous and robust 8-hour training workshop (across two days) in the measurement protocol associated with FMS and self-report questionnaires. This involved an objective criteria-informed process to ensure field staff were consistent in the data collection measurement protocol.

The data were collected on participants within their class groups (max n = 30) during specific school visits (n = 3). Objective measurements, such as FMS, were carried out during a timetabled block, with a ratio of one researcher to five students. Subjective self-report measurements took place in a supervised classroom, or computer lab, and the ratio of participant to researcher was 10:1. The study was briefly explained, and instructions provided on how to complete the questionnaire. Participants were encouraged to take their time, reflect on their answers, and to be as honest as possible. All questionnaires were completed online through the tool 'Survey Monkey'. In cases where computer networks failed, participants completed hardcopies of the questionnaire. Throughout the duration of this baseline data collection, participants were assigned identification numbers for anonymity purposes.

4.4.3 PA self-report assessment

Moderate to vigorous PA (MVPA) was assessed using a modified version of the Physical Activity Questionnaire for Older Children (PAQ-C) (Kowalski et al., 2004). Studies have established the reliability and validity of the 7-day recall on children (Moore et al., 2007). The PAQ-C for this study included 15 physical activities, 10 leisure/free-time activities, and activities in school (Physical Education), transport activities (walking to and from school) and other activities. The participants were told to recall what activities they had engaged in the previous seven days and how many times and number of minutes they participated in each of these activities. Habitual PA was also assessed using two questions from the Physician-based Assessment and Counseling for Exercise (PACE) questionnaire: how many days in the last week (PACE 1) and in a usual week (PACE 2) does the subject do at least 60 min of physical activity. The PACE questionnaire presents a test–retest reliability assessed by the Intra-class Correlation Coefficient (ICC) of 0.77 (López Sánchez et

al., 2016), and due to its simplicity and ease of understanding, the PACE questionnaire was suitable for the 8–12-year-old cohort. In the current study, the Cronbach alpha coefficient was 0.63, suggesting that the scale has good internal consistency. Data were collected on participants in their class groups with a ratio of one trained field staff to ten students, for questionnaire completion. The study was briefly explained, and instructions were provided on how to complete the questionnaire. The compound result was obtained from both questions ((PACE 1 + PACE 2)/2) and students were categorised as low active (meeting guidelines on 0, 1, 2, or 3 days a week), moderately active (meeting on 4 or 5 days), or highly active (meeting on 6 or 7 days) (Rowe & Murtagh, 2012).

4.4.4 Measures: fundamental movement skills (FMS)

The FMS proficiency of seven movement skills were assessed (n = 160) in conjunction with the behavioural components from three established instruments, namely the Test of Gross Motor Development (TGMD) (Ulrich, 1985), Test of Gross Motor Development-2 (TGMD-2) (Ulrich, 2000), and the Get Skilled Get Active resource (New South Wales Department of Education and Training, 2000). Each of these instruments and their associated protocols have established validity and reliability in children and are designed to give an objective measurement of gross motor skill proficiency. The test consists of two subscales, locomotor control (LOC) skills and object-control (OC) skills and was designed to measure criterion elements of FMS performance in children aged 8–12 years. The seven-item test included: three LOC skills (run, skip, and vertical jump), one stability (balance) skill, and three OC skills (stationary dribble, catch, kick), which combine to give an overall maximum raw score of 60. A total score for all seven skills was calculated for each participant, along with an OC score, and LOC score. Overall mean OC and LOC scores were also calculated. The raw skill scores were then added to obtain a raw LOC subtest score (ranging from 0–36 points) and a raw OC subtest score (ranging from 0–24 points).

During data collection, the seven skills were assessed during a three-hour timetabled block and one trained field staff member provided every participant (in groups of 8) with an accurate demonstration of the FMS to be performed.

Participants performed the skill on three occasions, including one familiarisation practice, and two performance trials, as reported in previous Irish adolescent movement skill data collection studies (O' Brien et al., 2016a, 2016b). Participant performance, along with execution of the required skill, were recorded using digital video cameras (3× Canon type Legria FS21 cameras; Canon Inc., Tokyo, Japan) to allow for greater measurement scrutiny, and accuracy of measurement precision during analysis. The FMS scoring process was completed at a later date by the principal investigators. The number of FMS performance criteria varied from six to twelve across the range of selected FMS. There was a total of 29 performance criteria for all seven fundamental movement skills. Once data collection was completed, the principal investigators were required to reach a minimum of 95% inter-observer agreement for scoring all seven FMS. If children displayed correct performance on all or all but one skill component, they were classified as having achieved 'mastery' or 'near mastery', respectively, for that skill. 'Near mastery' was defined as correct performance of all components but one on both trials (van Beurden et al., 2002).

4.4.5 Perceived physical self-confidence

Participants' perceived PSC levels were assessed using the PSC scale (McGrane et al., 2016), which has shown excellent test–retest reliability, and internal consistency, with a Cronbach alpha coefficient of 0.94 (McGrane et al., 2016). In the current study, the Cronbach alpha was 0.88, suggesting very good internal consistency reliability for the perceived PSC scale for the seven skills with this sample. The PSC scale consists of 15 questions in which participants rate their confidence at performing 15 separate FMSs. The identified skills included within this instrument are considered central to the Irish youth sporting culture (Cohen et al., 2014; van Beurden et al., 2002) Participants rated their confidence at performing each skill on a Likert scale of 1–10, with "1" being not confident at all, and "10" being very confident. This present study assessed 7 of the 15 actual movement skills, consistent with the seven actual FMSs assessed, therefore, the maximum PSC score which could be achieved was 70 if participants scored their confidence at 10/10 for performing all seven skills. Similar to previous research (McGrane et al., 2016),

participants were divided into three tertiles based on perceived PSC using visual binning in SPSS (≤28.7 was the low PSC group, 28.8–49.3 was the medium PSC group, and 49.4+ was the high PSC group).

4.4.6 Physical performance self-concept

Participants' PPSC were assessed using a modified version of the Athletic Competence sub-scale, taken from the Self-Perception Profile for Children (Harter, 1982) (Sherwood et al., 2004). The scale for this study consists of eleven statements (e.g., 'I am good enough at sports'). Students were asked to indicate how true each statement was for them ('very true', to 'not at all true', range 1–4), and the participant selected the statement that best described them. The more positive the statement in the questionnaire, the higher the value. For example, 1 = not at all true and 4 = very true for nine of the 'positive' statements (e.g., 'I feel positive about myself physically' and 'I am good enough at sports', etc. 1 = not at all true and 4 = very true). This was reversed and recoded for two of the 'negative' PPSC statements (i.e., 'I wish I could feel better about myself physically' and 'I like to watch sports rather than play'), whereby in this case 4 = not at all true and 1 = very true. Reliabilities for the subscales of the PPSC range from 0.73 to 0.84 [35], and the test-retest reliability coefficient (r = 0.51) was moderate (Sherwood et al., 2004). In the current study, the Cronbach alpha coefficient was 0.70, thus suggesting that the scale has acceptable internal consistency.

4.4.7 Data analysis

The FMS, PSC, PPSC, and PA data set were analysed using IBM, USA for SPSS software (version 20.0 for Windows (SPSS Inc., IBM Corp., Armonk, NY, USA). Statistical significance was set at $p < 0.05$. Where participants had incomplete data for a given variable, participants were excluded from analysis of this variable specifically. The number of days participants self-reported meeting the 60 min PA guidelines were analysed descriptively using means, standard deviations, and proportions. Descriptive statistics and frequencies for all variables were calculated.

One-way between-groups analysis of variance were conducted to explore the impact of PA groupings (low, moderately, and highly active) on overall FMS, LOC and OC proficiency levels, perceived PSC and PPSC levels. As the assumptions for ANOVA were met, two-way between-groups ANOVAs were used to explore the impact of the two variables (perceived PSC, PPSC) and PA grouping (low, moderately, or highly active) on total FMS, LOC, and OC scores. In instances where significant main effects were found, post-hoc comparisons were carried out using the Tukey (HSD) test to determine where the differences occurred. Considering the relatively large numbers of means (FMS, LOC, and OC), the use of Tukey HSD comparisons is a powerful, and accepted form of statistical post-hoc assessment.

Spearman's correlation coefficient test was used to investigate the relationship between actual FMS proficiency levels and perceived PSC levels. A multiple linear regression was conducted to explore the predictive ability of actual FMS, perceived PSC, and PPSC on PA measurement.

4.5 RESULTS

4.5.1. Physical activity

Self-report PA data showed that 10.2% of participants were meeting the 60 min guideline on 0–3 days a week (low active), with 40.95% meeting the guideline on 4 or 5 days a week (moderately active), and the remaining 48.85% of participants meeting the guidelines on 6 or 7 days a week (highly active). The percentage of participants meeting the 60 min PA guideline on all 7 days was 28.2%.

4.5.2 Fundamental movement skills

Only three participants (1.9%) possessed complete mastery level across all seven OC and LOC skills. Overall, the vertical jump and the skip were the poorest performed skills across the cohort, where 38.6% and 36.9%, respectively, achieved mastery. The best performance was for the kick (OC), where 68.4% and 24.7%, respectively, achieved mastery and near mastery. The overall mean FMS score of participants was 48.75 (SD = ±5.83), out of a possible score of 62. Mean overall FMS scores for the

three PA groups were as follows: low = 46.25 (SD = ±7.60), medium = 49.92 (SD = ±3.80), and high = 48.74 (SD = ±6.04). Mean skill scores by PA grouping (low, moderately, and highly active) for actual FMS are given in Table 4.1. A one-way between-groups analysis of variance was conducted to explore the impact of PA groupings (low, moderately, and highly active) on overall FMS proficiency levels. Participants were divided into three groups according to their PA level (Group 1: low active; Group 2: moderately active; Group 3: highly active). There was no statistically significant difference at the $p < 0.05$ level in overall actual FMS proficiency for the three PA groupings.

Table 4.1: Descriptive data for each variable (frequency, means, standard deviation, and physical activity (PA) grouping (low, moderately, and highly active).

Frequencies of PA Groupings						
Variable	**N**	**M**	**SD**	**LA**	**MA**	**HA**
PA	158	1.57	0.67	16	36	106
FMS	158	48.75	5.84	16	36	106
PSC	152	57.55	14.34	15	35	102
PPSC	150	18.89	3.33	14	35	101
LOC	158	29.71	4.20	16	36	106
OC	158	19.04	2.98	16	36	106
Age	160	10.69	1.40	16	36	106

N = number; M: Mean; SD: standard deviation; LA: low active; MA: moderately active; HA: highly active; LOC: locomotor control; OC: object-control.

Table 4. 2: Mean scores for fundamental movement skills (FMSs), perceived physical self-confidence (PSC), and physical performance self-concept (PPSC) by physical activity (PA) grouping (low, moderately, and highly active).

	FMS (*n* = 158)				PSC (*n* = 152)			
Skill	**Low Act (*n* = 16)**	**Mod Act (*n* = 36)**	**High Act (*n* = 106)**	**OMS**	**Low Act (*n* = 15)**	**Mod Act (*n* = 35)**	**High Act (*n* = 102)**	**OMS**
Run	6.79 SD = ±1.42	6.67 SD = ±1.51	6.59 SD = ±1.41	6.63 SD = ±1.43	6.53 SD = ±3.50*	7.06 SD = ±3.12	8.27 SD = ±2.66*	7.81 SD = ±2.92
Skip	4.60 SD = ±1.18	5.00 SD = ±1.33	4.63 SD = ±1.12	4.72 SD = ±1.18	6.93 SD = ±3.22	6.86 SD = ±3.27	7.90 SD = ±2.71	7.56 SD = ±2.92
VJ	9.67 SD = ±2.38	9.94 SD = ±2.01	9.97 SD = ±2.24	9.94 SD = ±2.19	7.13 SD = ±3.25	7.26 SD = ±3.23	8.19 SD = ±2.72	7.87 SD = ±2.92
Balance	8.63 SD = ±1.31	9.17 SD = ±1.16	8.73 SD = ±1.34	8.82 SD = ±1.30	8.27 SD = ±2.34	8.15 SD = ±2.55	8.99 SD = ±2.07	8.73 SD = ±2.23
Kick	7.13 SD = ±1.50	7.58 SD = ±0.77	7.37 SD = ±1.04	7.39 SD = ±1.05	8.33 SD = ±1.92	8.09 SD = ±2.78	8.88 SD = ±1.88	8.65 SD = ±2.13
Bounce	6.06 SD = ±2.21	6.60 SD = ±1.99	6.77 SD = ±1.68	6.66 SD = ±1.81	9.27 SD = ±1.44	8.15 SD = ±2.85	9.08 SD = ±2.10	8.89 SD = ±2.26
Catch	5.13 SD = ±1.20	5.11 SD = ±1.01	5.43 SD = ±0.92	5.33 SD = ±0.98	7.07 SD = ±2.99*	8.62 SD = ±2.26	8.72 SD = ±2.34*	8.53 SD = ±2.43
LOC	27.94 SD = ±6.04	30.81 SD = ±2.71	29.60 SD = ±4.22	29.71 SD = ±4.20	7.22 SD = ±3.08	7.33 SD = ±3.04	8.34 SD = ±2.54	7.63 SD = ±2.89
OC	18.31 SD = ±3.44	19.11 SD = ±2.46	19.13 SD = ±2.98	19.04 SD = ±2.91	8.22 SD = ±2.12	8.29 SD = ±2.63	8.89 SD = ±2.11	8.47 SD = ±2.29
OMS	46.25 SD = ±7.60	49.92 SD = ±3.80	48.74 SD = ±6.04	48.75 SD = ±5.84	53.53 SD = ±14.48	53.23 SD = ±17.46	59.62 SD =±12.76	57.64 SD =±14.23*
PPSC	16.64 SD = ±3.63*	17.89 SD = ±3.80*	19.54 SD = ±2.89*	18.89 SD = ±3.33*				

*: Statistical significance $p \leq 0.05$. OMS: Overall mean score; Mod: Moderately; VJ: Vertical jump; LOC: Mean locomotor score; OC: Mean object-control score.

4.5.3 Perceived physical self-confidence

Interestingly, 40 participants (26% of the cohort) rated themselves as the top score on the perceived PSC scale for all seven FMSs, while only three participants (1.9% of the cohort) possessed complete mastery level across all seven FMSs in the actual FMS assessment. The overall mean perceived PSC score of participants was 57.64 (SD = ±14.23), out of a possible score of 70. Mean skill scores by PA grouping (low, moderately, and highly active) for perceived PSC are given in Table 4.1. There was also a statistically significant difference at the $p < 0.05$ level in overall perceived PSC scores for the three PA groups ($F (2, 143) = 3.34$, $p = 0.038$). There were significant PA grouping differences observed in perceived PSC, with highly active participants scoring significantly higher than low active participants in two of the seven individual skills, as highlighted in Table 4.1. This included one LOC skill (run; $p = 0.020$) and one object control skill (catch; $p = 0.046$).

4.5.4. Physical performance self-concept

The overall mean PPSC score of participants was 18.89 (SD = ±3.31), out of a possible score of 24. Mean skill scores by PA grouping (low, moderately, and highly active) for PPSC are given in Table 4.1. A one-way between-groups analysis of variance was conducted to explore the impact of PA grouping on overall PPSC levels. There was a statistically significant difference at the $p < 0.05$ level in PPSC scores for the three PA groups ($F (2, 147) = 7.32$, $p = 0.001$). The actual difference in mean scores between the groups was moderate. The effect size, calculated using eta squared, was 0.09, which in Cohen (1988) terms would be considered a medium effect size. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for highly active ($M = 19.54$, $SD = 2.89$) participants was significantly different ($p = 0.05$) from the low active participants ($M = 16.64$, $SD = 3.63$). Likewise, the mean score for the moderately active group ($M = 17.89$, $SD = 3.80$) was significantly different than the highly active group ($p = 0.02$).

4.5.5 Interrealtionship between variables

A two-way between-groups analysis of variance was conducted to explore the impact of PA groupings and perceived PSC on overall FMS proficiency levels. Participants

were divided into three groups according to their PA level (Group 1: low active; Group 2: moderately active; Group 3: highly active). The interaction effect between PA grouping and perceived PSC was statistically significant (F (4, 143) = 2.76, p = 0.03). There was also a statistically significant main effect for PA category (F (4, 143) = 4.76, p = 0.01).

Additionally, a two-way between-groups analysis of variance was conducted to explore the impact of PA grouping and perceived PSC on overall FMS LOC proficiency levels, as shown in table 4. 2. The interaction effect between the two variables was statistically significant (F (4, 143 = 2.78, p = 0.029). There was also a statistically significant main effect for PA category (F (2, 143) = 6.54, p = 0.002), and PSC grouping (F (2, 143) = 3.77, p = 0.025). This means that low, moderately, and highly active participants differ in terms of their overall locomotor scores, and there is also a difference in scores for participants with low, modertely, and highly perceived PSC scores. Results from a two-way between-groups analysis of variance also revealed no statistically significant interaction effect between PA grouping and PPSC on overall FMS proficiency levels.

The relationship between actual FMS proficiency levels and perceived PSC levels was investigated using Spearman's correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumption of normality, linearity, and homoscedasticity. There was no correlation found between the two variables (rho = 0.11, n = 154, p = 0.191).

A multiple linear regression was calculated to predict overall PA levels based on participants' perceived PSC, PPSC, and actual FMS proficiency. A significant regression equation was found (F (3, 145) = 3.127, p = 0.028), with an R^2 of 0.061. The model explains only 6.1% of the variance in overall PA levels. Of the three variables, perceived PSC makes the largest, unique, significant contribution (beta = 0.183) while PPSC and actual FMS proficiency made no statistical contribution (beta = 0.119 and 0.011, respectively). This indicates that PSC is a predicting variable in female participants' overall PA levels.

4.6 DISCUSSION

Results of this study show that the percentage of participants meeting the 60 min MVPA guidelines on all 7 days was 28.2%. These low levels of PA participation are

relatively consistent with other studies on a national Irish level (Layte & Mccrory, 2011; Woods, et al., 2010). Although higher than the 16% reported figure for a similar age group in the Irish Health Behaviour in School-aged Children (HBSC) study (Gavin et al., 2015), these low levels are in line with this study's findings.

The majority of female adolescents in this study (98.1%) failed to reach a level of mastery across key FMSs, indicating that basic movement skill proficiency amongst this selected pre-adolescent Irish female youth cohort is low. These observed low findings of FMS proficiency are consistent with recent Irish adolescent research (O' Brien et al., 2016a). Results from the present cohort indicate that only three participants were fundamentally competent across all seven object-related, stability, and locomotor skills, despite children having the developmental capacity to master these skills by ten years of age (Gallahue et al., 2012). Previous international research examining the FMS proficiency of female children support these low levels of FMS competency (Duncan et al., 2017; Hardy et al., 2012).

In the present study, 26% of participants (n = 40) rated themselves as being fully proficient at performing the seven FMSs on the perceived PSC scale. However, actual FMS assessment results reveal only three participants (1.9%) possessed complete proficiency across all seven FMSs. On the perceived PSC scale (0–10), participant mean values were generally in the upper thresholds (mean values of ≥6.5 within Table 4.1), indicating higher levels of perceived PSC amongst this selected female cohort. High reported PSC in the current study aligns with recent research on an Irish cohort, which highlighted that female adolescents in particular consistently scored a mean of 6.8 or above (out of 10) in confidence, regardless of their actual ability (McGrane et al., 2016). Similarly, in another recent Irish adolescent study (O'Brien et al., 2017), the results purport that participants had considerably higher perceived PSC levels when compared to their actual skill proficiency in FMS.

Futhermore, the results of this study suggest that despite the low levels of actual FMS proficiency, Irish girls may be inaccurately overestimating their perceived confidence levels for movement. Harter & Pike (1984) support this view in postulating that it is considered 'normative' for young children to overestimate their abilities, because of cognitive limitations in finding it hard to distinguish between their 'ideal' in terms of competence, and their own reality (Harter & Pike, 1984). Research suggests that inflated perceived competence can drive the acquisition of movement skills, because children will continue to engage in mastery attempts in activities for

which they believe they are skilful (Stodden et al., 2008). Furthermore, this early period has been termed a 'window of opportunity', as children (even if low skilled) can still be keen participators in activity (LeGear et al., 2012). It is, therefore, imperative to have an understanding of children's perceived and actual movement skill proficiency to allow for the implementation of interventions during this early period.

In this study, no correlation was found between perceived PSC and actual FMS proficiency levels. This indicates that children's perceptions of their LOM and OC skill proficiencies are not associated with the 'reality' in terms of their actual FMS proficiencies. This lack of association in the current study can perhaps be explained by the fact that the participants' mean age was 10.69 years (SD = ±1.40), and according to Barnett et al. (2015), young children may not have the capacity to differentiate perceived competence in terms of the different skill types of LOM and OC. The findings in the current study are not in line with McGrane et al. (McGrane et al., 2016), where perceived PSC and actual FMS proficiency levels were moderately correlated among Irish females (r = 0.305). These findings (McGrane et al., 2016) suggest that if a female has low actual FMS proficiency, she may in turn have low PSC levels, or vice versa. Likewise, in a recent study by O'Brien et al. (2017), the results revealed that the perception of adolescent females in relation to their movement confidence did not equate to their actual movement skill proficiencies. Similar results were also found in the Vedul-Kjelsås et al. (2015) study, where actual FMS proficiency and self-perception were strongly correlated with girls (r = 0.312, mean age 11.46 years). Nevertheless, the results of the current study align with Stodden et al.'s (2008) developmental theory, which suggess that the transition into middle childhood (9–11 years) marks an important period when perceived physical competence should be lower. Stodden et al. (2008) postulate that the shift from early childhood to middle childhood marks the beginning of a period of vulnerability during which children who have lower actual movement skill competence will demonstrate lower perceived movement skill competence and are less physically active.

Consistent with other studies (Stellino & Sinclair, 2013; Ulrich, 1987), the analysis of psychological variables reveals an association with female children's PA levels. Although there were no associations found in the current study, there were significant differences found among the PA groupings (low, moderately, and highly active) for perceived PSC and LOM scores and overall FMS levels, which exhibited small effects. The interaction effect between PA grouping and perceived PSC was

statistically significant. There was also a statistically significant main effect for PA category. This indicates that there is a significant difference in the effect of perceived PSC on overall FMS scores for the different PA groupings (low active, moderately active, and highly active). Furthermore, this implies that PA groupings may impact perceived PSC levels. Research suggests that those who are not confident about their ability (in this case those in the low perceived PSC group) will not want to put themselves in a situation where they may display low ability levels, which in turn may affect their performance (Harter & Pike, 1984). Furthermore, a comprehensive understanding of the issues surrounding perceived PSC and motivation for PA by developmental stages in female adolescents are vital for improving interventions, and enhancing psychological well-being (Porter, 2016).

To the authors' knowledge, this is the first study of its kind in Ireland that seeks to critically examine late childhood, and early adolescent female perceived PSC, PPSC, actual FMS proficiency, and PA participatory levels. Nevertheless, one limitation of this current study is the use of a convenience sample, which can lead to the under-representation or over-representation of particular groups within the sample. Another limitation of the present study is its cross-sectional design. The results do not provide causal evidence regarding relationships among actual FMS proficiency, perceived PSC, PPSC, and PA. To gain more insight in the direction of these relationships and to understand how associations among these variables may change over time, longitudinal or experimental studies should be conducted.

4.6.1 Future practical implications

Pre-adolescent girls are an important target for PA behavioural change strategies, as this age cohort may enhance tracking into the crucial period of adolescence (Biddle et al., 2014). The quantification of intervention effectiveness for this age group of girls has not been adequately reported (Biddle et al., 2014) specifically examining perceived PSC and actual FMS proficiency. Indeed, as investigated in the present cross-sectional study, components that foster the development of both actual and perceived confidence levels may have the potential to significantly improve the long-term impact of childhood and adolescent movement.

Considering the observed low levels of actual FMS proficiency amongst female pre-adolescents, developing a specifically designed movement-oriented intervention

would be a strategic step towards improvement. Furthermore, the promotion of autonomous and competence-based activities among PA groupings (particularly targeting low active girls) may exist within future interventions. From this study, it appears that females need additional hours of instructional practice towards the acquisition of actual FMS proficiency.

4.7 CONCLUSIONS

In terms of perceived PSC, participants generally displayed higher levels of confidence, however, these results do not appear to be associated with their actual movement-based tasks. Results from this study suggest that future interventions may need to specifically address the low levels of actual movement skill proficiency with developmentally appropriate strategies for understanding perceived confidence at the FMS level. Likewise, increasing perceptions of PSC and levels of actual FMS proficiency are potential strategies to promote physical activity (Foweather, 2010). Furthermore, physical education professionals and youth sports programmes should target both actual and perceived motor confidence and competence in order to promote lifelong PA in children.

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Declaration of interest statement

The authors declare that there are no conflicts of interest within this manuscript publication.

4.8 LINK TO CHAPTER 5

As discussed, there is a noticeable gap in the literature relating to young girls actual and perceived movement skill proficiency; therefore, chapter 4 assessed the actual and perceived competence and confidence of FMS and the relationship with PA amongst 8- to 12-year-old pre-adolescent girls. The findings from chapter 4 constituted one part of baseline data and assisted the development, design and originality of the G4G intervention, specifically the FMS component. The reader will be able to identify the findings from the baseline data collection (chapter 4), incorporated within the intervention; furthermore, the reader will recognise specific PA patterns, FMS proficiency levels, and psychological correlates of PA (chapter 5), as integrated within the G4G intervention. The overall objective of chapter 5 is to contextualise the development of a targeted community sports-based intervention (G4G) for Irish 8 to 12-year-old girls.

CHAPTER 5

ENHANCING THE EVIDENCE BASE FOR IRISH FEMALE YOUTH PARTICIPATION IN PHYSICAL ACTIVITY—THE DEVELOPMENT OF THE GAELIC4GIRLS PROGRAMME

Chapter 5: Enhancing the Evidence Base for Irish Female Youth Participation in Physical Activity—The Development of the Gaelic4Girls Programme

Preamble

The following article reports the second 'Gaelic4Girls' (G4G) baseline study, which further informs the development of the G4G intervention. Cross-sectional data on PA levels, psychological correlates of PA, anthropometric characteristics, and the FMS proficiency of 8- to 12-year-old girls were collected. Focus group interviews were used to explore perceptions of PA, barriers and motivators to PA in the cohort. This is a published manuscript which has been peer-reviewed and published in the Women in Sport and Physical Activity Journal (WSPAJ) online [March 12th, 2018].

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Statement of authorship;

I hereby declare that I, Orlagh Farmer, am the principal author of this article. As the data presented in chapter 5 is the same dataset as chapter 4, the statements outlining my leading contributions to this work are presented in chapter 4.

5.1 PURPOSE OF CHAPTER

5.1.1 Rationale

At present, there is a specific gap in the literature, as no other study has assessed PA levels and psychological factors of PA and FMS, both quantitatively and qualitatively, as part of an existing Irish childhood female sports-based development programme. Very few studies have aimed to involve youth voice in the design of PA interventions, resulting in the development of interventions which may not meet the needs and interests of those involved. This study investigated the PA patterns, FMS proficiency, and psychological factors influencing PA in 8- to 12- year-old Irish girls. Focus group interviews were used to explore perceptions of PA, barriers and motivators to PA and sport participation in the cohort. The overall objective of this chapter was to contextualise the development of a targeted community sports-based intervention (G4G) for Irish 8 to 12-year-old girls.

5.1.2 Contribution to the field

This study strengthens the evidence base of the sparsely available literature on PA, FMS and psychological wellbeing for 8 to 12-year-old girls, justifying the development of a multi-component PA programme targeting low levels of PA, FMS proficiency in female youth sport interventions, through addressing self-efficacy levels, inclusive of fun, and socially-stimulating PA environments.

5.2 ABSTRACT

Background: The purpose of the current research was to gather baseline data on female youth to inform the development of a targeted physical activity (PA) and sports-based intervention, specifically identified as “Gaelic4Girls”.

Methods: Cross-sectional data on PA levels, psychological correlates of PA, anthropometric characteristics, and the fundamental movement skill (FMS) proficiency of female youth (n = 331; M age 10.92±1.22) were collected. A subsample (n = 37) participated in focus group (FG) interviews exploring perceptions of health/sport and identifying barriers/motivators to participation. PA levels were assessed using self-report (PA Questionnaire for Older Children) and classified as low, moderate, and high active.

Results: One- and two-way ANOVAs (post hoc Tukey honest significant difference [HSD]) were used to analyse the data. The FGs were transcribed verbatim, coded, and thematically analysed. Findings indicated that the majority of youth (71.8%) were not meeting the minimum daily PA recommendations for health, and that 98.1% did not achieve the FMS proficiency expected for their age. Low, moderately, and highly active participants differ significantly in terms of overall FMS ($p = .03$), and locomotor control scores ($p = .03$). FG findings report fun and friendship as key PA motivators, too much competitiveness as barriers, and positive outside encouragement from family/friends/coaches as facilitators encouraging PA engagement.

Conclusion: Findings highlight the need for targeting low levels of PA, FMS proficiency in female youth sport interventions, through addressing self-efficacy levels, inclusive of fun, and socially stimulating PA environments.

Keywords: fundamental movement skill, physical activity motivators and barriers, psychosocial physical activity correlates, sport participation

5.3 INTRODUCTION

It is well established that regular participation in physical activity (PA) is imperative for good health (Eime et al., 2013). While PA of any type will deliver an array of physical, psychological, and social health benefits (Biddle & Asare, 2011), research continues to show that lack of PA participation among children and adolescents is a global concern (Guthold et al., 2010). According to previous data obtained from 105 countries, 80% of children aged 13 to 15 years fail to meet the recommended public health guidelines of 60 min of moderate-to-vigorous physical activity (MVPA) per day (Hallal et al., 2012). In an Irish context, the most recent 2016 Report Card on PA (a national document, containing all data on indicators related to children's PA levels from Northern and Southern Ireland) awarded children and adolescents an overall grade of "D" for low PA participation (Harrington et al., 2016).

Further to these low levels of PA participation, a consistent gender-based disparity in PA among adolescents exists, whereby females are significantly less active than males (Marques et al., 2016; Telford et al., 2016). A notable decrease in PA participation during adolescence has been observed, with a higher risk of decline among girls (Bradley et al., 2011; Woods et al., 2010). On a national level, the Growing Up in Ireland National Longitudinal Study (Layte & McCrory, 2011) found a significant gender differential visible among 9-year-olds, with boys (29%) more likely than girls (21%) to meet the PA guidelines. Based on the consistently reported research-informed literature, girls have been identified as a high-priority population for childhood PA promotion (Biddle et al., 2014). Nevertheless, organised youth sports (OYS) have been shown to have a positive association with PA participation. These OYS provide an excellent opportunity to be physically active and have been recommended as a heightened opportunity to increase young peoples' MVPA participation (Guagliano et al., 2012; Mandic et al., 2012). In a recent study (Marques et al., 2016) investigating associations between organised sport (OYS) participation and objectively-measured PA (N= 973, M age = 14.1±2.4), results reported that those who were engaged in OYS were significantly more likely to achieve PA guidelines, spend more time in moderate physical activity (MPA), vigorous physical activity (VPA), and MVPA than those who did not participate in OYS. Further to this, more boys (51.3%) than girls (28.3%) reported to be involved in OYS participation (Marques et al., 2016).

Like PA, participation in OYS during childhood and adolescence has important benefits for physical, psychological, and social health (Eime et al., 2013), and has been shown to promote greater involvement in PA over time (Nelson et al., 2011). Previous research suggests participation in OYS can be an avenue for developing social skills such as cooperation, responsibility, empathy, and self-control, as well as promoting good citizenship, social success, positive peer relations, leadership skills, and a sense of initiative (Côté & Hancock, 2016). It is also important to note that OYS participants cumulatively acquire transferable movement skills for enhanced competence and confidence (Rosewater, 2009), all of which are imperative benefits for female youth PA participation.

Similar to OYS, fundamental movement skills (FMS) have been shown to have a positive association with PA (Robinson et al., 2015). FMS are the basic observable building blocks for movement and provide the foundation for specialised and sport-specific movement skills required for participation in a variety of physical activities (Babic et al., 2014), including games, sports, and recreational activities (Hands, 2012). Studies have shown that higher levels of FMS proficiency will provide greater opportunity for children to engage in a variety of physical activities, games, and sport (Wick et al., 2017). This is pivotal to note within the female pre-adolescent context, as girls are less active than boys.

Several studies indicate that OYS is positively associated with increased PA, FMS, and areas of health, including fitness, healthy body composition, and self-concept (Hendrix et al., 2014). By the time children reach 10 years of age, they should have developmental capabilities to master FMS performances (Gallahue et al., 2012). Nevertheless, literature consistently illustrates that children and adolescents do not obtain proficiency in FMS development (Farmer et al., 2017; Mitchell et al., 2013; O' Brien et al., 2016a, 2016b; O'Brien et al., 2017).

Further to this, research reports gender differences in the execution of FMS (Barnett et al., 2016; Eather et al., 2018), with girls performing lower in object control skills, involving catching, kicking, and throwing, in comparison to boys (Barnett, et al. 2016; Butterfield et al., 2012). This emerging evidence suggests that children are making the transition to adolescence without acquiring basic movement skill proficiency (O'Brien et al., 2016a, 2016b; Belton et al., 2014). The fact that

FMS proficiency is consistently low among Irish adolescents (O'Brien et al., 2016a, 2016b; O'Brien et al., 2017) indicates the importance of early intervention programmes in Irish primary schools, particularly for the female youth population.

Examining girls' PA perceptions, motivations, barriers, and psychological correlates (for example, self-efficacy and attitudes) through in-depth qualitative research allows for greater understanding of the rationale behind their PA-related choices (Whitehead & Biddle, 2008). Underlying motivators and barriers to whether an individual engages in PA is important to investigate (Hoare et al., 2017). Current research on female youth reveals that having fun (Pawlowski et al., 2014; Visek et al., 2015), keeping fit, and being with friends (Carlin et al., 2015) are key motivators for female youth PA participation. Other studies have shown that internal factors such as confidence, pressure, embarrassment, or negative self-belief, lack of female role models, and other hobbies or commitments that result in a lack of time or preference for sport are the main barriers for female youth (Wetton et al., 2013). Similarly, the weather (Pawlowski et al., 2014), access to facilities, and lack of enjoyment have also been shown to be key barriers among female youth.

A variety of theories have been employed to explain and predict the adoption of an active lifestyle and PA participation in children and adolescents (Inchley et al., 2011). Among the well-researched theories include Icek Ajzen's Theory of Planned Behaviour (TPB; Ajzen, 1988), stating that behavioural intention to be physically active is influenced by attitude, subjective norms, and perceived behavioural control (PBC). In the present study, self-efficacy (SE) and attitude represents the positive or negative evaluation of engagement in MVPA, whereas subjective norms reflect perceived social pressures to perform MVPA. PBC refers to resources and obstacles (barriers) that facilitate or impede engagement in MVPA behaviour. Research has shown that PA and self-concept are connected in different ways (Planinšec et al., 2004). Furthermore, to engage young girls more effectively, the factors which influence PA behaviour must be better understood (Inchley et al., 2011).

Although previous studies have demonstrated that highly skilled children are significantly more active than children with lower levels of FMS proficiency in school and community-based PA interventions (Morgan et al, 2013), little is known regarding the influence of FMS on female children's PA in an Irish OYS context.

Such a context includes the Gaelic4Girls programme: an emerging intervention strategy. Furthermore, it is not yet fully understood how OYS in female youth could be optimised to facilitate continued participation and increased PA, specifically in a female sport context such as Ladies Gaelic Football (a team field sport that is popular in Ireland and organised through the Ladies Gaelic Football Association). The Gaelic4Girls (G4G) research project is part of an existing national Ladies Gaelic Football (LGF) programme in Ireland for 8–12-year-old female adolescents. Based on results of previous literature, the potential impact of developing FMS through OYS may be important for promoting long-term health-enhancing PA across childhood.

The purpose of this study was to investigate the PA patterns, FMS proficiency, and psychological factors influencing PA in 8–12-year-old Irish girls. The second purpose was to investigate differences in psychological correlates by physical activity pat- terns. Results of this current study will aim to inform the development of a multi-component, community-sports-based Irish intervention, specifically identified as G4G. At present, there is a specific gap in the literature, as no other study has assessed PA levels and psychological factors of PA and FMS, both quantitatively and qualitatively, as part of an existing Irish childhood female sports-based development programme.

5.4 METHODS

5.4.1 Overview of the study

Cross-sectional empirical baseline data were collected and analysed to inform the design and development of a larger multi- component, community-sports-based physical activity intervention (G4G) aimed at increasing PA participation for Irish female youth for ladies' football clubs in Ireland. Baseline data for the study (initiated in October 2015) was gathered over an 8-week period from March to May 2016, which specifically included PA (accelerometry and self-report), FMS, focus group (FG) discussions, and anthropometric characteristics (height and mass). Full ethical approval for this cross-sectional, mixed-methods study was granted by the Institutional Social Research Ethics Committee at University College Cork in 2016.

Parents and children were informed about the full study prior to the physical and psychological data collection. Informed assent for participation was granted by all participants and written consent was obtained from their parent(s)/ guardian(s) and the school principals prior to participation; all participants were free to withdraw from the research at any stage.

5.4.2 Participants and setting

A convenience sample (based on the researcher's proximity to the schools) of cross-sectional data were collected from Irish female youth (n = 331) as part of the baseline study protocol. Eligible primary school pupils enrolled between second and sixth class (8– 12 years) from three, all-female, rural and rural/urban schools were invited to participate, as presented in Figure 5.1. A representative social economic status demographic was selected, with the inclusion of one school identified as DEIS (delivering equality of opportunity in schools). A total of 443 participants from the three schools were originally invited to participate in the study, with full consent received from 358 participants (81% of total sample). Of the participants, 20 children were in second class (6%), 57 were in third class (16%), 100 were in fourth class (28%), 97 were in fifth class (27%), and 84 were in sixth class (23%). In total, 275 female participants (with a M age of 10.92±1.22 years) had full data available for the PA questionnaire (PAQ), 228 had full data for the anthropometric and FMS assessment, and 37 participants had full data for the FG discussions, as presented in Figure 5.1.

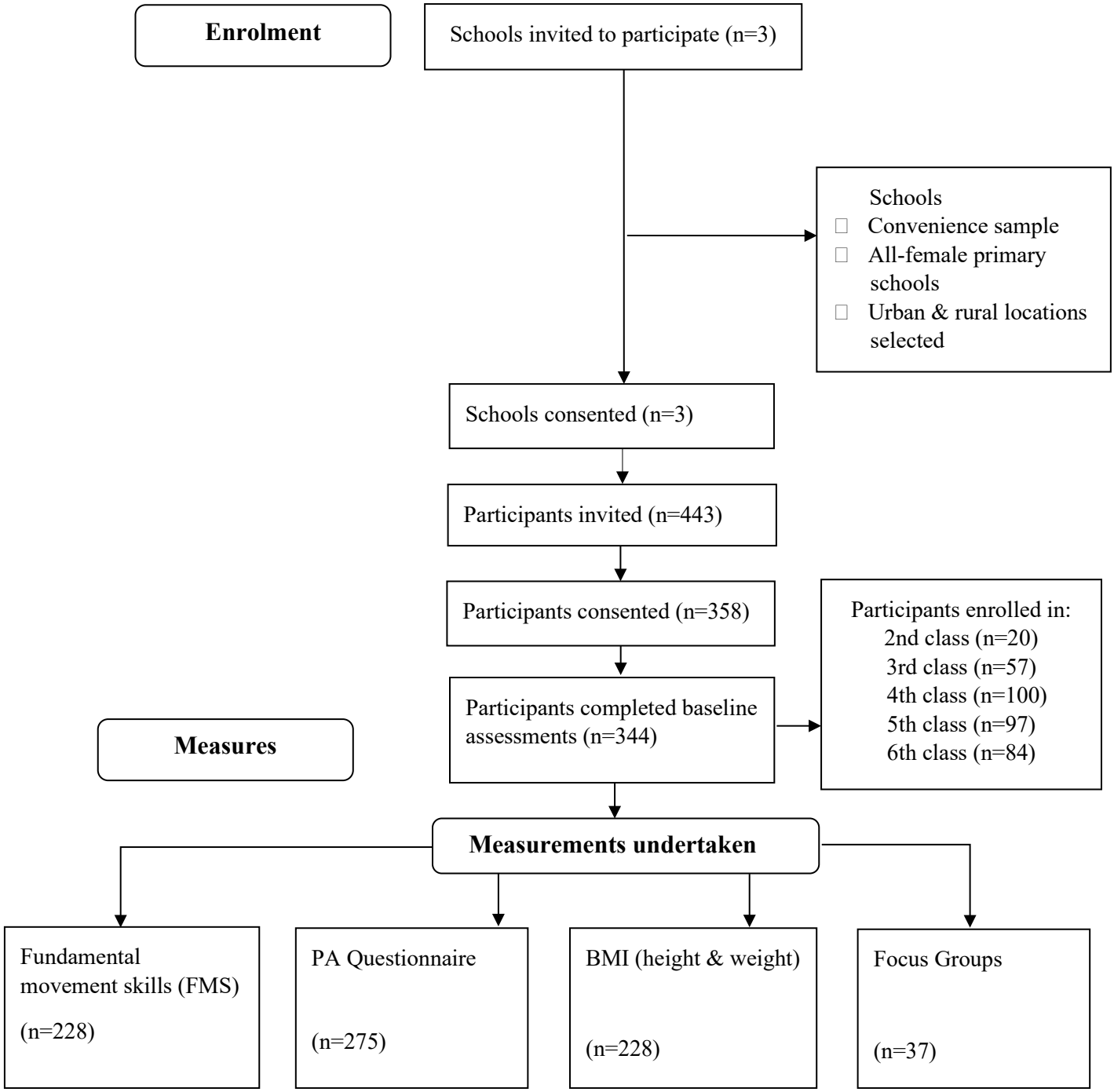

Figure 5.1: Study design and flow of baseline data collection *(N=344)*

5.4.3 Measures/Instruments

5.4.3.1 PA self-report assessment

MVPA was assessed using a modified version of the Physical Activity Questionnaire for Older Children (PAQ-C) (Kowalski, Crocker, & Donen, 2004). Studies have established the reliability and validity of the 7-day recall on children (Moore et al., 2007). The PAQ-C for this study included 15 physical activities, 10 leisure/free-time activities, activities in school (physical education), transport activities (walking to and from school), and other activities. The participants were told to recall what activities they had engaged in the previous 7 days and how many times and number of minutes they participated in each of these activities.

Habitual PA was also assessed using two questions from the Physician-based Assessment and Counselling for Exercise (PACE) questionnaire: How many days in the last week (PACE 1) and in a usual week (PACE 2) does the subject do at least 60 min of physical activity? The PACE questionnaire presents a test-retest reliability assessed by the intraclass correlation coefficient (ICC) of 0.77 (López Sánchez et al., 2016), and, due to its simplicity and ease of understanding, the PACE questionnaire was suitable for the 8–12-year-old cohort.

Questions on psychological correlates of PA (self-efficacy, physical self-worth, PA attitudes, perceived benefits and barriers to PA participation, subjective norms, behavioural control, and intentions) were all taken, with scales intact, from the FifeActive survey (Rowe & Murtagh, 2012). Participants' SE was assessed using a modified version of the Children's Physical Activity Self-Efficacy Survey, an 8-item scale modified by Sherwood et al. (2004). Physical self-worth was assessed using a global physical self-worth subscale from the Child and Youth Physical Self-Perception Profile (taken from Physical Activity in Scottish School age children [PASS]) (Inchley et al., 2008). Participants' physical performance self-concept was assessed using the Athletic Competence subscale taken from the Self-Perception Profile for Children (Sherwood et al, 2004). Participants' perceived PA motivators and barriers were assessed using a modified version of the Physical Activity Outcome Expectancies Scale (Taylor et al., 2004) and PASS, respectively (Inchley et al., 2008). PA attitudes, subjective norms, behavioural control, and intentions were assessed using the scale from Rhodes and Smith's (2006) questionnaire. In the

current study, the Cronbach alpha coefficient for all measures were calculated, and all scales have good internal consistency (see Table 5.2).

5.4.3.2 Anthropometric measurements

As reported in O'Brien et al. (2016b), mass was measured to the nearest 0.1 kg using Seca 761 dual-platform (Chino, CA) weighing scales. Height was measured to the nearest 0.1 cm using a portable stadiometer (Leicester portable height scale; Marsden, Rotherham, UK). Body mass index (BMI) was calculated (n = 228) using the following equation: weight (kg)/height (m)^2. Children were classified as normal weight, overweight, and obese according to gender and age-specific BMI cut-off values proposed by the Cole and Lobstein (2012) classification. Subsequently, underweight/normal weight, overweight, and obese subjects were grouped into three weight cohorts.

5.4.3.3 Fundamental movement skills (FMS) assessment

The FMS proficiency of seven motor skills were assessed (n = 228) in conjunction with the behavioural components from three established instruments, namely the Test of Gross Motor Development (TGMD; Ulrich, 1985), Test of Gross Motor Development-2 (TGMD-2; Ulrich, 2000), and the Get Skilled Get Active (NSW Department of Education and Training, 2000). Four skills (run, stationary dribble, kick, and catch) were assessed using the TGMD- 2. The remaining three skills included the skip and the vertical jump, which were both assessed using the TGMD (Ulrich, 1985), and balance, which was assessed using the Get Skilled Get Active Manual (NSW Department of Education and Training, 2000). Each of these instruments and their associated protocols have established validity and reliability in children and are designed to give an objective measurement of gross motor skill proficiency. The four locomotor skills (run, skip, vertical jump, and balance) and three object-control skills (stationary bounce, kick, and catch), all of which are culturally relevant to ladies football and deemed important to Irish sporting culture (Woods et al., 2010), were assessed during a 3-hr timetabled block.

Participants performed the skill on three occasions, including one familiarisation practice and two performance trials, as reported in previous Irish

adolescent movement skill data collection (O'Brien et al., 2016a, 2016b), and were recorded using a digital video camera (3 × Canon type Legria FS21 cameras; Canon Inc., Tokyo, Japan) to allow for greater measurement scrutiny and accuracy of measurement precision (Okely et al., 2004) during analysis. The FMS scoring process was completed at a later date by the principal investigators. Each skill comprises three to six performance criteria across the seven selected FMS, which are scored as either present (1) or absent (0) and scored over two test trials. Scores for each child were calculated by totalling the correctly performed criteria for two trials for each skill (i.e., if a skill comprises three performance criteria, the score range is 0–6). The maximum subtest scores for locomotor and object control skills were 30 and 22, respectively, with a minimum of 0. The sum of both subtests yielded the total gross motor skill score (total FMS). Raw scores were used in the data analysis as this is recommended for research purposes (Ulrich, 2000).

Skill mastery was determined when the child correctly demonstrated each performance criteria of the skill on both trials. Once data collection was completed, the principal investigators were required to reach a minimum of 95% interobserver agreement for scoring all seven FMS. If children displayed correct performance on all or all but one skill component, they were classified as having achieved mastery or near mastery, respectively, for that skill (Okely & Booth, 2003). Near mastery was defined as correct performance of all components but one on both trials (Van Beurden et al., 2002).

5.4.3.4 Focus groups

FG interviews were used to explore students' perceptions of what it means to be healthy and physically active, and to identify their motivators and barriers to PA and ladies football participation. A semi-structured interview guide, using questions designed by the research team, was developed (see Table 5.1). Six FG interviews (two FG interviews in each school with six participants in each FG) were conducted.

5.4.4 Procedures (field training and data collection)

Prior to data collection, six field staff underwent a rigorous and robust field researcher training workshop in the measurement protocol associated with FMS, self-report questionnaires, FG discussions, accelerometery, and body composition. This involved an objective criteria-informed process to ensure field staff were consistent in the gross motor skill and movement tasks. In an effort to ensure consistency and accuracy, a protocol manual, which included specific instructions for conducting all assessments, was also developed and used by research assistants to standardise procedures and for quality assurance. In terms of the research rigor associated with school-based measurements, the leading investigators for the G4G study are qualified post-primary specialist physical education (PE) teachers, as recognised by the Teaching Council of Ireland.

The baseline data were collected on participants within their class groups (max n = 30) during specific school visits. Objective measurements, such as FMS, accelerometry, and body composition were carried out during a 3-hr timetabled block, while subjective self-report measurements and FG interviews were taken during a specific school visit, in a supervised classroom, and computer lab, respectively. During FMS data collection, one trained field staff member provided approximately every eight participants with an accurate demonstration of the FMS to be performed. Procedures outlined in the respective examiners' manuals were closely adhered to. Self-report data were collected on participants (n = 275) in their class groups, with a ratio of one researcher to 10 students, for questionnaire completion. The study was briefly explained, and instructions were provided on how to complete the questionnaire. All questions were completed using the online tool SurveyMonkey (San Mateo, CA), with an ID number assigned.

Thirty-seven participants were randomly selected in the three all-female schools, following the completion of the self-report, anthropometric, and FMS data collection. FGs occurred in a school classroom, under supervision, and lasted 45–50 min each, on average. Prior to FG commencement, all participants and their parents/guardians received and signed a consent form and a plain language statement providing details of the research. Girls from second to sixth class were invited to participate in the FG study by way of a letter, which explained the purpose of the

study. Interested girls were given a letter of introduction and a consent form for their parents. Those girls who returned a completed parental consent form participated in the FG at a later time. The girls were also asked to sign a consent form on the day of the FG allowing for the sessions to be audio taped. All FGs were conducted by the leading investigator, who has training and experience facilitating FGs. The FGs were conducted at school in a meeting room, with chairs arranged in a circular manner around a boardroom style table, as suggested by (Kitzinger, 1995). Each session was also attended by an assistant who took comprehensive notes in order to aid the subsequent transcription process, as suggested by Krueger & Casey (2000). Patton (2002) technique of probing through follow-up questions (i.e., detail probes, elaboration probes, clarification probes, and contrasting probes) was employed to gain a mutual understanding between the participants and the lead researcher during interviews. Participants were reminded that they could withdraw from the interview at any stage and that all recordings would remain confidential. The FG interviews were recorded by dictaphone and were transcribed verbatim.

Each of the six FG interviews were conducted by two researchers: a facilitator and a note taker. The facilitator's role was to guide the FG, stimulate interaction among students toward the theme, oversee group discussion, and encourage all students to respond. The note taker kept a record of the discussion as it evolved to add details for instances where the recording was not audible (Tannehill et al., 2015). The FG commenced with a brief introduction by the moderator, which included a short discussion on how the FG would work. The moderator then asked an opening question, namely, "What does being healthy mean to you?" The opening question was designed to be easy to answer, with the purpose of encouraging the participants to talk and feel comfortable in the group setting (Krueger & Casey, 2000). The first key question (see Table 5.2) was then asked, with girls being allowed to talk until no more views were expressed. The moderator then followed up the points the girls had made, using follow-up (e.g., "Can you tell me more about that?") or clarifying questions (e.g., "Was that in an all-girls team or a mixed team?") to explore issues at a deeper level. Throughout the duration of this baseline data collection, participants were assigned ID numbers for anonymity purposes. Trustworthiness of data was established through data triangulation, peer debriefing,

and dependability. Data triangulation was implemented by examining data from different respondents but collected using the same method.

The research team looked for patterns and contradictions investigating the same problem, which brought about different perceptions of inquiry, helping to reduce bias while strengthening the integrity of the FG findings. The research team sought support (peer debriefing) from other academic professionals (staff within the department) to provide scholarly guidance. Such investigators looked at the study back- ground information, data collection methods and process, data management, transcripts, data analysis procedure, and research findings (Pitney & Parker, 2009). Dependability was implemented through the code recode strategy (code agreement), whereby the researcher coded the same data twice, giving 1- or 2-weeks' gestation period between each coding. The results from the two codings were compared to see if the results were the same or different (Ary et al., 2010). The coding results of this current study were in agreement and therefore enhanced the dependability of the qualitative inquiry.

Table 5.1: Procedure & questions used for the G4G baseline focus groups (n=6)

Phase	Focus Group Activity/Questions	Purpose
Opening – Ice-Breaker Activity	Participants were asked to draw a picture of what being healthy means to them ('Draw a picture of yourself at the weekends surrounded by all of your favourite physical activities and objects on this sheet'). Participants also coloured the sheet.	Informal conversation ice-breaking activity used to create a relaxing environment
1.		
Health-related PA	• What does being healthy mean to you? • What do you think makes you healthy? • What do you think PA is? • Do you know how much PA per day you should be doing? Prompt: How many minutes • How do you think PA affects your health? PA definition/explanation & note-taker summarised key words/themes/comments from this section. Facilitator will ask do the group have further comments they would like to make.	Discussion conducted to reveal participant's understanding of PA/Health.
2.		
PA motivators/ **barriers and preferred activities**	• What are your favourite types of PAs/sports? • What PAs/sports do you take part in? • What kind of things do you do when you play outside? • Where/when/with whom do you take part in these activities? • Why do you take part in PA/sport? • Who or what helps you to take part in PA/sport?	Discussion conducted to identify preferred PAs, motivators and barriers that influence children's PA/sport participation.

	• Why don't you like taking part in PA/sport? • Is there anything stopping you from becoming more active than you already are? Reinforced PA explanation and note-taker summarised this section. Facilitator asked the group if they had further comments to add.	
3. **PA opportunities & possible PA enhancers**	• Is there anything that would help you to take part in more PA/sports? • Is there anything that would help you to enjoy PA/sport more? • Do you think some people have more opportunities to play sports than other people? Why might that be the case? • Do some people give up sports? Why, in your opinion does this happen? • What do you think we could do to get more people playing sports? • If you could play any sports in the world what would they be and why? Reinforced PA explanation and note-taker summarised this section. Facilitator asked the group if they had further comments to add.	A discussion on what participants deemed important in influencing their participation in, and barriers to, PA and sport
4. **LGF/OYS environment**	• What do you know about LGF? • Do you play LGF? (club/school) • Do you like playing it? What's your favourite part? • What don't you like about LGF? • What would encourage you to play LGF? • What would stop you from playing LGF? • What do you think we could do to get more girls playing LGF?	Discussion based on participant's knowledge of LGF, and possible strategies to promote LGF/sport was then conducted

Abbreviations: LGF = Ladies Gaelic Football (popular Irish female sport); OYS = organised youth sport; PA = physical activity

5.4.5 Data analysis

The FMS and PA data set were analysed using SPSS version 20.0 for Windows (IBM, Armonk, NY). Participants with incomplete data for a given variable were excluded from analysis of this variable specifically. The number of days that were self-reported to meet the 60-min PA guideline were analysed descriptively using means, standard deviations, and proportions. Students were categorised as low active (meeting guidelines on 0, 1, 2, or 3 days a week), moderate active (meeting on 4 or 5 days), or high active (meeting on 6 or 7 days) (Rowe & Murtagh, 2012). Descriptive statistics and frequencies for all FMS, PA, and psychological variables were calculated. All statistical assumptions were tested for normality, outliers, and homogeneity of variance. A one-way between-groups ANOVA was used to explore the impact of PA grouping (low, moderate, or high active) on all psychological correlates. To reduce the risk of Type I error, a Bonferroni adjustment to the alpha level was made by dividing $p < .05$ by 8 (number of variable comparisons); thus, the alpha level was set to $p < .006$. In instances where significant main effects were found, post hoc comparisons were carried out using the Tukey honest significance difference (HSD) to determine where the differences occurred. To calculate effect sizes, Cohen d values (1988) were applied, with d= 0.2 representing a small effect size, 0.5 representing a medium effect size, and 0.8 representing a large effect size.

FG audio recordings were transcribed verbatim. The leading author double-checked each transcript against the original recording for robustness and accuracy prior to analysis. Transcripts were analysed using thematic analysis procedures (Braun & Clarke, 2006) involving coding, categorisation, and summarizing (Elo & Kyngäs, 2008). The FGs were coded and, under each heading, the coded comments were clustered into categories based on similar content. Then, a thematic analysis was conducted to produce an in-depth description and understanding of the transcripts; phrases from the transcripts were highlighted and grouped, from which themes and subthemes emerged (Neergaard et al., 2009; Pawlowski et al., 2014).

5.5 RESULTS

Of the 331 participants involved in this study, the mean age was 10.92 years (SD = 1.22). Participants had an average BMI of 19.03 ±3.41 kg/m2 (n = 228), with 73.2%

categorised as underweight/ normal weight, 20.2% overweight, and 6.6% obese, using the Cole and Lobstein (2012) classification for girls.

5.5.1 Physical activity

Self-reported PA data showed that 11.6% of participants are meeting the 60-min guideline for 0–3 days a week (low active), with 41.4% meeting the guideline 4 or 5 days a week (moderately active), and the remaining 47% of participants meeting the guidelines 6 or 7 days a week (high active). The percentage of participants meeting the 60-min PA guideline on all 7 days was 28.2%. Self-reported PA participation data found that the largest motivators were "being healthy" (91.0%), "having fun" (93.4%), and "making new friends" (89.8%). Conversely, the largest participation barrier to PA was "not being as good as others at it" (37.4%). Other participation barriers to PA include "difficulty in accessing facilities to do PA" (26.6%), "fear of injury" (25.4%), and "not having enough time" (22.6%).

5.5.2 Fundamental movement skills

Only six participants (2.63%) possessed complete mastery level across all seven-object control and locomotor skills. Overall, the vertical jump and the skip were the poorest performed skills across the cohort, where 38.1% and 39.1%, respectively, achieved mastery (see Figure 5.2). The best performance was for the kick (object control), where 63.7% and 25.7%, respectively, achieved mastery and near mastery. Mastery levels for all seven skills are reported in Figure 5.2. The overall mean FMS score of participants was 48.86 (SD = 5.61), out of a possible score of 62.

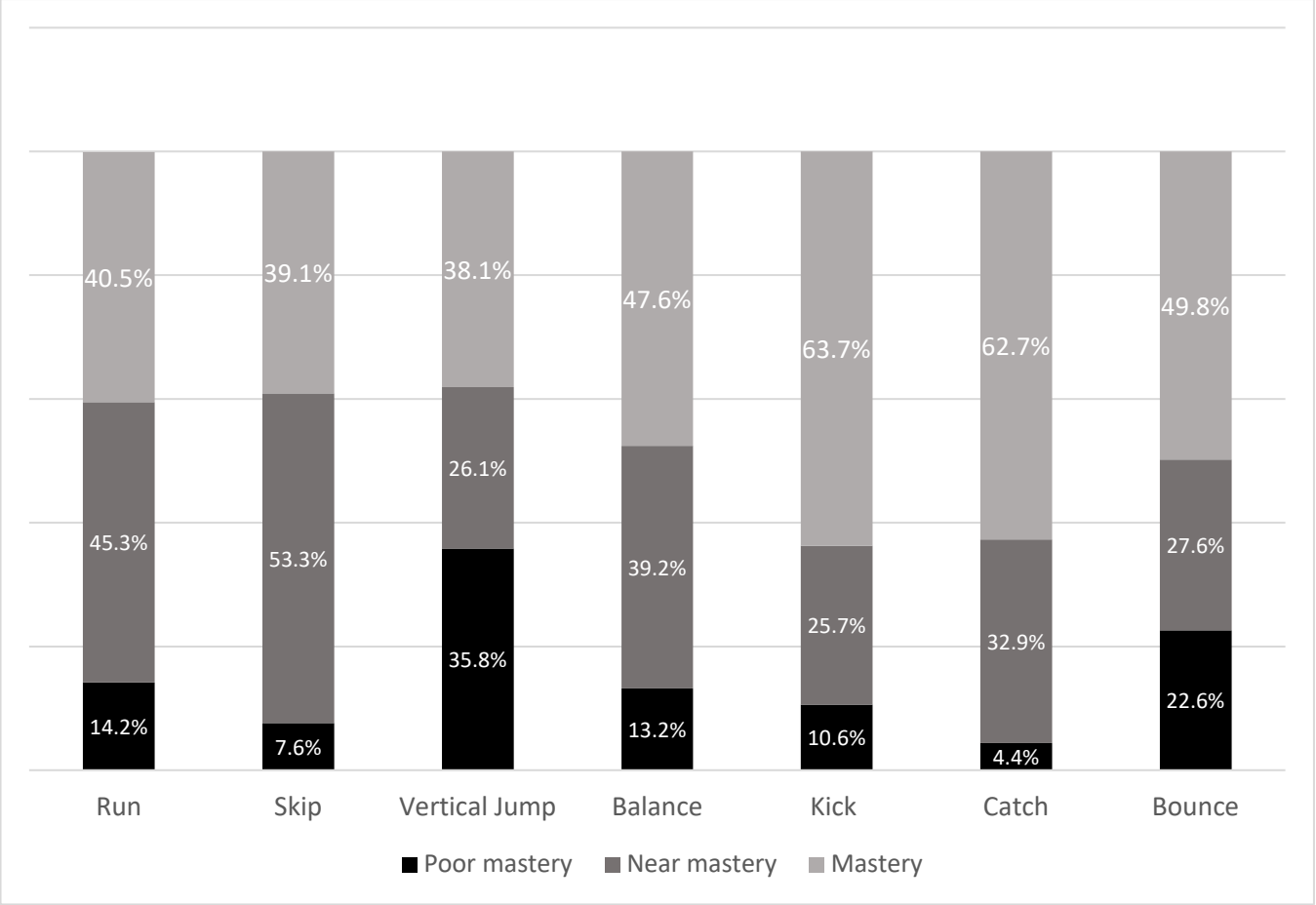

Figure 5.2: Percentage of advanced skill proficiency of 8-12-year-old participants (*N*= 228).

5.5.3 Psychosocial correlates of PA

A one-way between-groups analysis of variance was conducted to explore the impact of physical activity groupings (high, moderate, and low active participants) on levels of self-efficacy, as measured by the PASES scale. Participants were divided into three groups according to their PA level (Group 1: low active; Group2: moderately active; Group3: highly active). There was a statistically significant difference at the $p < .004$ level in self- efficacy scores for the three PA groupings: $F(2, 255) = 17.21$, $p = .00$. The actual difference in mean scores between the groups had a medium to large effect size, using the Cohen d value of 0.74. Post hoc comparisons using the Tukey HSD test indicated that the mean score for high active participants (M=38.26, SD = 3.89) was significantly different from low active (M=35.53, SD = 5.33) and moderately active (M= 33.84, SD =4.53) participants.

Of the remaining psychological variables assessed (see Table 5.2), PA self-confidence, perceived self-worth, physical performance self-concept, PA motivators, PA barriers, and PA attitudes demonstrated significant main effects for PA grouping, with small to medium effect sizes in each case using Cohen d. Post hoc comparisons, using the Tukey HSD, showed that in each of the aforementioned variables, bar PA motivators, the mean scores for the low active group were significantly reduced, when compared to the high active group. Significant differences in mean scores for PA groupings are shown in Table 5.2.

Table 5.2 Mean (SD) Across physical activity grouping with significant main effects and effect size of one-way ANOVAs

Variable	N	Low	Mod	High	OMS	Main Effect	d	α	Post hoc M Differences	
Self-efficacy	258	33.84*	35.53*	38.26*	37.84	F(2, 555) = 17.21, p = .004	0.74	.73	Low & high	p < .047
		(25)	(60)	(173)					Mod & high	p < .047
Self-confidence	257	46.60*	51.54*	61.28*	58.00	F(2, 554) = 5.78, p = .002	0.41	.85	Low & high	p < .047
		(25)	(59)	(173)					Mod & high	p < .015
Barriers	258	32.72*	33.47*	36.25*	35.15	F(2, 555) = 6.63, p = .002	0.46	.84	Low & high	p < .025
		(25)	(60)	(173)					Mod & high	p < .01
PA motivators	253	32.12	32.03*	33.66*	33.11	F(2, 550) = 5.73, p = .004	0.41	.74	Mod & high	p < .007
		(25)	(59)	(169)						
Attitudes	255	13.88*	14.15*	14.92*	14.61	F(2, 552) = 6.16, p = .002	0.46	.82	Low & high	p < .024
		(25)	(59)	(171)					Mod & high	p < .017
Perceived self-worth	258	17.72*	18.95*	20.23*	19.59	F(2, 555) = 5.80, p = .003	0.41	.66	Low & high	p < .009
		(25)	(60)	(173)						

Physical performance self-concept	257	16.58* (24)	17.35* (60)	19.42* (173)	18.68	F(2, 554) = 17.3, p = .000	0.47	.73	Low & high Mod & high	p < .000 p < .000
Subjective norms/social support	255	16.24* (25)	17.44 (59)	18.27* (171)	17.84	F(2, 552) = 3.92, p = .021	0.35	.81	Low & high	p < .027

Abbreviations: Mod = moderate; OMS= overall mean score; PA = physical activity. *p < .05.

*p < .05.

5.5.4 Focus groups

Three key themes emerged from the FG data that were pertinent to students' perceptions of health, and what participants deemed important in influencing their participation in, and barriers to, PA and sport. These themes were: (a) motivators: PA/sport is fun; (b) barriers: lack of time, distance, weather, and friend-related factors; and (c) factors influencing PA/sport engagement and disengagement (dropouts).

5.5.4.1 PA motivators: fun, enjoyment, and friends

The key emergent themes in relation to motivators for PA and sport were fun, enjoyment, and a sense of social satisfaction. Examples of this include a participant stating: "I love doing it (physical activity/ sport) because it just makes me feel really happy; it's just very enjoyable". Similarly, other students commented on the rationale behind partaking in PA and sport: "so I will be stronger and independent" and "you can learn new things about the sport". Interestingly, the influence of friends was a common recurring theme, with the social aspect "to make friends" attributed by participants as a PA motivator, with participants stating: "I love to socialize with everybody on the team", and "I like seeing my friends there".

5.5.4.2 PA barriers: lack of time, fear of injury, weather, and friend- related factors

In relation to the barriers to PA participation, insufficient time to participate (particularly on parent's side, coupled with too many other commitments) was identified as the main barrier among participants. One student stated: "I have a lot of things going on during the week, and I just don't have enough time". Similarly, another participant commented: "Like, my mom and dad won't have time to bring you there because they have to bring like my brothers and sisters around too". Several participants voiced concerns in relation to fear of injury as a barrier to PA and sport participation, with one participant stating: "Some people get a bit too competitive and that kind of like makes you feel not that confident, like, some people just get a bit too into it and yeah know pushing and shoving…. and there might be a couple of injuries and competitiveness".

Other participants commented on the weather as a barrier; responses included: “I don’t really like being wet” and “like, if it was too hot, you would be tired and mightn’t want to do it”. Interestingly, friends acting as barriers negatively impacted self- esteem, which was another emergent response among participants. One student indicated: “like, you’d see other people doing gooder (at sport), and then you would feel quite bad about yourself, because it’s just not your thing I suppose”.

5.5.4.3 Factors influencing PA/sport engagement and disengagement (dropouts)

Findings illustrate that positive outside encouragement/support from family, friends, and coaches act as models of motivation, encouraging PA engagement among the female participants. Supporting statements included: “she’s very encouraging”, “she [teacher] thinks it’s important to, like, get active’’ and ‘they’d (sports role models) give you tips on how to become better and you’d take them’”. Contrastingly, participants cited that negative relationships with coaches promote drop-out from the PA/sport, or participants are less likely to stay engaged. This is depicted with one student stating, “if there’s a really mean coach I’d probably stop the sport because they’d give out to you”, with another participant’s reason for disengaging as, “too much competitiveness amongst girls”. In addition to this was a lack of enjoyment (“not fulfilled, bored, I just thought it was way too strict, like, it wasn’t fun”) along with having a dislike for the teacher/coach (“the teacher was mean”) and a lack of support/encouragement from coach/teacher (“you feel that you’re not able because they are giving out you so much”.

5.6 DISCUSSION

Results of this study indicate that a large number of Irish female youth are insufficiently active to benefit their current and future health. The percentage of participants meeting the 60-min MVPA guidelines on all 7 days was 28.2%. These low levels of PA participation are relatively consistent with other studies on a national Irish level (Layte et al., 2011; Harrington et al., 2014). Although higher than the 16% reported for a similar age group in the Irish Health Behaviour in School-aged Children (HBSC) study (Gavin et al., 2015), comparable findings were reported for other European countries (Inchley et al., 2017; Verloigne et al., 2012) and in New Zealand (Maddison et al., 2016), which are in line with this study's findings. Given the consistently reported age-related decline in PA participation for girls (Bradley et al., 2011), the need for intervention to address these low levels reported for young girls aged 8–12- years-old is palpable.

The majority of female youth in this study (97.74%) failed to reach a level of mastery across key FMS, indicating that basic movement skill proficiency among pre-adolescent Irish youth is low. These observed low findings of FMS proficiency are consistent with recent Irish adolescent research (O'Brien et al., 2016a). Results from the present cohort indicate that only six participants were fundamentally competent across all seven object-related and locomotor skills, despite children having the developmental capacity to master these skills by 6 years of age (Gallahue & Ozmun, 2006). Previous international research examining the FMS proficiency of female youth supports these low levels of FMS mastery (Bryant et al., 2016; Cliff et al., 2012; Foweather, 2010). The poorest performed skill across the cohort was the vertical jump, where only 38.1% achieved mastery. This finding for the low prevalence of vertical jump proficiency among female youth participants is in line with the Physical Education, Physical Activity and School Sport (PEPASS) year 2 study by Foweather (2010), specifically across 10–11-year-old children, where only 16% of female participants obtained skill proficiency in the vertical jump. It is critical that children develop competence in locomotor skills, as they appear to be a key determinant of children's PA, physical fitness, and body fatness (Foweather, 2010). It would appear that Irish female youth may be engaging in sport-specific skills without learning the prerequisite criteria for basic jumping movement patterns. This highlights a further implication, indicating that these FMS are not developed

during PE or in the sporting environment (O'Brien et al., 2016a). Furthermore, this points to the targeting of improving FMS proficiency as a strategic supplement of future school-based and community interventions in the promotion of PA in female youth. A strategic step for the future G4G intervention in Ireland may include the provision of opportunities for young girls to execute FMS through fun games and developmentally-appropriate activities within school and community settings, as these environments have been empirically shown to significantly improve FMS proficiency in youth (Morgan & Barnett, 2013).

Consistent with other recent studies (Stellino & Sinclair, 2013; Verloigne et al., 2016), the analysis of psychological variables demonstrated differences and significant main effects with female children's PA levels. This was evident in the current study for self-confidence, perceived barriers, attitudes, and perceived performance self-concept (PPSC), all of which exhibited small to medium effect sizes, as shown in Table 5.1. Self-efficacy, interestingly, was the only variable from the analysis which exhibited medium to large effect sizes from the PA groupings. A significant difference in the mean scores were found in the attitudes of participants toward PA, self-efficacy, self- confidence, perceived barriers, and PPSC between low, moderately, and high active participants, with moderately active participants scoring significantly lower than their high active counterparts in each case and low active participants scoring significantly lower than their high active participants in each case. This is relatively consistent with other studies (Belton et al., 2014; Bauman et al., 2012), further implying that levels of perceived self-efficacy, self-confidence, attitudes, PPSC, and barriers differ among low, moderately, and high active female youth, which may impact future PA intention and participation.

These variables (self-efficacy, self-confidence, attitudes, PPSC, and barriers), each of which demonstrated differences and significant main effects with female children's PA levels in the current study are categorised as important factors for the TPB. The TPB posits that behavioural intention to be physically active is influenced by attitude, subjective norms, and PBC (Ajzen & Madden, 1986). Current research suggests that children who express strong feelings of control and have high motivation to engage in PA are likely to have high MVPA levels (Wang & Wang, 2015). In the current study, self-report and FG findings indicate that social pressures, namely parents, coaches, and peers, were reported as participatory barriers, and these

findings are in line with previous research on female youth (Verloigne et al., 2016; Perry et al., 2011). Regarding PBC, resources facilitating (positive encouragement/praise) or impeding engagement (negative coach relationship) among 8–12-year-old female youth are deemed important findings in the context of this G4G study, and are consistent with recent studies (Battaglia et al., 2017; Fenton et al., 2017; Laird et al., 2018).

The FGs in this current study identified several issues which will be important to consider in the design of the G4G intervention. Friendship and the influence of peers were consistent themes both for influences on current activity and suggestions on how to promote participation ("I love to socialize with everybody on the team", and "I like seeing my friends there".) This theme emerged irrespective of current PA levels and underlines the importance of peers at this stage of the life cycle (Fitzgerald et al., 2012). The influence of friends and the importance of having someone to participate with have been shown to be key factors in young female participation in PA (Carlin et al., 2015; Fitzgerald et al., 2012; Sawka et al., 2013).

Additionally, a systematic review of 106 studies on PA influences identified that children's PA was positively associated with encouragement from friends, friends' own PA participation, and engagement with friends in PA (Maturo & Cunningham, 2013). Feeling connected to others, such as parents, teachers, and peers, can help cultivate the development of intrinsic motivation (Crespo et al., 2013), particularly for female youths. Similarly, Dudley et al. (2015) posits that one of the primary reason's youth participate in PA is for the sheer enjoyment they experience while moving in social situations and interacting with their peers. This suggests, particularly for this current G4G study, that it is important to emphasize the social aspect within PA interventions for young girls, specifically by focusing on doing physical activities and skills with friends and promoting the message to encourage each other to participate in these activities (Voorhees et al., 2005).

In addition to this, participants cited the important role of parents within their PA and sport involvement. Parental support and direct help from parents have previously been correlated with PA in female youth (Carlin et al., 2015; Eddolls et al., 2016). Given the continued influence parents play as children move into adolescence (Van Der Horst et al., 2007), it would be prudent for the G4G

intervention to consider active peer and parental involvement, as these reinforcing factors may positively influence girls' PA participation (both directly and indirectly) through the internalisation of several personal psychological variables, such as self-efficacy to be active and the perceived benefit of having fun (Verloigne et al., 2016).

The community-based Gaelic Athletic Association (GAA) club environment in Ireland is also a key opportunity for the promotion and provision of PA opportunities through sport, specifically for LGF participation. Previous cross-sectional studies indicate that youth sports club participants tend to have higher levels of PA, increased self-esteem, and positive peer relationships (Basterfield et al., 2015; Geidne et al., 2013; Silva et al., 2013). Considering that LGF is a favourite form of sport among female youths and adolescents and is currently recognised as one of the fastest growing female sports in Europe (LGFA, 2016), it is indeed a desirable environment in which girls can engage.

The G4G programme, through a sports-based community environment, is a key opportunity to intervene, and may overcome many barriers to female youth participation. It is group-based and offers social interaction by promoting movement and skill competence in a non-competitive context. This programme provides an appropriate medium through which to increase PA participation and basic movement skill proficiency among female Irish youths. Results from the "Keeping Them in The Game" study (Lunn et al., 2013) in Ireland report that 1 in 10 girls drop out of playing regular sports during the primary to secondary school transition (12–13 years old). This is of concern, and it is proposed that the next phase of the G4G intervention will be implemented through the provision of LGF clubs and the community environment.

Preadolescent girls are an important target for PA behavioural change strategies, as this age cohort may enhance tracking into the crucial period of adolescence (Biddle et al., 2014). The quantification of intervention effectiveness for this age group of girls has not been adequately reported (Biddle et al., 2014). This suggests that the school and community centre are key organisational structures to implement this proposed intervention, supported by professionals (Murillo Pardo et al., 2014). Therefore, school and com- munity-based interventions that are multi-component in nature, simultaneously targeting curricular, school environment,

policy, and community links, are a promising approach for promoting PA (Biddle et al., 2014). A critical challenge facing governments, schools, sports groups, and communities is to develop forms of PA that are sensitive to girls' needs and interests.

There were some limitations of the present study. First, the data relied on self-reports of PA and psychological variables. Although previous studies showed that the PA and the psychological measures had good reliability and acceptance validity, more objective measures of activity, such as accelerometer data, should have an additional value. Secondly, the use of a convenience sample is a limitation, which can lead to the under-representation or over-representation of particular groups within the sample. Another limitation of the present study is its cross-sectional design and small sample size. The results do not provide causal evidence regarding relationships among actual FMS psychological correlates of PA and PA. To gain more insight in the direction of these relationships and to understand how associations among these variables may change overtime, longitudinal or experimental studies should be conducted with a bigger sample size.

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Declaration of interest statement

The authors declare that there are no conflicts of interest within this manuscript publication.

5.8 LINK TO CHAPTER 6

The unique element of this chapter was the assessment of PA patterns, FMS proficiency and psychological correlates of 8 to 12-year-old girls, as part of the baseline data. This process allowed the G4G research team to identify weaknesses in skill performance and pre-adolescent needs-driven perceptions to inform the development of the G4G intervention. Chapter 5 is directly associated and logically connected with the following overview of the G4G intervention (chapter 6). In this next chapter, the components of the G4G intervention will be outlined, described and discussed, as underpinned by Deci & Ryan (2002) Self-Determination Theory (SDT) and Stokols (1996) Social-Ecological Model (SEM). The reader will be able to identify the findings from baseline data collection (chapters 4 and 5), integrated within the research-informed G4G intervention (chapter 6).

CHAPTER 6

RATIONALE AND STUDY PROTOCOL FOR THE 'GAELIC4GIRLS' PROJECT: A NOVEL MULTI-COMPONENT COMMUNITY SPORTS-BASED COACHING INTERVENTION FOR INCREASED PHYSICAL ACTIVITY PARTICIPATION OF PRE-ADOLESCENT GIRLS

Chapter 6: Rationale and Study Protocol for the 'Gaelic4Girls' Project: A Novel Multi-Component Community Sports-Based Coaching Intervention for Increased Physical Activity Participation of Pre-Adolescent Girls

Preamble

The following article reports the 'Gaelic4Girls' (G4G) intervention protocol study; a 10 week specifically designed multi-component PA and FMS community sports-based coaching intervention, informed by contextually relevant data (chapters 4 and 5), targeting 8- to 12- year olds, from a community sports club setting. The design of this study was guided by Deci & Ryan's (2002) Self-Determination Theory (SDT) and Stokols (1996) Social-Ecological Model (SEM). This manuscript is currently under review in the Sports Coaching Review Journal.

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Statement of authorship;

I hereby declare that I, Orlagh Farmer, am the principal author of this article. The following statements outline my contributions to the work:

- I was the principal investigator responsible for all the data collected (2017) in this chapter. I organised all stages of data collection consisting of timetabling undergraduate students, contacting all primary schools and the LGFA club involved (principals, teachers, coaches, and students), equipment preparation, data storage, data cleaning and data inputting.
- Organised the rigorous training and protocol workshop for field staff assistants which was an important component of this baseline study.
- Made substantial contributions to the conception and design of the work; the acquisition, analysis and interpretation of data for the work.

- Wrote the first draft of the full article and contributed significantly to the subsequent redrafts until submission.
- Final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

6.1 PURPOSE OF CHAPTER

6.1.1 Rationale

There are a lack of effective intervention strategies to promote PA in female youth (Anokye et al., 2018), and particularly within a sporting context (Whitley et al., 2019). In this chapter, the reader is introduced to the theory-based design protocol of the 'Gaelic4Girls'(G4G) study intervention, specifically the participant, coach (pedagogical focus), and parental (support) components, designed to increase 8 to 12-year-old pre-adolescent girls PA, FMS proficiency and psychological wellbeing. By actively engaging the G4G participant, coach, parent, guardians and community sports club in the intervention process, the G4G intervention is adhering to previously successful intervention evidence in
a youth sporting context, as underpinned by the SDT and SEM.

6.1.2 Contribution to the field

In terms of originality, the theoretical components of the intervention address PA, FMS, and psychological content in the promotion of skill competency, attitudes, self-efficacy, enjoyment and social support structures towards the importance of regular PA participation in OYS. The theoretical framework underpinning this study may be used to guide future theory-based community-sports based coaching interventions, targeting both PA promotion for8 to 12-year-old girls and the enhancement of coach education within a youth sport context.

6.2 ABSTRACT

Background: This paper reports on the theory-based design protocol of the revised 'Gaelic4Girls'(G4G) study, a novel, multi-component, community sports-based coaching intervention for increasing pre-adolescent Irish girl's physical activity (PA) levels, fundamental movement skill (FMS) proficiency, and psychosocial well-being.

Methods: A target sample of 241 female-only participants, aged 8 to 12 years old received the revised G4G intervention. A sub-sample (n = 117; mean age = 10.44 ± 1.40 years) were assessed at pre- and post-intervention phases (March-June 2017), using empirically established self-report and fundamental movement skill proficiency. The revised G4G intervention (child, coach, and parental/guardian component) was delivered once a week, for 60 minutes, over 10 weeks in a rural community sports club setting, as guided by the Social-Ecological, and Self-Determination theoretical frameworks.

Conclusion: The theoretical framework underpinning this study may be used to guide future theory-based community-sports based coaching interventions, targeting both PA promotion for pre-adolescent girls and the enhancement of coach education within a youth sport context.

Keywords: organised youth sport intervention; fundamental movement skills; psychosocial correlates of physical activity; coach education

6.3 INTRODUCTION

Regular physical activity (PA) is associated with numerous physical, and psychological health benefits for children and young people aged 5 to 18 years old (Owen et al., 2017). A large body of evidence, however, consistently shows that a large proportion of children and adolescents fail to meet the current recommendation of 60 minutes of moderate-to-vigorous PA (MVPA) daily (Hallal et al., 2012). It is widely reported that girls are less physically active than boys throughout childhood (Sallis et al., 2016), and the age-related decline in PA participation, particularly from early adolescence onwards, is steeper for girls than for boys (Owen et al., 2017).

Recent systematic reviews examining the effectiveness of interventions to increase PA in children have reported only small treatment effects, specifically in terms of increasing girls' MVPA (Owen et al., 2017; Voskuil et al., 2017). Previously reported evidence would suggest that pre-adolescent girls are an important target population for PA behaviour change and are identified as a high priority group for PA promotion (Camacho-Minano et al., 2011). Evidence would support the importance of intervening during the pre-adolescent period for PA promotion, specifically as activity levels have been previously shown to track into adolescence (Biddle, 2014).

Organised youth sport (OYS) participation is one such strategy with the existing potential to increase overall PA levels in young people (Hebert et al., 2015), and for these reasons, community-sports based settings are recognised as key health settings in promoting knowledge of PA, and healthy lifestyle behaviours (Kokko, 2014). Sports club membership predicts higher levels of leisure-time PA engagement among girls (Marques et al., 2016), and OYS participation increases the likelihood of meeting daily PA recommendations for improved health (Hebert et al., 2015). Evidence suggests that an array of physical and psychosocial health benefits are associated with children and adolescents' participation in team OYS settings, such examples include improved skill development, heightened levels of muscular strength and endurance, increased self-esteem and positive peer relationships (Felfe et al., 2016). Despite these widely endorsed benefits for OYS, there is a lack of effective intervention strategies to promote PA in female youth (Anokye et al., 2018), and particularly within a sporting context (Whitley et al., 2019).

Aligned with these intervention strategies, coaches in OYS settings are prominent stakeholders who have the potential to impact the health and well-being of children and adolescents (Guagliano et al., 2014). Specifically, these coaches can be viewed as important role models who can influence players' PA developmental experiences (Santos et al., 2019), empowering and enabling participants to engage in PA (Griffiths & Armour, 2014) within an OYS context. It is, therefore, of particular importance that coaches at the grass-roots level (volunteer, part-time and full time) engage in regular coach education programmes (Côté & Gilbert, 2009) reinforcing their unique position towards children's involvement in sport (Bäckmand et al., 2010). Based on Côté and Gilbert's (2009) understanding of effective coaching, it is necessary to systematically integrate coaches' knowledge to increase athletes' confidence, competence, connections, and character, given the particular characteristics of a sport context (i.e. aims, age group, and coaching domain) (Côté & Gilbert, 2009; Flett et al., 2013).

Previous studies (Sullivan et al., 2012) have highlighted that those who participate in coach education programmes can positively improve their coaching efficacy, beliefs, knowledge, and behaviours (Trudel et al., 2010). A recent review on the effectiveness of coach education in OYS indicated that non-formal learning methods within coach education (such as continuous professional development (CPD), clinics, workshops or seminars) (Maclean & Lorimer, 2016) are more authentic, meaningful, and contextualised to a coach (Mallett et al., 2009). Despite some of the research on the effectiveness of non-formal coach education training programmes, little is known about how the acquisition of knowledge is transmitted through these types of programmes (Trudel et al., 2010). Research in practice would now suggest that there is a need for innovative coach education approaches, that can better equip coaches with the professional competencies needed to deal with the dynamic nature of coaching within OYS settings (Morgan et al., 2013).

Similar to the domains of both OYS and coach education, fundamental movement skills (FMS) have also been shown to have a positive association with youth PA participation (Robinson et al., 2015). Proficiency in a range of FMS is considered to be the foundation for an active lifestyle (Cattuzzo et al., 2016), and the primary school window (5 to 12 years old) represent the "golden years" of motor skill development (Clark & Metcalfe, 2002). In order to achieve the overall recommendation of increasing PA levels of Irish youth, previously reported national

surveillance data on childhood PA recommended that the development and promotion of FMS should be of priority (Woods et al., 2010). Existing evidence would suggest that children with better skills develop enhanced physical self-perceptions, and this enables further PA engagement, leading to greater motor competence (Robinson et al., 2015; Stodden et al., 2008). Children who fail to acquire a proficient level of FMS often lack the confidence and motivation to engage in PA (Whitehead & Biddle, 2008) and are more likely to drop out of OYS during adolescence (Woods et al., 2010). Nationally in Ireland (Farmer et al., 2018) and internationally (Eather et al., 2018), the proportion of school-aged children achieving FMS proficiency is low. Efforts to promote PA in youth, particularly among girls, alongside the professional development of coaches, may lead to a greater understanding of evidence-based strategies to improve FMS proficiency (Morgan et al., 2013).

In the last decade, there has been a gradual increase in the number of randomised controlled trials (RCT's) that have evaluated the impact of PA-based interventions on young girls (Jago et al., 2015; Sutherland et al., 2016), however, minimal evaluations of pre-adolescent girls within a community sports-based setting exist. Of those RCT's which have been undertaken, results have found small effects when PA was measured objectively (Okely et al., 2011). The need to promote higher habitual MVPA engagement amongst children (particularly girls), in parallel to the provision of coach education in the youth sport context, has been underlined as prudent strategies (Fenton et al., 2017).

In light of the previous considerations, this paper reports the study protocol and methodological procedures used in the design, development, and implementation of the 10-week G4G community sports-based coaching intervention. The novel coaching strategies and pedagogies utilised within G4G aim to increase overall PA levels, FMS proficiency, and psycho-social well-being among pre-adolescent girls. The Gaelic4Girls (G4G) research project is part of an existing national Ladies Gaelic Football (LGF) coaching programme in Ireland, designed for 8 to 12-year-old girls. LGF is a favourite form of PA engagement among Irish youth (Woods et al., 2010), and as a national 'Gaelic' game, the sport is a desirable activity in which pre-adolescent girls can participate.

In this study, the G4G coaching intervention seeks to highlight the novel coaching pedagogies from an intervention design and dosage perspective for

heightening young girl's participation in LGF in a rural community sports club setting in the County Cork region of Ireland. The G4G project specifically targets pre-adolescent girls and OYS coaches, intending to create a community club sporting environment for LGF, which encourages and supports the full involvement of girls in PA. This proposed research objective will be targeted through a specifically designed multi-component community-sports based coaching intervention, informed by contextually relevant data (Chapters 4 and 5). The purpose of this paper was to provide a detailed insight into the theory-based design protocol of the G4G intervention study, namely the G4G participant, coach, parent/guardian, and intervention components.

6.4 METHODS

6.4.1 Study design

The G4G intervention, a 10-week multi-component PA and FMS community sports-based coaching intervention targeted 8- to 12- year olds, from five girls' only primary schools, all of which were located in a proximal location to the surrounding rural LGF club. Assessment measures were conducted at pre-intervention [March 2017] and were repeated at post-intervention [June 2017] phases. Ethical approval for this study was obtained from the Social Research Ethics Committee of the researchers' institution (University College Cork) in March 2016.

6.4.2 Recruitment, setting, and participants

Convenience sampling was used to recruit from the five girls' only primary schools (rural and rural/urban) in the County Cork region. All schools were in close proximity to the local designated LGF club and the research team. To be considered eligible for this study, participants (girls only) were formally enrolled between the years of second to sixth class of primary school (aged 8- to 12- years old) and had expressed an intention to attend the programme for its full duration. Informed parental consent and child assent were the requirements for eligible participation in this study. Information sheets and consent forms were administered to students who expressed an interest in taking part in G4G. Informed assent for participation was

granted by all participants, and written consent was obtained from their parent(s)/ guardian(s) prior to the physical and psychological data collection measurements. For coaches to be eligible to partake in the programme, recognised LGF coaching credentials from the National Ladies Gaelic Football Association (LGFA), and previous experience coaching girls within the existing community sports-based setting were required; all participants were free to withdraw from the research at any stage.

Prior to the commencement of the G4G intervention study, the leading researcher emailed the school Principal from all five primary schools, calling for expressions of interest for the lead researcher to visit the school, and specifically to inform the girls about the G4G programme. Subsequent to the granted approval from school Principals, the lead researcher, along with the two G4G coordinators (head club coaches from the selected LGF intervention club) visited the five primary schools, where a full outline of the G4G intervention and the associated data collection measurements were provided.

Three hundred and seven participants from the five primary schools were invited to participate in this study. Two hundred and forty-one participants took part in the 10-week G4G intervention, with 188 participants providing fully available date at both pre and post data collection time points (78 % of the total sample).

6.5 GAELIC4GIRLS INTERVENTION

6.5.1 Theoretical framework

The revised G4G intervention is underpinned by self-determination theory (SDT) (Deci & Ryan, 2008), and elements of the social-ecological model (SEM) (Stokols, 1996), because its theoretical foundations are concerned with how the psychological and socio-environmental conditions (e.g., created by a coach) can support an individual's motivation (Fortier et al., 2012). SDT is particularly appropriate for understanding pre-adolescent girls' PA participation viewpoints (Player, 2010b) because the theoretical framework focusses on understanding the quality of an individual's motivation (e.g. how self-determined their reasons for PA participation are). Previous research suggests that more autonomous PA motivation is positively associated with child and adolescent PA participation (Dishman et al., 2016), and

positive psychological outcomes (such as quality of life and physical self-concept, etc.) (Standage et al., 2012). SDT within G4G contends that finding ways in which pre-adolescent girls can develop a sense of choice and ownership over their own PA (autonomy), feel capable engaging in PA (competence), and are supported within a broader social context (relatedness) will foster more self-determined forms of motivation (e.g. participating for fun or personally valued benefits), which are in turn positively associated with heightened PA levels (Sebire et al., 2016). SDT, therefore, suggests that PA interventions, such as the named G4G programme, which target enjoyable and valued activities, and foster perceptions of ownership, competence, and belonging, are more likely to result in a sustained behaviour change (Sebire et al., 2013).

The revised G4G intervention was also designed using elements of the Social Ecological Model (SEM) (Stokols, 1996), grounded in three key elements (organisational, interpersonal, and individual). At the organisational level, initial support from the G4G lead researcher allowed for the development of a multi-component community OYS coaching intervention (see Figure 6.1). At the interpersonal level, ongoing support was provided for the G4G coaches from both the lead researcher and the G4G coordinators. The individual-level involved developing coaches', parents, and guardian's understanding of the benefits surrounding children's PA, FMS, and effective coaching practice.

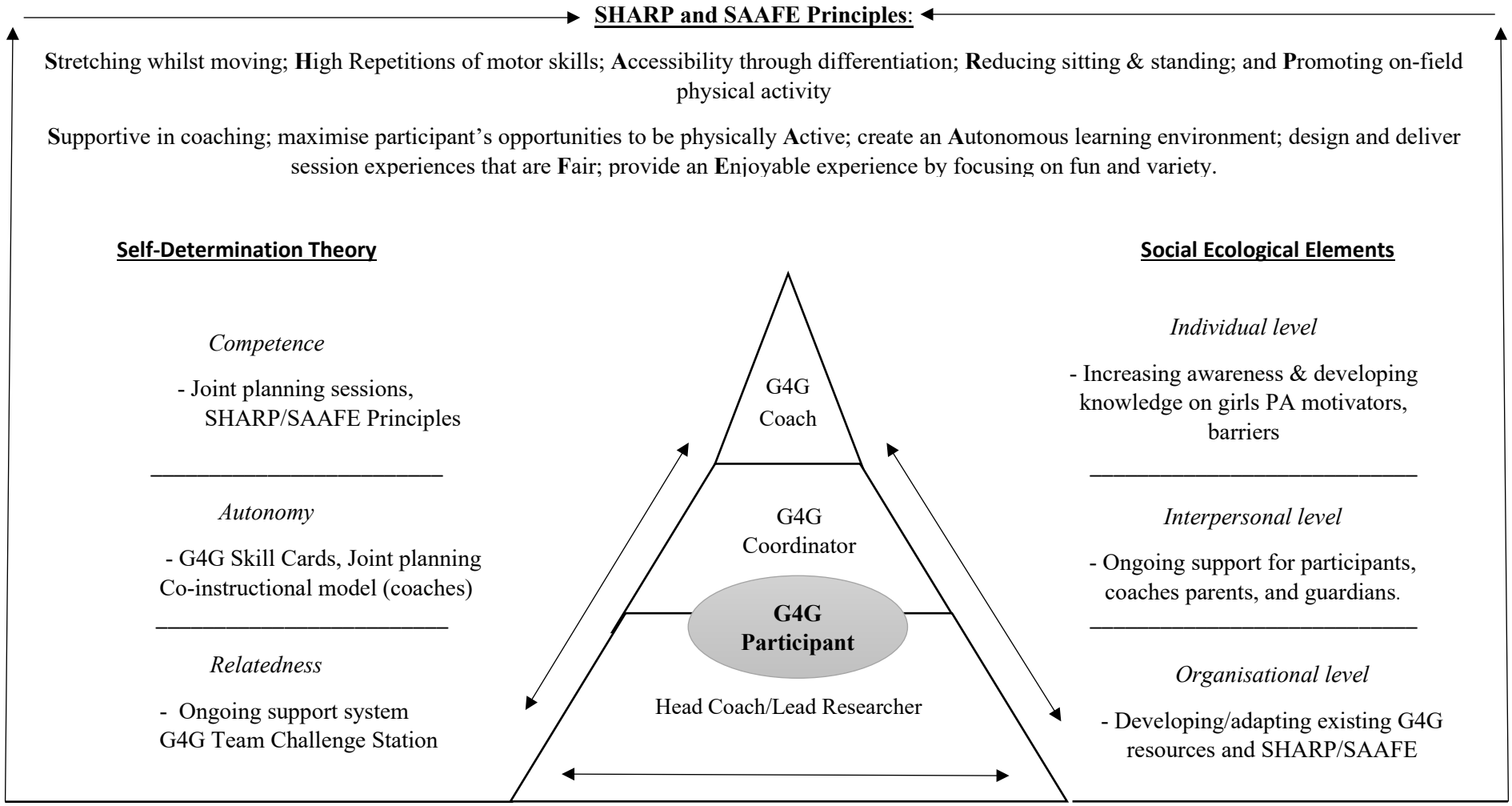

Figure 6.1. Theoretical underpinnings of G4G Intervention

6.5.2 G4G intervention structure and components

Participants selected for G4G participation, received the 10-week intervention, consisting of 1 × 60 minutes, specifically tailored, and research-informed LGF session per week (10 sessions in total between March and May 2017). The G4G intervention includes three major components, as guided by the associated theoretical constructs, specifically the (1) participant component, (2) coach education component, and (3) parent/guardian/community component (see Table 6.1).

The programme was structured using a consistent format each week and included 6 rotatory LGF skills stations (i.e. adopting a stations-based sport pedagogy approach) (Butler & Griffin, 2010). In each of the 6 stations (10-minutes each), coaches were instructed to focus on different skills, specific to LGF, and these skills were informed by the weekly joint planning sessions between the lead researcher and the G4G club coordinators. Due to a large number of G4G participants, coaches had access to two full-size Gaelic Athletic Association (G.A.A.) pitches to set up the 6 stations and deliver the weekly G4G programme sessions (see Figure 6.2). In terms of targeting specific intervention components within G4G, research guided baseline findings (Farmer et al., 2017, Farmer et al., 2018) informed the design and the development of this proof of concept feasibility trial, and in particular, highlighted the need for targeting low levels of PA and FMS proficiency, through addressing participants' self-efficacy levels, inclusive of fun, and socially-stimulating PA environments.

6.5.2.1 G4G participant components

1) Developing FMS

Using the existing G4G framework (6 x 10-minute rotatory LGF stations), participants in the revised G4G intervention were exposed to a variety of FMS, and LGF sport-specific skills, through a Teaching Games for Understanding (TGFU) instructional model (Sheppard, 2014), within a rotatory station-based approach (see Figure 6.2). The previous implementation of a station-based, and TGFU approach has been shown to empower young children, deepen their knowledge of game tactics, help improve skills, and contribute to enjoyment levels (Butler & Griffen, 2010). As only 2% of participants were proficient in FMS, across a range of 7 object

control and locomotor skills at baseline (Farmer et al., 2018), as part of the G4G intervention, one of the six stations each week focused specifically on the deliberate practice of key FMS, as a strategy for increasing motor competence among girls. The FMS activities were implemented through fun games, with appropriate strategies to stimulate development and for the provision of adequate time for participants to perform both locomotor and object control FMS-related activities (Robinson et al., 2015).

To further encourage the development of FMS proficiency, and foster independence and autonomy in practicing sports-specific skills, participants received weekly G4G skill cards upon completion of each session. Each sport specific G4G skill card (10 in total) every week comprised of a different skill focus within the game of LGF (e.g. kick, catch, hand pass), and pedagogically, these were presented with a visual, and a brief description of the key coaching cue points.

A sub-sample of participants (n = 52) took part in an innovative LGF and FMS dance for 30 minutes, before the commencement of the G4G pitch sessions, from weeks three to eight. The rationale for the inclusion of the G4G FMS dance was to provide an additional opportunity for participants to practice basic FMS (e.g. coordination, skipping), combined with sport specific LGF skills into a fun movement sequence of dance, using a prevalent song in the charts as an auditory stimulus. The Canadian Sport for Life (Sport for Life Society, 2016) states that participation in rhythmic activities, such as dance, aids in the ease and efficiency of performing many FMS, by enhancing the fluidity of movement patterns.

The G4G dance, therefore, provided an appropriate medium to increase girls' PA and apply the SDT through intrinsically motivating and building girls' perceived autonomy, competence, and relatedness (Jago et al., 2013). Participants performed the G4G dance for parents, coaches and the invited LGF player 'role models' (Morgan et al., 2017) at the presentation evening on week 8 of the programme, as part of a culminating festival of sport within G4G (Appendix I and J).

2) Promotion of a Social and Inclusive Environment

Participants were exposed to a specific 'Team Challenges' station each week (see Figure 1), to promote fun, friendship, and inclusivity. Previously published G4G baseline findings reported that the biggest participation barrier to PA was 'not being as good as others at it' (Farmer et al., 2018). Additionally, the influence of friends

and the importance of having someone to participate as a key emergent theme (Farmer et al., 2018) among primary school-aged children, and these are key factors in young female's participation in PA (Carlin et al., 2015). As such, the 'Team Challenges' station was incorporated to promote a sense of inclusiveness, friendship, and belonging, while providing feedback to each of the participants within a fun non-competitive environment. The need for relatedness (SDT) and feeling connected to others (peers) can help cultivate the development of intrinsic motivation (Crespo et al., 2013). Additionally, the 'Team Challenges' station encouraged the social aspect of PA participation with friends and promoted encouragement with each other through participation in these types of activities (Maturo & Cunningham, 2013).

6.5.2.2 G4G coach components

1) Coach Education

The lead researcher conducted an initial 2-hour Coach Education Workshop session, prior to the start of the G4G intervention. This followed with 8 x 1-hour Coach Education sessions, specifically with the lead researcher engaging face-to-face with the G4G club coordinators (N=2) and coaches (N=15) each week, approximately three to four days prior to each G4G intervention session. The provision of Continuous Professional Development (CPD), similar to the Robbins et al., (2013) 'Girls on the Move' intervention protocol was adhered to in terms of discussing issues, and reinforcing G4G policies and procedures. Additionally, G4G club coordinators and coaches received an on-demand 'WhatsApp' instant messaging service for additional support, where necessary, while the programme was ongoing. This instant messaging service included coaching session ideas for consideration within the G4G intervention or communication correspondence regarding the weekly training session set-up structure.

The coach education sessions were theoretical (SDT and elements of SEM) in their design, increasing levels of self-determination for coaches, through the provision of opportunities to support girls' through the three basic psychological needs of autonomy, competency, and relatedness (Deci & Ryan, 2002). The sessions also aimed to develop the G4G coordinator and coaches' self-efficacy to coach with

confidence and to support the participants to engage in more PA participation. A co-instruction model between the lead researcher and the G4G club coaches was utilised throughout the entire intervention, whereby G4G coaches independently instructed sessions with the support of the lead researcher. This type of experiential learning is a process through which the learner (i.e., the coach) can construct knowledge, skill, and value directly from an experience within the environment, and this CPD strategy has been proven to be a successful approach (Marlow & McLain, 2011).

As part of the weekly coach education workshops, G4G coordinators and coaches were provided with the opportunity to suggest additions or develop new strategies to engage the G4G participants. Coaches were then given a reflective task as part of these coach education workshops, utilising a similar protocol as 'The Girls Peer Activity (G-PACT) Project for adolescent girls (Owen et al., 2018). Coaches were prompted to consider how active they thought the G4G participants were during the previous week's coaching session, how the participants spent their time during training, and potential modifications the coaches could make to some of their drills to increase opportunities for PA participation (Guagliano et al., 2014).

The content for the following week was also discussed, alongside how best to deliver the sessions, which allowed the lead researcher to maintain consistency in the delivery and content coverage of the G4G intervention in the sports club (Owen et al., 2018). At the end of the 10-week intervention, the lead researcher assisted the G4G coordinator and coaches with the development of a club sports policy and action plan, which specifically encouraged the coaches and coordinators to continue using the G4G programme autonomously (i.e. without the lead researcher influence), and integrating the key components into current practice within the club setting. The coach education component targeted all G4G coordinators (N=2) and coaches (N=15) to act as change agents and supportive role models for PA promotion in the community-sports club environment (Belton et al., 2018).

2) G4G Coaching Manual

While the CPD sessions were designed using the research-informed protocol and existing national programme curricula from the LGFA, the lead researcher also tailored the intervention towards the inclusion of information on different coaching

methods/styles, content knowledge, and theoretical underpinnings (as guided by baseline findings (Farmer et al., 2017, 2018). To support coaches throughout the intervention, every coach received a comprehensive G4G Resource Pack, which was aligned to the evidence-informed SAAFE (Lubans et al., 2017) and SHARP principles (Powell et al., 2016).

The SAAFE principles and practical strategies (Lubans et al., 2017) have been designed to enable practitioners to deliver engaging PA sessions to youth, in a manner that maximises PA participation, and promotes physical literacy by enhancing affective, cognitive, motivational, and movement skill outcomes. G4G coordinators and coaches were encouraged to (i) be Supportive in their teaching, (ii) maximise participants' opportunities to be physically Active, (iii) create an Autonomous learning environment by including elements of choice and providing a rationale for activities, (iv) design and deliver session experiences that are Fair by allowing all participants to experience success regardless of their physical abilities, and (v) provide an Enjoyable experience by focusing on fun and variety.

Additionally, the 'SHARP Principles', were a set of weekly sport pedagogy principles [adapted from (Powell et al., 2016)], which formed a core element during the G4G intervention, and involved increasing opportunities for young girls to be physically active through the integration of key pedagogical components: e.g. Stretching whilst moving; High Repetitions of motor skills; Accessibility through differentiation; Reducing sitting & standing, and Promoting on-field physical activity (see Table 6.1).

The G4G resource pack consisted of the following: (1) Ten visual G4G session plans (emphasizing Teaching Games for Understanding, SAAFE, and SHARP principles); (2) A user manual containing pertinent coach education topics (such as 'Effective Coaching', 'Differentiation, and 'Including all Children'); (3) A sample range of FMS and LGF games; 4) Overall signposting information to useful online/print resources. This G4G resource pack was used to ensure continuity and consistency across the 10-week intervention.

6.5.2.3 G4G parental and guardian component

Given the continued influence parents and guardians play, specifically as children transition into adolescence (Belton et al., 2019), the incorporation of familial support was accounted for in the G4G intervention. Previously published baseline findings

further highlighted the need to actively engage parents and guardians in young girls' PA and sporting experiences (Farmer et al., 2018). Furthermore, parental and guardian support services (in alignment with SDT) were implemented into the revised G4G intervention through the following strategies;

- *Technological resources* – the lead researcher set up a 'WhatsApp' instant messaging and 'Facebook' group for all interested parents. The purpose of this messaging support service was to provide a communication link for encouraging parents to engage in regular text messaging regarding updates on the G4G programme (see Table 6.1). Parents utilised this platform to discuss the G4G programme, carpooling to training, attending games, and other matters (relatedness).
- *Parent/Guardian Evening* – On week 4 of the G4G programme, the lead researcher designed and delivered a 45 minute 'G4G Parent/Guardian Workshop' in the community sports setting, prior to the commencement of week 4's coaching session for children. The rationale behind this workshop was to inform and educate parents/guardians on the important role they play in positively impacting their daughter's sporting experience. Other items surrounding the importance of FMS and club registration were also discussed. The lead researcher also encouraged parents and guardians to actively get involved with their daughter through the LGF skills at home (promote youth 'ownership'), specifically via the G4G Skill Cards.

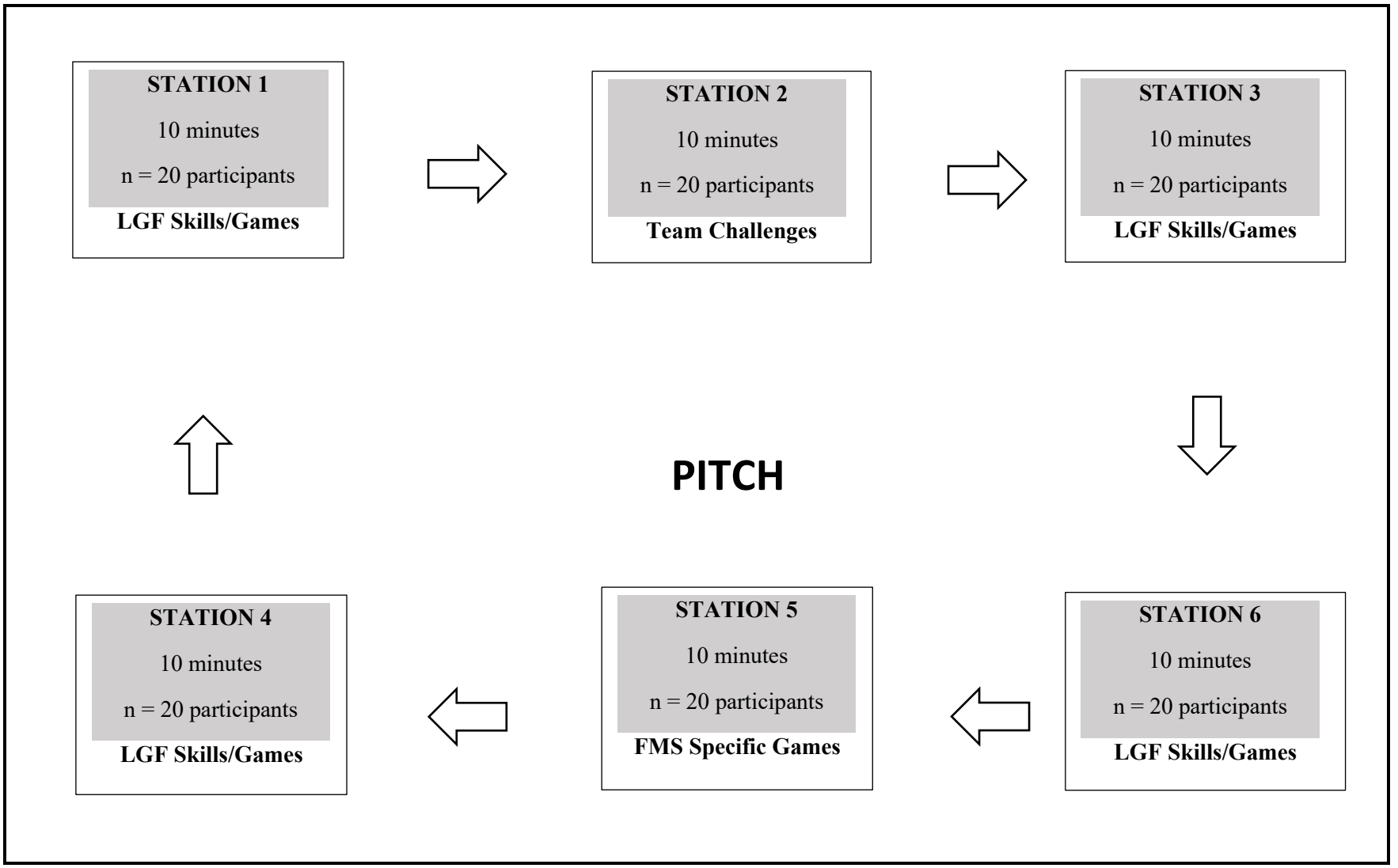

Figure 6. 2: Gaelic4Girls weekly session station-based approach pitch layout

Table 6. 1: Gaelic4Girls (G4G) intervention components and theoretical constructs

SDT Components	G4G Participant	G4G Coordinators/Coaches	Parental/Guardian Component
Autonomy	• Received weekly Ladies Gaelic Football (LGF) Skill Cards - encouraged to practice each week.	• Although instruction was provided in terms of following the SHARP and SAAFE Principals, coaches were actively engaged in the weekly session planning (coaches input of previous/existing knowledge/experience).	• Autonomous in positive role-modeling for their daughters (promoting an autonomous supportive relationship).
Competence	• FMS/LGF Dance Sessions (30 minutes from weeks 3 to 8) • G4G Weekly LGF Skill Cards • Specific FMS Station (10 minutes)	• Coaches were in control of their behaviour, contributed to choosing the content of the session, and actively engaged in the planning stage of the sessions. • Coaches competence developed through joint planning (feedback sessions) and the SHARP Principles.	• Understanding PA/Sport participation barriers for young girls.
Relatedness	• Specific Team Challenge Station (10 minutes) • Opportunity to practice FMS and LGF skills in a fun, social, and enjoyable environment	• Coaches sense of belonging, intervention supported by lead researcher and G4G coordinators providing an instant support network for coaches involved. • The weekly CPD joint planning meetings assisted in providing social belonging and support for the G4G Coordinators and the G4G Coaches.	• Support/guidance system via the 'WhatsApp messaging group and the G4G Facebook page'.
SEM Components	G4G Participant	G4G Coordinators/Coaches	Parental/Guardian Component

Individual-level	• Increasing girl's knowledge of the importance of stretching/sport participation. • Developing girl's knowledge and skills of FMS combined with skills of LGF through a fun, enjoyable dance routine, weekly LGF Skill Cards and SHARP and SAAFE Principles.	• Increasing coaches' awareness of children's PA levels and attitudes to sport. • Developing coaches' knowledge and skills of FMS/LGF skills/coaching/SHARP and SAAFE Principles through weekly CPD joint planning sessions with the lead researcher.	• Increasing parental/guardian awareness of developing knowledge on children's PA/FMS levels. Importance of parents as active role models, through the sharing of weekly videos/information on G4G Facebook page and Parental Workshop on week 4.
Interpersonal level	• Ongoing support from G4G coaches and coordinators (positive reinforcement and praise, as guided by the SHARP and SAAFE Principles).	• Ongoing support from the lead researcher and the G4G coordinator • Ongoing support for the G4G coordinator through regular emails, 'WhatsApp' messaging, and meetings (action plan and progress were reviewed).	• Ongoing support for the parents and guardians through regular reminder messages, 'WhatsApp' messaging support service, and Facebook page.
Organisational level		• Ongoing support from the G4G Coordinator/lead researcher. • Development of a club sports policy and action plan with the G4G • Coordinator integrating SHARP and SAAFE Principles.	

SDT: self-determination theory; SEM: social-ecological model; LGFA: ladies Gaelic football association; PA: physical activity; FMS: fundamental movement skills; CPD: continuous professional development

6.6 OUTCOMES

6.6.1 Data collection

Pre- and post-intervention assessments were conducted by trained research assistants at the community sports club (FMS assessment) and local primary school settings (questionnaire and FGs). Pre FMS testing took place on week 1 of the intervention, prior to the G4G's commencement, while post-testing took place upon completion of week 10 of the intervention. To enhance the quality of the data across all collection sites, the research assistants (all pre-service physical education teachers) were formally trained in the standardised measurement procedures and protocols associated with FMS, self-report questionnaires, and focus group (FG) interviews. Each research assistant attended a 2-hour robust field training workshop and was given detailed manuals, checklists, and scripts to read when informing the participants about the measures.

Objective measurements, such as FMS were conducted in the community sports club setting hall, with a ratio of one researcher to five child participants (1:5). Subjective pre- and post-self-report PA measurements took place in a supervised classroom or computer lab, and the ratio of the researcher to child participants was 1:10. All questionnaires were completed online through the tool 'Survey Monkey'.

FG's with child participants, coaches, parents, and guardians occurred in a school classroom, under supervision, and lasted between 45 to 50 min each on average. All FGs were conducted after the 10-week G4G intervention by the leading researcher, who has training and experience facilitating FGs. Participants were reminded that they could withdraw from the interviews at any stage and that all recordings would remain confidential. The FG interviews were recorded by dictaphone and were transcribed verbatim. Throughout this data collection, participants were assigned identification numbers for anonymity purposes.

6.6.1.1 Physical activity self-report assessment

MVPA was assessed using a modified version of the Physical Activity Questionnaire for Older Children (PAQ-C) (Kowalski et al., 2004). Studies have established the reliability and validity of the 7-day recall of children (Moore et al., 2007). The PAQ-C for this study included 15 physical activities, 10 leisure/free-time activities, activities in school (Physical Education), transport activities (walking to and from

school), and other activities. The participants were told to recall what activities they had engaged in the previous seven days and how many times and the number of minutes they participated in each of these activities for. Habitual PA was also assessed using two questions from the Physician-based Assessment and Counseling for Exercise (PACE) questionnaire: how many days in the last week (PACE 1) and a usual week (PACE 2) does the subject do at least 60 min of physical activity.

6.6.1.2 Fundamental movement skills

The FMS proficiency of participants across seven-movement skills was assessed in conjunction with the behavioural components from three established instruments, namely the Test of Gross Motor Development (TGMD) (Ulrich, 1985), Test of Gross Motor Development-2 (TGMD-2) (Ulrich, 2000), and the Get Skilled Get Active resource (Ryde, 2000). Each of these instruments and their associated protocols has established validity and reliability in children and are designed to give an objective measurement of gross motor skill proficiency. The seven-item test included culturally relevant skills to LGF: three locomotor skills (run, skip, and vertical jump), one stability (balance) skill, and three object skills (stationary dribble, catch, kick), which combine to give an overall maximum raw score of 60.

Participants performed the skill on three occasions, including one familiarisation practice, and two performance trials, as reported in previous Irish movement skill data assessments (Farmer et al., 2017). Participant performance, along with the execution of the required skill, were recorded using digital video cameras (2× Canon type Legria FS21 cameras; Canon Inc., Tokyo, Japan) and 2 x Apple I-Pads to allow for greater measurement scrutiny and accuracy of measurement precision during analysis. Once data collection was completed, the principal investigators were required to reach a minimum of 95% inter-observer agreement for scoring all seven FMS.

6.6.1.3 Psychological correlates of PA

Questions on psychological correlates of PA (self-efficacy, physical self-worth, physical performance self-concept, PA attitudes, perceived motivators and barriers to PA participation, subjective norms, behavioural control, and intentions) were all taken, with scales intact, from the Fife Active survey (Rowe & Murtagh, 2012). Participants' self-efficacy was assessed using a modified version of the Children's

Physical Activity Self-Efficacy Survey, an 8-item scale developed by Sherwood et al., (2004). Physical self-worth was assessed using a global physical self-worth subscale from the Child and Youth Physical Self-Perception Profile (taken from Physical Activity in Scottish School-age children [PASS]) (Inchley et al., 2008). Participants' physical performance self-concept was assessed using the Athletic Competence subscale, taken from the Self-Perception Profile for Children (Sherwood et al., 2004). Participants' perceived PA motivators and barriers were assessed using a modified version of the Physical Activity Outcome Expectancies Scale (Taylor et al, 2004) and PASS, respectively (Inchley et al., 2008). PA attitudes, subjective norms, behavioural control, and intentions were assessed using the scale from Rhodes & Smith's (2006) questionnaire.

6.6.1.4 Focus Group Interviews

Three FG interviews with child participants and one FG interview with coaches, parents/guardians (combined) at post-intervention were undertaken to assess programme implementation. Specifically, FG interviews were used to elicit child participant and coach/parent (1) experiences/perspectives on the G4G programme; (2) PA beliefs, feelings, motivators, and barriers; (3) improvements/future directions of the programme and LGF. A semi-structured interview guide, using questions designed by the research team, was developed. Each of the FG interviews was conducted by two researchers: a facilitator and a note-taker.

6.6.2 Data analysis

This paper reports the study protocol and methodological procedures used in the design, development, and implementation of the 10-week G4G community sports-based intervention only. For the purpose of this intervention protocol and component design manuscript, intervention evaluation comparisons are not reported. Such intervention comparisons are reported in chapter 7 to-follow'.

6.7 DISCUSSION

In this paper, the authors describe the rationale and study protocol for the G4G intervention, which is an innovative, multi-component, community sports-based

coaching intervention. This is the first study of its kind in Ireland highlighting novel coaching strategies for increased PA levels, improvements in FMS movement mastery, and heightened psychosocial wellbeing, as a means to counteract the worryingly low levels of PA and FMS proficiency of pre-adolescent girls (Farmer et al., 2017; Kelly et al., 2018).

A recent systematic review and meta-analysis of PA community sports-based interventions among girls (Pearson et al., 2015) found that greater intervention effectiveness appears to result from multi-component interventions, theory-based, (Van Sluijs et al., 2007) focused on girls only (Camacho-Minano et al., 2011), target both PA and sedentary behaviour (Pearson et al., 2015), and include a non-formal coach education element (Koh et al., 2014). Multi-component interventions including several methods, namely; (1) combinations of support components (i.e. coaches, family, friends, etc.), (2) individual components (i.e., specifically tailored programmes for individuals/groups), (3) choice components (different options to facilitate behaviour change), and (4) educational (i.e., coach education) and environmental components have proven successful in targeting and improving youth PA participation (Pearson et al., 2015). The social interaction, fun challenges, motor skill focus, non-competitive nature, and personally relevant PA opportunities provided in G4G aligns with previous studies (Beni et al., 2017; Springer, 2013), reporting similar themes identified as central influences to young people's meaningful experiences and engagement in PA and sport.

Recommendations for school- and community-based PA programmes from various countries have FMS development as an integral aspect of physical education, school, and community sport (Morgan et al., 2013). Recent evidence supports a positive association between competence in FMS and PA in young people (Bremer & Cairney, 2018; Hulteen et al., 2018). The continuous inclusion of the SHARP and SAAFE coaching principles has the potential to provide coaches with key FMS elements to focus on in both the planning stages and in the delivery stages of the future G4G sessions. Coaches, therefore, have the opportunity to influence their athletes' PA and FMS levels, utilising the SHARP (Powell et al., 2016), and SAAFE principles as specific coaching strategies to monitor the intensity of PA during these G4G sessions (Guagliano et al., 2014). Findings from previous community sports-based youth interventions (Lubans et al., 2017) provide evidence that FMS coach

support strategies may be an effective way to improve FMS competencies and mastery.

An important element of G4G is the coach education component (Robbins et al., 2013; Owen et al., 2018). The literature widely acknowledges that youth PA interventions through the provision of non-formal coach education, such as CPD opportunities (training, resource manual, and opportunities to work with coaches and instructors) can positively support programme implementation, and childhood engagement in PA (Casey et al., 2014; Koh et al., 2014). There are currently no evidence-based studies regarding coach education and the provision of coach CPD opportunities within the existing LGFA organisational context in Ireland. Due to the amateur nature of Ireland's national game (G.A.A.), many coaches, parents, and guardians are voluntarily coaching, and this may lead to a lack of confidence for effective coach pedagogy (Gearity, 2012). Coaches within an OYS environment have the potential to be ideal candidates to promote PA (Guagliano et al., 2014), and are considered role models for PA, promoting a fun, friendly, and supportive team environment that provides children with sport-specific development. The G4G coach component comprising of weekly CPD learning opportunities (including the SHARP and SAAFE Principles) has attempted to address the need through the provision of a valuable framework for sustainable coaching practice, which may be used to facilitate positive change in OYS settings.

The friendship and social support structure within G4G (friends, family, and coaches) appears to be a sensible approach going forward for the G4G programme, as previous studies have reported that youth who feel socially connected to their coach, or other children in a sports team (Farmer et al., 2018; Carlin et al., 2015) tend to have greater satisfaction and positive emotions in the context of youth sport. Social agents, such as the G4G coaches and coordinators in this study, can structure the PA environment to maximise feelings of competence and personal mastery, with children more likely to enjoy the activity, maintain interest in involvement, and commitment to the activity (Granero-Gallegos et al., 2017)

Limitations of this study include the relatively small sample size of the intervention club, along with the non-randomised design, limiting the generalisability of the findings. The study design was limited to one subjective method for the assessment of participant's MVPA; a future recommendation would be to use more objective measurements of PA, such as accelerometers, or wearable

technologies. The strength of this study is the enhanced ecological validity, stemming from the naturalistic community sports-based G4G intervention setting. Another strength of the study is the use of simple, innovative, and feasible intervention strategies, based on a sound conceptual framework, which can be adapted in other similar OYS settings.

In order to develop and implement targeted strategies to increase team sport participation and, consequently, PA levels among pre-adolescent girls, there is a need to understand trends in, and influences on, pre-adolescent girls' participation in a team sport, including knowledge surrounding coaching practice and coach education. Although previous systematic reviews have examined the effectiveness of interventions designed to increase PA in general (Metcalf et al., 2012), to date there is no known systematic review investigating the effectiveness of multi-component PA interventions for pre-adolescent girls that aim to promote participation in team sport through developmental coaching pathways. There is a growing need to address youth PA in the community, as to date, the knowledge translation from youth PA research to practice in the community is weak (Peters et al., 2013). In a national context, Coaching Ireland (through the national Sport Ireland representative body) aims to raise the standard, status, and profile of coaching by implementing quality coach and tutor education supports (Chambers & Gregg, 2016). There is, however, a current lack of literature within the LGFA community in terms of quality coaching provision for athletes and PA participation opportunities.

6.8 CONCLUSION

The current trial of this protocol study presents, as far as the authors are aware, the first intervention to be conducted in an Irish OYS context, designed to increase participant's MVPA, FMS proficiency, and psychological wellbeing among 8-12-year-old girls through the professional development of coach education practices. This G4G (Gaelic4Girls) feasibility study will provide evidence regarding the implementation of a multi-component, community-sports based coaching intervention, and can be used as a starting point to inform the development of theory-based coaching interventions targeting PA promotion for pre-adolescent girls in Ireland. Examining the future efficacy of the G4G programme, as part of a larger trial would seem prudent in terms of the gathering sustainable, longitudinal evidence.

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Declaration of interest statement

The authors declare that there are no conflicts of interest within this manuscript publication. The current research is funded through the Government of Ireland Irish Research Council Postgraduate Scholarship Scheme (October 2018-October 2019).

6.9 LINK TO CHAPTER 7

- As outlined in chapter 6, the G4G community sports-based intervention for Irish pre-adolescent girls was formulated from baseline findings (2016-2017) and guided by the appropriate intervention literature for female youth PA promotion. Chapter 6 provided a descriptive overview of the theoretical underpinnings and components of the G4G intervention.
- In chapter 7, the reader will examine the primary outcome measures for the 10-week G4G research-informed intervention, by comparing PA, FMS and psychological results between the 1) G4G research-informed intervention club, 2) a club utilising the existing G4G programme run by the LGFA, and 3) a control club without any programme conditions. The results will be illustrated through critical discussion and future directions for G4G research will be outlined.

CHAPTER 7

'GAELIC4GIRLS' –THE EFFECTIVENESS OF A 10-WEEK MULTI-COMPONENT COMMUNITY-SPORTS BASED PHYSICAL ACTIVITY INTERVENTION FOR 8-12-YEAR-OLD GIRLS

Chapter 7: 'Gaelic4Girls' – the effectiveness of a 10-week multi-component community-sports based physical activity intervention for 8-12-year-old girls

Preamble

The following article reports the effectiveness of the 'Gaelic4Girls' (G4G) intervention study; a 10 week specifically designed multi-component PA and FMS community sports-based coaching intervention, informed by contextually relevant data (chapters 4 and 5). In chapter 7, the reader will examine the primary outcome measures for the 10-week G4G intervention by comparing PA, FMS, and psychological results between the specifically tailored, research-informed G4G intervention group (1), a second treatment intervention group (2) and control group (3). The results will be illustrated through critical discussion and future directions for the G4G research during 2018 will be outlined. This is a published manuscript which has been peer-reviewed and published in the International Journal of Environmental Research and Public Health online [September 22nd, 2020]. The following is the citation for this article:

Farmer, O., Cahill, K., & O'Brien, W. (2020). Gaelic4Girls—the effectiveness of a 10-week multicomponent community sports-based physical activity intervention for 8 to 12-year-old girls. International Journal of Environmental Research and Public Health, *17*(18), 6928. https://doi.org/10.3390/ijerph17186928

Statement of authorship;

I hereby declare that I, Orlagh Farmer, am the principal author of this article. The following statements outline my contributions to the work:

- I was the principal investigator responsible for all the data collected (2018) in this chapter. I organised all stages of data collection consisting of timetabling undergraduate students, contacting all primary schools and the LGFA club involved (principals, teachers, coaches, and students), equipment preparation, data storage, data cleaning and data inputting.
- Organised the rigorous training and protocol workshop for field staff assistants which was an important component of this baseline study.

- Made substantial contributions to the conception and design of the work; the acquisition, analysis and interpretation of data for the work.
- Wrote the first draft of the full article and contributed significantly to the subsequent redrafts until submission.
- Final approval of the version to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolve

7.1 PURPOSE OF CHAPTER

7.1.1 Rationale

In the last decade, there has been a gradual increase in the number of randomised controlled trials (RCT's) that have evaluated the impact of PA-based interventions on young girls (Voskuil et al., 2017; Jago et al., 2015; Sutherland et al., 2016), however, minimal evaluations of pre-adolescent girls within a community sports-based setting exist. Therefore, this study aims to assess the effectiveness of a multi-component, community sports-based intervention for increasing girl's PA levels, FMS proficiency, and psychological wellbeing.

7.1.2 Contribution to the field

The current intervention evaluation trial of this G4G exploratory study presents, as far as the authors are aware, the first three-armed intervention effectiveness comparative trial to be conducted in an Irish OYS context, designed to increase participants MVPA, FMS proficiency, and psychological wellbeing among 8- to 12-year-old girls. This study strengthens the evidence base of the available OYS interventions for pre-adolescent girls, providing justification for the development of an RCT to assess the true effectiveness of G4G on PA levels, FMS proficiency and psychological wellbeing.

7.2 ABSTRACT

Background: This study aims to assess the effectiveness of a multi-component, community sports-based intervention for increasing girl's physical activity (PA) levels, fundamental movement skill (FMS) proficiency, and psychological wellbeing.

Methods: One hundred and twenty female-only participants (mean age = 10.75 ± 1.44 years), aged 8 to 12 years old from three Ladies Gaelic Football (LGF) community sports clubs (rural and sub-urban) were allocated to one of three conditions; 1) Intervention Group 1 (n = 43) received a novel, specifically tailored, research-informed 'Gaelic4Girls' (G4G) intervention, 2) Intervention Group 2 (n = 44) used the traditionally delivered, national G4G programme, as run by the Ladies Gaelic Football (LGF) Association of Ireland, and 3) Control Group 3 (n = 33) received no G4G intervention (group 1 or 2) conditions and were expected to carry out their usual LGF community sports activities. Primary outcome measurements (at both pre-and-10-week follow up) examining the effectiveness of the G4G intervention included 1) PA, 2) FMS and 3) Psychological correlates (enjoyment levels, self-efficacy, peer and parental support). A focus group (FG) interview (n = 6) was also conducted with the child participants from the intervention group 1 only, at the follow-up phase.

Results: Following a two (pre to post) by three (intervention group 1/intervention group 2/control group 3) mixed-model ANOVA, it was highlighted that intervention group 1 significantly increased in PA, FMS proficiency and the psychological correlates of PA. FG findings reported positive findings for intervention group 1 participants, specifically the heightened psychological wellbeing for girls, and the establishment of emerging friendships between peers.

Discussion: The findings demonstrate that the 10-week specifically tailored, research-informed G4G intervention is a feasible and efficacious programme, leading to a positive effect on the physical and psychological wellbeing of pre-adolescent Irish girls, as relative to the traditionally delivered national G4G comparative programme, and control group conditions.

7.3 INTRODUCTION

It is widely reported that girls are less physically active than boys throughout childhood (Sallis et al., 2016), and the age-related decline in physical activity (PA) participation, particularly from early adolescence onwards, is steeper for girls when compared to boys (Owen et al., 2017). Pre-adolescence (11–12 years of age) is a critical period of change in the PA participation levels of girls (Biddle, 2014).), and finding ways to help girls to become more physically active at this age is important for short and long-term health. The gender disparity in PA participation has highlighted the need to develop and evaluate interventions, specifically targeting at-risk youth (Camacho-Minano et al., 2011).

Club-based participation in organised youth sport (OYS) during childhood and adolescence contributes considerably to leisure-time PA for health-enhancing benefits (Howie et al., 2018), and has the potential to increase overall PA levels in young people (Golle et al., 2014; Pfeiffer & Wierenga, 2019), specifically among girls (Marques et al., 2016). OYS participation is also associated with important psychological benefits, which include increased wellbeing, self-efficacy, and positive peer/social relationships (Felfe et al., 2016). Evidence also highlights that a positive relationship exists between participation in OYS and fundamental movement skill (FMS) proficiency in children (Fransen, 2014; Henrique et al., 2016), allowing children to cumulatively acquire transferable movement skills that give them a sense of movement competence and confidence (Rosewater, 2009). A Portuguese cross-sectional study (n=973) reported that primary school children participating in OYS are less sedentary and participate in more frequent bouts of moderate to vigorous physical activity (MVPA) (Marques et al., 2016; Herbert et al., 2015), when compared to those who do not participate in organised sports. Although OYS does not necessarily prevent the decline in PA participation during adolescence (Bélanger et al., 2009), research does continue to illustrate that children who maintain their involvement in sport are also more likely to participate in PA during adolescence (Basterfield et al., 2016; Shull et al., 2019), and into adulthood (Bélanger et al., 2015; Hirvensalo & Lintunen, 2011).

Encouragingly, sport occupies a prominent place in Ireland's national cultural identity, which is reflected in the high prevalence (58-80%) of 10 to 18-year olds

who participate in some form of OYS, on at least one occasion in the week (Woods et al., 2018). The Global Advocacy for Physical Activity (GAPA) the Advocacy Council of the International Society for Physical Activity and Health (ISPAH) (2011) has identified participation in sports as one of the seven worldwide "investments that work" for improving youth PA levels, and for these reasons, community-sports based settings are recognised as key health settings in promoting knowledge of PA (Beets et al., 2016), and healthy lifestyle behaviours (Kokko, 2014). These youth sport participation outcomes have obvious short-term benefits, however, this domain may also help to develop 'physical literacy' (PL), and thereby support the continuum of lifelong PA. PL captures the essence of the basic skills children and adolescents should attain in order to be physically active and participate in sports (Meghann Lloyd et al., 2014). Whitehead (2010) further defines PL as "the motivation, confidence, physical competence, knowledge and understanding to maintain physical activity throughout the life course" (p. 18). Based on Lloyd et al. (2010) work, PL represents the successful interaction of four inter-related core domains: (a) physical fitness (cardiovascular fitness, muscular strength and endurance, flexibility, and coordination); (b) fundamental motor skills (e.g., catching and throwing a ball); (c) physical activity behaviours, and (d) psychological/cognitive factors (attitudes, knowledge, and feelings).

Numerous studies have shown the importance of these aforementioned PL variables as basic requirements for children and adolescents' health (Poitras et al., 2016). Furthermore, it is important to recognise that the value of the PL domains provides a powerful lens for PA, in relation to motor skill outcomes, environmental context, and broader psychological outcomes, including social and affective learning processes (Cairney et al., 2019). Despite these widely endorsed PL benefits for OYS, there are a lack of effective intervention strategies to promote sustainable PA participation in female youth (Anokye et al., 2018), particularly within a sporting context (Whitley et al., 2019). In the last decade, there has been a gradual increase in the number of randomised controlled trials (RCT's) that have evaluated the impact of PA-based interventions on young girls (Voskuil et al., 2017; Robbins et al., 2019), however, minimal evaluations of pre-adolescent girls within a community sports-based setting exist. Of those RCT's which have been undertaken, results have found small effects when PA was measured objectively (Okely et al., 2011). The need to

promote higher habitual MVPA engagement amongst children (particularly girls) in the youth sport context has been underlined as a prudent strategy (Fenton et al., 2017) particularly as knowledge translation from youth PA research to practice in the community is weak (Kelly et al., 2012).

In regard to specific PA programmes for female youth, it is recommended to incorporate psychological skill instructions that aim to enhance self-esteem, positive body image, positive attitudes towards PA, and motivation to participate in PA (R.D DeBate et al., 2009; Futris et al., 2013; Rauscher et al., 2013). Programmes should aim to also provide social environments that offer a variety of activities that girls may consider enjoyable (Howie et al., 2018; Martin et al., 2009).

The primary aim of this three-armed non-randomised controlled trial (NRCT) was to assess whether 8 to 12-year-old pre-adolescent girls who attended a multi-component research-informed tailored 10-week 'Gaelic4Girls' (G4G) community sports-based intervention, could: i) increase their overall PA levels, ii) FMS proficiency, and iii) psychological wellbeing when compared to an intervention group 2 and a control group 3. A secondary aim was to gather intervention group 1 participant perspectives, specifically those from the research-informed tailored 10-week G4G intervention (at follow-up) on the following: i) programme acceptability (structure, content and delivery); ii) identify potential barriers and facilitators to intervention uptake and continued PA participation. The current paper presents, as far as we are aware, the first NRCT conducted in an Irish 'Gaelic' Games, OYS context. It is hypothesised that the intervention group 1 would demonstrate significant improvements in all primary outcome variables when compared to those within the intervention group 2 and the control group 3 conditions.

7.4 MATERIALS AND METHODS

7.4.1 Study design

This was a quasi-experimental, non-randomised controlled before-and-after design, with a mixed-methods approach. This study adopted a three-arm NRCT design, with a specifically tailored, research-informed G4G intervention group (1), a second treatment intervention group (2) and control group (3). The study followed the transparent reporting of evaluations with nonrandomised designs (TREND)

statement for reporting (Reeves & Gaus, 2004). One hundred and twenty female-only participants (M age = 10.75 ± 1.44 years), aged 8 to 12 years old from three LGF community sports clubs (rural and sub-urban) in Ireland were recruited to partake into one of three study conditions; intervention group 1 (n = 44), the club that received the research-led G4G intervention; intervention group 2 (n = 43), the club that used the existing 'traditional' national G4G programme structure; and the control group 3 (n = 33), the club that received no G4G intervention condition, and was expected to carry out their usual LGF community sports activities. Assessment measures were conducted at pre-intervention [March 2018] and were repeated at post-intervention [June 2018] phases. Ethical approval for this study was obtained from the Social Research Ethics Committee of the researchers' institution (University College Cork) in March 2016.

7.4.2 Recruitment, setting and participants

Convenience sampling was used to recruit participants from the 18 girls' only primary schools (rural and urban), from three local LGF clubs in the Cork and Kerry regions (Munster Province, Ireland). All schools were in close proximity to the local designated LGF club and the research team. To be considered eligible for this study, participants (girls only) were formally enrolled in between the years of second to sixth class of primary school (aged 8- to 12- years old) and had expressed an intention to attend the programme for its full duration. Informed parental consent and child assent were the requirements for eligible participation in this study. Information sheets and consent forms were administered to students who expressed an interest in taking part in G4G. Informed assent for participation was granted by all participants, and written consent was obtained from their parent(s)/ guardian(s), prior to the physical and psychological data collection measurements. For coaches to be eligible to partake in the programme, recognised coaching credentials from the national LGFA, and previous experience of coaching girls within the existing community sports-based setting was required; all participants were free to withdraw from the research at any stage.

Prior to the commencement of the research informed G4G intervention, the leading researcher emailed the school Principal from the five surrounding primary schools, calling for expressions of interest for the lead researcher to visit the school

and inform the girls about the G4G programme (intervention group 1). Subsequent to the granted approval from the five school Principals, the lead researcher, along with the two G4G coordinators (head club coaches from the selected LGF intervention club) visited the five primary schools, where a full outline of the G4G intervention and the associated data collection measurements were provided as part of the intervention group 1 condition. Club coordinators from the intervention group 2 and the control group 3 locations were also contacted by the lead researcher via phone call, and a full brief of the associated data collection measurements were again outlined. One hundred and sixty fifty participants were invited to participate in this study, with a total of 137 providing full consent (intervention group 1: n=50; intervention group 2: n=49; control group 3: n=38). In total, 120 participants had fully available data at both pre and post data collection time points (intervention group 1: n=44; intervention group 2: n=43: control group 3: n=33).

Gaelic4Girls Research-Informed and Tailored Intervention Group 1

The G4G intervention, underpinned by the self-determination theory (SDT) (Deci & Ryan, 2008), and elements of the social-ecological model (SEM) (Stokols, 1996) (see Table 7.1) is a multi-component PA and FMS community sports-based intervention. Participants selected for the research informed G4G programme received the 10-week intervention, consisting of 1 × 60 minutes, specifically tailored LGF session per week (10 sessions in total between March and May 2018). This G4G intervention includes three major components, as guided by the associated theoretical constructs; the (1) participant component, (2) coach education component, and (3) parent/guardian/community component (Chapter 6).

Gaelic4Girls Nationally Delivered and Existing G4G Intervention Group 2

Participants allocated to the intervention group 2 (n = 43) received the 10-week 'traditional' existing G4G programme, as run by the LGFA. In comparison to intervention group 1, this programme consisted of 1 × 60-minute introductory LGF sessions per week (10 sessions in total between March and May 2017), without research-informed content, coach education professional development workshops, or

any additional digital or hardcopy resources. Similar, to intervention group 1, the 'traditional' G4G programme included three major components, (1) participant component, (2) coach education component, and (3) parent/guardian/community component.

Control Group 3

Participants selected for the control group 3 received no G4G programme, resources or coach education workshops. The participants trained as they would normally in their local LGF club setting over a 10-week period.

Table 7.1 Overview of the research informed G4G intervention group 1 programme components with associated pedagogical considerations

Part	What	Pedagogical Considerations
Participant *PA* *FMS* *Psychological*	- 6 x 10-minute rotatory LGF skills stations (i.e. provision of specific time for locomotor and object control skill execution and development) - Sport-specific G4G skill cards (10 in total, e.g. kick, catch, hand pass) of key coaching cue points. - G4G innovative LGF and FMS dance for a duration of 30 minutes indoor, prior to commencement of G4G outdoor pitch sessions, from weeks 3 to 8 (extra 300 minutes of FMS specific execution). - Specific 'Team Challenges' station to promote fun, friendship and inclusivity.	TGfU instructional model (Sheppard, 2014) - SHARP Principles (Powell et al., 2016) - SAAFE Principles (Lubans et al., 2017).
Coach *Coach Education Workshops* *Resources* *Support Structures*	- Initial 2-hour Coach Education Workshop session, prior to the start of the G4G intervention with the lead researcher. - 8 x 1-hour Coach Education sessions, specifically with the lead researcher engaging face-to-face with the G4G club coordinators and coaches each week before sessions - G4G Coaching Manual & Resource Pack/Electronic video clips of activities with key coaching points, via booklet and on-demand 'WhatsApp' instant messaging service. This instant messaging service was also used for communication correspondence regarding the weekly training session set-up structure. - G4G Coordinator and Coach Reflective Task provided with the opportunity to suggest additions or develop new strategies to engage the G4G participants on a weekly basis.	- SHARP Principles (Powell et al., 2016) - SAAFE Principles (Lubans et al., 2017). - SDT Interpersonal, Autonomy, Competence and Relatedness
Parental *Support & Engagement*	- Technological resources – the lead researcher set up a 'WhatsApp' instant messaging and 'Facebook' group for all interested parents - On week 4 of the G4G programme, the lead researcher designed and delivered a 45 minute 'G4G Parent/Guardian Workshop' in the community sports setting. - Parent and guardians were encouraged to actively get involved with their daughter through the LGF skills at home, specifically via the G4G Skill Cards.	- Interpersonal (communication/relatedness with other parents - Encourage parents to promote 'youth ownership'

7.4.3 Outcomes

7.4.3.1 Data collection

Pre- and post-intervention assessments were conducted by trained research assistants at the community sports club and local primary school settings. Pre-testing took place prior to week 1 of the study, while post-testing took place upon completion of week 10 of the study. To enhance the quality of the data across all collection sites, the research assistants (all pre-service physical education teachers) were formally trained in the standardised measurement procedures and protocols associated with FMS, self-report questionnaires, and focus group (FG) interviews. Specifically, each research assistant attended a 3-hour robust field training workshop and was given detailed manuals, checklists and scripts to read, when informing the participants about the measures.

Objective measurements, such as FMS were conducted in the community sports club setting hall, with a ratio of one researcher to five child participants (1:5). Subjective pre and post-self-report PA measurements took place in a supervised classroom or computer lab, and the ratio of a researcher to child participants was 1:10. All questionnaires were completed online through the tool 'Survey Monkey'.

The FG was conducted after the 10-week G4G intervention by the leading researcher, who has training and experience facilitating FGs. Participants were reminded that they could withdraw from the interview at any stage and that the recordings would remain confidential. The FG interview was recorded by dictaphone and was transcribed verbatim. Throughout this data collection, participants were assigned identification numbers for anonymity purposes.

7.4.3.2 Physical activity self-report assessment

Moderate to vigorous PA (MVPA) was assessed using a modified version of the Physical Activity Questionnaire for Older Children (PAQ-C) (Kowalski et al., 2004). Studies have established the reliability and validity of the 7-day recall of children (Moore et al., 2007). The PAQ-C for this study included 15 physical activities, 10 leisure/free-time activities, activities in school (Physical Education), transport activities (walking to and from school), and other activities. The participants were told to recall what activities they had engaged in the previous seven days and how many times and the number of minutes they participated in each of these activities

for. Habitual PA was also assessed using two questions from the Physician-based Assessment and Counseling for Exercise (PACE) questionnaire: how many days in the last week (PACE 1) and a usual week (PACE 2) does the subject do at least 60 min of PA.

7.4.3.3 Fundamental movement skills

The FMS proficiency of participants across seven-movement skills was assessed in conjunction with the behavioural components from three established instruments, namely the Test of Gross Motor Development (TGMD) (Ulrich, 1985), Test of Gross Motor Development-2 (TGMD-2) (Ulrich, 2000), and the Get Skilled Get Active resource (NSW Department of Education, 2000). Each of these instruments and their associated protocols has established validity and reliability in children and are designed to give an objective measurement of gross motor skill proficiency. The selected seven FMS included culturally relevant skills to LGF: three locomotor skills (run, skip, and vertical jump), one stability (balance) skill, and three object control skills (stationary dribble, catch, kick), which combine to give an overall maximum raw score of 58.

Participants performed the skill on three occasions, including one familiarisation practice, and two performance trials, as reported in previous Irish movement skill data assessments (Farmer et al., 2017). Participant performance, along with the execution of the required skill, were recorded using digital video cameras (2× Canon type Legria FS21 cameras; Canon Inc., Tokyo, Japan) and 2 x Apple I-Pads to allow for greater measurement scrutiny and accuracy of measurement precision during analysis. Once data collection was completed, the principal investigators were required to reach a minimum of 95% inter-observer agreement for scoring all seven FMS.

7.4.3.4 Psychological correlates of PA

A variety of psychological outcomes were assessed using existing questionnaires that have demonstrated reliability and validity for use with this age group. Table 7.2 presents information regarding all psychological correlates for the PA instruments used in this present study, along with the internal consistency values (Cronbach's alpha value) and relevant references: namely, self-efficacy, perceived self-confidence, PA enjoyment, PA attitudes, perceived peer and parental social support.

These internal consistency values were greater than .70, representing acceptable internal consistency values (Nunnally, 1978).

7.4.3.5 Focus group Interview

One FG interview was conducted at post-intervention with child participants from the research informed G4G programme (intervention group 1) to assess programme implementation. The primary purpose of the structured discussion with participants from the research informed G4G programme was to determine the applicability and sustainability of the G4G intervention, specifically in terms of assessing enjoyment, knowledge acquired, and suggestions for future developments. Six participants were randomly selected from the intervention group 1, following the completion of the self-report, anthropometric, and FMS data collection. The FG occurred in a meeting room in the clubhouse, under researcher supervision, and lasted 45–50 minutes approximately. A semi-structured interview guide, using questions designed by the research team, was developed. The FG interview was conducted by two researchers: a facilitator (lead researcher) and a note-taker.

7.4.4 Data analysis

The combined PA, FMS and psychological correlate dataset was analysed using SPSS version 20.5 for Windows (IBM, Armonk, NY). Participants with incomplete data for a given variable were excluded from the analysis. Descriptive statistics and frequencies for all PA, FMS and psychological variables were employed to describe participants' characteristics. Comparability of the three groups at pre-test was ascertained using a One-way ANOVA. The pre-test to post-test variable changes was evaluated using repeated-measures analysis of variance (ANOVA) to determine time and time-by-group differences. All statistical assumptions were tested for normality, outliers, and homogeneity of variance. Specifically, a two (pre to post) by three (intervention group 1, intervention group 2 and control group 3) mixed model analyses of variance (i.e. between-within subjects) was conducted to analyse any main effects and time x group interactions for PA, FMS proficiency, and the psychological variables. Levene's test was used to determine whether variances were equal between each group.

To reduce the risk of Type I error, a Bonferroni adjustment to the alpha level was made by dividing $p < .05$ by 10 (number of all variable comparisons); thus, the alpha level was set to $p < .005$. In instances where significant interaction effects were found, post hoc comparisons were carried out using the Tukey honest significance difference (HSD) to determine where the differences occurred. Effect sizes of significant differences were evaluated using partial eta-squared ($\eta 2$). To calculate effect sizes, Cohen d values (1988) were applied, with $d = 0.2$ representing a small effect size, 0.5 representing a medium effect size, and 0.8 representing a large effect size.

The FG data transcript was thematically analysed (Braun & Clarke, 2006) by the lead author, involving coding, categorisation, and summarising (Elo & Kyngäs, 2008). The FG was coded, and, under each heading, the coded comments were clustered into categories based on similar content. Then, a thematic analysis was conducted to produce an in-depth description and understanding of the transcript phrases from the transcript were highlighted and grouped, from which themes and subthemes emerged (Neergaard et al., 2009; Pawlowski et al., 2014). Any discrepancies in the coding or reduction process were discussed until consensus was reached. Finally, both members of the primary research team selected indicative quotes representing the core wider views. Field notes and email correspondence were also recorded, filed and included within analyses. The FG audio recording was transcribed verbatim. The leading author double-checked the transcript against the original recording for robustness and accuracy prior to analysis.

Table 7.2. G4G psychological correlates of PA assessment instruments and scales, with Alpha Cronbach Coefficients

Variable	Instrument	Scale	Max score	Reference (taken from)	α
SE	Modified version of the Children's Physical Activity Self-Efficacy Survey (PASES)	11-items (4-likert)	44	Saunders et al., 1997, adapted by Sherwood et al.,2004	.73
PSC	Physical self-confidence scale	15-items	150	McGrane et al., 2017	.93
PA Enjoyment	Modified version of Choices questionnaire	10-items (5-likert)	50	Motl et al., 2001	.80
PA Attitudes	The Fife Active Survey Scale	4-item (4-likert)	16	Rowe & Murtagh, 2012	.82
Peer/Social Support	Modified version of Choices Questionnaire	5-item (5-likert)	25	Birnbaum et al., 2005	.74
Family Support	Modified version of Choices Questionnaire	5-item (5-likert)	25	Saunders et al., 1997	.76

Abbreviations: PA = physical activity; α = Cronbach's Alpha Coefficient; SE = self-efficacy; PSC = perceived self-confidence

7.5 RESULTS

7.5.1 Descriptive statistics

All three intervention and control groups (N=120) were similar for most pre-test characteristics, with a one-way ANOVA revealing no significant differences between groups for any of the primary outcome variables. Participants mean scores for all primary outcome variables pre and post-test (PA, FMS and psychological), as split by group condition are shown in Table 7.3.

Table 7.3. Descriptive statistics [means and standard deviations (M±SD)] of PA, FMS and psychological measurements, stratified by group and time-period

Variables	Intervention G1		Intervention G2		Control G3	
	Pre	Post	Pre	Post	Pre	Post
N	43	43	44	44	31	31
	M SD	*M SD*	*M SD*	*M SD*	*M SD*	*M SD*
PA (mins)	325.81 ± 98.76	365.58 ± 64.56	306.81 ± 84.57	300.68 ± 68.32	308.71 ± 85.97	290.32 ± 66.36
LOM	18.67 ± 2.90	19.91 ± 2.70	19.80 ± 2.33	19.37 ± 2.42	18.48 ± 2.71	17.68 ± 2.48
OC	17.12 ± 2.72	17.70 ± 2.58	17.41 ± 2.22	17.43 ± 2.24	16.61 ± 2.22	15.71 ± 1.64
Overall FMS	44.21 ± 5.13	46.07 ± 4.43	45.14 ± 4.07	44.59 ± 4.21	42.21 ± 4.49	41.00 ± 3.79
SE	33.79 ± 4.02	35.60 ± 4.74	32.45 ± 4.38	31.98 ± 4.86	33.13 ± 4.19	31.03 ± 6.16
PSC	118.00 ± 23.24	121.30 ± 23.28	116.12 ± 28.17	115.12 ± 27.64	123.84 ± 26.01	118.10 ± 24.84
Enjoyment	43.00 ± 3.52	45.93 ± 3.48	44.48 ± 3.82	44.30 ± 3.43	42.70 ± 3.99	41.87 ± 3.89
PA Attitudes	48.19 ± 6.37	49.33 ± 5.06	46.07 ± 6.29	45.39 ± 5.71	46.81 ± 5.64	45.42 ± 5.28
Peer/SS	17.79 ± 3.18	19.26 ± 3.32	17.68 ± 3.22	17.00 ± 3.16	18.87 ± 3.90	17.90 ± 3.58
Family S	18.00 ± 3.35	19.49 ±3.53	17.40 ± 3.90	17.71 ± 3.64	18.87 ± 4.36	18.16 ± 4.48

Abbreviations: PA =physical activity; M = mean; SD = standard deviation; LOM = locomotor; OC = object-control; FMS = fundamental movement skills; SE = self-efficacy; PSC: perceived self-confidence; SS = social support

7.5.2 Physical activity

A mixed between-within subject's analysis of variance was conducted to assess the impact of the three different groups (intervention group 1, intervention group 2, and the control group 3) on participants' self-reported PA, across two time periods (pre-and-post-test). There was a significant interaction effect between programme type (group) and time for PA, Wilks' Lambda = .83, F (2, 115) = 11.77, p <.0001, partial eta squared = .170. Post-hoc tests (adjusted Bonferroni) revealed that there was a significant PA difference between the intervention group 1 (mean change = 39.7, SD = 81.66, p=.003) and the intervention group 2 (Mean change = -6.13, SD = 76.45, p<.002), from pre- to post- time periods. Similarly, there was a significant PA difference between the intervention group 1 (mean change = 39.7, SD = 81.66, p=.003) and the control group 3 (Mean change = -2.1, SD = 5.18, p = .004), from pre- to post- time periods. Conversely, there were no significant PA differences between the intervention group 2 and the control group 3 from pre- to post- periods. In terms of the direction of the results, the findings suggested a small PA difference (Cohen d = .03) between the three groups; only the intervention group 1 showed a PA increase from pre- to post- periods. For the intervention group 2 and control group 3, however, a reduction in PA was observed across the two time periods. Mean PA differences from pre- to post- in terms of self-reported weekly moderate-to-vigorous physical activity (MVPA) minutes among the groups (n = 120) can be seen in Figure 7. 1.

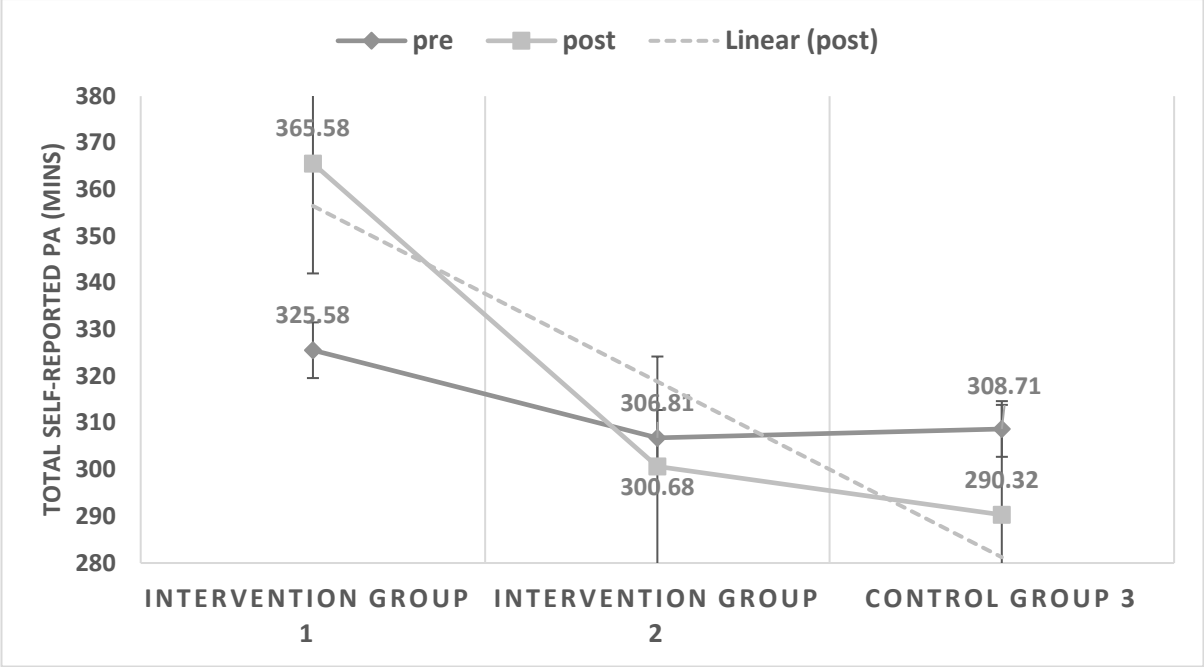

Figure 7.1. Comparison of the mean self-reported minutes of MVPA over time (pre to post) by group

7.5.3 Fundamental movement skills

Following the two by three mixed model ANOVA, there were significant increases in overall FMS proficiency, from pre-to post-time periods for those in the intervention group 1, when compared to the intervention group 2, and the control group 3 ($p = .003$). Specifically, results showed a small- to moderate significant main effect for the three groups ($F (2,115) = 6.16$, $p < 0.003$, $\eta^2 = .09$). There was a significant interaction effect between programme type (group) and time, Wilks' Lambda = .68, $F (2, 115) = 27.71$, $p < .0001$, $\eta^2 = .325$. Follow-up post-hoc indicated that participants in the intervention group 1 (mean change = 1.86, SD = 4.78) reported significantly greater increases ($p = .005$) in overall FMS proficiency, when compared to those in the control group 3 (Mean change = -1.21, SD = 4.14) only.

For locomotor skills, when comparing the three programme (group) types (between-subjects effect), there was a significant interaction effect observed ($F (2, 115) = 21.98$, $p = .000$, partial eta squared = .28), suggesting small- to moderate differences only. Post-hoc tests revealed (adjusted Bonferroni) that only the intervention group 1 showed a small increase in locomotor skill proficiency over

time. Both the intervention group 2 and the control group 3 showed a small reduction in locomotor skill proficiency over time.

For object control skills, when comparing the three types of intervention/control groups (between-subjects effect), there was a small- to moderate main effect observed (F (2, 115) = 3.46, p = .035, partial eta squared = .057) There was a small but non-significant (p =.060) increase in object control proficiency scores for participants in both the intervention group 1 (mean change = 0.55) and intervention group 2 (mean change = 0.02). Similar to locomotor skills, a small but non-significant (p=.100) reduction in scores for those in the control group 3 was shown (mean change = 0.90).

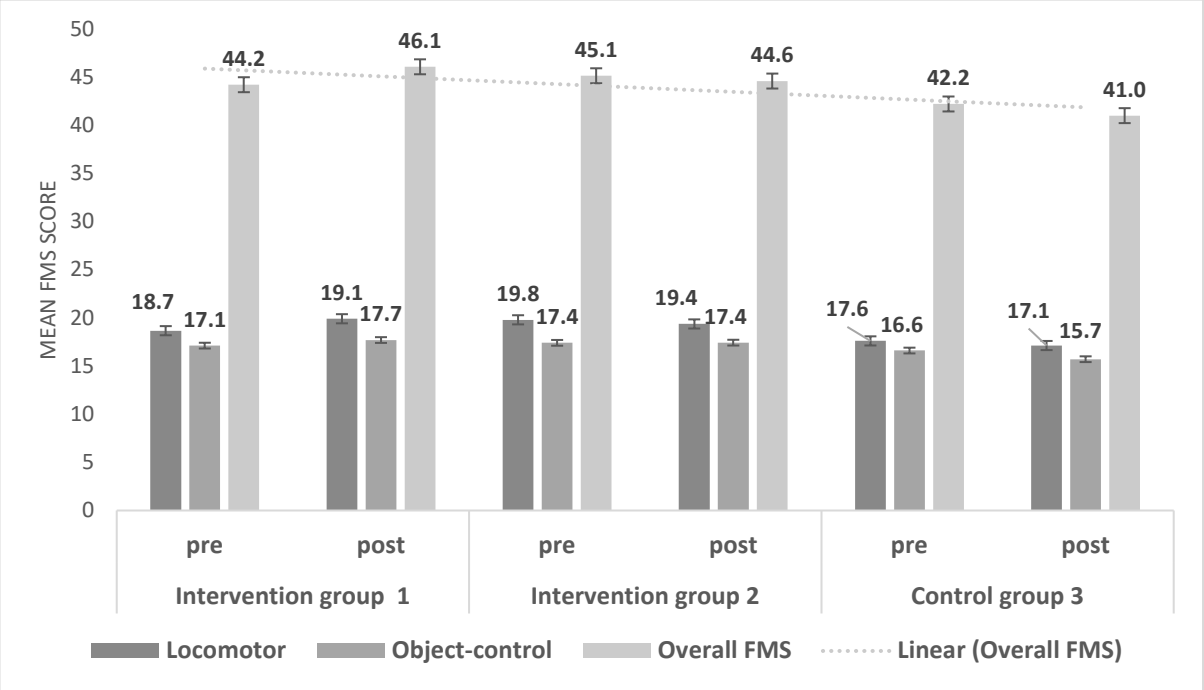

Figure 7.2. Mean locomotor, object-control, and overall FMS proficiency differences among groups over time (pre to post stages; n = 120)

7.5.4 Psychological correlates of PA

There was no significant main effect for the three groups across all psychological variables (see Table 7. 4). However, there were significant interaction effects for time within and between groups across all the psychological variables. Follow-up post-hoc tests revealed statistically significant differences for SE, PA enjoyment, and attitudes towards PA between the three groups, particularly for the intervention

group 1, when compared to their control group 3 counterparts. Post-hoc comparisons (adjusted Bonferroni) revealed statistically significant differences in mean scores between the three groups, with small- to moderate effect sizes observed (using Cohen's d value in Table 7.4). Table 7. 4 presents the statistically significant differences for all significant psychological correlates of PA.

Table 7.4. Mean change (MC) differences and significant interaction effects (within time and between-group) for the psychological variables

Variable	N	G1 *(MC)*	G2 *(MC)*	G3 *(MC)*	Main interaction effects	*d*	Post hoc MC Differences	
SE	118	1.81	-0.47	-2.1	$F(2,115) = 15.18$, $p = .000$	.209	G1 & G2	$p < .002$
							G1 & G3	$p < .003$
PSC	114	3.30	-1.00	-5.74	$F(2,114) = 8.81$, $p = .000$	.134	G1 & G3	$p < .002$
							G2 & G3	$p < .001$
PA Enjoyment	118	2.93	-0.18	-0.83	$F(2,118) = 13.82$, $p = .000$	.107	G1 & G3	$p < .003$
Attitudes towards PA	115	1.51	-0.48	-0.09	$F(2,115) = 12.64$, $p = .000$	.180	G1 & G2	$p < .003$
Peer Social Support	115	1.47	-0.68	-0.97	$F(2,115) = 37.17$, $p = .000$	.393	G1 & G2	$p < .003$
							G1 & G3	$p < .001$
Family Support	113	1.49	0.31	-0.17	$F(2,115) = 10.16$, $p = .000$	.152	G1 & G2	$p < .002$

Abbreviations: MC = mean change; G1 = intervention group 1; G2 = intervention group 2; G3 = control group 3; d = Cohen's d; SE: self-efficacy; PSC: perceived self-confidence, PA: physical activity

7.5.5 Focus group

Qualitative results (post-test) from children concerning the G4G intervention's (group 1) acceptability in terms of structure, content/perception of learning, delivery, potential intervention barriers and changes/future directions of the G4G programme for continued PA participation, are summarised below in Table 7.5. Table 7. 5 provides an overview of the main intervention components, with exemplary quotes from children. The themes emerging from the FG were i) delivery pattern, ii) engagement and enjoyment, iii) perception of learning, iv) the confidence levels of the child and v) sustainability of the intervention.

Intervention design

Structure

1) Taster sessions

Most girls expressed the opportunity to experience an introductory '*sample session'* prior to signing up for the G4G programme *'so that you don't have to commit from the very start'.* The girls reported that this might give girls, who may not be interested in sport, a chance to get a feel for LGF and as a result would possibly be more likely to attend.

2) Station-based approach

Based on their experience of the 10-minute station-based approach every week, most children felt the novel activities challenged them and were enjoyable and welcomed the station-based approach. One participant cited *'I like the way we moved stations and learned different things'*. All participants expressed a desire for longer station time which further alluded to their enjoyment of the station-based approach.

3) Timing/duration of G4G

Some participants indicated that one hour in the evening was *'long enough'* and an appropriate time for delivering the intervention. Others indicated that an hour and a half would be better suited for the programme allowing for more time at the stations. Participants also suggested the G4G programme should take place in the summer as the weather is better. One participant expressed *'I think the summer is better because I wouldn't want to be going out in the cold'.* Two participants suggested running the programme in Autumn instead, as this would be a feasible option to guarantee intervention attendance, as family holidays may pose as a barrier during the summer.

The girls provided a range of responses (e.g. one hour, one hour and a half during the Summer and Autumn/Winter) but when asked for a show of hands, a large majority preferred the session to be delivered for one hour in the summer evenings.

Content

1) Fun, friends and fitness

Most of the intervention group 1 children did appear to associate the G4G activities/programme with positive learning, having fun with friends and they felt fit, happy and confident following the activities. One participant expressed 'w*e got fitter and did new things'*, while another participant highlighted the friendship aspect as an appealing part of the programme '*It was nice to meet girls from other schools there'*. Most children felt the novel activities challenged them and were enjoyable (particularly the G4G dance). *'I liked the way it (G4G Dance) was fun and we learned new skills'*.

2) Confidence in skills

The children associated the G4G activities with learning, specifically having felt they increased their perceived confidence levels in skill execution. Specifically, a few participants expressed that their fear of catching the ball reduced at post-intervention, one participant cited '*when I was playing matches, and everyone was trying to get the ball and I sort of hid and now I feel I can catch the ball – before I didn't do that'*. Other participants stated that their '*soloing and kicking skills'* significantly improved over the 10-week G4G intervention. Additionally, one participant referred to the G4G Skill Chart as a motivator to practise skills at home *'I thought the G4G Skill Chart really helped me and motivated me to practice'*.

3) Health messages

Participants identified a range of health benefits associated with partaking in the programme. One participant alluded that the programme and football was an escape to *'get all the things out of your mind'*. Another participant expressed that the G4G programme *'made me happy'*.

4) Other appealing activities

The 'other' appealing activities the participants referred to in terms of enjoyment were the specific Team Challenge and FMS stations as part of the station-based approach that *'mightn't necessarily be a football game'*. Participants liked the idea of

'*not playing football the whole time'* during the weekly 60-minute LGF sessions and highlighted how the activities were fun and different.

Delivery

1) Female role models

The children expressed a strong desire for female role models to coach/join in with the activities expressing, that they would further motivate and engage the G4G participants. One participant cited '*If they could teach us at a young age, then we might like to be like them when we are older'.* Additionally, participants referred to the visit of the elite athlete role-model *'Cork players'* on week 8 and how this garnered the interest of all participants. One participant stated '*I liked when the Cork girls (senior elite athletes) came down, we got to meet them, and they signed our jerseys'*. This theme re-surfaced when discussing the changes/future direction of the G4G programme for continued PA participation.

2) Variety of coaches

The variety of coaches and the changing nature of the 10-minute station-based approach for the weekly G4G sessions was particularly liked among participants. A number of participants felt it provided an opportunity to learn *'different games and skills'* and maintain interest during the session. One participant cited '*I like the way you moved on to a new coach after every 10 minutes so you wouldn't get bored of the same person'.*

Barriers

Additionally, a range of barriers were identified that were perceived to affect intervention uptake and continued PA participation (Table 7.5). Barriers included; i) lack of confidence, ii) friends (social acceptance), iii) body image, iv) fear of injury, v) competitive nature.

i) Lack of confidence

Participants identified skill-related lack of confidence among girls as a potential barrier for G4G intervention uptake or continued sport participation. One participant expressed that some girls *'might doubt themselves when trying to kick the ball and keep soloing'*. Another participant indicated that the fear of failure when performing skills may cause frustration, which may also impede continued sport participation *'If they can't do it (skills) they might get frustrated because they can't do it'*.

ii) Friends (social acceptance)

Participants also alluded to the fact that social acceptance among friends may act as a barrier to G4G intervention and continued sport participation. Specifically, social comparison *'with friends thinking you're not good at football and you're not good at stuff'*. Other participants referred to social acceptance and that *'some girls are really shy' and* drop out of sport because they don't *'really have many friends'*. Another participant explained that bullying may also be a contributing factor to not partaking in sport or dropping out *'maybe girls get bullied by some people and end up dropping out'.*

iii) Body image

Body image was identified among some participants as a potential barrier to G4G intervention uptake and continuation in sport participation. When posed the question what might stop girls from taking part in sport, some participants cited '*I think some of my friends who don't play football wouldn't play because they don't want to get mucky, get their hair messy or sweaty'.*

iv) Fear of injury

Participants also referred to the fear of injury as a potential barrier highlighting that players may be fearful of the ball itself with one participant citing '*Like you could be really scared of the ball coming to you'.*

v) Too much competitiveness

The notion of being *'too competitive'* was alluded to by some participants as an impediment for sports participation and continuation. Participants indicated that the *'competitiveness'* increased as they transition from primary to secondary school. For example, one participant stated, '*When you go to secondary school, you move up to the U14's, and that's a bit more competitive than U12's but maybe girls don't enjoy it anymore then'.*

Sustainability of the intervention

The children also provided some interesting suggestions for changes to the intervention, including i) longer station time/fewer rotations, ii) more game/match time, iii) playing the G4G 'Blitz' earlier in the programme, iv) more role model and teacher involvement and v) seasonal timing and duration of the programme. Exemplar participant quotes are presented in Table 7.5.

Table 7.5. G4G research-informed intervention group 1 focus group thematic analysis findings (N=6)

	Key Themes	Quotes	Theoretical lens
Structure	Taster 'Introductory' Sessions	'Maybe you could sign up for G4G after the 1st session if you want – maybe do a sample session first so you don't have to commit from the very start'	Intra, Inter, Organisational
		'Maybe you could do an introductory day in school'	
		'In school, girls might be more comfortable with their school friends'	Relatedness
		'Maybe you could tell the teacher about it (G4G) and we could do football for PE'	
	Station-based approach	'I like the way you move stations'	Organisational
		'I like the way we moved stations and learned different things'	
		'The stations were fun but too short'	
	Timing/duration of G4G	'I thought the hour was long enough'	Organisational
		'I think it should be an hour and a half'	
		'I thought the hour was perfect'	
		'I think it shouldn't be on in the summer'	
		'Maybe if it was on in the Autumn/Winter instead of the summer because I missed the Blitz I was on my holidays; people are busier during the summer'	
		'I think the summer is better because I wouldn't want to be going out in the cold'	
Content/ Perception of learning	Fun, Friends and Fitness	'I really liked the way it was fun, and we learned new skills'	Intra, Inter
		'It was good to make new friends'	Relatedness
		'It was nice to meet girls from other schools there'	Competence
		'Everyone on the team is friends. Yesterday there was a football match and the new girls were there and now I know their names'	

		‘We got fitter and did new things’	
	Confidence in skill execution	‘I felt I improved my soloing. I wasn’t the best at soloing but after the programme, I feel I’m after getting a bit better’	Intra Autonomy Competence
		‘When I catch the ball before I was sort of afraid, but now I’m not afraid and the programme helped me’	
		‘My kicking and hand-passing got way better – now I can kick it like really really far’	
		‘When I was playing matches, and everyone was trying to get the ball and I sort of hid and now I feel I can catch the ball – before I didn’t do that’	
		‘I couldn’t solo the ball at first but when I did the programme, I started to become better’	
		‘I thought the G4G Skill Chart really helped me and motivated me to practice’	
	‘Other’ appealing activities/resources	‘I like the way there was matches and football but also fun games like that would keep you fit – it mightn’t necessarily be a football game so that you’re not playing football the whole time’	Intra, Inter Autonomy, Competence, Relatedness Organisational
		‘I liked the jerseys’	
		‘I thought the G4G Skill Chart really helped me to practice the skills and motivated me to practice’	
		‘The feel of the ball was soft – it was a lot lighter; it was easier to kick it and it went up a lot higher than the other balls’ (SpotonSports football)	
		‘It (G4G Dance) was great fun, I like the way we had the ball included in the dance, and we did the skills and stuff inside the dance’ ‘It’s a good way to practice skills’	
Delivery	Female Role Models	‘I liked when the Cork girls (senior elite athletes) came down, we got to meet them, and they signed our jerseys’	Community Relatedness
		‘We met new Cork players that we mightn’t have known’	
		‘If they could teach us at a young age, then we might like to be like them when we are older’	
		‘They’d help us keep going with football’	
	Different Coaches	‘I like the way you moved on to a new coach after every 10 minutes so you wouldn’t get bored of the same person’	Inter

		‘I liked moving around, usually your stuck with one coach, so I liked moving around cause *(sic)* different coaches had different games and skills and I liked that’	Relatedness
		‘I liked the way we had different coaches and that we weren’t just with the one coach the whole time’	
Programme barriers	Lack of confidence	‘Some girls might doubt themselves when trying to kick the ball and keep soloing’	Intra
		‘If they can’t do it (skills) they might get frustrated because they can’t do it’	Competence
	Friends (social acceptance)	‘Maybe people or friends saying ‘you’re not good at football and you’re not good at stuff’	Inter, Relatedness
		‘Some girls are really shy; I know a girl who dropped out because she didn’t really have many friends’	
		‘Maybe girls get bullied by some people and end up dropping out’	
	Body image/stereotyping	‘I think some of my friends who don’t play football wouldn’t play because they don’t want to get mucky, get their hair messy or sweaty’	Societal/cultural perspective
	Fear of injury	‘Like you could be really scared of the ball coming to you’	Intra, Autonomy
	Too much competitiveness	‘When you go to secondary school, you move up to the U14’s, and that’s a bit more competitive than U12’s but maybe girls don’t enjoy it anymore then’	Organisational
Changes/		‘we didn’t have enough time at the stations, maybe 15 minutes instead or having less rotations’	Organisational
future directions of G4G Programme		‘maybe a few short stations and a few long ones too’	Inter/
		‘longer time to play the matches’	Relatedness
		‘more role-models to help out and motivate us’	Autonomy
		‘not to have the Blitz at the very end when the programme is finished, maybe on the 6th week or something’	
		‘maybe if like sometimes we could choose the games to play at the different stations- that would be fun’	

7.6 DISCUSSION

The main purpose of the 'Gaelic4Girls' NRCT was to assess the effectiveness of a multi-component, community sports-based PA intervention for increasing girls PA levels, FMS proficiency, and psychological wellbeing, as well as to investigate participants programme experiences and perspectives for future direction. It is hypothesised that the intervention group would demonstrate significant improvements in all primary outcome measures, in excess of those within the comparison and control groups.

The PA data showed small, but significant increases in weekly minutes of self-reported MVPA, from pre-to post-time periods for those in intervention group 1, unlike those in intervention group 2 or the control group 3. This positive PA observation may be due to the fact that the coaches in the intervention group one were guided by research-informed implementation coaching principles, and were exposed to evidence-based frameworks, which were designed to guide the planning, delivery, and evaluation of the organised weekly G4G sessions in the community sports-based club. Two specific pedagogical coaching principles included the Lubans et al (2017) 'SAAFE' (Supportive, Active, Autonomous, Fair, and Enjoyable) delivery principles, and the Powell et al (2016) 'SHARP' principles, which involved the following key pedagogical aspects: Stretching whilst moving; high repetition of motor skills; accessibility through differentiation; reducing sitting and standing and promoting in-class/session PA.

One important factor was the introduction of dynamic stretches for intervention group one, which the coaches then integrated into the warm-up elements of their sessions for the duration of the research informed G4G programme, replacing their traditional static stretching routines (Bukowsky et al., 2014). Coaches in the intervention group one, therefore, had specific pedagogical guidance which sought to influence participants' PA levels, alongside focusing an increase in PA intensity during the weekly coaching sessions (Gugliano, 2014). The SHARP pedagogical principles (Powell et al., 2016) have recently proved successful in supporting teachers to increase 7- to 9-year-old children's MVPA by 30%, in primary PE lessons.

Additionally, it is plausible that the increase in self-reported minutes of MVPA among intervention participants in group 1 may be due to the Teaching

Games for Understanding (TGfU) (Sheppard, 2014) nature of the G4G station-based sessions. Participants in the intervention group were exposed to a variety of FMS, and LGF sport-specific skills, through a TGFU instructional model (Sheppard, 2014), within a rotatory station-based approach. Each 10-minute station allocated a significant amount of time to learning the skills of LGF via modified and small-sided games, which directly reinforced heightened periods for PA and minimising opportunities for physical inactivity among participants (Slingerland et al., 2014). As per the FG data collected from the child participants, the nature of the small-sided team games, the student enjoyment in the session stations, and the additional freedom utilising the TGfU approach may explain the improvement of self-reported PA levels. Previous research studies utilising the TGfU approach have proven successful in terms of increasing PA among children and adolescents in both school and community sports-based contexts (Harvey et al., 2016; Renshaw et al., 2016). Researchers have determined that the TGfU approach, alongside other pedagogical instructional models in teaching and coaching, can be effective in increasing the short-term (Perlman, 2012; Schneider et al., 2008) and long-term (Fu et al., 2016; Sallis et al., 1997) PA levels of children and adolescents. Previous pedagogical strategy interventions have produced a mean PA increase of 6.27% in children's MVPA during physical education lessons, with intervention groups spending 14% more time in the desired PA intensity when compared to control groups (Lonsdale et al., 2013).

The present results revealed that youth in the intervention group also reported significantly greater increased scores in their overall FMS proficiency over time when compared to both groups. Significant differences over-time were also found in overall locomotor skills proficiency between intervention group 1 and intervention group 2 and between the intervention group 1 and control group. Small, but non-significant increased differences were also found in the object-control subset, specifically between the intervention 1 group and control group. Based on the fact that the intervention was a research-informed structured sports-based programme, youth in the intervention group were organised and instructed by coaches who were trained and upskilled by the lead researcher, who had significant experience in physical education teaching and sports coaching. The small increase in overall FMS performance among the intervention group may have been as a result of the consistent exposure to the 10- minute weekly FMS coaching station, where basic

motor skill activities were implemented through fun games. Appropriate coaching strategies to stimulate FMS development were provided to participants to perform both locomotor and object control related activities (Robinson et al., 2015). Coaches in the research-informed intervention group, therefore, had the opportunity to influence the girls' PA and FMS levels, utilising the SHARP (Powell et al., 2016), and SAAFE principles as specific coaching strategies to monitor the intensity of PA during these G4G sessions (Guagliano et al., 2014).

Increases in the intervention group's overall FMS proficiency may also have been due to the fact that children received performance-related feedback on FMS and sport-specific skills. In order to support coaches throughout the intervention, every coach received a comprehensive G4G Resource Pack, which was aligned to the evidence informed SAAFE (Lubans et al., 2017) and SHARP principles (Powell et al., 2016). The initial 2-hour coach education workshop session (professional development prior to the start of the G4G intervention) alongside the 8 x 1-hour coach education sessions with the lead researcher may have had an impact. Specifically, these professional development opportunities for coaches targeted face-to-face engagement with the intervention groups coaches, whereby there were consistent visual demonstrations on the specific FMS performance criteria and coaching cues. Additionally, the G4G resource pack and electronic video resources may have assisted the coaches in understanding FMS, as these resources further reinforced the key coaching skill performance criteria.

The provision of Continuous Professional Development (CPD), similar to the Robbins et al., (2013) 'Girls on the Move' intervention protocol was adhered to in terms of discussing issues, and reinforcing G4G policies and procedures, which may have been a contributing factor to the coaches understanding and delivery of FMS. A similar approach was utilised by Cohen et al. (2015), with 460 children (54.1% girls; age 8.5 ± 0.6 years) in the Supporting Children's Outcomes Using Rewards, Exercise and Skills (SCORES) intervention, where teachers learnt about FMS and were instructed to provide students with specific feedback (Cohen et al., 2015). The literature widely acknowledges that youth PA interventions through the provision of non-formal coach education, such as CPD opportunities (training, resource manual, and opportunities to work with coaches and instructors) can positively support programme implementation, and childhood engagement in PA (Casey et al., 2014; Koh et al., 2014).

In addition to this, the inclusion of the G4G FMS dance provided an additional opportunity for participants in intervention group 1 to practice basic FMS (e.g. coordination, skipping), combined with the sport-specific LGF skills into a fun dance sequence, using a prevalent song in the charts as an auditory stimulus. Participants in intervention group 1 spent an extra 30 minutes of dance practice (from weeks 1 to 8) each week before the scheduled G4G on-pitch session. The culminating FMS and sport-skill dance routine was performed to coaches and parents on week 8 of the programme. Participation in rhythmic activities, such as dance, has shown to aid in the ease and efficiency of performing many FMS, by enhancing the fluidity of movement patterns (Sport for Life Society, 2016). For example, findings from an 8-week intervention study (Lykesas et al., 2014) among 7 to 9-year-old primary school children in Greece confirmed the crucial role of the dance programme for the development of kinetic education. Creative dance is a pedagogical approach of exploration and experimentation, it teaches children to use their creative abilities that lead them effortlessly in the development of movement abilities, and it also increases the availability and willingness of children to engage in motor activities (Cheung, 2010). In the present study, the dosage of FMS specific time for the intervention group participants [including the weekly 10-minute FMS station (100 minutes) and FMS dance practice and performance (300 minutes)] totalled 400 minutes throughout the 10-week intervention duration. Therefore, the research-informed intervention group 1 were exposed to a higher dosage of FMS activities, and it seems likely that they would improve their overall FMS proficiency to a higher level than those in intervention group 2 or the control group 3.

Further to this, Bryant et al. (2016) found that a 1 day per week PE intervention, focusing on FMS, resulted in the improvement of motor skills in children (mean age ± SD = 8.3 ± 0.4 years) within the intervention group (n=82) relative to children in the control group (n=83). Most recently, Costello & Warne (2020) showed that a four-week fundamental motor skill intervention effectively improves motor skills in 8 to 10-year-old Irish primary school children (n=100). Findings from previous community sports-based youth interventions provide evidence that FMS supporting strategies for coaches, including the implementation of a station-based format, and a TGfU pedagogical approach may be an effective way to improve 1) FMS competencies for children; 2) deepen children's knowledge

of game tactics; and 3) heighten overall enjoyment levels for children (Butler & Griffen, 2010; Bryant et al., 2016).

The present results revealed that participants in the intervention group also reported small, but significantly greater scores in some of the psychological **c**orrelates (see Table 4), including their SE and perceived PSC over time when compared to other two groups. Coaches in the intervention group were encouraged to utilise purposeful praise, positive reinforcement and performance-related feedback for the duration of the 10 weeks, which was highlighted as part of the CPD offering. Bandura (1997) posited that SE, as a product of a complex of self-persuasion, relies on the cognitive processing of diverse sources of efficacy information, including mastery experiences, vicarious experiences, and verbal persuasion. Performance-related feedback given by coaches has the potential to have a profound effect on players' performance, as well as on their perception of the motivational climate (Staley & Moore, 2016). It would seem likely that participants in the intervention group were more susceptible (as observed) to heightening their SE and perceived PSC levels, than those in the comparison and control groups.

Significant increases in participants PA enjoyment and attitudes was evident among the intervention group from pre- to post-intervention, in comparison to the two other groups. One explanation for this may have been the integration of the weekly 10-minute 'Team Challenges' fun station. This intervention component promoted the sense of inclusiveness, friendship and belonging to participants, while at this station, coaches also provided feedback to each of the participants in a fun non-competitive environment. Additionally, numerous participants cited that the '*G4G Dance'* was *'the most enjoyable'* part of the programme. The need for relatedness (SDT) and feeling connected to others (peers) can help cultivate the development of intrinsic motivation (Crespo et al., 2013), for increased PA participation (Bortoli et al., 2018; Timo Jaakkola et al., 2017; Vitali et al., 2019). Previous studies have acknowledged that the experiences of enjoyment are a critical factor in motivating young individuals to continue participating in PA (Brazendale et al., 2015; Cairney et al., 2012). It is anticipated that those who enjoy the benefits of physical activities have a favourable and positive attitude toward PA participation (Chadwick, 2011). This was evident in the current study with the intervention group 1 showing significant gains in PA attitudes in comparison to the intervention group 2 and the control group 3 conditions. Within the PA context, enjoyment represents a

positive attitude toward PA practice (Grasten et al., 2012) and constitutes one of the most important correlates for PA participation (Garn et al., 2019).

Significant increases in participants perceived peer and familial social support was evident among the intervention group 1 from pre- to post-intervention, in comparison to the two other groups. Social support was a key component of the research-informed intervention group 1 for participants (via positive reinforcement and praise). Peer influence within the G4G research-informed intervention may have been influenced through 1) modelling of PA (Team Challenge station), and (2) co-participation (TGfU stations) with participants. Within the research informed G4G intervention group, parents undertook the following i) co-participated in the LGF skills with their daughter (G4G Skill Cards), ii) attended a 'Parent's Evening' educational workshop on week 4 (led by the lead researcher), and iii) were provided with a communicative support structure platform (G4G Facebook page and What's App group) for the duration of the 10-weeks. The co-participation (e.g. performing physical activities together) and modelling communicative support structures may have led to increased parental social support and involvement with their daughter's engagement in the programme. Seabra et al. (2012) study, examining correlates of PA in schoolchildren aged 8-10 years, found perceived acceptance by peers in sports, and parental encouragement was positively related to PA in girls (n= 683).

The focus group findings elicited children's views on the G4G intervention acceptability (structure, content and delivery, data), with qualitative findings revealing the importance of incorporating multiple viewpoints for programme sustainability. Intervention participants associated the G4G activities/programme with positive learning, having fun with friends, and they felt fit, happy and confident (in terms of skill execution) following the programme completion. Most intervention participants expressed that the G4G dance was one of their highlights about the programme, which provided an appropriate medium to increase girls' PA and effectively apply the SDT (Jago et al., 2013). The 'other' appealing and '*not necessarily football'* activities (i.e. the FMS and Team Challenge stations) encouraged the social element of PA participation and may have played a contributing role to increase the intervention participants perceived peer support (Maturo & Cunningham, 2013). Most children felt that the activities challenged them and were enjoyable (particularly the G4G dance), where they acknowledged liking the novelty of the activities, and the station-based approach. Participants, however,

did request that more station time was needed, particularly to play matches and games. These findings are consistent with Jago et al. (2009) and Stearns et al. (2019), in which the authors both identified fun and friends as key motivators for PA participation among young girls. Research postulates that children like doing PA with friends rather than alone (Sanders et al., 2014) and describe their friends as influencing their PA in various ways, such as modelling, co-participation, and encouragement (Jago et al., 2009; Bukowski et al., 2011). Seabra et al. (2012) study examining correlates of PA in schoolchildren aged 8-10 years, found perceived acceptance by peers and parental encouragement were both positively and significantly related to PA in girls (n= 683). Research has shown that the presence of peers being physically active has resulted in an increase in PA among children and adolescents from the ages of 3 to 15 years old (Lau et al., 2016; Salvy et al., 2012).

To ensure the programme is enjoyable going forward, the girls outlined that a key feature of the intervention structure is the provision of taster sessions, whereby introductory LGF sessions are provided in schools and clubs, prior to the programme rollout. Girls believed that the taster sessions, alongside the G4G programme itself, would be better with the inclusion of female 'role-models. Providing primary school girls with active role models and links to existing community activities could positively influence girls PA in combat to the age-related PA decline in adolescence (Morgan et al., 2019). This was reflected in the present study, when social agents, such as the G4G coaches/coordinators, peers and role-models structured the PA environment to maximise feelings of competence and personal mastery, with children more likely to enjoy the activity, maintain interest in involvement, and commitment to the activity (Granero-Gallegos et al., 2017).

Additionally, some participants expressed interest in being involved in the PA station choices. Providing girls with such PA ownership is consistent with multiple principles of SDT, including intrinsic motivation, relatedness needs, autonomy support and autonomous motivation (Ryan & Deci, 2000). It has been noted in research that involving children directly in activities which they have choice and control are often the most enjoyable (Brooks & Magnusson, 2007). This is an important consideration for future PA promotion programmes, as a lack of choice can be one of the main reasons that girls disengage from PA (Mitchell et al., 2013).

Limitations of the current study include the relatively small sample size of the intervention club, along with the non-randomised controlled research design,

which limits the generalisability of the findings. The qualitative nature of the FG interviews conducted by the lead researcher who was actively involved on site in the intervention may have led to socially desirable answers, meaning the G4G participants give more favourable responses to the question. The novelty of participating in intervention group 1 or intervention group 2 may have demonstrated a heightened positive attitude towards PA and its correlates. These intervention conditions may have increased the participant/coach engagement with the intervention and influenced the findings in unknown ways. The study design was limited to a subjective method for the assessment of participants PA; a future recommendation would be to use more objective measurements of PA, such as accelerometers, or wearable technologies.

A strength of this study is the enhanced ecological validity, stemming from the naturalistic community sports based G4G intervention setting. Finally, a further strength of the study is the use of simple, innovative and feasible intervention strategies, based on a sound conceptual framework, which can be adapted in other similar OYS settings.

7.7 CONCLUSION

The results of this study indicate that the 10-week G4G multi-component community sports-based intervention led to improvements in i) self-reported PA levels, ii) overall FMS proficiency, and iii) several psychological correlates of PA including; perceived SE, perceived PSC, PA enjoyment, attitudes toward PA, and perceived peer and parental support. The current intervention evaluation trial of this G4G protocol study presents, as far as the authors are aware, the first three-armed intervention effectiveness study to be conducted in an Irish OYS context, designed to increase participants MVPA, FMS proficiency, and psychological wellbeing among 8-12-year-old girls. This G4G NRCT has provided sufficient evidence regarding the implementation of a multi-component, community-sports based intervention, and can be used as a starting point to inform the development of theory-based interventions targeting PA promotion for pre-adolescent girls in Ireland. Examining the future efficacy of the G4G programme, as part of a larger trial would seem prudent in terms of the gathering sustainable, longitudinal evidence.

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Declaration of interest statement

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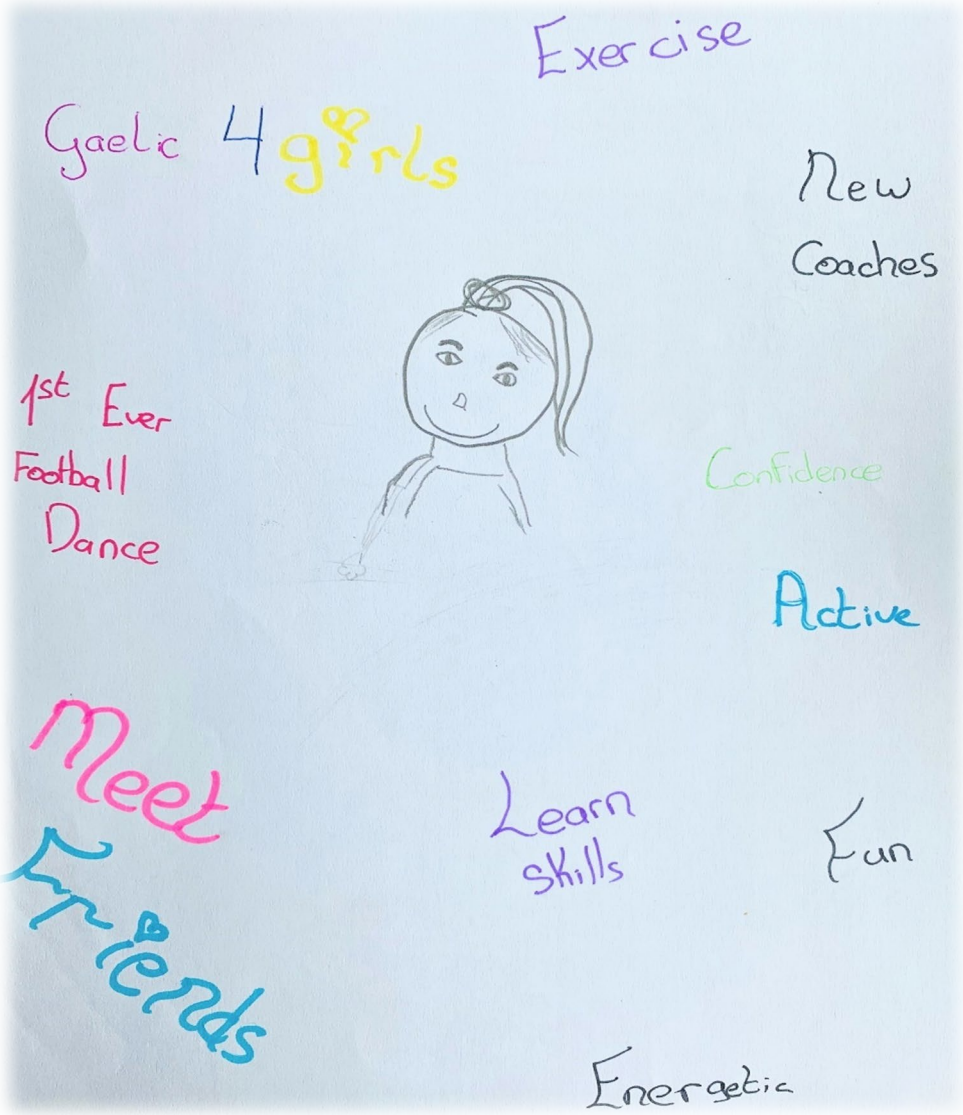
CHAPTER 8

DISCUSSION, CONCLUSION, AND FUTURE DIRECTIONS OF 'GAELIC4GIRLS



8.1 INTRODUCTION

The G4G research study was an exploration into the design, development, implementation, and evaluation of a community sports-based PA intervention for Irish 8 to 12-year-old girls. Specifically, the purpose of this thesis was to investigate whether a multi-component intervention would have the potential to increase PA and FMS levels, and improve psychological correlates of PA in 8- to 12-year-old girls. This chapter aims to provide an overview of each study, by discussing and highlighting the contributions these findings make to the existing evidence base. The chapter will further identify the strengths and limitations of the thesis, and outline final recommendations for future research, policy and practice.

8.2 THESIS OVERVIEW

The G4G research is a response to the recently documented low levels (self-report and accelerometer) of childhood PA participation (Aubert et al., 2018; Guthold et al., 2019; Tremblay et al., 2016) worldwide. In an Irish context, these low levels of PA participation are consistent with the literature, with only 17% of children aged 9- to 11- years old, and 10% of adolescents aged 12- to 17- years old reporting to meet the PA guidelines for health (Woods et al., 2018). Further to these low levels of PA participation, global and Irish specific evidence has shown a consistent gender-based disparity in youth PA participation, whereby girls are significantly less active than boys (Pearce et al., 2012; Silva et al., 2013; Telford et al., 2016; Van Hecke et al., 2016). In a first step to address these alarming low levels of youth PA participation among young girls, a feasible, cost-efficient, and sustainable exploratory intervention (G4G) trial was carried out in Ireland between 2017 and 2018.

Much research for youth PA promotion suggests that multi-component interventions are effective (Camacho-Miñano et al., 2011; Pearson et al., 2015; Russ et al. 2015), with community sports-based settings providing an opportunity to increase avenues for PA sustainability among youth, particularly vulnerable at-risk girls (Finch & Donaldson, 2010; Hebert et al., 2015; Sims et al., 2015). The structure of the G4G intervention was guided by the literature evidence gathered from previously successful community sport-based interventions amongst young people (Eime et al., 2018; Eime et al., 2015; Robbins et al., 2019).

Chapter 4, the first study in this thesis, was a particularly novel examination of pre-adolescent actual FMS proficiency, perceived motor confidence and competence, and PA levels from baseline data. With many studies now reporting positive associations between actual and perceived FMS and PA in young people (Barnett et al., 2015; Britton et al., 2020; McGrane et al., 2016; Stellino & Sinclair, 2013; Vedul-Kjelsås et al., 2015), chapter 4 was a distinctive study examining this relationship among pre-adolescent girls, prior to the G4G intervention. Although findings indicated no association between PA and self-concept on overall FMS proficiency level, perceived PSC was a significant predictor of the young girls' overall PA levels. Nonetheless, a recent systematic review (De Meester et al., 2020) has reported that the strength of the association between actual motor competence and perceived motor competence/physical self-perception in youth is low to moderate, with data demonstrating that the strength of association does not differ by age, sex, developmental status, or alignment between measurement instruments (De Meester et al., 2020).

Chapter 5, the second study in this thesis, contextualised the development of the G4G intervention for Irish pre-adolescent youth. Within this chapter, the evidence and background to the development of the G4G intervention is given. Findings from the baseline data informed the development of the intervention included low levels of pre-adolescent girls PA, insufficient levels of FMS proficiency, and substantial differences in self-efficacy, attitude towards PA, perceptions of health, and barriers to participation between the classified active and inactive participants. While these findings align with other recent research (Belton et al., 2014; Bolger et al., 2018; Connolly et al., 2020; Mikaelsson et al., 2020; Somerset & Hoare, 2018), this current study reinforced the need for a specifically tailored pre-adolescent PA intervention. From these specific baseline findings, the G4G pilot intervention was constructed based on the SDT and SEM theoretical frameworks (Deci & Ryan, 2000; Stokols, 1996).

Chapter 6 provided a detailed insight into the theory-based design protocol of the G4G intervention study, namely the G4G participant, coach, parent/guardian, and intervention components. This chapter laid the foundations for the overall evaluation of G4G, as described in Chapter 7. Chapter 6 introduced the reader to the originality of the G4G intervention; with a specific focus on the theoretical and pedagogical

coaching strategies with the aim of increasing PA, FMS, and psychological correlates among 8 to 12-year-old girls within the club-based environment. Similar theoretical and coaching pedagogical strategies (e.g. SHARP and SAAFE principles, TGfU) have been successfully utilised in previous PA and sport studies among young girls (Casey, et al., 2014; Shannon et al., 2018; Tibbitts et al., 2019). By documenting each pillar associated with G4G, the reader was provided with an overview of this multi-component intervention.

Chapter 7 assessed the effectiveness of the 10-week multi-component community-sports based G4G intervention for 8- to 12-year-old girls at pre- and post-test stages. The three-armed experimental study involved one intervention group who received the research informed G4G intervention over the course of 10-weeks (March-June 2018), a second intervention group who used the existing 'traditional' national G4G programme structure, and one control group who received their usual LGF training sessions for the same period without any researcher input or influence. It was encouraging to observe through the thesis results that over the 10-weeks of the intervention, there was an increase in the intervention group's self-reported daily MVPA. Furthermore, a significant improvement in overall FMS proficiency for those exposed to the G4G intervention, relative to their control counterparts was detected. Research has found that community sports-based interventions with coaches adequately trained in player-centred instruction can significantly improve the PA levels (DeBate & Bleck, 2016) and FMS competency (Lander et al., 2017) of early years adolescent girls.

This preliminary G4G trial provides support for the simultaneous integration of PA, FMS, and psychological wellbeing through a theoretical and pedagogical approach during weekly LGF training sessions amongst Irish 8 to 12-year-old female youth. Yet, as is acknowledged and discussed in chapter 7, the relatively small sample size within the three clubs must be considered a limiting factor when interpreting these findings. In addition, it is recognised that while preliminary research findings may be valid in the Irish pre-adolescent LGF sporting setting, without further intervention examination, these results must be interpreted with caution. For these reasons, a definitive randomised controlled trial (RCT), with a larger sample is recommended to confirm results.

8.3 CONTRIBUTION OF THESIS TO THE LITERATURE

The studies within this thesis are very much original and nuanced within youth PA and community organised sport participatory research. This thesis makes several contributions to the literature and throughout this chapter, the following will be discussed: 1) integration of pedagogical coaching frameworks as an avenue for increased PA and motor skill opportunities, 2) emphasis on a psychological value and needs-driven approach for intervention design, and 3) the impact of social support by significant others (peers, parental and role model) on 8 to 12-year-old girls' PA and sport participation.

8.3.1 Pedagogical coaching frameworks: an avenue for increased physical activity and motor competence in 8 to 12-year-old Irish girls

An important finding across studies in this thesis is the girls' consistent failure to meet the minimum daily PA recommendations for health, with a significant majority also not achieving the FMS proficiency expected for their age (Chapter 4, 5 and 7). This evidence is in agreement with previous representative samples of Irish primary school children (Behan et al., 2019; Bolger et al., 2018; Woods et al., 2018), and consistent with global data on estimates of female youth PA (Demetrio et al., 2019; Owen et al., 2017; Bardid et al., 2016; Bryant et al., 2014;), providing further arguments to find strategies for enhancing girls' PA levels and motor skill proficiency levels in organised sports. For this reason, pedagogical sports coaching approaches were included in the NRCT in Chapter 7, which were underpinned by theory along with participant suggestions from the baseline studies (Chapter 4 and 5).

As highlighted in Chapter 2, a recent systematic review and meta-analysis of PA community sports-based interventions among girls (Pearson et al., 2015) found that greater intervention effectiveness appear to result from interventions that include a non-formal coach education element (Koh et al., 2014). The combination of the two specific 'SAAFE' (Lubans et al., 2017) and SHARP (Powell et al., 2016) pedagogical coaching principles as part of the G4G programme (Chapters 6 and 7) proved successful in heightening the participants self-reported perceived PA and enjoyment levels. To date, very few published interventions give clear details on

how specific theory-based pedagogical coaching frameworks were used to guide the design of community sports-based interventions.

Additionally, participants in the intervention group (as opposed to the control groups) were exposed to a variety of FMS, and LGF sport-specific skills, through a TGfU instructional model (Sheppard, 2014), using a rotatory station-based approach. Each 10-minute station allocated a significant amount of time to learning the skills of LGF via modified and small-sided games (Slingerland et al., 2014). The integration and implementation of non-formal CPD coach education opportunities (training, FMS supporting strategies, resource manual, and opportunities to work with coaches and instructors), and a TGfU pedagogical approach in previous community sports-based youth interventions may be an effective way to improve 1) FMS competencies for children; 2) deepen children's knowledge of game tactics; and 3) heighten overall enjoyment levels for children, and childhood engagement in PA (Sierra-Díaz et al., 2019; Casey et al., 2014; Bryant et al., 2016).

Successful interventions that provided training with fun activities and appropriate pedagogical curricula were encouraged by Cregan, 2020; Hardy et al., 2012; Mazur et al., 2020; Owen et al., 2018; Van Beurden et al., 2003. For example, González-Valero et al. (2020) recent 'Rhythmic Gymnastics' intervention study among 104 11- and 12-years old girls (11.66 ± 0.47), reported more optimal levels of physical self-concept and PA enjoyment post-intervention (17 sessions). González-Valero et al. (2020) coaching strategies, particularly the task (designing activities), grouping (working groups), evaluation (assessment criteria) and time (pace of learning and teaching) align with the pedagogical approaches used in the G4G intervention. Similarly, in the Bristol Girls Dance Project (BGDP), the SDT-focused element of the training explored the practical application of the theory to dance sessions and proved successful in improving girls (N = 281) reported PA enjoyment levels (Sebire et al., 2016). The BGDP 20-week school-based intervention, consisting of two 75 min after-school dance sessions. The SDT-focused element of the instructor training and session plan manual explored the practical application of the theory to dance sessions. Similar to the G4G study, the instructors were provided the opportunity to use autonomy-supportive styles of instruction, seek clarification and obtain feedback from study researchers (Edwards et al., 2016).

There are currently no evidence-based studies regarding coach education and the provision of coach CPD opportunities to increase PA and FMS opportunities within the existing LGFA organisational context in Ireland, thus contributing to new knowledge within a Gaelic Games context. The G4G intervention provided non-formal learning methods within coach education (such as continuous professional development (CPD and weekly workshops) (Maclean & Lorimer, 2016) and addressed specific topics that are more authentic, meaningful, and contextualised to the coaches within the LGF sporting culture (Mallett et al., 2009).

8.3.2 Psychological correlates of PA – knowing your target audience for intervention design

8.3.2.1 'Girls just wanna have fun': capitalising on PA enjoyment

A key finding within this thesis is the 'fun factor' associated with 8 to 12-year-old girls' sport participation. The most frequently cited reason among pre-adolescent Irish girls within this thesis (Chapter 5 and 7) indicates that fun, enjoyment, and social satisfaction are the strong motivators, and lack of fun is a primary reason for sport attrition/drop-out. Lack of enjoyment was the most frequently cited reason among 8 to 12-year-old girls for dropping out of sport, expressing feelings of being bored and not fulfilled; along with having a dislike for the teacher/coach and a lack of support/encouragement from coach/teacher. These findings are in line with current research on female youth revealing that having fun through feelings of acceptance, achievement, involvement and social interactions are significant motivators for female youth PA and OYS participation (Corr & Murtagh, 2020; Enright & O' Sullivan, 2010; Farmer et al., 2018; Pawlowski et al., 2014). Additionally, the absence of fun is noted as a common reason for youth sport attrition globally (Visek et al., 2015; Witt & Dangi, 2018). In chapter 5, findings indicate that the 'competitive' nature and the idea of winning was not as critical and could even spoil the fun and, in some cases, may be the cause of discontinued engagement. These findings align with other studies where the 'competitive' nature posed as a barrier in female youth PA and OYS (Corepal et al., 2018; Farmer et al., 2018; Sport Northern Ireland, 2016). Interestingly, team-based competitions have

shown potential to better encourage PA for girls as a motivator not to leave the team down (Corepal et al., 2018).

In chapter 7, most children felt the novel activities challenged them and were enjoyable (particularly the G4G dance). Participants referred to the *'matches'* and *'other'* non-football activities, such as the specific FMS and Team Challenge stations, including the G4G Dance, as appealing and enjoyable aspects of the programme. The use of game-centred approaches and Sport Education (SE) instructional models (including TGfU) have been found to contribute to students having fun and finding value in organised youth sport (Fry et al., 2010; Georgakis & Light, 2009). Collectively, these findings support the use of a modified games approach (i.e. inclusion of Team Challenges and G4G Dance) and SE models (TGfU) as ways to promote fun through meaningful experiences in youth sport for young girls (Beni et al., 2017).

At present, fun remains a relatively elusive concept (Visek et al., 2015), with limited efforts made to characterise and quantify fun in youth sport, and there is little or no consensus of its meaning in the literature (Bengoechea et al., 2004; Visek et al., 2018). For instance, relatively few studies have attempted to identify specific factors that comprise fun in youth sports (Visek et al., 2018; Witt & Dangi, 2018; 2018; Martin, 2014,) or identify what is done to promote these positive movement experiences. Additionally, there is a lack of longitudinal studies on the evolution of enjoyment in organised sport and factors that are associated with the enjoyment of sport from a longitudinal perspective (Lagestad & Sorensen, 2018). Most recently, Visek et al.'s (2018) 'FUN MAPS' concept provides evidence-based blueprints for the fun integration theory (FIT); this appears to be the only stakeholder-derived and fully conceptualised theoretical framework for understanding fun in youth sport today. On a smaller scale to Visek et al.'s (2018) FUN MAPS, the G4G intervention study (Chapter 7) in Ireland made efforts to characterise and identify quantify fun from a pre-adolescent girl perspective, bridging a gap of standard practice for promoting fun in Gaelic Games youth programmes.

8.3.2.2 'I won't because I think I can't': Building confidence and competence in 8 to 12-year-old girls

The G4G intervention study results revealed that participants in the research-informed intervention group 1 (Chapter 7) also reported small, but significantly greater scores in some of the psychological correlates, including their SE and perceived PSC over time when compared to the other two groups. Additionally, qualitative findings revealed the G4G participants in the research-informed group 1 associated the G4G activities with learning, having felt they increased their perceived confidence levels in skill execution. Specifically, two participants expressed that their fear of catching the ball reduced at post-intervention, while other participants stated that their soloing and kicking skills significantly improved over the 10-week G4G intervention.

FG findings in Chapter 5 reported a lack of confidence in skill execution linked with peer social comparison, as potential barriers for continued intervention uptake or continued sport participation, which are important findings for G4G intervention sustainability. Similarly, in Chapter 7, participants identified skill-related lack of confidence among girls as a potential barrier for G4G intervention uptake or continued sport participation, which is in alignment with previous research specific to young girl's sport participation (Basterfield et al., 2016; Somerset & Hoare, 2018). In sport and exercise psychology, the physical self-concept has been identified as a psychological component through which motor skill level in childhood reverberates into physically active and healthy lifestyles later in adolescence (Babic et al., 2014). Furthermore, the aforementioned G4G findings provide a comprehensive understanding of the issues surrounding perceived PSC and motivation in LGF among 8 to 12-year-old girls.

8.3.3 The impact of social support from 'significant others' on 8 to 12-year-old girls' PA: peers, parents, and positive role-models

8.3.3.1 Peer and parental social support

The G4G intervention programme is unique due to the integration of a combination of social support structures from key stakeholders, namely peers, parents, coaches, and role model LGF players, all contributing to the perceived psychological

enjoyment within the intervention study (Chapter 7). Both quantitative and qualitative findings in this thesis reveal the social support structures around the G4G participants were perceived as enabling or inhibiting factors for continued sport participation (Chapter 5 and 7). Specifically, FG findings in Chapter 5 illustrate that positive outside encouragement/support from family, friends, and coaches act as models of motivation, encouraging PA engagement among the female participants. Self-report and FG findings within this thesis (Chapter 5 and 7), however, do indicate that social pressures were reported as participatory barriers, and these findings are in line with previous research on female youth (Perry et al., 2011; Verloigne et al., 2016). The G4G social support structures facilitating (positive encouragement/praise) or impeding engagement (negative coach relationship) among 8- to 12- year-old female youth are deemed important findings in the context of this G4G study and are consistent with recent studies (Battaglia et al., 2017; Fenton et al., 2017; Laird et al., 2018).

Research postulates that coach, parent and peer support play a significant role in shaping youth sport experiences both from a positive (athlete motivation levels) and negative (drop-out) perspective (Howie et al., 2020; Sheridan et al., 2014). The social support structures implemented in G4G mirrored the youth sport triangle or triad (Lisinskienė & Šukys, 2014), which is a conceptualisation of the total youth sport experience of the G4G participant. The athletic triangle (participant, coach, and parent components) can influence the young athlete's decision to participate in sport, to remain in the sport, and to pursue a sporting career (Lisinskiene et al., 2019). The research informed G4G intervention is made up of the three intervention components, the coach, the parent(s) or guardian(s), and the athlete, and active participation of all three members is important and necessary for the positive development of the intervention's success. Positive relationships with teammates and friends are associated with favourable self-perceptions, emotions, self-determined motivation, and moral development (Smith & McDonough, 2008).

In Chapter 7, intervention participants associated the G4G activities/programme with positive learning and having fun with friends. Participants also alluded to the fact that social acceptance among friends may act as a barrier to G4G intervention and continued sport participation. As outlined in Chapter 2, it has been well-established through a detailed literature review, that peers and parents play

many and important roles in organised youth sports. In addition, children who have supportive friends and peers have also been found to be more physically active (Laird et al., 2018; Fitzgerald et al., 2012).

Increasing the PA levels of pre-adolescent girls is challenging, with most efforts to date focusing on school-based settings in older adolescent populations. The potential combined positive influence of key stakeholders, including parental and peer support structures, through co-participation within a youth sporting environment is a possible avenue for increased PA among young girls. The rationale for a co-participatory approach to sport participation and promotion is due to the family and peers being considered as important influencers for shaping children's PA (Timperio et al., 2013). The influence of parents on young girls' PA level in the G4G intervention programme occurred through modelling and co-participation (Madsen et al., 2009), but especially through supporting them, through encouragement or through the provision of logistical support (Beets et al., 2010; Sebire et al., 2013). Similarly, a co-participatory approach among peers was evident in the G4G research-informed intervention via the station-based activities (Team Challenge station). Parents and peers PA through the modelling of PA or sport (Demetriou et al., 2019); and co-participation with children (Cleland et al., 2011), along with peer support (Laird et al., 2018) can play an extremely important role in shaping the PA behaviours of young girls.

8.3.3.2 Role-models as significant influencers for increased participation in OYS

The impact of other role-models, specifically OYS coaches and 'elite' LGFA players as potential enabling and inhibiting factors for continued sport participation is another important finding revealed within this thesis. As an enabling factor, the qualitative findings in Chapters 5 and 7 highlighted the important motivational role 'elite' LGF players have on 8 to 12-year-old Irish girls within the LGF context. In Chapter 7, the G4G participants from the research-informed intervention group recognised the positive impact of the interaction between the G4G participants when the 'elite' athletes visited the revised intervention club. It has been suggested that role models can inspire young people to become involved in, or maintain involvement in, sport and PA (Adriaanse & Crosswhite, 2008). The World Health

Organisation (WHO) specifically recommends the use of role models within local communities to increase PA among females (Bailey et al., 2005). To this end, the G4G findings provide a further understanding of the positive influence LGF female players as role models can have on Irish 8 to 12-year-old girls.

Researchers have highlighted that youth sport participants are most likely to experience positive developmental outcomes when interactions are characterised by positive and informational feedback, appropriate role modelling, and autonomy-supportive engagement styles (Atkins et al., 2015). Research is needed to test the effectiveness of social support interventions in youth sport (Balish et al., 2014). To date, few studies (Conroy & Coatsworth, 2007; Lavallee et al., 2019) have used social support theoretically informed intervention-based approaches to assessing the effectiveness of a specific intervention or training programme for providing effective support to youth athletes. Investigating girls' perspectives and experiences of social support provided by significant others for PA behaviour would improve our understanding of how social support influences PA behaviour, which in turn could inform the development of PA intervention strategies aimed at engaging inactive girls in PA (Laird et al., 2018).

8.4 STRENGTHS AND LIMITATIONS

The strengths of this thesis include the formative and pedagogical approach to intervention design, guided by appropriate theory. The detailed account of how the theoretical frameworks were used in intervention design along with the use of simple, innovative, and feasible intervention strategies, acknowledges the importance of comprehensive multi-component interventions in OYS settings. A novel and innovative intervention was designed and developed for 8 to 12-year-old girls in the Irish LGF sporting context, as guided by a thorough examination of the evidence-based literature, and by the baseline studies (Chapter 4 and 5) to inform decisions on the G4G research.

The mixed-methods approach within the studies is also a strength, as the qualitative data provided important context and insight into the quantitative data collected (Choy, 2014). The qualitative data in the FGs were collected as a method of involving participant opinions to inform the design of a revised community

sports-based intervention, that otherwise may not have been detected through quantitative data alone. Additionally, as mentioned in Chapter 3, qualitative data aided in the exploration of PA enablers and barriers, which was necessary to ensure appropriate intervention functions and pedagogical coaching techniques were being considered in the revised G4G intervention. The use of practical objective and subjective measurement tools, specifically the PAQ-C, TGMD-2, GSGA, and numerous psychological instruments were reported to have acceptable validity, reliability, and practicality for use with children and adolescents (Benitez-Porres et al., 2016).

Furthermore, the study is conducted in a real-life 'Gaelic Games' sport setting, where the usual participants, coaches, and parents, under expert guidance from the research group, carried out the implementation of the intervention components. This also means that any findings of the trial are more generalisable because they are performed in the setting in which they are most likely to be implemented. This complies with the need for more effectiveness trials, defined as interventions delivered under real-world conditions (Glasgow et al., 2003).

In addition to the individual study limitations described in previous chapters (4 to 7), the following overall thesis limitations should be noted. An important limitation that must be acknowledged is the small sample size used within the studies, as described in this thesis. These small sample sizes result in difficultly generalising results to a wider population, as well as issues with assessing effectiveness, due to a lack of power. The lack of follow-up retention assessment is an important limitation which could have provided a greater understanding on the sustainable impact of the G4G intervention over time. A disadvantage of the 'real life' community sports-based setting is that it may lack breadth; gathering very detailed information means being unable to gather data from a very large number of people or groups. In Chapter 7 for the exploratory trial, in terms of matching criteria, the three clubs were selected for inclusion based on geographical location; in terms of sample size, the control club was not an exact match to the intervention. A follow-up assessment, however, was not feasible in the timeframe of this PhD project. It must be noted that all participants volunteered to participate in the G4G intervention study (Chapter 7), and therefore had an interest in increasing their PA levels and may not be representative of the true Irish population.

Additionally, the PA measurement outcome variable was limited to a subjective method for the assessment of participants' PA; a future recommendation would be to use more objective measurements of PA, such as accelerometers, or wearable technologies. The FMS inter-rater reliability process used within the studies may have given rise to subjectivity among the raters according to different interpretations of each skill evaluation criteria. The younger girls (8-9 years) within the studies may have produced less reliable responses in the questionnaire than the older girls, as cognitive ability between the 8 to 12-year-old girls differed. Furthermore, these limitations should be addressed in a full RCT, as discussed in the future research recommendations section.

8.5 RESEARCH, POLICY, AND PRACTICE IMPLICATIONS

8.5.1 Future directions of G4G

The revised G4G intervention study, as evaluated in chapter 7, was a quasi-experimental non- randomised controlled trial. Following the MRC (2000) framework (as discussed in Chapter 2) for complex interventions, this research study has undertaken the theory (pre-clinical), modelling (phase 1), and exploratory trial (phase 2) phases of investigation in the evaluation of G4G. Following from the findings of the exploratory trial, it is important that the G4G study progressively expands to the definitive randomised controlled trial (RCT) (Phase 3). This next phase will compare the fully-defined G4G intervention to an appropriate control alternative using a protocol that is theoretically defensible, reproducible and adequately controlled with appropriate statistical power (Medical Research Council, 2000). Following the research presented in this thesis, the following are this researcher's recommendations for future directions:

- A fully powered randomised controlled trial of the G4G programme should be conducted to assess the effectiveness of the programme to increase the PA, FMS proficiency levels and psychological wellbeing of 8 to 12-year-old girls. A future trial should also aim to include a larger sample of participants, from clubs situated in different areas (rural and urban) throughout the varying

regions of the country to reach a wider population (four provinces in Ireland), and include pre-post and follow-up testing.

- Evaluate G4G parental and coach perceptions of the G4G programme (intervention design/acceptability), eliciting their perspectives on the programme through qualitative analysis. Including active participation of all three G4G user groups is central to a phased approach to complex intervention design and is deemed essential to their success (Davison et al., 2013).
- Assess the impact of peer, parental and LGF player role-model support structures on G4G participants PA and psychological wellbeing across the duration of the programme for the duration of the programme, using both intervention and control groups.

Along with research recommendations, the results of this thesis present several recommendations for both policy and practice. As researchers, we must look to systematically build a culture that fosters young girls' involvement in sport and PA. This requires all those interested and involved in sport and PA provision for young people to look at current policies and practices and mount a cohesive challenge to existing practices.

8.5.2 Implications for policy

The importance of sport and PA in the Republic of Ireland is reflected by recent changes in policy, specifically related to the development of the National Physical Activity Plan (NPAP) 'Get Ireland Active!' (Department of Health, 2016) and the National Sports Policy (Department of Transport, Tourism, and Sport, 2018). The following recommendations, relating to implications for policy and practice, are emanating from the findings of this thesis:

- Ireland's NPAP consists of some key guiding principles, including creating increased opportunities for people to be active every day and to create a supportive environment for PA participation (Department of Health 2016). The overarching target of the plan is to 'increase the proportion of the population across each life stage undertaking regular physical activity by 1%

per annum across the lifetime of Healthy Ireland' (p.13). The G4G findings within this thesis align with three of the seven Action Areas, specifically Action Area 2 – dealing with Children and Young People, Action Area 6 – Sport and PA in the community, and Action Area 7, Research Monitoring and Evaluation. Aligned with Action Area 2 of the NPAP, dealing with Children and Young People, Sport Ireland and Sport Northern Ireland are leading out on the development of a physical literacy (PL) position statement, and this project was commissioned for inception in 2018. The findings of this thesis on the G4G research programme are part of this PL study, and will contribute to developing Ireland's first-ever PL consensus. Developing a strong consensus around PL throughout the sport, physical education (PE) and PA systems are regarded as a key potential enabler in efforts to achieve the desired policy objectives around participation, including addressing the drop-out rates from PA and sport participation of young girls in Ireland (Department of Health, 2018).

- Sport Ireland, with the support of the Dormant Account Fund (DAF), have developed, in conjunction with the Department of Children and Youth Affairs, Hub na Óg, and the National Governing Bodies (NGBs) of Sport, a toolkit to give volunteers and members of staff in sporting organisations a clear understanding of what they need to do to involve their young members in decision-making from club level to NGB level. The value needs-driven approach of G4G programme and findings could inform the continued development of the toolkit, by encouraging sporting organisations to find out what is important to their young members in order to support their involvement in decision-making and to consult with them in more depth on any topic. The studies within this thesis, particularly Chapter 5 and Chapter 7 illustrate the importance of listening to the pre-adolescent voice, particularly when providing them with opportunities to be active.
- One target area of the Sport Ireland policy on Women in Sport (reflective of the National Sports Policy 2018-2027 and National Strategy for Women and Girls 2017-2020) is 'Active Participation'. In order to reduce the drop-out rate from PA and sport in young girls, the policy aims to promote the establishment of a 'girls in sport toolkit' which better assists coaches in

supporting young girls who are at risk of drop-out. Findings within this thesis, specifically the importance of highlighting the psychological and social support engaging and retaining young girl's in community sports-based settings has been consistently documented as important for PA participation for girls. The research-informed G4G intervention and future iterations of G4G can contribute to these actions in supporting the establishment of the Sport Ireland 'girls in sport toolkit'.

- Another objective of the Women in Sports Policy is to invest in participation programmes which lead to sustained engagement in sport by women and girls, specifically to address transitions and dropout of PA and sport participation. Aligned with Action Area 6 of the NPAP (Sport and PA in the community), there is scope for the revised research-informed G4G programme, in conjunction with the LGFA, to be adopted for implementation at local sports partnerships (LSP) across the country. If LSPs adopted the programmes such as G4G as part of their Women in Sport initiative, then the programme could potentially be delivered to more clubs and schools with a wider range of participants across the country to improve PA and health behaviours as well as increase sport participation. This is important as G4G has impacted over 500 LGF clubs to date and its reach continues to grow.

8.5.3 Implications for practice

8.5.3.1 A mentor-based approach building role models within the G4G and LGF community

The findings underline the importance of the role of female role models and the necessity for organisations to build strong links between the G4G programme and the senior county players. The findings from this study contend that inviting established elite LGF players as part of the programme (week 8) to distribute G4G certificates of completion, pass down their skill-based knowledge, and share their playing experience could play a crucially important function in the improvement of 8 to 12-year-old girls psychological wellbeing and enjoyment of LGF. The possibility of including existing county LGF players as a fourth component to the G4G programme may prove successful in positively influencing young girls.

The current 20x20 campaign, presented by the Federation of Irish Sport and supported by Healthy Ireland is championed by Ireland's NGBs and LSPs, is calling on the people of Ireland and all those involved in Irish sport and PA to get behind female sport in a concerted effort to increase media coverage, boost attendances and ultimately, grow involvement in female sport and PA by 20% by the end of 2020. International strategies and research reports, which aim to improve female participation, acknowledge the importance of female role models as a significant factor (Lawler et al., 2020; Dunn, 2015). The G4G thesis findings complement the current 20x20 campaign by further emphasising the need to incorporate female role-model support structures within the existing school and community youth sports-based programmes in Ireland.

8.5.3.2 The school-community link – educating and empowering teachers and students

Findings from this thesis may inform further development of the existing LGFA TEACH Programme – a coaching course designed for Primary and Post Primary school teachers interested in coaching LGF, through their PE classes or school teams. The certified course aims to provide training and support to teachers, who impart valuable coaching services to many young female players. The suggestion from G4G participants within this thesis of providing 'taster' G4G sessions within the school environment prior to signing up for G4G may prove successful for future G4G participant recruitment strategies.

Additionally, findings from this thesis may inform the continued development of the existing Transition Year Active School (TY/AS) LGFA Programme available in secondary schools across Ireland TY/AS programme. Specifically, the G4G findings could enhance the TY students understanding of 8 to 12-year-old girls' motivators and barriers to sport participation as part of the 'Basics of Coaching' training day, as outlined in the TY/AS Curriculum. As the transfer for participants from school-based sport to community opportunities is imperative (Eime & Payne, 2009), there is potential for the TEACH and TY/AS programmes to link in with the research-informed G4G programme as a method of introducing young girls to taster' LGF sessions, ensuring the opportunities are tailored to their

needs/interests. Adopting a student-centred approach ensures that all youth receive a broad, accessible and inclusive programme of extra-curricular activities. The studies within this thesis, particularly Chapter 4 and Chapter 7 illustrate the importance of listening to the pre-adolescent voice, particularly when providing them with opportunities to be active. Stronger links between sports clubs and schools can aid the integration of schools into local community life and strengthen local social cohesion. Sports clubs, in turn, can acquire regular structured access to young people in schools and thus enhance their ability to recruit and develop new generations of players and club members (Fahey et al., 2005).

8.5.3.3 Enhancing LGFA coach education practices for increased PA levels, movement confidence, competence, and psychological wellbeing

The innovative G4G research-informed resources designed specifically as part of this thesis for the G4G intervention (Chapters 6 and 7), namely the electronic FMS and LGF coaching video clips, the Coaching Manual, and G4G Skill Chart can be shared with existing LGFA coaches, reaching hundreds of coaches and young LGF players around Ireland. The findings of this study highlight the need for consistent (weekly) non-formal CPD coach development support for the duration of the G4G programme. Coaches at the youth level should be encouraged to ground their practice around an athlete-centred model underpinned by elements of the SDT and SEM principles, with the aim of increasing 8 to 12-year-old girls LGF participation levels and psychological wellbeing through research-informed pedagogical coaching approaches. When applied, this approach to coaching is considered a powerful tool in empowering young athletes to learn and become intrinsically motivated, which, ultimately, results in enhanced performance, a thriving, supportive team environment, as well as the development of individual personal assets (Fraser-thomas et al., 2010). Such an approach over time may lead to the formation of a specific holistic LGFA policy as part of their vision for increasing player participation and coach educational development.

8.6 CONCLUDING THOUGHTS

The thesis aimed to design, develop, implement, and evaluate the efficacy of a targeted LGF community sports-based intervention, 'G4G', specifically designed to increase PA levels, FMS proficiency and psychological wellbeing of 8-12-year-old female Irish youth. The series of papers presented demonstrate that the integration of specific PA, FMS and psychological wellbeing pedagogical strategies, underpinned by theoretical frameworks, in a 10-week LGF community setting is effective and feasible. To address further gaps in the literature, the baseline studies (Chapter 4 and 5) conducted in three post-primary schools aimed to address current PA levels, movement skill-competencies and psychological correlates of PA among 8 to 12-year-old girls to further inform the design of the G4G intervention study. The qualitative synthesis (Chapter 5 and 7) highlighted young girls' perceptions of PA, specifically noting the potential motivators and barriers of girls' participation in PA and sport (Chapter 5), as well as the G4G intervention perceptions and acceptability (Chapter 7). The unique and original component of the G4G intervention has been the integration of PA, FMS and psychological wellbeing in a pedagogically sound manner, by using appropriate theory in intervention design, and incorporating the participant's voice in a community sports-based climate for 8- to 12-year-old female youth. The findings demonstrate that the 10-week specifically tailored, research-informed G4G intervention is a feasible and efficacious programme and had a positive effect on the physical and psychological wellbeing of 8 to 12-year-old Irish girls.

While small sample sizes limit the generalisability of the results, the results of all four studies of this thesis add significant contributions to the currently sparse evidence base relating to community sports-based interventions for young girls and provide justification for the integration of a theoretically sound multi-component PA promotion intervention this age-cohort within an OYS setting. To better understand the implications of these results, future research should aim to expand on the findings of this thesis using the recommendations for practice, strengthening the evidence base for theory-based PA interventions for 8 to 12-year-old girls. Additionally, the results of this review identify recommendations for future interventions at a local, a national and an international level. For example;

- At a local level, club coaches, teachers, and those involved in LGF session delivery (e.g., schools, local LGF clubs, and local activity providers) should include young people in designing interventions and facilities to ensure they are meeting the needs of this age group and providing the right opportunities for this age cohort of girls to be active. Findings from this thesis suggest the need to tailor PA, PE and sports programmes, specifically to increase self-efficacy and enjoyment of PA among girls (Butt et al., 2011; Dishman et al., 2005; James et al., 2018).
- At a national and international level, PA and sport participation initiatives, such as the G4G programme can help improve uptake, sustainability and overall success of future projects by considering the following;
    - Physical activities should be varied and fun meeting the needs of the age-group.
    - The role of the parent-guardian should be considered. Involving parents/guardians is a key ingredient for successful implementation.
    - The importance of coach education should be encouraged.
    - Individual, physical, and psychological characteristics should be accounted for, including specific FMS deliberate practice and outcomes such as self-concept, social behaviours, and self-efficacy.
    - Identify and promote positive role models. A variety of positive sporting role models can have a powerful effect on children's attitudes to PA.
    - Barriers should be identified early and a plan to overcome them developed.
    - Focus on fun and friendship; Informal, girls-only physical activity sessions, which focus on fun and enjoyment with friends, are very successful.

It was encouraging to observe that many of the conclusions in studies by Pearson et al. (2015) and Allison et al. (2017) are comparable to the future development of G4G. To move forward, there is a need for the provision of quality sport participation data to supply the evidence to inform well-structured programmes and policies to meet young girls' and community needs. This is not possible if sport participation remains hidden in the broader PA context, or if it is not investigated in

more detail (Allison et al., 2017). Examining the future efficacy of the G4G programme, as part of a larger trial would seem prudent in terms of gathering sustainable, longitudinal evidence.

In summary, the development of the revised G4G intervention has been insightful in terms of critically reviewing the literature around the area. The overall research process for designing, developing, implementing, and evaluating this exploratory study has undoubtedly been challenging, laborious, yet ultimately an enriching and rewarding learning experience. On a personal note, during the course of my 4-year PhD research study, despite the complex unpredictable nature of the research process, I have increased my intellectual freedom, self-development, and ability to think critically and creatively in intervention design and scientific evaluation for grass-root community sports-based initiatives. Whilst specialising in the field of PA promotion in Gaelic Games, specifically for female children, I am excited to continue working closely with local community groups (GAA, LGFA etc.), coaches, parents, teachers and children – I will strive to continue educating, empowering and making a difference to the lives of young girls.

'Children are not things to be moulded but are people to be unfolded'

Jess Lair

'Do not follow where the path may lead. Go instead where there is no path and leave a trail'

Ralph Waldo Emerson

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APPENDIX A:

ETHICAL APPROVAL LETTER

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Oifig an Leas - Uachtaráin Taighde
agus Nuálaíochta
Office of the Vice President
for Research and Innovation

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Wesley O'Brien & Orlagh Farmer
Sports Studies and Physical Education Department
School of Education
University College Cork

18th March 2016

Dear Wesley and Orlagh,

Thank you for submitting your research (project Log 2015-005 entitled 'The design, development, implementation and evaluation of the Gaelic4Girls intervention') to SREC for ethical perusal. I am pleased to say that we see no ethical impediment to your research as proposed and we are happy to grant approval.

We wish you every success in your research.

Your sincerely,

Mike Murphy,

Chair of Social Research Ethics Committee

APPENDIX B:

G4G INFORMATION SHEET AND CONSENT FORMS

Research Project Information – 'Gaelic4Girls' Study

Dear Parent/Guardian

My name is Orlagh Farmer, and I am a PhD student in the area of physical activity promotion for girls. I am also a member of the Cork Senior Ladies Football team and I am carrying out a study (by University College Cork) as part of the Gaeic4Girls programme in your child's **local GAA club**. The study aims to gather information on the physical activity levels of young girls in the club, their **attitudes, perspectives on physical activity/sport & skills** and implement **an intervention (Gaelic4Girls)** to help **improve** these levels, and then to assess whether or not activity levels have been improved. Please find overleaf an informed consent form for your child's participation in a **physical activity study** titled "*Gaelic4Girls intervention- **promotion of Physical Activity Participation in Female Youths"***.

In order for your child to participate in this study, please **read and sign the attached form** and **return** on the **first night of Gaelic4Girls on Monday 27th March** along with the signed registration form. Your child can still take part in the 12-week Gaelic4Girls programme without being involved in the study. If at any point throughout the study your child wishes to discontinue please inform the coaches/research team.

Thank you for your time.

Yours sincerely,

Wesley O'Brien

Orlagh Farmer

Dr. Wesley O'Brien. Ph.D.

Principal investigator

Project Title: "The design, development, implementation and evaluation of the Gaelic4Girls (G4G's) Intervention- Promotion of Physical Activity through a targeted LGFA-based intervention 'Gaelic4Girls".

Introduction to the study:

Physical activity has been shown to be extremely beneficial to youth, however in Ireland currently 81% of primary school children are not meeting the recommended minimum of 60 minutes moderate to vigorous physical activity (MVPA) every day. In order to develop effective physical activity programmes for your child's age group, it is important that researchers understand what influences children in Ireland to become and remain active.

This is what will happen during the research project study: Your child will

- Complete a ***physical activity questionnaire.*** This questionnaire will be filled out at the training session with the help of the coaches and Ms. Orlagh Farmer (PhD Candidate UCC).
- Have their height and weight measured.
- Be recorded using a video camera in the hall to measure how well they can –***Run, Jump, Kick, Bounce, Skip, Catch & Balance***
- Your child may be asked to wear a *small device (accelerometer)* around their waist to measure how much they move in a specific length of time (7 days).Each parent/guardian may receive a text message on their mobile phone each morning from the research team reminding their children to put on the accelerometer.
- Your child may be asked to take part in a *group discussion*. These discussions will take place in the club with Ms. Orlagh Farmer and either a coach or another adult.

*Involvement in the research is **completely voluntary**. Participants may choose to withdraw from the study at any time prior to PhD submission. This means they can withdraw before the study commences, even if participants agreed to participate; or discontinue after data collection has started. All information gathered will be treated in the **strictest of confidence.** To ensure this, your child's name will be removed from all data and replaced with an ID number. Only the researcher will know your child's ID number, and only the researchers will have access to the information.

Please read below and complete as appropriate.

----------✂----------

Child to be included in the study – Informed Consent Form

Are there any medical conditions or other relevant information e.g. behavioural problems, inhalers used, allergies? Please specify below.

Yes ☐ Please specify _____

No ☐

Signature: _____

APPENDIX C:

G4G QUESTIONNAIRE

Your RECENT physical activity

PHYSICAL ACTIVITY IS ANY BODY MOVEMENT

• Moderate Effort - makes your heart rate and breathing rate faster than normal. You may also sweat a little. Brisk walking and jogging are good examples.

• Vigorous Effort - makes your heart rate much faster and you have to breathe deeper and faster than normal. You will probably sweat. Playing football or tennis are good examples.

Examples: *Exercise Running, dancing, etc. Sports Basketball, football, athletics, swimming, etc. General Brisk walking, washing the car, walking or cycling to school, etc*.

* 1. **What is your name? (include surname)**

(*Remember your name will be changed to a code number for anonymity purposes)

* 2. **What is your date of birth?**
(e.g. 26/03/2017)

Day/Month/Year

DD/MM/YYYY

* 3. **What's the name of your school?**

* 4. What class are you in?

- 1st class
- 2nd class
- 3rd class
- 4th class
- 5th class
- 6th class

* 5. Do you have younger **or** older **sibling(s)** (i.e.brother/sister)

- Yes - older brother(s) or sister(s)
- Yes - younger brother(s) or sister(s)
- I have no brother or sister

Other (please specify)

* 6. **OVER THE PAST 7 DAYS... on** how many days were you **physically active** for a total of **at least 60 minutes (one hour)** per day?

*The total 60 minutes can be broken down into various stages within the day.

Please click on the correct number of days.

- **0 days**
- **1 day**
- **2 days**
- **3 days**
- **4 days**
- **5 days**
- **6 days**
- **7 days**

* 7. **Over a typical or usual week SCHOOL week** how many DAYS are you **physically active** for a total of at **least 60 minutes (one hour)** per day?

*The total 60 minutes can be broken into various stages within the day. Please click on the correct number of days.

- **0 days**
- **1 day**
- **2 days**
- **3 days**
- **4 days**
- **5 days**
- **6 days**
- **7 days**

PHYSICAL ACTIVITIES (not including PE Class)

8. Did you do the following **SPORTS ACTIVITIES in the PAST 7 DAYS?**
- Please write Yes or No for each of the sports
- If you selected yes please select the number of days and minutes roughly that you spent doing that sport/activity.

	YES / NO	No of DAYS in past 7 days (1-7)	MINUTES per day
Ladies Gaelic Football			
Camogie			
Gymnastics			
Dancing			
Soccer			
Basketball / Volleyball			
Rounder's / Cricket			
Hockey			
Rugby			
Martial Arts (e.g. Judo, Karate)			
Running or jogging			
Swimming lessons			
Swimming for fun			
Tennis / Badminton / squash / other racquet sports			
Golf			
Other sport			

Other (please specify)

9. How many times do you have **PE in school per week?**
Please tick **ONE** box only

- [ ] 0
- [ ] 1
- [ ] 2
- [ ] 3
- [ ] 4
- [ ] 5 times

10. **And on average, how long is each PE class?**(hours/minutes)

11. In this question we want to know about things you have done **IN THE LAST 7 DAYS** that **involve sitting down**

- Please tick Yes or No for the following activities that you have done in the **PAST 7 DAYS**
- If YES, on **how many days** did you do the activity?
- On average, how **many minutes** did you do this activity on the days that you did it?

SITTING DOWN ACTIVITIES

	YES / NO	NO OF DAYS IN LAST 7 DAYS (1-7)	MINUTES PER DAY
Using Computer / Internet / IPad/ Smartphone			
Sitting Playing Video Games (Play station)			
Homework, studying			
Reading (not for school)			
Art & Craft (pottery, drawing, painting etc.)			
Sitting during school breaks			
Sitting and talking to friends			
Listening to music			
Talking on the phone			
Television or DVD watching			
Playing a musical instrument			
Travel by car/bus to school			
Other			

Other (please specify)

12. How do you usually travel **to** school?

Please tick one box only - for the LONGEST distance of your usual journey **to school.**

- [ ] Walk
- [ ] Cycle
- [ ] Car
- [ ] Bus

13. How long does your journey **to school** usually take? (minutes)

14. **How do you usually travel home from school?**

- [ ] Walk
- [ ] Cycle
- [ ] Car
- [ ] Bus

15. How long does your journey **home from school** usually take? (minutes)

STATEMENTS about PHYSICAL ACTIVITY

Below are some statements about PHYSICAL ACTIVITY
Remember that physical activity means any activity that makes your heart beat faster and makes you get out of breath some of the time.

16. Physical Activity Enjoyment Scale

When I am active.....

	Disagree a lot	Disagree a little	Neither disagree nor agree	Agree a little	Agree a lot
1. I enjoy it.....	○	○	○	○	○
2. I feel bored.....	○	○	○	○	○
3. I dislike it.....	○	○	○	○	○
4. I feel as though I would rather be doing something else.....	○	○	○	○	○
5. It's no fun at all.....	○	○	○	○	○
6. It feels good.....	○	○	○	○	○
7. It makes me depressed (sad).....	○	○	○	○	○
8. My body feels good.....	○	○	○	○	○
9. It's very exciting.....	○	○	○	○	○
10. It gives me a strong feeling of success.....	○	○	○	○	○

* 17. Please tick **ONE** box for **each** statement to show how true it is for you.

	Very true	Quite true	Not very true	Not very true at all
I could do physical activity even if I was **tired**	○	○	○	○
I could do physical activity even if I had **other things I wanted to do**	○	○	○	○
I could do physical activity even if I had to **exercise on my own**	○	○	○	○
I could do physical activity even if I had **a bad day at school**	○	○	○	○
I could do physical activity even if I was **feeling lazy**	○	○	○	○
I could do physical activity even if I was **not very good at it**	○	○	○	○

18. Please tick **ONE box** for each sentence to show how true it is for you.

	No	Not sure	Yes
I could be physically active even if it is **very hot or cold outside**	○	○	○
I have the skills I need to be physically active	○	○	○
I can ask my best friend to be physically active with me	○	○	○
I can ask my parents / other adults to do physically active things with me	○	○	○
I can be physically active no matter how **busy** my day is	○	○	○

* 19. Below are some statements **how you see yourself physically**

*Please choose **ONE item per box for each sentence** to show how true it is for you (best describes you)*

	Very true	Quite true	Not very true	Not very true at all
I am **good enough** at sports				
I do **very well** at **all kinds** of sport				
I am **better** than **friends** at sport				
I like to **play** sports **rather than watch**				
I do **well** at any **new sport**				
I am **happy** with how I am and **what I can do physically**				
I feel **positive** about **myself physically**				
I feel **confident** about **myself physically**				
I like to **watch** sports **rather than play**				
I wish I could **feel better** about **myself physically**				

* 20. **Below are some reasons WHY people do physical activity.**

Please tick ONE box for each statement to show how true it is for you

Doing Physical Activity.....

	Very true	Sort of true	Not very true	Not very true at all
is fun				
Helps me make new friends				
Gives me more energy				
Teaches me about health and fitness				
Keeps me from gaining weight				
Makes me look better				
Helps me feel better about myself				
Makes me stronger				
Helps me be healthy				
Is good for my mental health				
Helps me cope with stress				

* 22. **ATTITUDES TO PHYSICAL ACTIVITY**

This question asks you how you **FEEL** about physical activity.

For each statement, please tick the most appropriate response.

	Agree in a BIG way	Agree	Disagree	Disagree in a BIG way
Doing physical activity every day would be **fun**	○	○	○	○
Doing physical activity every day would be **enjoyable**	○	○	○	○
Doing physical activity every day would be **good for me**	○	○	○	○
Doing physical activity every day would be **important for me**	○	○	○	○
My **family** wants me to do physical activity every day	○	○	○	○
My **friends** want me to do physical activity every day	○	○	○	○
My **teachers** want me to do physical activity every day	○	○	○	○
My **family** do physical activity every day	○	○	○	○
My **friends** do physical activity every day	○	○	○	○
My **teachers** do physical activity every day	○	○	○	○
I could do physical activity every day **if I really wanted to**	○	○	○	○
I have the time to do physical activity every day if I really wanted t	○	○	○	○
I live in a **place** which allows me to do physical activity every day if I wanted to	○	○	○	○
I **plan** to do physical activity every day	○	○	○	○

23. **During a TYPICAL week, how often:** Please tick ONE box only

	None	Once	Sometimes	Almost every day	Every day
1. Do you **encourage your friends** to do physical activities or play sports?	○	○	○	○	○
2. Do your friends **encourage you** to do physical activites or play sports with you?	○	○	○	○	○
3. Do your friends do physical activites or play sports **with you**?	○	○	○	○	○
4. Do other kids **tease you** for not being good at physical activity or sports?	○	○	○	○	○
5. Do friends **tell you** that you are doing well in physical activites or sports?	○	○	○	○	○

24. **During a TYPICAL week, how often has someone in your house/member of your family:**(e.g. father, mother, sister, grandparent, or other relative)

	None	Once	Sometimes	Almost every day	Every day
1. **Encouraged you** to do physical activites or play sports?	○	○	○	○	○
2. Done a physical activity or played sports **with you**?	○	○	○	○	○
3. **Provided transport** (e.g. a spin) to a place where you can do physical activities or play sports?	○	○	○	○	○
4. **Watched you** participate in physical activites?	○	○	○	○	○
5. **Told you** that you are doing well in physocal activites or sports?	○	○	○	○	○

* 25.

The scale below (0-10) to tell how confident you are to<u>correctly perform the following skills</u>:


0= Not at all confident


5= Somewhat confident


10= Very confident

How good can I.....

	1	2	3	4	5	6	7	8	9	10
Run in a straight line 	○	○	○	○	○	○	○	○	○	○
Skip in a straight line	○	○	○	○	○	○	○	○	○	○
Leap over a bean bag 	○	○	○	○	○	○	○	○	○	○
Gallop in a straight line	○	○	○	○	○	○	○	○	○	○

	1	2	3	4	5	6	7	8	9	10
Side shuffle (**slide**) in straight line 	○	○	○	○	○	○	○	○	○	○
Jump in the air for height from standing still 	○	○	○	○	○	○	○	○	○	○
Jump for distance from standing still 	○	○	○	○	○	○	○	○	○	○
Throw a tennis ball overarm 	○	○	○	○	○	○	○	○	○	○
Catch a tennis ball using two hands	○	○	○	○	○	○	○	○	○	○
Kick a ball placed in front of you on the ground	○	○	○	○	○	○	○	○	○	○
Strike a non-moving ball placed in front of you at hip height with a bat	○	○	○	○	○	○	○	○	○	○
Bounce a ball with your hand four times in a row while standing	○	○	○	○	○	○	○	○	○	○
Balance on one foot 	○	○	○	○	○	○	○	○	○	○
Hop three times with your right and left foot 	○	○	○	○	○	○	○	○	○	○
Roll a ball underarm	○	○	○	○	○	○	○	○	○	○

PREFERRED TYPES of physical activity

****Remember that physical activity means any activity that makes your heart beat faster and makes you get out of breath some of the time**

The questions on this pages
are about the types of physical activity that YOU WOULD LIKE TO DO.

26. **Would you like to do MORE team games if you could?**Examples: basketball, football, hockey,rounder's, rugby, volleyball

- ○ Yes
- ○ No

27. **WHAT is your FAVOURITE sport/physical activity ? (CHOOSE ONE)**

28. **WHERE would you like to do sport/team games? (Click on all that apply)**

- ☐ School
- ☐ Club (without school)
- ☐ Leisure Centre
- ☐ Home
- ☐ The outdoors
- ☐ Swimming pool

* 29. **WHEN would you like to do team games? (Click on all that apply)**

- [ ] Before school
- [ ] After school
- [ ] Break time
- [ ] During PE
- [ ] Evening
- [ ] Weekend

30. **Do you play Ladies Gaelic Football with a sports club or in school?**

- ( ) Yes
- ( ) No

31. **Would you like to play Ladies Gaelic Football with a sports team in your community?**

- ( ) Yes
- ( ) No
- ( ) I already play with a sports club

APPENDIX D: FUNDAMENTAL MOVEMENT SKILL PERFORMANCE CRITERIA

(TGMD, TGMD-2, GET SKILLED GET ACTIVE)

G4G FMS Skill Component Performance Criteria (7 Skills)

LOCOMOTOR SKILLS (X3)

Run [TGMD-2]

	Performance Criteria	Trial 1	Trial 2	Score
1.	Arms move in opposition to legs, elbows bent			
2.	Brief period where both feet are off the ground			
3.	Narrow foot placement landing on heel or toe (i.e., not flat footed)			
4.	Non-support leg bent approximately 90 degrees (i.e. close to the buttocks)			

Skip [TGMD]

	Performance Criteria	Trial 1	Trial 2	Score
1.	A rhythmical repetition of the step-hop on alternate feet			
2.	Foot of non-support leg carried near surface during the hop phase			
3.	Arms alternately moving in opposition to legs at about the waist level			

Vertical jump [TGMD]

	Performance Criteria	Trial 1	Trial 2	Score
1.	Eyes focused forward or upward throughout the jump			
2.	Crouch with knees bent. Arms behind the body			
3.	Forceful forward and upward swing of arms			
4.	Legs straighten in air			
5.	Land on balls of feet. Bend knees to absorb land			
6.	Controlled landing with < = 1 (no more than one) step in any direction			

OBJECT-CONTROL SKILLS (X3)

Catch [TGMD-2] Performance Criteria	**Trial 1**	**Trial 2**	**Score**
1. Preparation phase where hands are in front of the body and elbows are flexed			
2. Arms extend while reaching for the ball as it arrives			
3. Ball is caught by hands only (2 hands)			

Stationary dribble [TGMD-2] Performance Criteria	**Trial 1**	**Trial 2**	**Score**
1. Contacts ball with one hand at about the belt level			
2. Pushes ball with fingertips (not a slap)			
3. Ball contacts surface in front of or to the outside of foot on the preferred side			
4. Maintains control of ball for four consecutive bounces without having to move the feet to retrieve it.			

Kick [TGMD-2] Performance Criteria	**Trial 1**	**Trial 2**	**Score**
1. Rapid continuous approach to the ball			
2. An elongated stride or leap immediately prior to ball			
3. Non-kicking foot placed even with or slightly in back of the ball			
4. Kicks ball with instep of preferred foot (shoelaces) or toe			

STABILITY SKILL (X1)

Static Balance [GET SKILLED GET ACTIVE] Performance Criteria	**Trial 1**	**Trial 2**	**Score**
1. Support leg still, foot flat on the ground			
2. Non-support leg bent, not touching the support leg			
3. Head stable, eyes focused forward			
4. Trunk stable and upright			
5. No excessive arm movements			

APPENDIX E:

G4G DATA COLLECTION PROTOCOL MANUAL

Gaelic4Girls Data Collection

Protocol Manual

Part 1: Fundamental Movement Skills

G4G Skills: Kick, catch, run, skip, bounce, balance, and vertical jump

Instruments: TGMD-2, TGMD, Get Skilled Get Active

Equipment/resources:

Cameras/iPad, tripods, cones, duct tape, soft soccer football, tennis ball, basketball, folder with master excel sheet, participant code stickers/list, and highlighter.

It is important to note that participants perform the skill 3 times (1 trial run and 2 actual times).

Skill Component Performance Criteria

Run [TGMD-2]

(1) Arms move in opposition to legs, elbows bent

(2) Brief period where both feet are off the ground

(3) Narrow foot placement landing on heel or toe

(4) Non-support leg bent approximately 90 degrees

Skill	Materials	Directions	Performance Criteria
1. Run	60 feet of clear space, and two cones	Place two cones 50 feet apart. Make sure there is at least 8 to 10 feet of space beyond the second cone for a safe stopping distance. Tell the child to run as fast as he or she can from one cone to the other when you say "Go." Repeat a second trial.	1. Arms move in opposition to legs, elbows bent 2. Brief period where both feet are off the ground 3. Narrow foot placement landing on heel or toe (i.e., not flat footed) 4. Nonsupport leg bent approximately 90 degrees (i.e., close to buttocks)

Skill illustration

Script for Run: *Run as fast as you can and stop at this cone!*

Skip [TGMD]

(1) A rhythmical repetition of the step-hop on alternate feet

(2) Foot of non-support leg carried near surface during the hop phase

(3) Arms alternately moving in opposition to legs at about the waist level

Skill illustration

Script for Skip: *Watch me skip ("Step, hop, step, hop") in a straight line from cone A to cone B*

Vertical jump

(1) Eyes focused forward or upward throughout the jump

(2) Crouch with knees bent. Arms behind the body

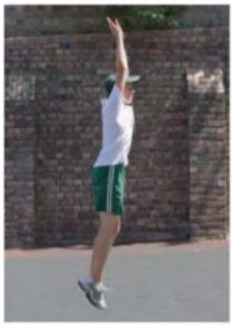
(3) Forceful forward and upward swing of arms

(4) Legs straighten in air

(5) Land on balls of feet. Bend knees to absorb land

(6) Controlled landing with no more than one step in any direction

Skill illustration


Script for Vertical Jump: *Watch me jump upwards as high as I can and land.*

Catch [TGMD-2]

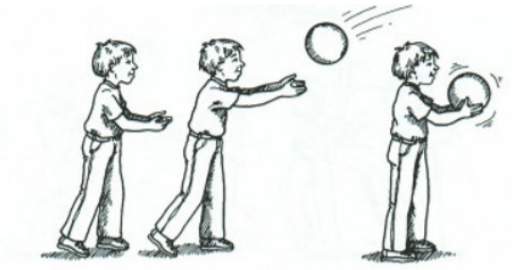
(1) Preparation phase where hands are in front of the body and elbows are flexed

(2) Arms extend while reaching for the ball as it arrives

(3) Ball is caught by hands only

Skill	Materials	Directions	Performance Criteria
3. Catch	A 4-inch plastic ball, 15 feet of clear space, and tape	Mark off two lines 15 feet apart. The child stands on one line and the tosser on the other. Toss the ball underhand directly to the child with a slight arc aiming for his or her chest. Tell the child to catch the ball with both hands. Only count those tosses that are between the child's shoulders and belt. Repeat a second trial.	1. Preparation phase where hands are in front of the body and elbows are flexed 2. Arms extend while reaching for the ball as it arrives 3. Ball is caught by hands only

Skill illustration



Script for Catch: *Watch me catch the ball. Then I am going to throw the ball to you, and you are going to catch it.*

Stationary dribble [TGMD-2]

(1) Contacts ball with one hand at about the belt level

(2) Pushes ball with fingertips (not a slap)

(3) Ball contacts surface in front of or to the outside of foot on the preferred side

(4) Maintains control of ball for four consecutive bounces without having to move the feet to retrieve it.

Skill	Materials	Directions	Performance Criteria
2. Stationary Dribble	An 8- to 10-inch playground ball for children ages 3 to 5; a basketball for children ages 6 to 10; and a flat, hard surface	Tell the child to dribble the ball four times without moving his or her feet, using one hand, and then stop by catching the ball. Repeat a second trial.	1. Contacts ball with one hand at about belt level 2. Pushes ball with fingertips (not a slap) 3. Ball contacts surface in front of or to the outside of foot on the preferred side 4. Maintains control of ball for four consecutive bounces without having to move the feet to retrieve it

Skill illustration

Script for Dribble: *Bounce the ball 4 times and catch!*

Kick [TGMD-2]

(1) Rapid continuous approach to the ball

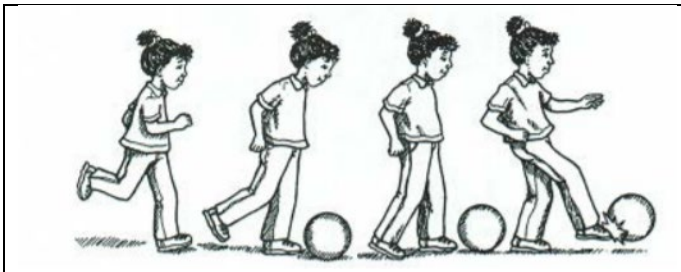
(2) An elongated stride or leap immediately prior to ball contact

(3) Non-kicking foot placed even with or slightly in back of the ball

(4) Kicks ball with instep of preferred foot (shoelaces) or toe

Skill	Materials	Directions	Performance Criteria
4. Kick	An 8- to 10-inch plastic, playground, or soccer ball; a beanbag; 30 feet of clear space; and tape	Mark off one line 30 feet away from a wall and another line 20 feet from the wall. Place the ball on top of the bean-bag on the line nearest the wall. Tell the child to stand on the other line. Tell the child to run up and kick the ball hard toward the wall. Repeat a second trial.	1. Rapid continuous approach to the ball 2. An elongated stride or leap immediately prior to ball contact 3. Nonkicking foot placed even with or slightly in back of the ball 4. Kicks ball with instep of preferred foot (shoe-laces) or toe

Skill illustration



Script for Kick: *Watch me run up and kick the ball!*

Static Balance

(1) Support leg still, foot flat on the ground.

(2) Non-support leg bent, not touching the support leg.

(3) Head stable, eyes focused forward.

(4) Trunk stable and upright.

(5) No excessive arm movements.

Skill illustration

Script for Balance: *Watch me balance on one foot for at least 4 seconds.*

Scoring Directions

The examiner enters a "1" for successful completion, or a "0 "for failed attempt, for each of the performance criterion listed for the skill. There are no partial marks. If the SP refuses to do any of the tests, the examiner should make a note "Did not Participate" on the sheet for that skill.

Part 2: Height and Weight (BMI) Protocol

Height:

Equipment:

- Standard collapsible portable stadiometer
- Data collection sheets

Set-up:

- Construct stadiometer following instructions.
- Place it on a level, flat, hard surface with the stabilising bar against a vertical surface such as a wall or door.

Instructions to participant:

1. Remove shoes.
2. If the hairstyle affects their height, ask them to adjust it for the test.
3. Stand with heels and toes together on the base plate.
4. Arms loosely by their side.
5. Back straight against the vertical measuring rods.
6. Look straight ahead.
7. Take a deep breath and stand as straight as possible without their heels lifting off the ground.

Note: These can be difficult instruction for children/youth to follow – make sure the head is not tilted or the shoulders raised, breath normally. Check posture before measuring (body is in a straight line - mid-axillary line parallel to stadiometer).

Record in metres to nearest 1/10th of a centimetre

Weight:

Equipment:

- Standard portable calibrated scales.

- Data collection sheets.

Set-up:

- Ensure scales are pre-calibrated with a known weight.
- Place scales on a hard, level surface.
- To promote confidentiality of screening results, and reduce anxiety, all students should be facing away from the scales.
- Students BMI screening results recorded are strictly confidential and should not be discussed with anyone.

Instructions to participant:

1. Wear only light garments.
2. Remove items such as money from pockets.
3. Remove shoes.
4. Stand on the scales, with both feet fully on the weighing platform, heels towards the back edge, and their arms loosely by their side.
5. Remain as still as possible with their head facing forward.
6. Step down from the scale.

Record in kilograms to nearest ½ gram

Height and weight will be used to calculate Body Mass Index (BMI)

BMI = Weight (kg) / Height (m^2)

Part 3: Questionnaire Protocol

PART A: Introduce selves

Hi guys, I'm ___ and this is __ and _. We're from UCC and we're completing a study with 8-12-year old girls to find out how active people your age are, why you like sport, what would stop you from playing etc.

We will be giving you a numbered sticker. Please wear this sticker for the duration of the testing.

PART B: Introduce questionnaire

1. The questionnaire will be introduced with the following instructions:

a. We have a questionnaire that we'd like you to complete on the computers/sheets. It takes around 45 minutes to do and is designed to gather information on sport and physical activity levels of 8-12-year old girls. Your responses are for research purposes only and will be treated in the strictest confidence.

b. If you are unsure about how to answer any questions please put your hand up and one of us (research assistants) will come to you. Do not ask the person next to you (as they may not know the answer). [All facilitators/research assistants will have name badges, so that the participants can call them for assistance if necessary]

c. While many of the questions may appear quite similar, there are subtle differences between them, and you should treat each one as a separate question.

d. The best approach is to answer each question fairly quickly and focus on each item separately.

e. It is important to answer ALL the questions.

f. Your answers are strictly confidential so try to answer all questions as honestly as you can. You will be assigned an ID code so it will be totally anonymous.

g. This is not a test; there is no pass/fail.

2. While the students are filling in the 1st page ask the teacher how far a kilometre is from the school to a local landmark (i.e., the local park, or shop).

3. If at any stage a student cannot continue filling in the questionnaire, as assent cannot be assumed. Please assign another task, the teacher may help with this.

PART C: Read out definition of physical activity

Before we start the questionnaire, I'm just going to read out this definition of physical activity so that everyone is clear:

'Physical activity is any body movement.

It can be done at different levels of effort:

Moderate Effort makes your heart rate and breathing rate faster than normal. You may also sweat a little. Brisk walking and jogging are good examples.

Vigorous Effort makes your heart rate much faster and you have to breath deeper and faster than normal. You will probably sweat. Playing football or tennis are good examples.

Physical activity includes:

Exercises - Weight training, aerobics, jogging, dancing, etc.

Sports - Hurling, football, athletics, swimming, etc.

General - Brisk walking, washing the car, walking or cycling to school, etc.

For some of the questions, you will be asked to add up all the time you spend in physical activity each day. **Only include activities of either MODERATE or VIGOROUS effort'**

PART D: Remainder of the questionnaire – explain question types

There are a few different types of question in the questionnaire

i. There are questions which ask you to select a box and others where you must click the circle depending on how much you agree or disagree/true of you or not.

ii. A few contain text boxes for you to type your own answer. There's a slight delay on the buttons so type slowly and wait a second between each letter.

iii. Some of the questions may ask you more personal information (e.g. your feelings, etc.).

4. After question 5, read out the definition of physical activity in the box on page 1. It is very important that the participants are clear on this definition.

5. Tell the students how far a kilometre is in relation to their school and a local landmark (questions 13 and 15).

6. Ask students to go to 'Statements about Physical Activity Section (do not fill out now):

a. When you are answering these questions you have to think about yourself and what applies to you.

b. Then you must decide, for each question, whether you agree a lot, sort of agree or disagree a lot with the physical activity statements.

c. Then you must decide whether you the statements are very true of you, quite true, or not very true at all and tick the one box that applies.

d. Then you must decide how often the statements relate to you (once, often, sometimes etc.) and tick the one box that applies.

e. Please tick only one box for each question.

7. Please go ahead and fill in the questionnaire. If you are unsure about any questions just put up your hand and we will come to you. And remember there is no right or wrong answers. When you are finished please raise your hand [and we will collect it off you].

8. Once a questionnaire is finished a researcher must check through it to make sure all questions have been answered and if not, get the student to fill it in unless they totally object to filling in a certain section (hardcopy).

9. If students refuse to take part in the study, take note of why and how many.

10. Ensure all questionnaires are collected and/or cleared from computers once finished.

Part 4: Focus Group Interview Protocol

Purpose

- The purpose of focus group discussions (FGDs) is to obtain information about a group's beliefs and attitudes on a particular issue or problem.
- FGDs differ from individual interviews in that the discussion allows for interaction among all the members of the group.
- FGDs differ from surveys in that they permit participants to give detailed opinions on a topic.

Description

- Five to eight G4G participants will take part in each of the FGDs ranging in age from 8-12-years from 1st – 6th class.
- The FGD will be led by the lead researcher. It is very useful to have another person (notetaker) present who takes notes but does not participate in the discussion.
- FGDs should be held in a location which provides as much privacy as possible and where participants are comfortable. A classroom or community hall can work well.
- Group should be set up so that all participants have eye contact with each other and can hear each other speak. Sitting in a circle - on chairs is usually best.

Ethical Considerations

- Every individual has the right to refuse to participate in a focus group, or to stop her participation at any time. The focus group facilitator/lead researcher must respect this right.
- It is important to conduct focus groups in a manner that is comfortable for all participants, so they are able to speak openly and honestly.
- No identifying information should be kept in the notes or final report.

Focus Group Discussion Guide

- The FGD facilitator uses a discussion guide which describes the topics to be covered.
- The discussion guide may contain examples of follow-up or probe questions for the facilitators.
- In a FGD, the facilitator covers all of the topic areas in the discussion guide, but does not necessarily follow a particular sequence. The discussion should flow as naturally as possible and some topics may be raised by group members. The facilitator should follow the lead of the group members, probing relevant topics they raise during the discussion.
- The discussion guide should be pre-tested with a group of participants similar to the ones you will be talking to later.

Characteristics of a Facilitator

- A child-friendly demeanour, including patience, warmth, humour, and flexibility, is an ideal characteristic of a moderator (Kennedy et al., 2001).
- Facilitator should speak the same language as the participants. For children, concrete questions phrased in simple language should be used throughout the focus group
- Particularly, younger children may have difficulty understanding excessively general or vague questions. Questions starting with "what" or "how" are preferred to questions starting with "why" or to questions requiring "yes" or "no" answers. Using prompts such as "What does everyone else think?" "Do others have different thoughts?" "Tell me more" or "How interesting" can improve the flow of a discussion, especially with shy individuals (Lund et al., 2016).
- Expressions such as "Great!" "Terrific!" or "Cool!" should be avoided because they may discourage the child from telling the parts of the story that are less cool.
- Facilitator should have the ability to respect the dignity and confidentiality of respondents.
- Facilitator should have good skills in listening in a non-judgmental and unbiased way.

HOW TO CONDUCT A FOCUS GROUP DISCUSSION (FGD)

- Greet the participants and thank them for their time.
- Introduce yourself (facilitator) and the note-taker.
- Communicate duration of the FGD (typically 40-50 minutes).
- Highlight ethical considerations.
- Cover all topic areas in the discussion guide (may not necessarily follow a particular sequence).
- Ensure participation of all present.
- Probe only when necessary and do not try to 'put words in people's mouth'.
- If you are recording the discussion, obtain permission from the participants first and make sure your equipment works (always carry a back-up device).

- Reporting - Immediately after each FGD, the facilitator and notetaker should meet to review the main themes of the discussion.
- FGD notes should be typed and made fair, removing all identifying information such as participants' names. Noting exact quotes is important as they can be powerful elements of the report.

APPENDIX F:

BASELINE STUDY FOCUS GROUP QUESTIONS AND DRAWINGS (CHAPTER 5)

G4Gs Focus Group Questions – Exploring student's perspectives on physical activity/sport

12/05/16

'Gaelic4Girls' Project

Protocol

- Each of the 6 focus groups (2 per school) is designed to last for 40/45 min max.
- **Lead facilitator** (Orlagh) will control the focus groups (FGs) discussing the questions with the participants.
- **Assistant facilitator** (3rd Year PE student) will listen to the discussion and take notes on each section (*Reflective Field Notes* on site). They will then provide a summary at the end of each section to ensure the correct information has been gathered by students and ask are there any further comments they would like to add.
- Each FG will be recorded with a Dictaphone AND an IPhone (to later revisit the data)
- 6 Students in total will be selected randomly from 4th 5th and 6th class.
- Focus Groups will take place in a separate classroom under supervision of a schoolteacher. Students will sit together in a circle with table and chairs.
- Lead facilitator will introduce FG and give a brief overview of the Research Project in a child friendly manner and will remind participants that it is safe environment and students should feel free and safe to say what they want to say. Lead facilitator will also remind students that there are no right or wrong answers, their names won't be identified, and they have the right to withdraw from the FG at any stage.

Section 1 – Health-Related Physical Activity

- Introductory Activity (Icebreaker) Students will be asked to draw a picture of what being healthy means to them? / 'Draw a picture of yourself at the weekends surrounded by all of your favourite physical activities and objects in this box'. (Provide colours/sheets)
- Create a ranked list of your favourite activities/sports that you play from 1-5

Q1. What do you think makes you healthy?

Q2. What do you think physical activity/exercise is?

Q3. Do you know how much physical activity per day you should be doing? Prompt: How many minutes

Q4. How do you think physical activity affects your health?

Explain what physical activity is/definition

Note-taker will summarise key words/themes/comments from this section & facilitator will ask do the group have further comments they would like to make?

Section 2 (Motivators/Barriers/Preferred Activities)

Q1. What are your favourite types of physical activity/sports?

Q2. What physical activities/sports do you take part in?

Q3. Where do you take part in these activities? Prompt: PE, after school club, local club (environmental)

Q5. What kind of things do you do when you play outside?

Q6. Who do you take part with?

Q7. When in the week do you do these activities Prompt: PE, after school, weekend Focus on Ladies Football is mentioned.

Q8. Why do you take part in physical activity/sport? Prompt: fun, fitness, make friends

Q9. Who or what helps you to take part in physical activity/sport? Prompt: family, friends, teachers, can afford it, facilities

Q10. Why don't you like taking part in physical activity/sport?

Q11. Is there anything stopping you from becoming more active than you already are? Prompt: lack of facilities, if you had more money, more support from others e.g. family, friends

Reinforce physical activity explanation here

Note-taker will summarise key words/themes/comments from this section & facilitator will ask do the group have further comments they would like to make?

Section 3 (Enhancers)

Q1. Is there anything that would help you to take part in more physical activity/sports?

Q2. Is there anything that would help you to enjoy physical activity/sport more?

Q.3 Do you think some people have more opportunities to play sports than other people? Why might that be the case?

Q.4 Do some people give up sports? Why, in your opinion does this happen?

Q.5 What do you think we could do to get more people playing sports?

Q.6 If you could play any sports in the world what would they be and why?

Note-taker will summarise key words/themes/comments from this section & facilitator will ask do the group have further comments they would like to make?

Section 4 (Ladies Gaelic Football)

Q1. What do you know about LGF?

Q2. Do you play LGF? (club/school)

Q3. Do you like playing it? What's your favourite part?

Q4. What don't you like about LGF?

Q5. What would encourage you to play LGF?

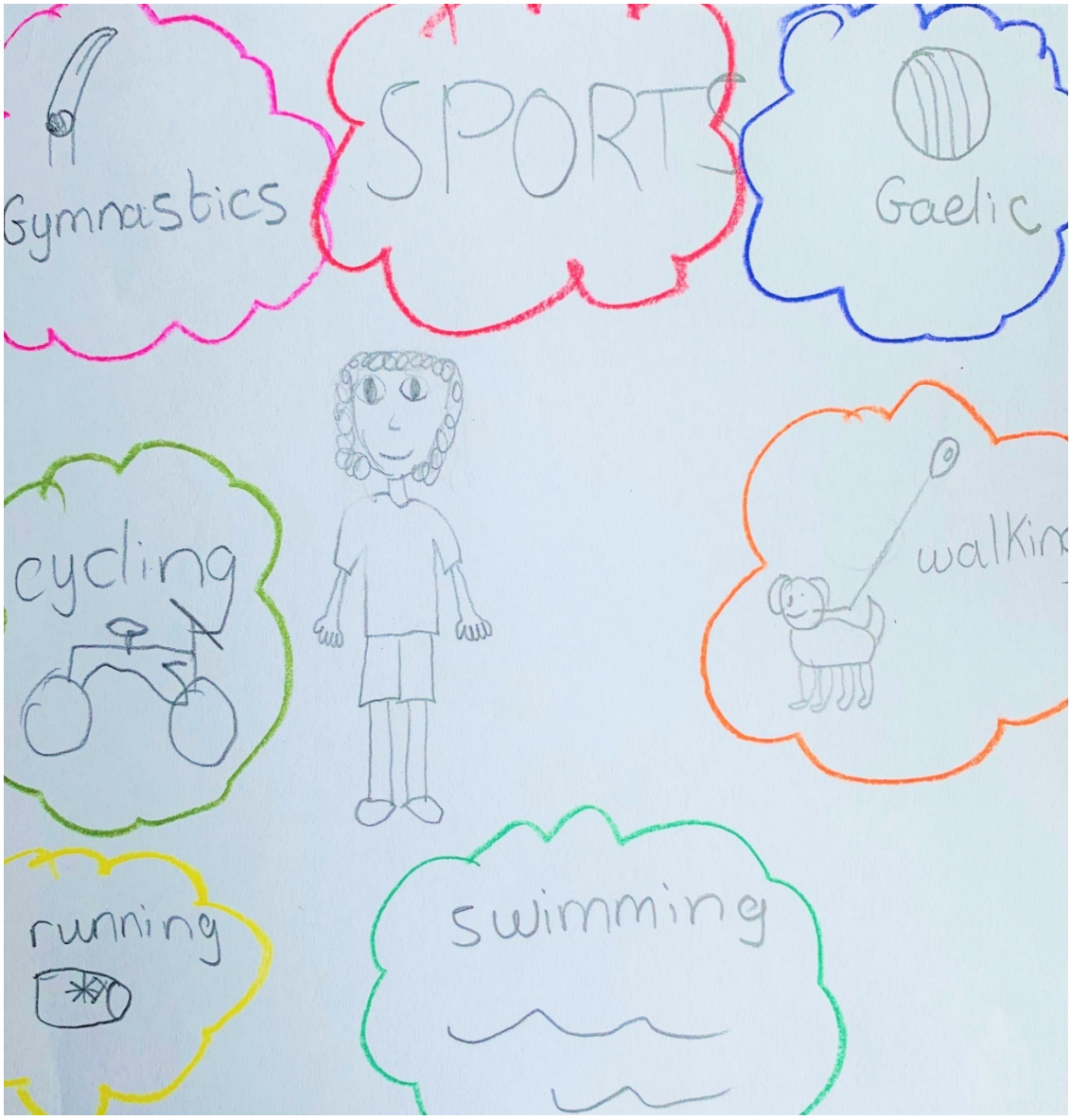
Q6. What would stop you from playing LGF?

Q7. What do you think we could do to get more girls playing LGF?

Note-taker will summarise key words/themes/comments from this section & facilitator will ask do the group have further comments they would like to make?

Focus Group Participant Drawings


Running
Golfing
Swimming
tennis
cycling
Gaelic Football
Soccer
hurling


Gymnastics
SPORTS
Gaelic
cycling
walkin
running
swimming

APPENDIX G:

G4G INTERVENTION STUDY FOCUS GROUP QUESTIONS AND DRAWINGS (CHAPTER 7)

Focus Group Questions – Exploring girl's perspectives on Gaelic4Girls Intervention 2018

20/06/18

SECTION 1

Engagement questions

(participants likes, dislikes & opinions on G4G programme)

Q1. You all took part in the 8-week Gaelic4Girls programme. What did you enjoy most about the programme? **What** was your favourite thing about the G4G programme? **Why** did you like this?

Q2. What didn't you enjoy about the G4G programme? **What/why** made you not to like these things?

Q3. Did you learn anything new during the 10-week programme? If so, what did you learn?

Q4. Did you find anything in the programme very challenging? If so, what did you find challenging? **(barriers/motivators)**

Q5. Is there anything you would change about the programme? If so, what and why? (length of programme etc.)

SECTION 2

Exploration Questions

(Impact of G4G programme on attitudes toward Health, PA, FMS, self-esteem)

Q1. Do you think that your health has been affected over the past 10 weeks by taking part in G4G? If so, in what way? (Prompts - Has it made you more active/fit?)

Q2. After taking part in the programme, what do you think about sport and ladies' football?

Q3. Do you think you are more confident at performing the ladies football skills now than before the programme? Why so? What do you think about the skill cards? Did they encourage you to practice skills at home? **(Competence, autonomy)**

Q4. If you took part in the ladies' football dance, what did you enjoy most about the dance? Do you feel that taking part in the dance has made you more confident about yourself and practising ladies football skills? **(Competence, autonomy, relatedness)**

Q.5 Do you want to continue playing ladies football after the G4G programme? Why? Do you think you will be playing ladies football this time next year with a club/school? Why do you think so**? (Autonomy/ PA, Sport motivators)**

SECTION 3

(PA/Sport barriers)

Q1. Is there anything stopping you from becoming more active than you already are? Prompt: lack of facilities, if you had more money, more support from others e.g. family, friends

Q2. Why do you think some girls might stop playing/drop-out of sports teams? (What would you say to somebody who is about to give up sport?

Q3. If your friends decided to stop playing ladies football, would you stop playing too? Explain your answer **(relatedness)**

SECTION 4

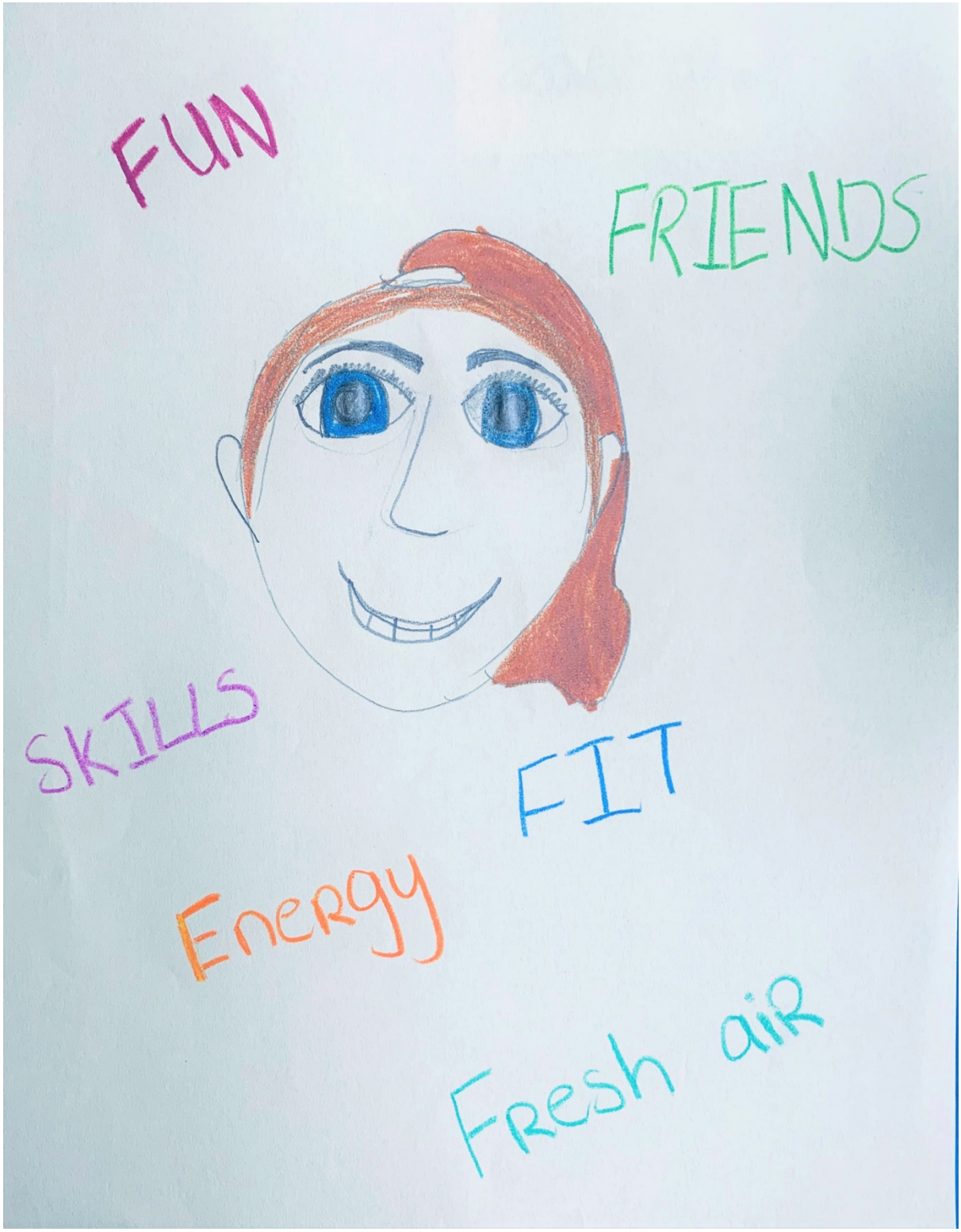
Exit Questions

(Possible improvements/future directions)

Q.1 Is there anything different that you would like to see in the Gaelic4Girls programme? Why would you like to see this in the programme?

Q2. What could we do to get more girls playing and enjoying ladies' football?

Focus Group Participant Drawings




Active
Friends
Fun!
Gaelic4Girls
Happy
Energy
Confidence

APPENDIX H:

EDITOR ACCEPTANCE NOTIFICATION OF PUBLISHED STUDIES

[Sports] Manuscript ID: sports-218877; doi:10.3390/sports5040074. Paper has been published.

Dear Authors,

28-Sep-2017

We are pleased to inform you that your article "The Relationship between Actual Fundamental Motor Skill Proficiency, Perceived Motor Skill Confidence and Competence, and Physical Activity in 8–12-Year-Old Irish Female Youth" has been published in Sports and is available online:

Abstract: http://www.mdpi.com/2075-4663/5/4/74/
PDF Version: http://www.mdpi.com/2075-4663/5/4/74/pdf
Manuscript: http://www.mdpi.com/2075-4663/5/4/74/manuscript (available to authors after login)

The issue release date for your article is 2017-12-22.

Thank you for choosing Sports to publish your work, we look forward to receiving further contributions from your research group in the future.

Kind regards,
Milica Laca
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--
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Article

The Relationship between Actual Fundamental Motor Skill Proficiency, Perceived Motor Skill Confidence and Competence, and Physical Activity in 8–12-Year-Old Irish Female Youth

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Received: 1 August 2017; Accepted: 21 September 2017; Published: 27 September 2017

Abstract: This study examines the relationship between actual fundamental motor skill (FMS) proficiency, perceived motor confidence and competence, and physical activity (PA) among female children (n= 160; mean age = 10.69 ± 1.40 years). The Test of Gross Motor Development-2nd Edition (TGMD-2) was used to assess seven FMSs (locomotor, object-control, and stability). Motor confidence and competence were assessed using a valid skill-specific scale, and a modified version of the Self-Perception Profile for Children. PA levels were assessed using self-report (PA Questionnaire for Older Children (PAQ-C)) and classified as low, moderate, and high active. One-way and two-way ANOVAs (post-hoc honest significant difference (HSD)) and correlation coefficients were used to analyse the data. Findings indicate that the majority of youth (71.8%) were not meeting the minimum 60 min of daily PA recommended for health, and that 98.1% did not achieve the FMS proficiency expected for their age. While there were high levels of perceived physical self-confidence (PSC) reported within FMS skill-specific tasks, there was no significant correlation observed between actual FMS proficiency and perceived PSC among the cohort. Results show that low, moderately, and highly active female participants differ significantly in terms of their overall FMS (p = 0.03) and locomotor (LOC) control scores (p = 0.03). Results from a two-way between-groups analysis of variance also revealed no statistically significant interaction effect between PA grouping and physical performance self-concept (PPSC) on overall FMS proficiency levels. Results of a multiple linear regression indicate that perceived PSC is a significant predictor (beta = 0.183) of participants' overall PA levels. Data show a need for targeting low levels of PA, and low FMS proficiency in female youth, and for developing interventions aiming to enhance perceived PSC levels.

Keywords: fundamental movement skills; perceived physical self-confidence; physical performance self-concept; physical activity; female youth

Women in Sport and Physical Activity Journal, 2018, 26, 111-123
https://doi.org/10.1123/wspaj.2017-0046

Human Kinetics
ARTICLE

Women in Sport and Physical Activity Journal - Decision on Manuscript ID WSPAJ.2017-0046.R3

12-Jul-2018

Dear Ms. Farmer:

It is a pleasure to accept your manuscript entitled "Enhancing the evidence-base for Irish female youth participation in physical activity – the development of the 'Gaelic for Girls' programme." in its current form for publication in the Women in Sport and Physical Activity Journal. Thank you for attending to all of the final comments and our editorial assistant, Christina Johnson, was able to convert your figures to .tif files.

Thank you for your fine contribution. On behalf of the Editors of the Women in Sport and Physical Activity Journal, we look forward to your continued contributions to the journal.

Sincerely,
Lori Gano-Overway

Editor, Women in Sport and Physical Activity Journal

lgano@bridgewater.edu

Women in Sport and Physical Activity Journal, 2018, 26, 111-123
https://doi.org/10.1123/wspaj.2017-0046

Human Kinetics
ARTICLE

Enhancing the Evidence Base for Irish Female Youth Participation in Physical Activity—The Development of the Gaelic4Girls Program

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Wesley O'Brien
University College Cork

The purpose of the current research was to gather baseline data on female youth to inform the development of a targeted physical activity (PA) and sports-based intervention, specifically identified as "Gaelic4Girls". Cross-sectional data on PA levels, psychological correlates of PA, anthropometric characteristics, and the fundamental movement skill (FMS) proficiency of female youth ($n = 331$; M age 10.92±1.22) were collected. A subsample ($n = 37$) participated in focus group (FG) interviews exploring perceptions of health/sport, and identifying barriers/motivators to participation. PA levels were assessed using self-report (PA Questionnaire for Older Children) and classified as low, moderate, and high active. One- and two-way ANOVAs (post hoc Tukey honest significant difference [HSD]) were used to analyze the data. The FGs were transcribed verbatim, coded, and thematically analyzed. Findings indicated that the majority of youth (71.8%) were not meeting the minimum daily PA recommendations for health, and that 98.1% did not achieve the FMS proficiency expected for their age. Low, moderately, and highly active participants differ significantly in terms of overall FMS ($p = .03$), and locomotor control scores ($p = .03$). FG findings report fun and friendship as key PA motivators, too much competitiveness as barriers, and positive outside encouragement from family/friends/coaches as facilitators encouraging PA engagement. Findings highlight the need for targeting low levels of PA, FMS proficiency in female youth sport interventions, through addressing self-efficacy levels, inclusive of fun, and socially-stimulating PA environments.

Keywords: fundamental movement skill, physical activity motivators and barriers, psychosocial physical activity correlates, sport participation

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Article

Gaelic4Girls—The Effectiveness of a 10-Week Multicomponent Community Sports-Based Physical Activity Intervention for 8 to 12-Year-Old Girls

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Abstract: Girls are less active than boys throughout childhood and adolescence, with limited research focusing on female community sports-based programs. This study aims to assess the effectiveness of a multi-component, community sports-based intervention for increasing girl's physical activity (PA) levels, fundamental movement skill (FMS) proficiency, and psychological wellbeing, as relative to a second treatment group (the traditionally delivered national comparative program), and a third control group. One hundred and twenty female-only participants (mean age = 10.75 ± 1.44 years), aged 8 to 12 years old from three Ladies Gaelic Football (LGF) community sports clubs (rural and suburban) were allocated to one of three conditions: (1) Intervention Group 1 (n = 43) received a novel, specifically tailored, research-informed Gaelic4Girls (G4G) intervention; (2) Intervention Group 2 (n = 44) used the traditionally delivered, national G4G program, as run by the Ladies Gaelic Football (LGF) Association of Ireland; and (3) Control Group 3 (n = 33) received no G4G intervention (group 1 or 2) conditions and were expected to carry out their usual LGF community sports activities. Primary outcome measurements (at both pre- and 10-week follow up) examining the effectiveness of the G4G intervention included (1) PA, (2) FMS and (3) Psychological correlates (enjoyment levels, self-efficacy, peer and parental support). Following a two (pre to post) by three (intervention group 1, intervention group 2, and control group 3) mixed-model ANOVA, it was highlighted that intervention group 1 significantly increased in PA (p = 0.003), FMS proficiency (p = 0.005) and several psychological correlates of PA ($p \leq 0.005$). The findings demonstrate that the 10-week, specifically tailored, research-informed G4G intervention is a feasible and efficacious program, leading to a positive effect on the physical and psychological wellbeing of pre-adolescent Irish girls, relative to the traditionally delivered national G4G comparative program and control group conditions.

Keywords: physical activity; fundamental movement skills; psychological correlates of physical activity; pre-adolescent girls; organized youth sport; multi-component intervention

APPENDIX I:

G4G COACHING MANUAL (WEEKLY SESSIONS (X3), WORKSHOP OVERVIEW, AND ELECTRONIC LGF/FMS VIDEO CLIPS)

REGISTRATION

- There are currently close to 70 girls registered for Gaeilc4Girls and should be expecting another 30+ girls on Thursday also.
- Registration will take place in small hall/dressing room?
  Table 1 → girls who have registered (signed the forms) already (List on Excel Sheet)
  Table 2 → girls who need to register
- Once kids come into hall mentors/coaches need to take the girls into dressing rooms and onto pitch ASAP.

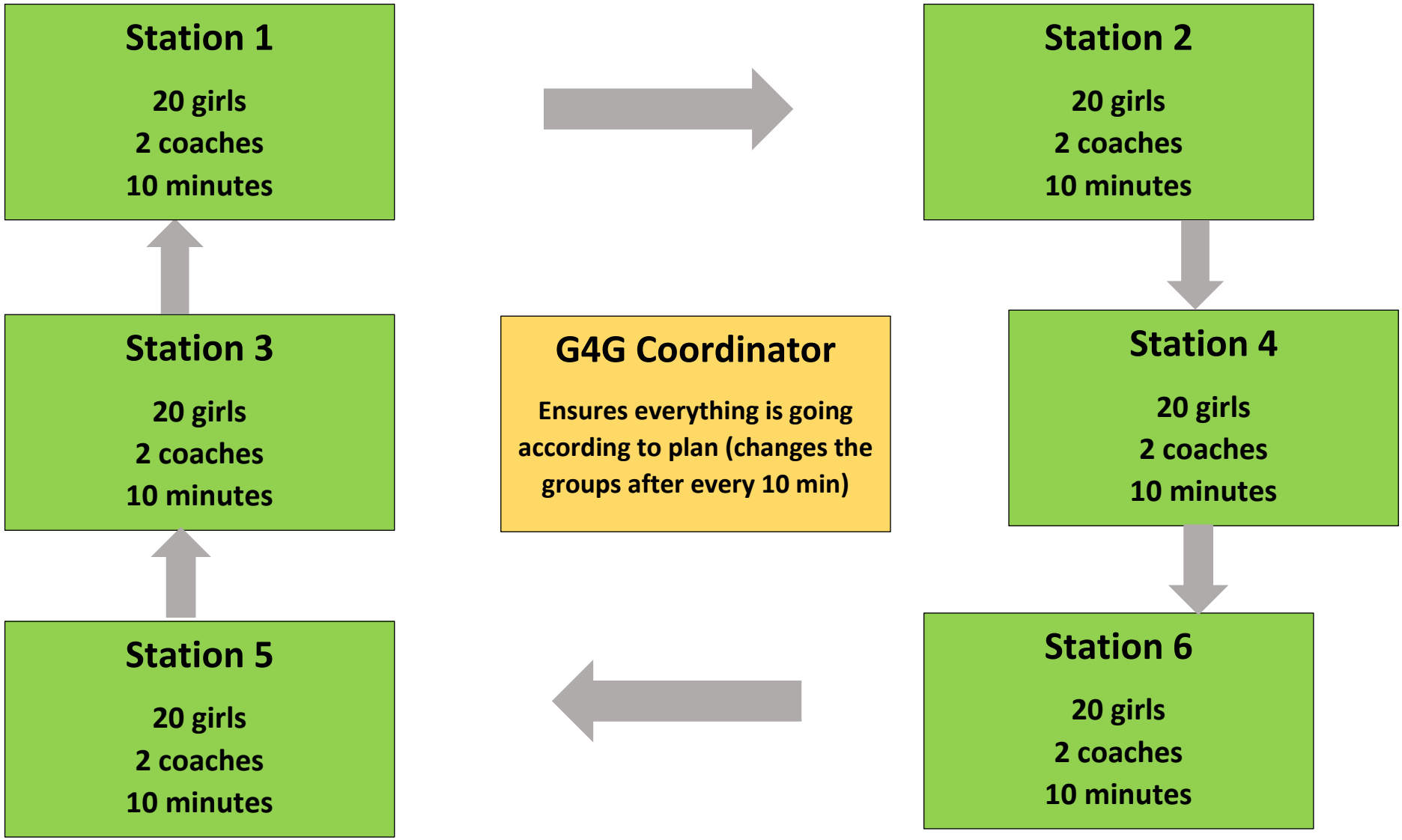
EQUIPMENT

- 6 station pitch layouts (see diagram below).
- Equipment will need to be set-up prior to 6pm (would advise for all coaches/mentors to be at pitch early (meet at 5.30pm if possible), particularly on first night to get the ball rolling.
- Equipment & coaches will stay at the same station → the kids will be moving from station to station.

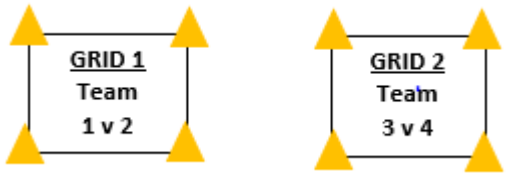
PITCH LAYOUT

- 1-2 pitches - 6 stations on each pitch (circa 15/16 per station)
- Centre area for G4G Coordinator
- Coaches/coordinator will need to sort girls into groups according to age on pitch
- Get all the 8-year olds to stand behind the blue cone, 9-year olds behind the red cone, 10-year olds (yellow cone) etc. easier to divide them into their groups.

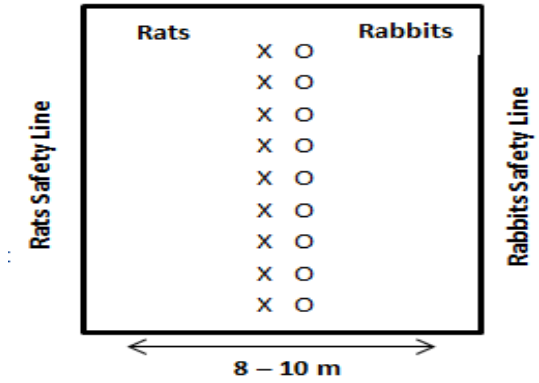
Gaelic4Girls Session PITCH LAYOUT



SESSION 1: GAELIC4GIRLS	SAAFE & SHAARP PRINCIPLES
WARM UP	
BIBS BULLDOG	
- Normal bulldog, except every player has a bib hanging from shorts. - The girls that are on (3/4) have to try and pull their bib when passing over to other side, if the taggers grab their bibs they are now on with the taggers. - Keep playing until 2/3 left with bib. *NOTE→ players are not allowed hold onto their bibs or tuck them in shorts. Also, non-contact game	• **ACTIVE/STRETCHING WHILE MOVING (heart-raiser game)** - Reduce time at the cone/line, less talk, blow whistle sooner • **HIGH REPETITION OF MOTOR SKILLS** (running, agility) • **FAIR**: Call if players run outside marked boundaries and/or cheating • **ENJOYABLE:** FUN & POSITIVE PRAISE
STATION 1 – HANDPASSING – 10 mins (balls, bibs, cones)	
PAIR PASSING	
• Right hand left hand (go through technique) get them moving up on their feet • Let them practice first and then go through technique – *2 hands, 1 hand follow through.* Get them to say it all together out loud – 2 hands one hand follow through – eyes on the ball) • Challenge/focus game – how many successful hand passes and catches can each pair get in a minute on both right/left hands?	• **ACTIVE:** Get them moving up on their feet • **DIFFERENTIATION:** '*can you beat your right/left hand score?*' • Mix teams by ability • **AUTONOMOUS** (keep own scores) • **FUN**

	• OBSERVE, DEMONSTRATE, FEEDBACK & POSITIVE PRAISE
POSSESSION HAND PASSING GAME	
• 2 grids – 4 teams (5 players max per team) – 2 teams per grid • Hand passing only (no bounce or solo – take 4 steps) • 3 passes to score – once you have passed run and touch any of the four cones and back into grid. 	• **ACTIVE/MAX PARTICIPATION:** Small-sided games – more ball contact • **DIFFERENTIATION:** Mix teams by ability • OBSERVE, DEMONSTRATE, FEEDBACK & POSITIVE PRAISE
STATION 2 – SOLOING – 10 mins (10 balls, cones)	
SOLO GRID	
• In pairs, solo around grid with your partner in same direction (hand pass to your partner after soloing). • On whistle change direction of run around grid. • On coaches call (‘cone’) players must run with the balls and touch any of the cones around the grid. • Divide the group into two teams & they run around grid in opposite directions (traffic – forces them to look up).	• **SMALL-SIDED GAME – SMALL GROUPS – MAXIMUM PARTICIPATION** • **SUPPORTIVE** (positive praise) • **DIFFERENTIATION** (mix groups by ability) • **REDUCING STATIC SOLOING** (moving around grid constantly)
SOLO TAG	

• Mark out a big grid • 2 teams (Red & Blue) • Team **Blue** start with a ball each soloing around the grid. • On whistle team **Red** run into the grid and try to get the ball off the blue team • If the blue team's ball is taken/stolen they must solo their ball around the outside grid until the game is over. • Switch teams and repeat (time the teams the next time around & see which team get all the balls off other team the quickest).	• **SMALL-SIDED GAME – SMALL GROUPS – MAXIMUM PARTICIPATION** • **SUPPORTIVE** (positive praise) • **DIFFERENTIATION** (mix groups by ability) • **REDUCING STATIC SOLOING** (moving around grid constantly)
STATION 3 – FMS FUN GAMES– 10 mins (10 balls, cones)	
RATS AND RABBITS	
• Put girls in pairs standing across from each other, facing each other • One line are rats, the other line are rabbits • Coach calls out commands (E.G. HIGH KNEES, TURN AROUND, TOUCH YOUR TOES, HIGH FIVE YOUR PARTNER, JUMPING JACKS, TOUCH KNEES ETC.) • If coach calls RATS – all the girls that are rats must turn and run to their rat's safety line without getting caught by their partner (Rabbit). • If a rabbit catches a rat 0 the rat, then joins the rabbit line and becomes a rabbit. • The line with most people in it wins	• **FUN/ENJOYABLE** • **ACITVE** (heart-raiser) • **SAFE** (space) • **REPITITION OF MOTOR SKILLS** • **POSITIVE PRAISE** • **KEY TEACHING POINTS**



SNATCH GAME

- Put girls in pair's facing each other with a cone between them on the ground – spread the pairs around to give them plenty of space.
- Coach calls out different commands (E.G. HIGH KNEES, TURN AROUND, TOUCH YOUR TOES, HIGH 5 YOUR PARTNER, JUMPING JACKS, TOUCH KNEES ETC.)
- On whistle girls must try snatch their cone before their partner gets hand on it.
- Whoever snatches the cone first gets *one point* – tell the girls to keep their own score (best out of 5). Repeat if you have time and get them to change partners!
- To note* - If pair grab the cone at the same time – they can award themselves a point each! They are only allowed to use their hands to grab the cone (no diving/feet in) and no hoovering over cone.

- **AUTONOMOUS** (keeping own score)
- **FUN/ENJOYABLE**
- **STRETCHING WHILE MOVING**
- **ACITVE** (heart-raiser)
- **SAFE** (space) and **FAIR** (abiding by rules)
- **REPETITION OF MOTOR SKILLS/KEY TEACHING POINTS**
- **POSITIVE PRAISE**

STATION 4 –TEAM CHALLENGES - 10 mins (cones)

‘THE HUMAN KNOT’

- Put girls into groups of 5/6 and get them to stand in their own circle.
- Each player must raise their right hand, reach across the circle and grab someone else’s hand.
- Next, have each player do the same with their left hand.
- Have the students untangle themselves without letting go of hands – they should end up in a circle.
- Players must not be holding the hands of the players next to them. Aim of the game is to communicate and help each other. Repeat & change groups up!

- **FAIR**
- **ENJOYABLE**
- **ACCESS THROUGH DIFFERENTIATION**
- **POSITIVE PRAISE**
- **SAFE**

‘COMMANDO’

Commando
(Balance, Coordination)

Split the class into two / three teams. The aim is to reach the opposite side of the hall first. Each team stands in a line at one side of the hall with their legs apart. The person at the back then crawls underneath all of the pairs of legs and then becomes the person at the front. Once they have reached the front of the line the child then has to shout next so the person at the back knows when to start. Slowly but surely the line starts to move forward! Tip: make the children stand really close together as it’s a little easier. The first team to the opposite end of the hall are the winners.

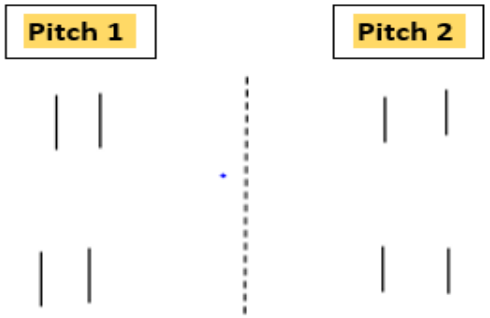
- **PROMOTING PA AND TEAMWORK**
- **ENJOYABLE**
- **STRETCHING WHILST MOVING**
- **FAIR**

STATION 5 – MODIFIED GAMES – 10 mins (balls, cones/poles & bibs)

MINI GAELIC FOOTBALL GAME

- 2 Mini Games (only 1 bounce and solo rule)
- Set up 2 mini pitches (cones/poles as goals and mark a side-line with cones)
- 4 teams of 5 max (depends on numbers) in each group (team A, B, C & D)
- 2 games play at same time (3 minutes)
- Team A V B and Team C V D
- After 3 minutes change teams so that each team gets to play each other
- Award extra points for block down or tackle **

- **MAXIMUM PARTICIPATION**
- **DIFFERENTIATION** (mix teams by ability)
- **FAIR** (enact rules)
- **ACTIVE**
- **POSTIVIE PRAISE**
- **KEY TEACHING POINTS**



STATION 6 –KICKING - 10 mins (balls, cones, hula hoops)

PAIR KICK PASSING

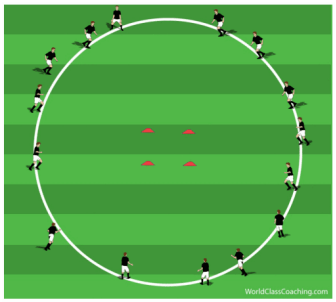
- Right foot left foot (go through technique) get them moving up on their feet
- Let them practice first and then go through technique – 2 hands, 1 hand follow through. Get them to say it all together out loud – 2 hands one hand follow through – eyes on the ball)
- Challenge/focus game – how many successful kick passes and catches can each pair get in a minute on both right/left feet (can you beat your right foot score with your left foot?)

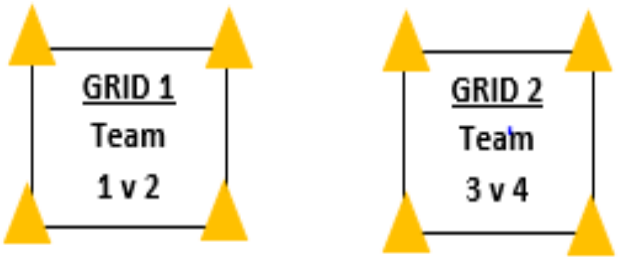
- **AUTONOMY**
- **MAXIMUM PARTICIPATION** (ball between two)
- **REDUCING STANDING AND SITTING** (promote players to move on feet in between passes)
- **DIFFERENTIATION** (change pairs after certain amount of kicks)

KICK PASS THROUGH HULA HOOP

- In groups of 5's – one girl holding hula hoop & 2 on either side of hula hoop
- Practice kick passing (chest height and below chest height) through the hula hoop to player on other side (in close to make it easy for them). Once the player kicks the ball through the hoop they run to other side of hoop.
- How many successful kicks can you get through the hula hoop as a team in one minute (without dropping the ball)

- **AUTONOMY**
- **MAXIMUM PARTICIPATION** (ball between two)
- **REDUCING STANDING AND SITTING** (promote players to move on feet in between passes)
- **DIFFERENTIATION** (change pairs after certain amount of kicks)
- **POSITIVE PRAISE**

SESSION 2: GAELIC4GIRLS	SAAFE & SHAARP PRINCIPLES
WARM UP	
DYNAMIC CIRCLE STRETCH	
• All players in circle around coach, players run in towards coach while doing dynamic movements stretches; • High knees/ Heel flicks • Side steps/ Running backwards • Turn and sprint outwards • Jumping/hopping on toes – on whistle sprint outwards • Add your own stretches and/or get the girls to choose some exercises 	• **ACTIVE/STRETCHING WHILE MOVING** • **HIGH REPETITION OF MOTOR SKILLS** (running, agility, FMS) • **AUTONOMOUS** (ask girls to choose the exercises) • **ENJOYABLE:** FUN & POSITIVE PRAISE
STATION 1 – HANDPASSING – 10 mins (balls, bibs, cones, hula hoops)	
PAIR HULA HOOP PASSING	

• Right hand left hand (go through technique) get them moving up on their feet • Let them practice first and then go through technique – *2 hands, 1 hand follow through.* Get them to say it all together out loud – 2 hands one hand follow through – eyes on the ball) • In groups of 5's (one girl holding hula hoop) • Challenge/focus game – how many successful hand passes and catches can each pair get in a minute on both right/left hands THROUGH THE HOOP?	• **ACTIVE:** Get them moving up on their feet • **DIFFERENTIATION:** '*can you beat your right/left hand score?*' • **FUN AND FAIR** • OBSERVE, DEMONSTRATE, FEEDBACK & POSITIVE PRAISE
POSSESSION HAND PASSING GAME	
• 2 grids – 4 teams (5 players max per team) – 2 teams per grid • Hand passing only (no bounce or solo – take 4 steps) • 3 passes to score – once you have passed run and touch any of the four cones and back into grid. 	• **ACTIVE:** Get them moving up on their feet • **DIFFERENTIATION:** '*can you beat your right hand score with your left hand?*' • Mix teams by ability • **FUN** • OBSERVE, DEMONSTRATE, FEEDBACK & POSITIVE PRAISE

STATION 2 – SOLOING – 10 mins (balls, cones)

SOLO GRID

- In pairs, solo around grid with your partner in same direction (hand pass to your partner after soloing).
- On whistle change direction of run around grid.
- On coaches call ('cone') players must run with the balls and touch any of the cones around the grid.
- Divide the group into two teams & they run around grid in opposite directions (traffic – forces them to look up).

- **SMALL-SIDED GAME – SMALL GROUPS – MAXIMUM PARTICIPATION**
- **SUPPORTIVE** (positive praise)
- **DIFFERENTIATION** (mix groups by ability)
- **REDUCING STATIC SOLOING** (moving around grid constantly)

SOLO TURN

- Set up as shown below
- Solo around player on opposite side and hand pass back to group (small groups)
- Max participation- 3 players on cone
- Challenge players (e.g. go for one min without dropping the ball/left hand only etc.)

- **MAXIMUM PARTICIPATION** (3 per cone)
- **SUPPORTIVE** (positive praise)
- **DIFFERENTIATION** (mix groups by ability)
- **ACTIVE**

STATION 3 – FMS FUN GAMES– 10 mins (cones, ladders, balls)

FMS CIRCUIT

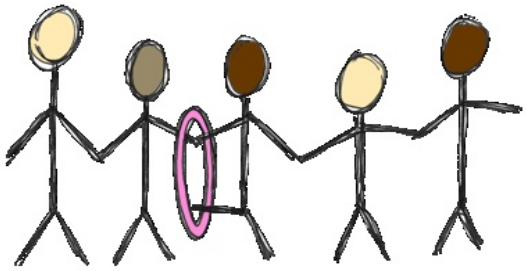
- Ladders, cones, hurdles, hula hoops, footballs)
- Place all of these around a grid and get players to practice;
  - Running through the ladders
  - Jumping over the hurdles
  - Throwing football up in air and catching it
  - Hopping on right leg at red cones
  - Hopping on left leg at green cones
  - Get girls to come up with their own exercise/circuit

- **FUN/ENJOYABLE**
- ACITVE (heart-raiser)
- **SAFE** (space)
- **REPITITION OF MOTOR SKILLS**
- **POSITIVE PRAISE**
- **KEY TEACHING POINTS**
- **AUTONOMY** (ask girls to come up with their own exercises)

STATION 4 –TEAM CHALLENGES - 10 mins (cones, hula hoops)

‘HULA HOOP CHALLENGE’

- 5 girls in circle holding hands
- Aim of game is to try and get the hula hoop around circle without breaking hands (the link) → stress to them that the team that works and communicates the best with each other will succeed – try and take focus off winning and promote teamwork
- Can then get half the group to face the other half and have race from one end to top of line to get hula hoop up without breaking chain of hands



- **FAIR**
- **ENJOYABLE**
- **ACCESS THROUGH DIFFERENTIATION**
- **POSITIVE PRAISE**
- **SAFE**
- **PSYCHOSOCIAL** (communication, teamwork, get the girls to come up with their own conclusions)

BALL BALANCE

- In group of 5 place footballs between each player (see photo below) and walk towards cones marked
- If ball drops all players have to go back to the start and start again
- Stress TEAMWORK & COMMUNICATION – if person at front goes too fast or person at back goes too slow the ball will drop.

- **PROMOTING TEAMWORK**
- **ENJOYABLE**
- **STRETCHING WHILST MOVING**
- **FAIR**
- **AUTONOMOUS**

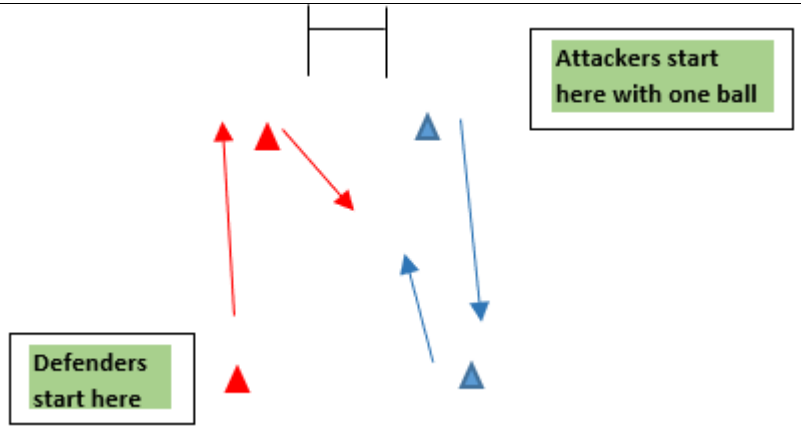
- Eliminate element of competition by saying 'the team that works the best together and talks and supports each other will get to the other side without dropping the ball – just like in a match you have to work together.

STATION 5 – MODIFIED GAMES – 10 mins (balls, cones/poles & bibs)

3V3 BACKS AND FORWARDS GAME

- 3 attackers on blue starting next to goal line
- 3 defenders on red as shown in diagram
- On coaches whistle 3 attackers with one ball run around blue cone and try to score a goal (1 point if score)
- AT THE SAME TIME… 3 defenders run around their red cone and come out to meet the attackers and defend them
- 1 point if tackle successfully and run back out past red cone with ball
- Set up two games

- **MAXIMUM PARTICIPATION**
- **DIFFERENTIATION** (mix teams by ability)
- **FAIR** (enact rules)
- **ACTIVE**
- **POSTIVIE PRAISE**
- **KEY TEACHING POINTS**

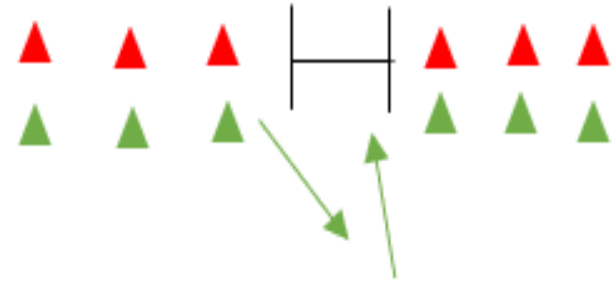


STATION 6 – ATTACKING/DEFENDING/SHOOTING - 10 mins (balls, cones, hula hoops)

THE NUMBERS GAME

- In pairs defenders stand behind pair on red cones
- Attackers stand in front on green cone
- On coaches whistle 3 attackers with one ball run around blue cone and try to score a goal (1 point if score)
- AT THE SAME TIME… 3 defenders run around their red cone and come out to meet the attackers and defend them (1 point if tackle successfully and run back out past red cone with ball)

- **MAXIMUM PARTICIPATION/ REDUCING STANDING AND SITTING** (several numbers called at once)
- **DIFFERENTIATION** (change pairs after certain amount of calls – players get a chance to be both attackers and defenders)

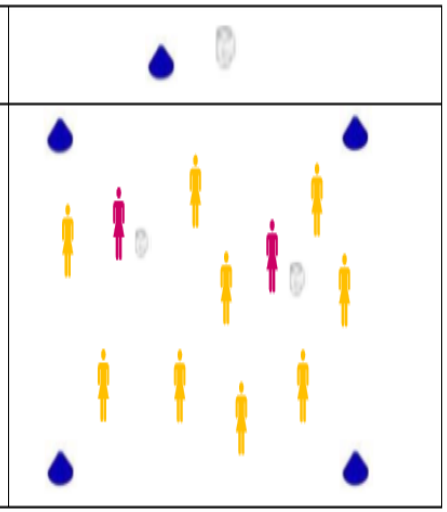
	• **CONSTRUCTIVE FEEDBACK, TEACHING POINTS, POSITIVE PRAISE**

SESSION 3: GAELIC4GIRLS

SAAFE & SHAARP PRINCIPLES

WARM UP

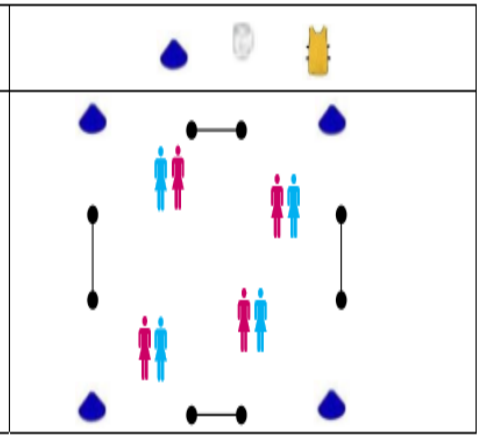
STUCK IN THE MUD

7. Stuck in The Mud  Reactions	
• All players in grid and two players with football • Players with ball solo around grid and fist pass to hit players below the knee • If player caught with ball they must freeze and stand with legs apart • Player can only be freed when another girl crawls through legs • Change catchers after few minutes	

- **ACTIVE/STRETCHING WHILE MOVING**
- **HIGH REPETITION OF MOTOR SKILLS** (running, agility, FMS, soloing, balance)
- **AUTONOMOUS** (ask girls to choose the exercises)
- **ENJOYABLE:** FUN & POSITIVE PRAISE
- **FAIR & SAFE** (enact rules)

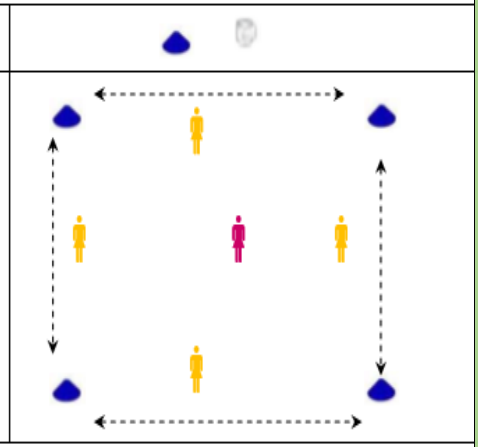
STATION 1 – HANDPASSING – 10 mins (cones, balls, bibs)

CATCHING GAME CAPTAIN BALL

16. **Catching Game Captain Ball** ★★ Hand pass, Tackle	
• Divide players into two teams. Mark out four goal areas as shown • Two players from each team act as goal keepers on opposite sides of grid • Object of game is for team in possession to hand pass ball to their goalkeeper • After each point, goal keeper must pass the ball to the opposition to restart • Alternate goal keepers	

- **ACTIVE:** heart-raiser
- **DIFFERENTIATION:** mix teams by ability
- **FUN AND FAIR**
- **HIGH REPETITION OF MOTOR SKILLS**
- OBSERVE, DEMONSTRATE, FEEDBACK & POSITIVE PRAISE

PIGGY IN THE MIDDLE PASSING GAME

1. **Piggy In the Middle** ★★ Fist Pass	
• Mark out a grid 5m x 5m using cones • Position one player along each length of the grid • Position the fifth player in the middle of the grid • The outside players must move along the lengths of the grid fist passing the ball to each other to retain possession • The middle player attempts to intercept the ball • If the ball is dropped or intercepted, the outside player responsible moves to take up position as the 'piggy in the middle'	

- **ACTIVE:** Get them moving up on their feet
- **DIFFERENTIATION:** mix teams by ability
- **FUN**
- OBSERVE, DEMONSTRATE, FEEDBACK & POSITIVE PRAISE

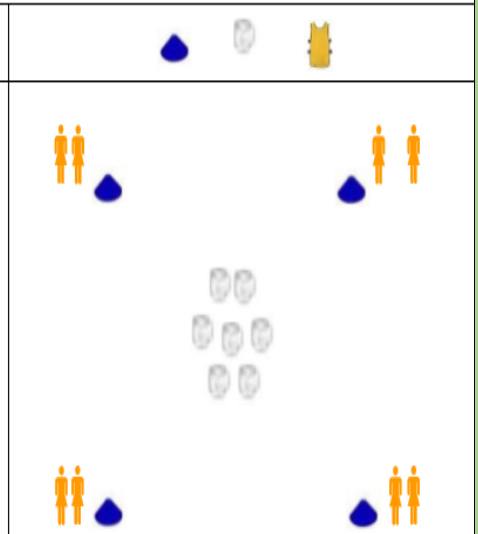
STATION 2 – SOLOING – 10 mins (balls, cones)

ROB THE NEST

3. Rob the Nest

Solo

- Split players into 4 teams at four corners
- On whistle first player runs to middle and collects a ball and solos back to group (can only take one ball at a time)
- Next player in team then runs and repeats collecting another ball
- When area in middle is empty players must rob a ball from one of the other teams
- Players cannot tackle each other
- Team must most footballs at their corner at end are the winners
- Repeat a few times



- **MAXIMUM PARTICIPATION**
- **SUPPORTIVE** (positive praise)
- **DIFFERENTIATION** (mix groups by ability)
- **REDUCING STATIC SOLOING** (moving around stealing from other players)

STATION 3 – FMS FUN GAMES– 10 mins (cones, hula hoops)

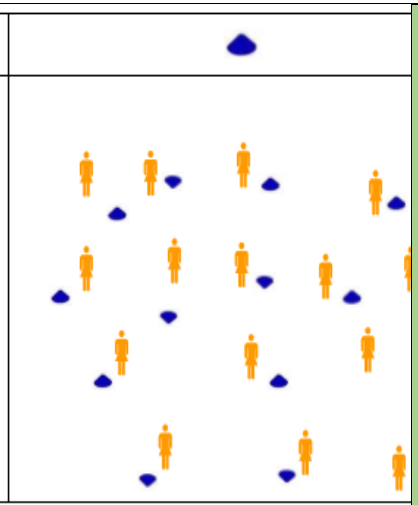
SHARK ATTACK GAME

Shark Attack
(Running, Coordination)

One catcher is a shark, the rest are swimmers. Spread a number of hoops around the hall, which are islands. The children jog (swim / surf / water ski) around the hall, and around the hoops. The shark swims around also, with their hands on their head, in the shape of a fin. When the coach shouts 'Shark Attack!' the swimmers must get onto an island before begin caught by the shark. If any swimmers are caught they then become a shark. You can also limit the number of people to an island as an added challenge, and you can pick up the islands, and then throw then down after you yell 'shark attack' so pupils don't congregate round hoops.

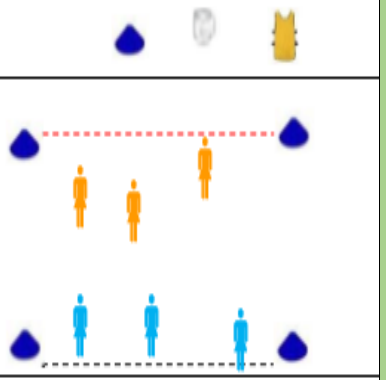
- **FUN/ENJOYABLE**
- ACITVE (heart-raiser)
- **SAFE** (space)
- **REPITITION OF MOTOR SKILLS**
- **POSITIVE PRAISE**
- **KEY TEACHING POINTS**

STATION 4 –TEAM CHALLENGES - 10 mins (cones)	
DRAGON'S TAIL	
Dragons' Tails (Running, Coordination)  In groups of 3 children stand in a line, one behind the other, with their arms on the person in front's shoulders. The person at the front will be catcher, and the person at the end is the tail. The tail of the dragon places a bib in the shorts or tee shirt to create a tail. In their threes the front two can try and steal the person at the backs tail. Alternatively the team of 3 can work together to steal other dragon's tails (other teams) whilst protecting their own tail. This game highlights the importance of team work!	• **ENJOYABLE** • **SAFE** • **PSYCHOSOCIAL** (communication, teamwork)
DOMES AND DISHES	
	• **PROMOTING TEAMWORK** • **ENJOYABLE** • **STRETCHING WHILST MOVING** • **FAIR** • **AUTONOMOUS**

3. Domes and Dishes	
• Give each member a cone. • Half group set marker on ground normally – these people are the 'saucers'. Other half put upside down marker in a space – these people are the cups • On whistle players run into grid and 'saucers' must try and put all markers normal way, while cups try and overturn markers • Have a time limit (e.g. 1 min)	

STATION 5 – MODIFIED GAMES – 10 mins (rugby balls, cones/poles & bibs)

GAELIC RUGBY

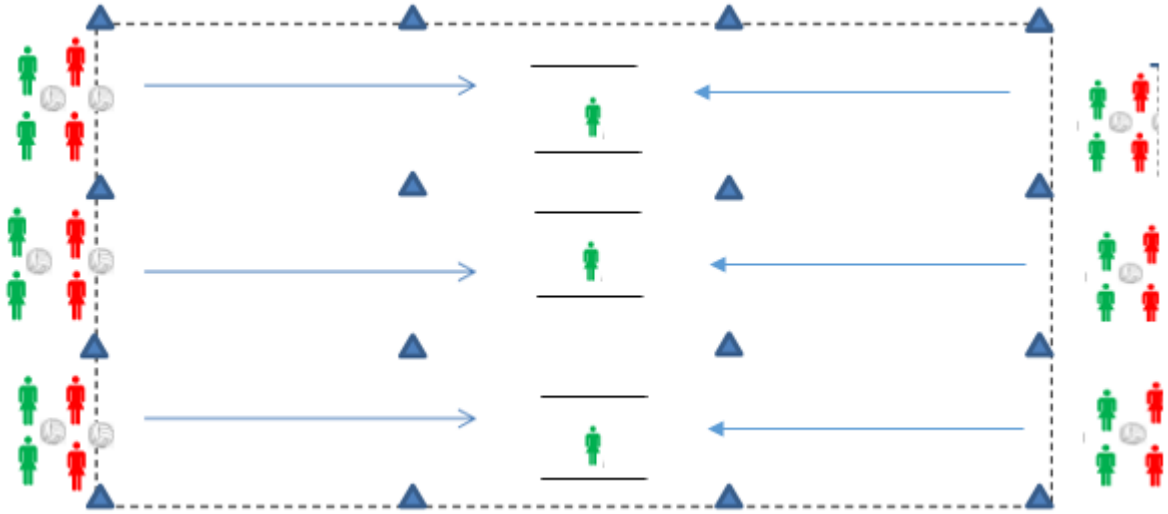
10. Gaelic Rugby	Handpass, Kicking	
• Rule No.1 – no rugby tackles • The aim of the game is to work the ball over the oppositions line within the rules of Ladies Gaelic football • You can vary number of passes teams have to get before crossing line etc.		

- **MAXIMUM PARTICIPATION**
- **DIFFERENTIATION** (mix teams by ability)
- **FAIR** (enact rules)
- **ACTIVE**
- **POSTIVIE PRAISE**
- **KEY TEACHING POINTS**

STATION 6 – TACKLING - 10 mins (balls, cones, balls)

CHANNEL TACKLING

- Set up like diagram with one player in the middle at poles
- Players at either side have to try get through the poles by soloing and bouncing ball. Player in the middel tries to tackle and dispossess ball.
- Change player n the middle after 4 tackles.
- EMPHASISE the near hand tackle and tackling stance (not flat footed and square) → up on toes and ready to turn right or left.



- **MAXIMUM PARTICIPATION/ REDUCING STANDING AND SITTING**
- **DIFFERENTIATION** (change pairs after certain amount of calls – players get a chance to be both attackers and defenders)
- **CONSTRUCTIVE FEEDBACK, TEACHING POINTS, POSITIVE PRAISE**

GAELIC4GIRLS COACH REFLECTIVE JOURNAL

SESSION 1	DATE:
1. **What worked well?** (content/delivery/girl's reactions/structure etc.)	
2. **What didn't work well?**	
3. **What could be improved for next week's session?** (organisational/content/structure etc.?)	
4. **Rate your own coaching performance out of 10** *(0 = not confident, 10 being very confident/efficient) – circle the number most relevant)*	**1 2 3 4 5 6 7 8 9 10**
5. **Any other comments or thoughts?** *Staged and deferred reflective practice (Huntley et al., 2014)*	

GAELIC4GIRLS WEEKLY COACH WORKSHOP FORMAT

1. **WELCOME (5 mins)**

2. **REFLECTIVE PRACTICE (20 mins)**

Discuss 'previous' Gaelic4Girls session (share thoughts as a group)

What went well? What didn't go well? How can we improve? What can we change?

COACH INSIGHT AND INPUT

3. **SESSION CONTENT EXPLANATION & DEMONSTRATION (30 mins)** ***equipment/electronic videos etc.***

4. **Q&A with COACHES, COORDINATOR and LEAD RESEARCHER (5 mins)** ***any other questions/comments.***

SAMPLE G4G ELECTRONIC COACHING CLIPS

(FMS AND LADIES FOOTBALL GAMES)

WATCH NOW

WATCH NOW

WATCH NOW

WATCH NOW

WATCH NOW

WATCH NOW

WATCH NOW

WATCH NOW

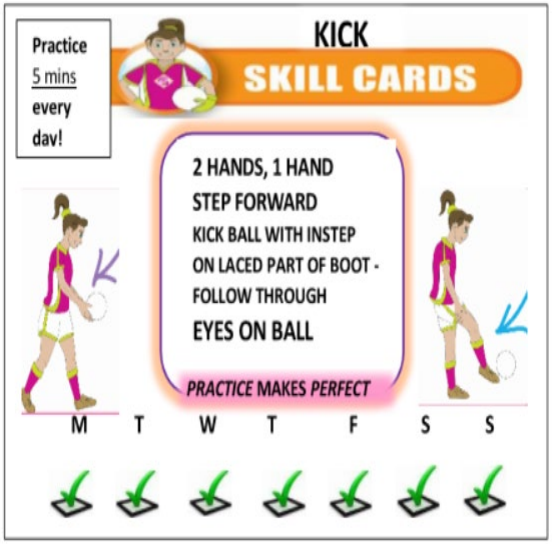
WATCH NOW

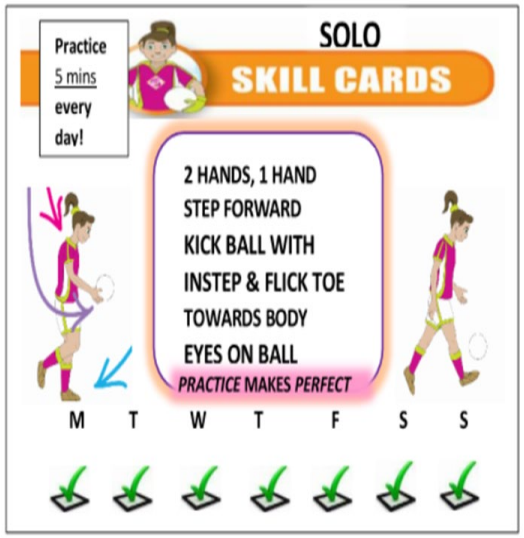
WATCH NOW

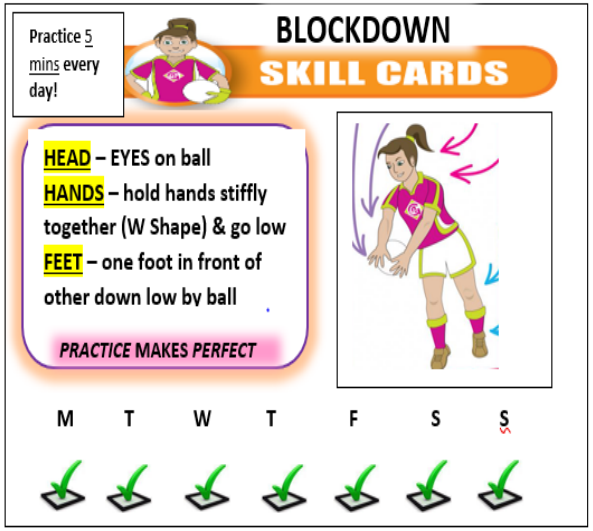
APPENDIX J:

G4G SKILL CARDS, POSTER AND CERTIFICATE

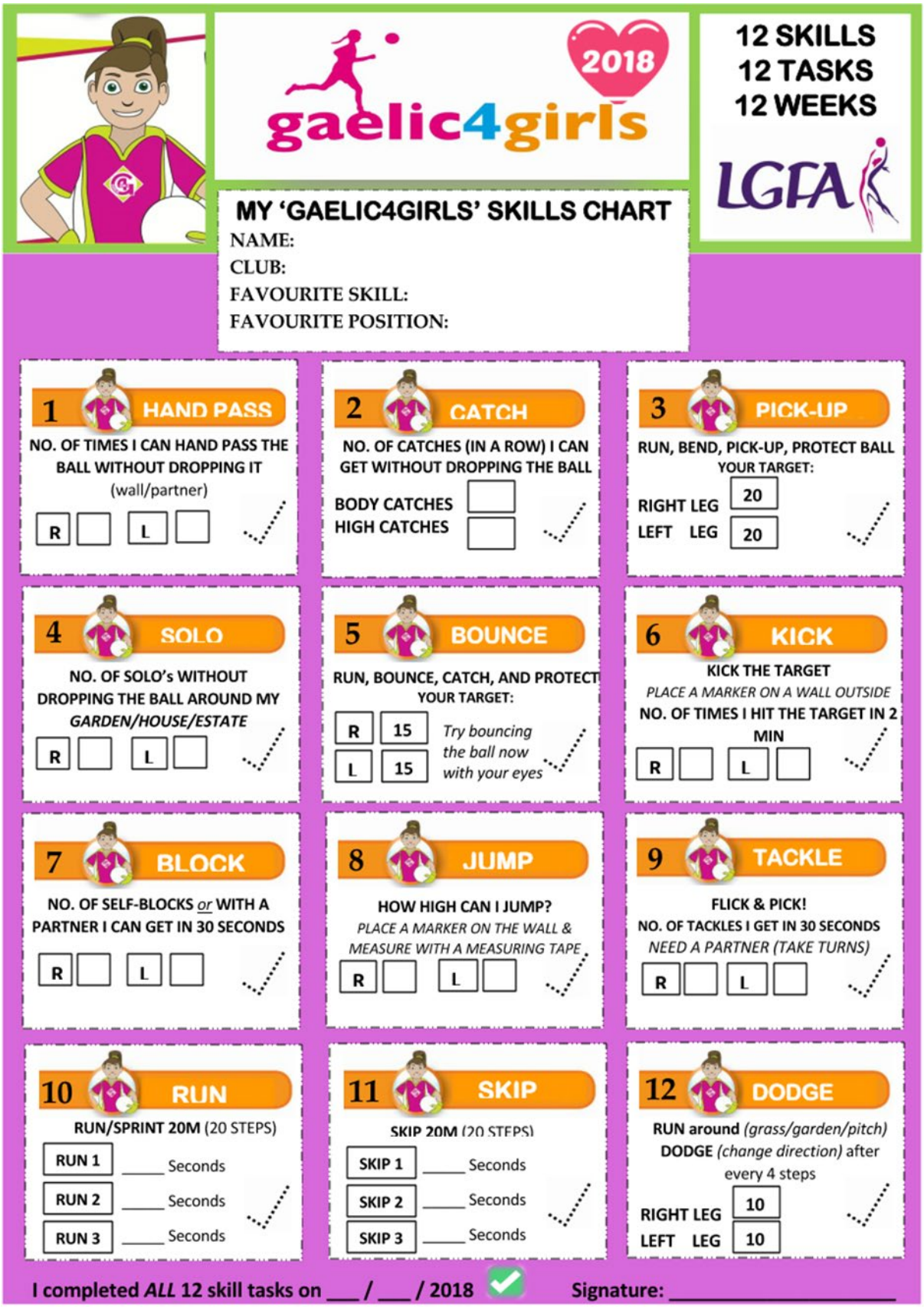
G4G Weekly Skill Cards







G4G Skill Poster/Chart



G4G Certificate of Completion (Week 8)

APPENDIX K: G4G PARENTS EVENING CONTENT AND PRESENTATION EVENING FLYER

G4G Parents Evening Slide Content

gaelic4girls

LGFA LADIES GAELIC FOOTBALL gaelic4girls UCC Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland

Gaelic4Girls

Parents Evening

Ms. Orlagh Farmer, PhD Candidate

orlagh-farmer@hotmail.com *@OrlaghFarmer*

LGFA LADIES GAELIC FOOTBALL

UCC Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland

Sports Studies & Physical Education
B.Ed. Sports Studies & Physical Education

My PhD Background

What the Research is saying?

At least **60** minutes of *moderate- to vigorous-intensity* aerobic activity **Every** day

PHYSICAL ACTIVITY

Less than 1/3 of children worldwide meeting the 60 min recommendation!

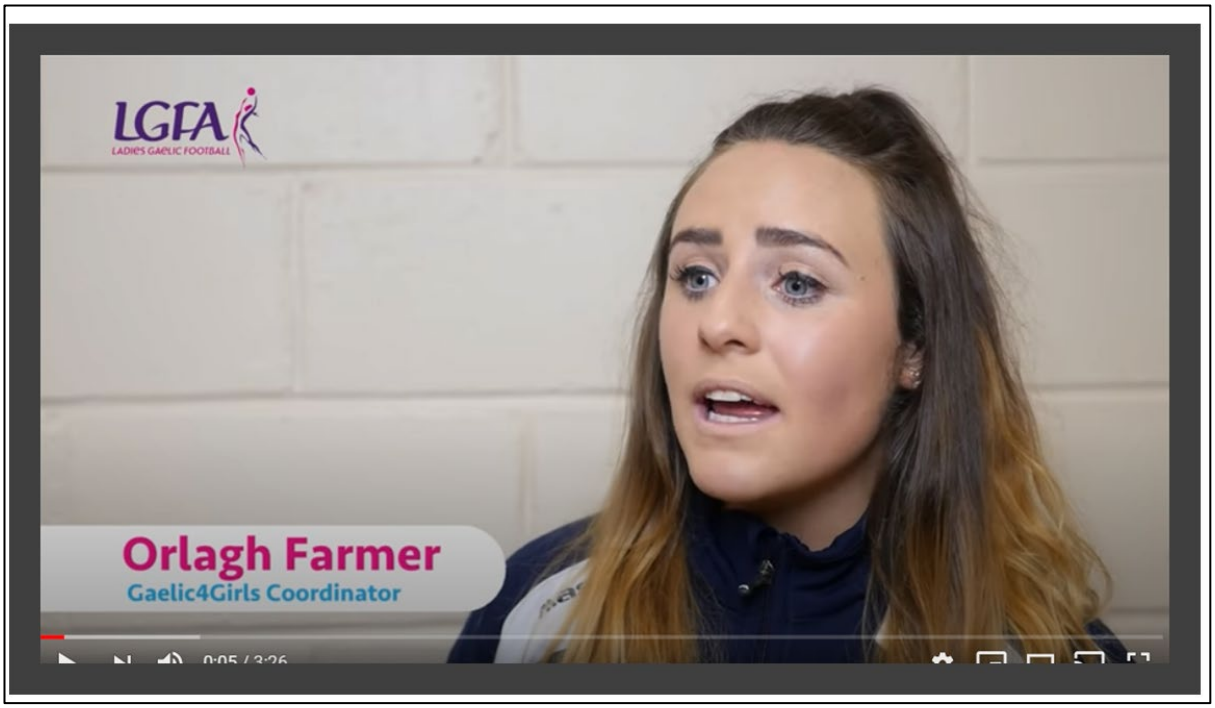
Fundamental Movement Skills

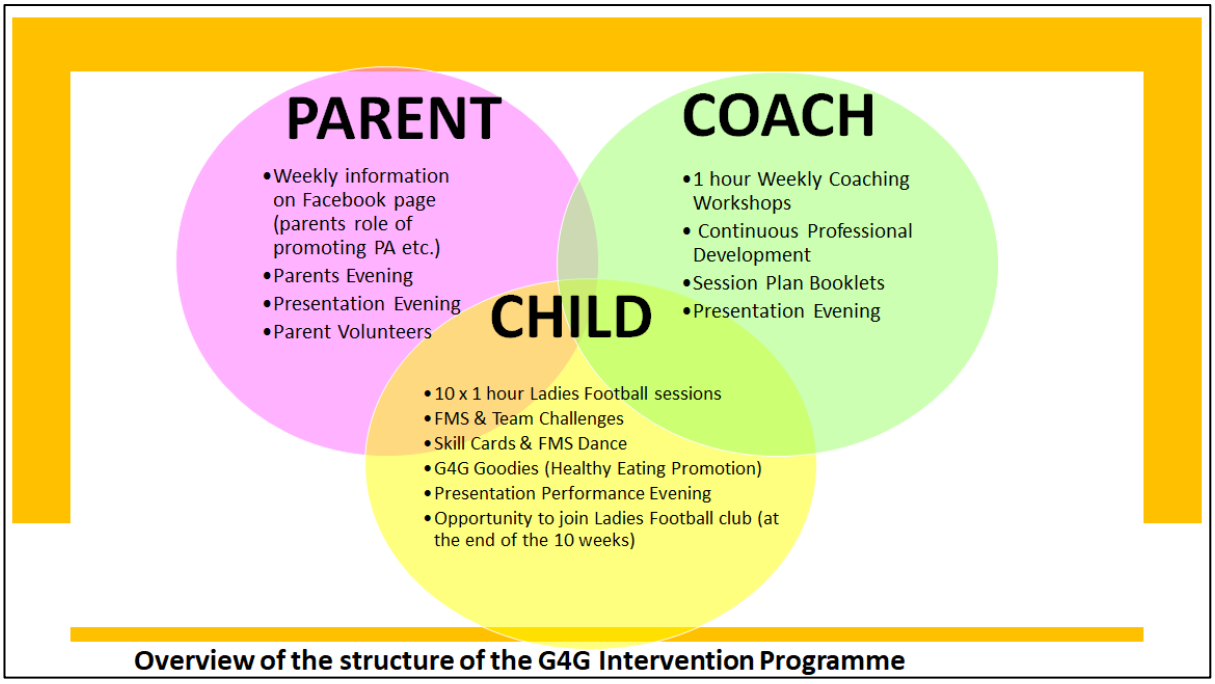
Less than 2% are proficient in performing these basic skills!

SURPLUS SAFETY VS EXPRESSIVE MOVEMENT

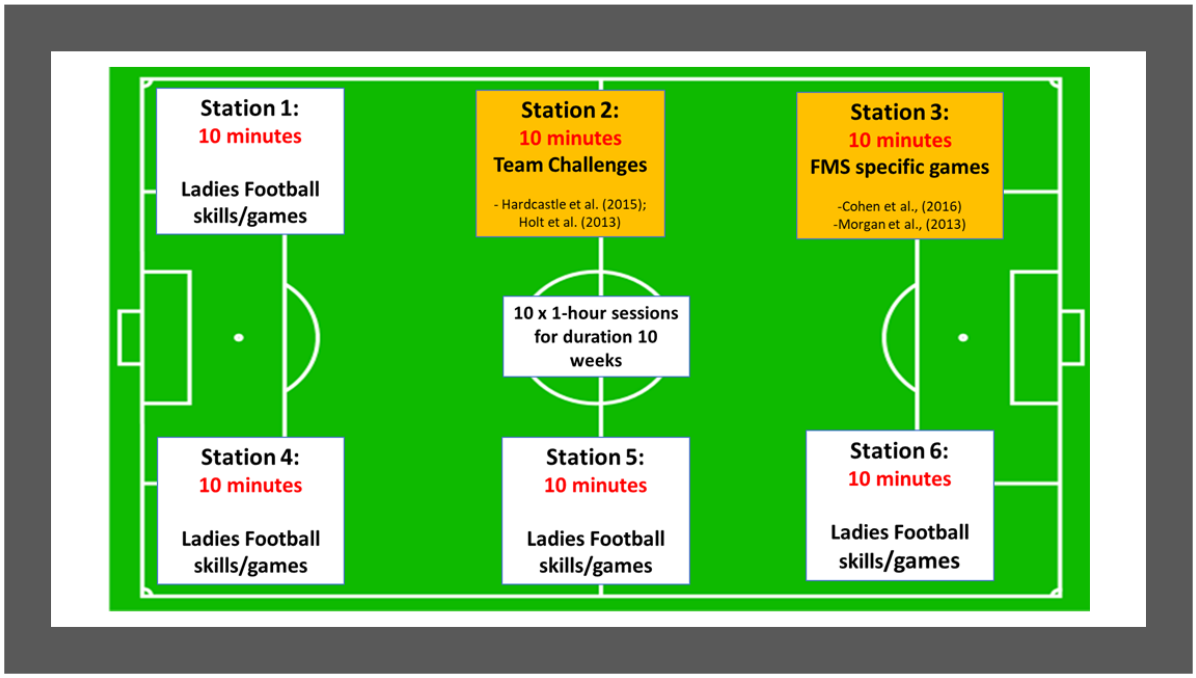
gaelic4girls

Overview of Gaelic4Girls



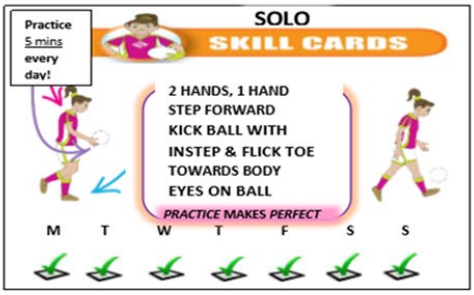


Overview of the structure of the G4G Intervention Programme

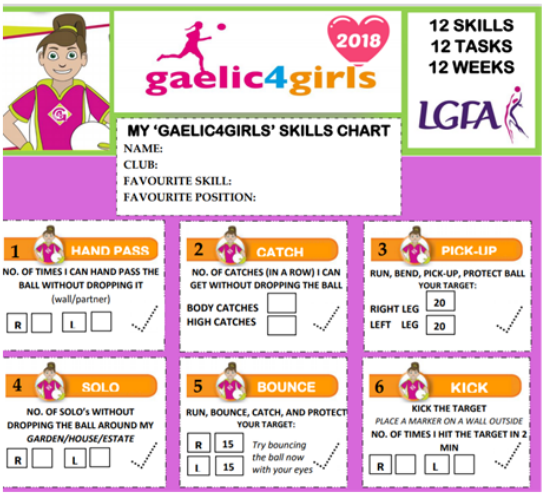


G4G GOODIES

G4G SKILL CARDS



'Gaelic4Girls' Skills Poster/Chart



FUNdamental SPORT SKILLS

'Gaelic4Girls' Dance

- **Dance as a type of PA has been shown to have multiple health benefits including social, psychological, and physical and fitness**

30 minutes of Dance Practice BEFORE Gaelic4Girls sessions

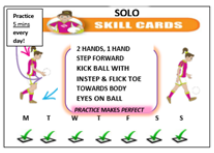
Dance Performance for Parents and Coaches on Week 8

(Canadian Sport for Life, 2011; Duberg et al., 2013)

What is YOUR role as a Parent???

What can you do to encourage/inspire your daughter's sport experiences?

- GO WATCH GAMES AND SUPPORT CLUB/COUNTY TEAMS
- PRAISE & POSITIVE REINFORCEMENT
- BE A ROLE-MODEL
- CO-PARTICIPATION
- REDUCING TECHNOLOGY TIME



WEEK 8 PRESENTATION EVENING

TAKE PART IN SOME FUN CHALLENGES WITH THE GIRLS
(CIRCLE HAND PASS & TUG OF WAR)

How can you enhance your daughter's GAELIC4GIRLS experience??

gaelic4girls

G4G Presentation Evening Flyer

All parents are invited to the

Gaelic4Girls Inch Presentation Evening

Thursday 7th June 2018 (6-7pm) at GAA Pitch

- **Gaelic4Girls Certificate & Jersey Presentation**

('Meet & Greet' the Cork Senior Ladies Footballers)

- **Gaelic4Girls Ladies Football Dance Performance**

- Followed by fun games & activities **(involving parents/coaches & the girls ☺)**

Including; Tug of War, Cross Bar Challenge, Solo Competition, & Team Challenges

***REGISTRATION**

New players can register with the club on the night! Remember you must be registered with Inch to play in the Munster Provisional **'Gaelic4Girls' Blitz Day** at the end of June!

For more information contact;

[redacted]

Hope to see all the parents on the Thursday 7th June ☺