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Time Use, Daily Activities, and Health-related Quality of Life of School-going Late Adolescents in Cork City and County: A Cross-sectional Study

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A thesis submitted to University College Cork for the degree of Doctor of Philosophy in the Department of Occupational Science and Occupational Therapy in the School of Clinical Therapies.

November 2014

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Declaration

I declare that this thesis has not been submitted as an exercise for a degree at this or any other University. The work upon which this thesis is based was carried out in collaboration with a team of supervisors who are duly acknowledged in the text of the thesis. The Library may lend or copy this thesis upon request.

Signed:  Date: July 2014

Declaration of Authorship

The candidate has taken responsibility for all aspects of the work presented in the thesis from its inception. With guidance from Dr. Anthony P. Fitzgerald (Biostatistician, Department of Epidemiology & Public Health/Department of Statistics, University College Cork), the candidate conducted the statistical analysis for all chapters. Dr Darren Dahly (Epidemiologist, Department of Epidemiology & Public Health, University College Cork) provided additional statistical guidance and editorial assistance with the analysis and write-up of Study Five (Chapter 6). The candidate wrote this thesis with guidance and supervision from Prof. Ivan J. Perry, Prof. Fiona Gibbon, Dr. Elizabeth A. McKay and Dr. Anthony P. Fitzgerald.

A number of the studies in this thesis have been published and all authors have been duly acknowledged therein. A list of these publications can be found in Appendix A. Copies of the papers published to date are also included in Appendix A.

Dedication

There is a time for everything and a season for every activity

under the heavens:

a time to be born and a time to die,

a time to plant and a time to uproot,

a time to kill and a time to heal,

a time to tear down and a time to build,

a time to weep and a time to laugh,

a time to mourn and a time to dance…

Ecclesiastes 3: 1-15

This thesis is dedicated to my husband and best friend Eoin who remains steadfastly by my side through the changing seasons of our lives and the times of uprooting and building, weeping and laughing, mourning and healing that we have navigated together during this PhD journey; and to our beautiful son Joseph, who is our greatest joy and blessing. Thank you both for your patience and support while I wrote "my big book".

Now is our time to dance.

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Thank you to Elaine Saunders who helped me code the parental occupation data, funded by the Health Research Board Summer Student Scholarship.

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To my parents, Bill and Úna, thank you for believing in me and for your ceaseless practical and emotional support of all that I do in my life. I love and respect you both

very much. I am forever grateful to you for all you have done for me, Eoin, and Joseph during this long and winding PhD journey.

To Eoin and Joseph, I dedicate this thesis to you, with love and gratitude.

Thesis Abstract

Aim: This thesis examines a question posed by founding occupational scientist Dr. Elizabeth Yerxa (1993) – "what is the relationship between human engagement in a daily round of activity (such as work, play, rest and sleep) and the quality of life people experience including their healthfulness" (p. 3). Specifically, I consider Yerxa's question in relation to the quotidian activities and health-related quality of life (HRQoL) of late adolescents (aged 15 - 19 years) in Ireland. This research enquiry was informed by an occupational perspective of health and by population health, ecological, and positive youth development perspectives.

Methods: This thesis is comprised of five studies. Two scoping literature reviews informed the direction of three empirical studies. In the latter, cross-sectional time use and HRQoL data were collected from a representative sample of 731 school-going late adolescents (response rate 52%) across 28 schools across Cork city and county (response rate 76%). In addition to socio-demographic data, time use data were collected using a standard time diary instrument while a nationally and internationally validated instrument, the KIDSCREEN-52, was used to measure HRQoL. Variable-centred and person-centred analyses were used.

Results: The scoping reviews identified the lack of research on well populations or an adolescent age range within occupational therapy and occupational science; limited research testing the popular assumption that time use is related to overall well-being and quality of life; and the absence of studies that examined adolescent 24-hour time use and quality of life. Established international trends were mirrored in the findings of the examination of weekday and weekend time use. Aggregate-level, variable-centred analyses yielded some significant associations between HRQoL and individual activities, independent of school year, school location, family context, social class, nationality or diary day. The person-centred analysis of overall time use identified three male profiles (*productive*, *high leisure* and *all-rounder)* and two female profiles (*higher study/lower leisure* and *moderate study/higher leisure).* There was tentative support for the association between higher HRQoL and more balanced time use profiles.

Conclusion: The findings of this thesis highlight the gendered nature of adolescent time use and HRQoL. Participation in daily activities, singly and in combination, appears to be associated with HRQoL. However, the nature of this relationship is complex. Individually and collectively, adolescents need to be educated and supported to create health through their everyday patterns of doing.

Extended Summary

Background: The health, well-being, and quality of life of the world's 1.2 billion adolescents (aged 10 – 19 years) are priorities internationally. A focus on the time use of adolescents and how this relates to health-related quality of life (HRQoL) can help to enhance their well-being and address the increasing burden of non-communicable diseases in adulthood.

Aim: This thesis examines a question posed by founding occupational scientist Dr. Elizabeth Yerxa (1993) – "what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness" (p. 3). Specifically Yerxa's question is considered in relation to the quotidian activities and HRQoL of late adolescents (aged 15 - 19 years) in Ireland. This research enquiry was informed by an occupational perspective of health and by population health, ecological and positive youth development perspectives.

Methods: This thesis is comprised of five studies. Two scoping literature reviews informed the direction of the three empirical studies. As the basis for the three empirical studies, cross-sectional time use and HRQoL data were collected from a representative sample of 731 school-going late adolescents (response rate 52%) across 28 schools across Cork city and county (response rate 76%). In addition to socio-demographic data, time use data were collected using a standard time diary instrument while a nationally and internationally validated instrument, the KIDSCREEN-52, was used to measure HRQoL.

The first scoping review sought to identify and map the extent and nature of time use research in occupational therapy and occupational science journals and the extent to which studies explored the relationship between time use and health. The second review mapped time diary research with well adolescents and the use of person-centred data analysis of overall time use as a multidimensional unit. Additionally, it explored whether and how the included studies analysed the relationship between time use and health, well-being and quality of life. The first empirical study examined the adolescents' time use during weekdays and weekends and how time use differed by two key determinants of health, namely gender and social class. The second empirical study

explored the relationship between daily time use, life contexts, and HRQoL for males and females. A person-centred analytic approach was employed in the third empirical study to establish whether distinct profiles of adolescent time use existed. The relationship between overall time use profiles and HRQoL was then examined using newly available statistical methods.

Results: Sixty-one studies published between 1990 and 2014 met the inclusion criteria for the first scoping review **(Study One, Chapter Two)**. This review identified the lack of studies of the daily lives of people in Ireland. Furthermore few studies focused on well populations, with just one (authored by the candidate and colleagues) focused specifically on well adolescents. Finally, the review demonstrated the limited extent of research testing the assumption underlying much occupational therapy intervention that time use is related to overall well-being and quality of life. Thirty-three studies met the inclusion criteria for the second scoping review (**Study Two, Chapter Two**). One-third of studies (n=11) captured data representing 24 hours of the day. Two studies (6%) used person-centred analyses while six studies (18%) examined time use and health and well-being. No studies were identified that examined adolescent 24-hour time use and quality of life. Moving to the empirical studies, the examination of participation rates and time spent in activities across the day for males and females **(Study Three, Chapter Four)** highlighted the gendered nature of adolescent time use particularly at weekends. Established international trends were mirrored in the findings with stereotypical gender role differences in physical activity, household tasks, personal care, computer/Internet use, and reading. Social class differences in time use were less evident. **Study Four (Chapter Five)** found that gender accounted for the most differences across the HRQoL domains. There was some variation in global HRQoL by time use particularly for females at weekends. Based on aggregate-level analyses some significant associations were found between HRQoL and individual activities such as physical activity and socialising with family, independent of school year, school location, family context, social class, nationality or diary day. Finally, the person-centred analysis presented in **Study Five (Chapter Six)** identified three male time use profiles, namely *productive*, *high leisure* and *all-rounder*. Two female time use profiles, *higher study/lower leisure* and *moderate study/higher leisure*, were identified. The quantitative and qualitative differences in male and female profiles provided further evidence regarding the gendered nature of adolescent time use. There was tentative support for the association between higher HRQoL and more balanced time use profiles.

Conclusion: Mirroring existing research, the findings highlight and reflect the gendered nature of adolescent time use and HRQoL. Participation in daily activities, singly and in combination, appears to be associated with HRQoL. However, the nature of this relationship is complex. Policy and practice in health and education should prioritise gender-specific interventions that address multiple risk and positive health behaviours. Individually and collectively, adolescents need to be educated and supported from an early age to create health through their everyday patterns of doing. By engaging in a daily round of activities that enhances their health, well-being, and quality of life adolescents can flourish and fulfil their potential for a life of quality in the 21st century.

Overview of Thesis

Chapter One

Having shared some of my personal background, this chapter aims to provide an overall context for the studies that comprise this thesis. The profession of occupational therapy and the academic discipline of occupational science are briefly described. A selection of the national and international policies relating to children and young people is then presented. Contemporary perspectives on adolescent health and the geographical and temporal context of this study, Ireland in the new millennium, are reviewed followed by a definition of some key terms. This work is further contextualised with a brief overview of some contemporary frameworks that form a backdrop to this research. The convergence of these frameworks is summarised after which 'doing in time' in relation to health is problematised. The overall aim of this doctoral thesis is then presented.

Chapter Two (Study One and Study Two)

The purpose of the first scoping review in this chapter is to situate the empirical investigations of this thesis within the occupational therapy and occupational science discipline-specific literature. This review seeks to identify and map the extent and nature of time use research in occupational therapy and occupational science journals and the extent to which studies explored the relationship between time use and health. The second scoping review extends beyond occupational therapy and occupational science and maps time diary research with well adolescents across multiple disciplines and the use of person-centred data analysis of overall time use as a multidimensional unit. Additionally, it explores whether and how the included studies analysed the relationship between time use and health, well-being, and quality of life. Chapter Two concludes with a brief narrative review of selected HRQoL literature.

- Study One: Accepted for publication in the *Scandinavian Journal of Occupational Therapy*
- Study Two: Proposal accepted by the *Journal of Adolescent Health* for the submission of a scoping review article. Review submitted.

Chapter Three

This chapter describes the design and implementation of this research study. The measurement of the time use and HRQoL of adolescents is briefly described followed by a detailed description of the development of the survey instrument. The ethical principles and practices employed in this study are then described. The involvement of

an advisory group of young people in the design and pre-piloting of the survey instrument is presented. Thereafter sampling, recruitment, and data collection procedures are outlined as are data entry, cleaning, and preparation. International guidelines regarding the analysis of time use data are briefly reviewed with specific data analytic plans outlined in the respective results chapters that follow. The quality enhancement strategies employed in this study are summarized.

Chapter Four (Study Three)

The overarching question in this thesis is "what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness" (Yerxa, 1993, p. 3). In order to consider this question in relation to Irish adolescents, information about their "rounds of daily activity" is firstly required. This chapter, the first of the three empirical studies in this thesis, presents this information. Specifically, the adolescents' time use during weekdays and weekends is examined. How time use differs by two key determinants of health, namely gender and social class, is then explored.

- Published in the *Journal of Occupational Science*

Chapter Five (Study Four)

This chapter reports the second of the three empirical studies in this thesis. Data on the adolescents' HRQoL and life contexts is firstly presented, paving the way for the subsequent examination of the relationship between their time use, daily activities, and HRQoL.

- Under second review with the *Journal of Adolescence*

Chapter Six (Study Five)

The previous two empirical studies used traditional variable-centred approaches to analyse aggregate-level data on the time use, daily activities and HRQoL of this group of Irish school-going late adolescents. The third study, reported in this chapter, uses a person-centred analytic approach to examine the adolescents' overall time use and to establish whether distinct profiles of adolescent time use exist and how these relate to HRQoL.

- Submitted to the journal *Quality of Life Research*

Chapter Seven

In this concluding chapter I present a summary of the main findings from the five studies that comprise this thesis and consider the generalizability of the empirical results. I reflect on the limitations and strengths of the overall research design as well as ethical issues that arose during the study and follow with a critical analysis of the overall contribution of this doctoral thesis. Implications for research, policy, and practice are identified. I conclude with a brief outline of some of the plans I have for continued mining of the dataset that was created through this PhD.

Overarching Research Question	What is the relationship between engagement in a daily round of activity and the quality of life that Irish school-going late adolescents experience?		
Context	Using population-level time use datasets to advance knowledge on human activity, participation, and health. **Published** in the *British Journal of Occupational Therapy* **Appendix A**	A scoping review of time use research in occupational therapy and occupational science. **Accepted for publication** in the *Scandinavian Journal of Occupational Therapy* **Chapter Two (Study One)**	A scoping review of adolescent time diary research. **Proposal for review accepted**, review submitted to the *Journal of Adolescent Health* **Chapter Two (Study Two)**
Empirical Studies	Time use and daily activities of late adolescents in contemporary Ireland. **Published** in the *Journal of Occupational Science* **Chapter Four (Study Three)**	Time use, daily activities, and health-related quality of life of late adolescents in Ireland. **Under second review** with the *Journal of Adolescence* **Chapter Five (Study Four)**	A person-centred analysis of the time use, daily activities, and health-related quality of life of Irish school-going late adolescents. **Submitted** to the journal *Quality of Life Research* **Chapter Six (Study Five)**

Figure 1a. Overview of thesis (July 2014)

Overarching Research Question	What is the relationship between engagement in a daily round of activity and the quality of life that Irish school-going late adolescents experience?		
Context	Using population-level time use datasets to advance knowledge on human activity, participation, and health. **Published** in the *British Journal of Occupational Therapy* **Appendix A**	A scoping review of time use research in occupational therapy and occupational science. **Published** in the *Scandinavian Journal of Occupational Therapy* **Chapter Two (Study One)**	A scoping review of adolescent time diary research. **Accepted for publication** in the *Journal of Adolescent Health* **Chapter Two (Study Two)**
Empirical Studies	Time use and daily activities of late adolescents in contemporary Ireland. **Published** in the *Journal of Occupational Science* **Chapter Four (Study Three)**	Time use, daily activities, and health-related quality of life of late adolescents in Ireland. **In preparation** for the *Journal of Research on Adolescence* **Chapter Five (Study Four)**	A person-centred analysis of the time use, daily activities, and health-related quality of life of Irish school-going late adolescents. **Published** in the journal *Quality of Life Research* **Chapter Six (Study Five)**

Figure 1b. Overview of thesis (Updated November 2014)

Chapter One

Introduction

1.1 Introduction to Chapter One

The purpose of this chapter is to provide a background and context for this doctoral study. Firstly, I share my story and the values and interests I bring to this enquiry. The story unfolds with a brief introduction to the profession of occupational therapy and the academic discipline of occupational science. I highlight the central place of time use in both these fields. A selection of the latest national and international policies relating to children and young people is briefly presented. Contemporary perspectives on adolescent health and the geographical and temporal context of this study, Ireland in the new millennium, are then described to situate this work. Some of the terms used in this study are next defined with other terms explicated subsequently in the thesis. This work is further contextualised with a brief overview of some contemporary frameworks that form a backdrop to this research. The convergence of these frameworks is summarised after which 'doing in time' in relation to health is problematised. The overall aim of this doctoral thesis is then presented.

1.2 My Story

Occupational therapy was the only course of study that I wanted to pursue. The blend of art and science, theory and practice appealed to me greatly. To that end I applied to colleges throughout the United Kingdom (UK) and to Trinity College Dublin (TCD), where the only Irish undergraduate programme was based. Luckily, I secured a place at TCD and qualified as an occupational therapist in 1997. I loved my college years. I have vivid memories of learning about the humanistic foundation of occupational therapy and feeling that this encapsulated my view of relating to people. Such was my interest in this topic that my first foray into research, for my undergraduate thesis, was on the education of Irish occupational therapy students with regard to the therapeutic relationship. I was fortunate to present that work at the 12th International Congress of the World Federation of Occupational Therapists in Montréal, Canada in 1998. This was a seminal early career experience for me as I had the opportunity to meet pioneers from the field of occupational therapy and the then emerging academic discipline of occupational science. I had the great privilege of hearing Dr. Ann Wilcock (1998a) deliver her famous keynote address on an occupational perspective of health. I also sat in a packed auditorium to hear Dr. Elizabeth Yerxa (2000) share her vision for occupational science. The energy and excitement amongst delegates and speakers were palpable.

Returning home from Canada, I felt more committed than ever to occupational therapy and the new ideas of occupational science. I soon registered for a part-time research Masters degree at TCD where I combined my clinical and academic interests in researching the leisure occupations of school-going adolescents. At that time I was enjoying working with young people with severe mental health difficulties in an inpatient child and adolescent mental health unit in Dublin. I wanted to understand more about the lives and lifestyles of well young people in the hope that this knowledge might be useful in my clinical work.

I completed my Masters degree in 2001 and, in that year, took up a post as a senior occupational therapist on a community-based child and adolescent mental health team in Cork. Two years later I was the first lecturer to be appointed to the newly established Department of Occupational Therapy at University College Cork (UCC). Professor Susan Ryan and I worked closely together to design the new programme and enshrine an occupational perspective in the curriculum. Nowadays, while I am overall coordinator of the undergraduate degree programme, my main teaching is in year one which is devoted entirely to an exploration of occupation and health across the lifespan. The students with whom I primarily work are young people in their late teens. I feel that my role as educator in UCC remains fundamentally that of occupational therapist, where I am committed to the person-centred values of the profession transmitted through my student-centred teaching practice (Hunt & Horgan, 2009).

Thus, the threads that have woven through my professional career to date have been my passionate belief in the humanistic values and person-centred practice of occupational therapy; the relationship between occupation, health, and well-being; and my work with young people. It is fitting then that these same threads weave together to form the foundation and focus of the doctoral research presented in this thesis. Naturally, I approached this scholarship with the awareness that my personal and professional beliefs must be bracketed to "mitigate the potentially deleterious effects of preconceptions that may taint the research process" (Tufford & Newman, 2010, p. 80); that I must be open to refutation of these beliefs; and that the investigations comprising this thesis would be rigorous in their design, analysis and interpretation (Gerhard, 2008).

1.3 Occupational Therapy and Occupational Science

Since its inception at the beginning of the 20th century, the profession of occupational therapy has been concerned with promoting health and well-being through occupation. According to Christiansen and Townsend (2004), human occupation is nothing less than the way we describe the experiences that account for our pathway through life – the activities that fill up each day. The primary goal of occupational therapy intervention is to help people to engage in the day-to-day activities that are important to them and to their health and well-being (Wilcock, 2003).

This focus on activities across the day is also a central concern for the discipline of occupational science. In 1991 Wilcock described the new discipline of occupational science as "the study of the human as an occupational being, including the need for and capacity to engage in and orchestrate daily occupations in the environment over the lifespan" (p. 297). The goal of occupational science is to generate a systematic base of description and understanding concerning participation in occupations. Specifically, occupational scientists seek to advance understanding of "how the form, function, and meaning of daily activities influence health and well-being" (Larson & Zemke, 2003, p. 80).

1.3.1 Time Use in Occupational Therapy and Occupational Science

With their interest in the orchestration of daily activities across the day and across the lifespan, it is clear that time use is a defining interest in the fields of occupational therapy and occupational science. Adolph Meyer (1922/1977), widely considered the father of occupational therapy (Söderback, 2009), called for "the awakening to a full meaning of time as the biggest wonder and asset of our lives" (p. 642). Kielhofner (1977) revisited the work of Meyer and Meyer's contemporary Eleanor Clarke Slagle and credited them with one of occupational therapy's core propositions that "in the richness of man's daily routines and his purposeful use of time, there was both health maintaining and health regenerating potential" (p. 236). To this day occupational therapists remain passionate in their belief that the things people do in their everyday lives are the foundation of health and well-being (Hocking, 2013).

In the first publication from the discipline of occupational science Yerxa et al. (1990) similarly positioned a "concern for time" (p. 8) as central to understanding human occupational behaviour. She encouraged consideration of "how a person occupies time,

how satisfied she or he is with the use of time and how well time use supports values and goals" (p. 8). Indeed, according to Harvey (1998), "at the heart of understanding people as occupational beings is understanding what they do minute-by-minute, day-by-day" (p. 2). Yerxa (1993) further argued that occupational science sought to address a major question confronting societies – "what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness" (p. 3). To that end occupational therapists and occupational scientists are using time use research to explore important contemporary issues such as unemployment (Scanlan, Bundy, & Matthews, 2011), childhood obesity (Orban, Ellegård, Thorngren-Jerneck, & Erlandsson, 2012; Ziviani, Desha, Poulsen, & Whiteford, 2010) and enduring mental illness (Desha, Nicholson, & Ziviani, 2011; Eklund, Erlandsson, & Leufstadius, 2010). In some cases such research has lead to the development of occupation-based interventions (Edgelow & Krupa, 2011; Erlandsson, 2013; Orban, Edberg, Thorngren-Jerneck, Önnerfalt, & Erlandsson, 2014). In addition to examining health issues for at-risk groups, occupational scientists have also examined the daily lives of different age groups within the well population including children (Lynch, 2009) and older people (Chilvers, Corr, & Singlehurst, 2010; King & Hunt, 2010). There remains an identified need for studies of population differences and an examination of occupational patterns across 24-hour cycles (Pierce, 2012). Specifically, further exploration is needed of "the apparent health or illness outcomes of contemporary lifestyles from an occupational perspective" (Wilcock, 2007, p. 3-4), defined by Njelesani, Tang, Jonsson, and Polatajko (2014) as "a way of looking at or thinking about human doing" (p. 233). Furthermore, detailed investigations are necessary to gain a better understanding of daily life for individuals across diverse cultures and geographical locations (Ziviani et al., 2010). In response to these calls, this thesis contributes newly-collected data on the time use and daily activities of well adolescents in Ireland.

1.4 National and International Policy Context–Children and Young People

Children and childhood were placed on the international policy agenda with the adoption of the United Nations *Convention on the Rights of the Child* (CRC) by the United Nations General Assembly in 1989 (Children's Rights Alliance, 2010). A child is defined in the CRC as a person under the age of 18 years. As Ben-Arieh (2010) pointed out, the CRC made clear that children's well-being is important in its own right, not just for when they become adults in the future. Looking at well-being rather than

only “well-becoming” (p. 139) brings into focus new domains of children’s well-being, including the daily activities in which they engage and their participation in society to create a better picture of children as human beings in their present life (Ben-Arieh, 2010).

The Irish State signed the convention on 30 September 1990 and ratified it on 28 September 1992 bringing children’s rights to the top of the agenda of the Irish government, legislators, and key decision-makers. Eight years later the *National Children’s Strategy* (Department of Health and Children, 2000) was a major government initiative to progress the implementation of the CRC in Ireland. This strategy sought to enhance the status and further improve the quality of life of children in Ireland based on the achievement of three national goals (p. 11):

1. Children will have a voice in matters which affect them and their views will be given due weight in accordance with their age and maturity.
2. Children’s lives will be better understood; their lives will benefit from evaluation, research, and information on their needs, rights, and the effectiveness of services.
3. Children will receive quality supports and services to promote all aspects of their development.

The Children’s Rights Alliance (2011) reviewed the implementation of the *National Children’s Strategy* and concluded that impressive progress was made in relation to the first two goals with the establishment of key infrastructure and work/research programmes that gave young people greater representation and illuminated the life of children in Ireland. However, progress on the third goal was limited. It is encouraging therefore that supporting families, tacking child poverty, protecting young people at risk, and improving childhood health and well-being are included as priorities in the latest national policy framework for children and young people *Better Outcomes, Brighter Futures* (Department of Children and Youth Affairs, 2014). This framework echoes the CRC with a commitment to “value and support our children and young people for who they are today as well as for what they will become in the future” (p. viii). The five national outcomes are that children and young people (p. xiv):

1. Are active and healthy with positive physical and mental well-being.
2. Are achieving their full potential in all areas of learning and development.
3. Are safe and protected from harm.

4. Have economic security and opportunity.
5. Are connected, respected, and contributing to their world.

These outcomes also reflect the eight Millennium Development Goals (MDG) that were adopted in 2001 in a global anti-poverty initiative coordinated by the United Nations. These goals range from halving extreme poverty to halting the spread of HIV/AIDS and providing universal primary education, all by the target date of 2015 (United Nations Children's Fund [UNICEF], 2014). Together these international public policies constitute "an unprecedented expression of commitment to children's rights" (UNICEF, 2014, p. 10). The 25th anniversary of the CRC will be commemorated in November 2014. Coupled with the culmination of the MDG in 2015, this will be an occasion to celebrate achievements and make renewed commitments to protecting and promoting the rights and health of children and adolescents around the world. The post-2015 development process is already being considered. At its annual assembly in May 2014 the World Health Organisation (WHO) argued that health must be a part of any future global development agenda. Moreover, it called for specific attention to adolescents, distinct from children and adults (WHO, 2014a).

1.5 Contemporary Perspectives on Adolescent Health and Well-Being

Adolescents aged 10 - 19 years comprise approximately 17% of the global population (WHO, 2014a) and have been described as "a new global power reshaping the world" (United Nations Population Fund, 2011, p. 9). Perhaps it is not surprising then that "unprecedented momentum is gathering to put adolescents into the centre of global health practice" (The Lancet, 2012, p. 1561) and to consider the role of adolescence as a foundation for future health for individuals and societies. Indeed, it is argued that "how nations harness the contribution of their adolescents and young adults will determine their futures, in terms of economic success and quality of life" (Resnick, Catalano, Sawyer, Viner, & Patton, 2012, p. 1565).

Historically, within the fields of adolescent medicine and health, adolescence has been characterised in two opposing ways. The first view focuses on high-risk behaviours and negative health outcomes while the second views adolescence as a time of optimal health with little need for medical services (Irwin, 2003). However, recent data undermine the latter assertion as, in the last 50 years, the health of adolescents has improved to a lesser extent than that of younger children (Sawyer et al., 2012). In their

examination of adolescent health and well-being in the 21st century, public health specialists Thiede Call et al. (2002) adopted a more balanced perspective. While they welcomed the increased attention to preventative care services for adolescents, they advocated that a comprehensive view of health be embraced, a view beyond a narrow focus on disease, immunizations, and monitoring physical development to a focus on the social and emotional health and well-being of adolescents. The recent *The Lancet* (2012) series of articles on adolescent health argued that "it is time to put the young person, not the specific issue, centre stage" (p. 1561). Accordingly, there is now an emphasis on wellness rather than the prevention of poor health (Hamilton, 2006) and on "lives not just risk factors" (Marmot, 2009, p. S126).

In May 2014, the WHO (2014a) published its report *Health of the World's Adolescents-A Second Chance in the Second Decade.* It rejected the myth that adolescents are healthy and therefore do not need much attention. This report endorsed an ecological view of the determinants of adolescent health and development and asserted that the health of young people needs to be considered in the broadest sense, incorporating positive aspects of health as well as risk factors for future ill-health and disease. It called for cross-sectoral action to achieve universal health coverage for adolescents and interventions that simultaneously address multiple health and risk behaviours.

As evidenced in the developments described above, there has been a shift from viewing child health and wellness from an adult perspective towards honouring children's subjective perspectives of their own well-being. To that end, children and young people are increasingly deemed the preferred reporters in assessments of their health and well-being (Ben-Arieh, 2010; Brooks & Hanafin, 2005; Huang, Revicki, & Schwartz, 2014; Lippman, Anderson Moore, & McIntosh, 2009; Nic Gabhainn & Sixsmith, 2005; Rees, Goswani, & Bradshaw, 2010; Statham & Chase, 2010; The Children's Society, 2013).

A further perspective evident in contemporary literature internationally is that of time use as a determinant and indicator of adolescent well-being (Ben-Arieh, 2010; Ben-Arieh & Ofir, 2002; Brooker & Hyman, 2010; Brooks & Hanafin, 2005; Larson & Verma, 1999; Rees et al., 2010; Vogler, Morrow & Woodhead, 2009; Wight, Price, Bianchi, & Hunt, 2009;). However, there is insufficient knowledge on the patterns of everyday activities of children and young people and the way such patterns impact on well-being (Ben-Arieh & Ofir, 2002). Therefore, it is argued that those who are

interested in studying the well-being of children and young people must gain knowledge of their time use and daily activities (Ben-Arieh & Ofir, 2002; Soupourmas, 2005; Zuzanek, 2005).

Reflecting these contemporary understandings researchers, policy makers, and health providers working in the field of adolescent health are urged to embrace holistic and ecological perspectives rather than disease specific and deficit models; advance cross-cultural research that gathers comprehensive subjective and objective data on health and lifestyles; invest in evidence-based practice that targets non-communicable diseases in particular, across age, gender, social class, and country of residence subgroups; and provide targeted, holistic, and age-appropriate interventions for all young people not just those who are at risk or experiencing difficulties (Blum, Bastos, Kabiru, & Le, 2012; Currie et al., 2012; Department of Health and Children; 2013; Kreipe, 2011; Sawyer et al., 2012; The Lancet, 2012; UNICEF, 2012; Viner et al., 2012). In summary, to borrow the words of Resnick (as cited in Ben-Arieh, 2010), the focus has shifted from survival and basic needs to quality of life, or from dying, disability, and discomfort to sparkle, satisfaction, and well-being.

1.6 Adolescents in Ireland

In 2011, Ireland had the highest percentage of children and young people in the European Union (EU) with 25% compared with the EU-27 average of 19% (Department of Children and Youth Affairs, 2012a). Given this, there is an acknowledged need for Irish research that will allow children's and young people's lives to be better understood, that will give them a voice and that will enable the provision of quality supports and services to promote all aspects of their development (Department of Children and Youth Affairs, 2014). The health of Irish young people has been the subject of increasing public, professional, and political attention in recent years. Many Irish strategy documents now identify young people as a target population for health promotion and risk prevention (Department of Health and Children, 2000; Department of the Taoiseach, 2006; Office of the Minister for Children, 2007a, 2007b; Department of Children and Youth Affairs, 2011a, 2014). Resources such as the *State of the Nation's Children* (Department of Children and Youth Affairs, 2012a) and the *Health Behaviour in School-Aged Children* study (Currie et al., 2012) routinely gather important data on aspects of Irish children's lives and health and risk behaviours, for example, on drug and alcohol use, physical activity, screen time, and nutrition, in some

cases making comparisons with available international data (Currie et al., 2012; UNICEF, 2012, 2013). Such surveys typically use stylised estimates of time use (i.e., survey questions that ask people to estimate the total time they spent undertaking various activities in a specified time period). However, macroscopic views are increasingly favoured in research on lifestyles and health with social scientists focusing more on overall patterns of occupations (Christiansen & Townsend, 2010). Despite this, just as Hagell, Peck, Zarrett, Gimenez-Nadal, and Symonds (2012) observed in the United Kingdom, Irish research on "the patterning of the whole day not just a few discretionary hours" (p. 71) is less extensive. As a result, little is known about the occupational nature of late adolescents in contemporary Ireland and the rounds of daily activities in which they engage. This study therefore aims to bridge this gap through the collection and analysis of new time use information on this large section of the Irish population. In so doing, this research provides country-based data that may aid the identification of local priorities by Irish policy makers and service providers (Catalano et al., 2012; Patton et al., 2012).

1.7 Ireland in the 21st Century

In Ireland, the context of participation in daily activities experienced dramatic social, cultural, and economic change in the latter part of the 20th century and into the new millennium (Greene & Moane, 2000). The Irish *National Children's Strategy* (Department of Health and Children, 2000) recognised this rapid pace of change in Irish society stating that "the opportunities and challenges faced by children are part of an Irish economy and society that has changed and grown in a way that could hardly have been envisaged ten years ago" (p. 7). In the period 1971 to 2002, the population of Ireland grew by almost one-third to reach nearly four million (Central Statistics Office [CSO], 2004). The next census in 2006 recorded a population growth of a further 8.2% (CSO, 2008). As a result of the speed of Irish economic development since the mid-1990s Ireland was dubbed "the Celtic Tiger". Gross domestic product (GDP) per capita growth averaged close to 5% from 1995 to 2007. Over a decade, living standards increased by one-third (Organisation for Economic Co-operation and Development [OECD], 2009). In the 10 years between 1993 and 2003, employment increased by over 50% (CSO, 2004). Unemployment dropped to historically low levels at 4.5% of the labour force in 2007 (CSO, 2008). The data in this study were collected at what is regarded as the peak of the economic boom in Ireland, quarter 4 in 2007, when real

gross domestic product (GDP) reached its highest level (Department of Children and Youth Affairs, 2013).

1.8 Terminology

Given their somewhat ambiguous nature four of the terms used in this study are next defined with other terms explicated subsequently in the thesis. These terms are time use research; activity; health and well-being; and adolescent and late adolescence.

1.8.1 Time Use Research

Farnworth and Fossey (2003) defined time use research as "the area of social science that focuses on what we do with our time and why" (p. 150). Time use studies provide important empirical information for occupational therapists and occupational scientists (Wilcock, 2006). While the use of time budgets or time use surveys can be traced back to the end of the 19th century most scholars in this field identify the defining contribution of Hungarian sociologist Alexander Szalai (1972) in the coordinated gathering of time use data. In 1965, under the auspices of United Nations Educational, Scientific and Cultural Organisation (UNESCO), he supervised the parallel collection of time use data from 12 countries using commonly agreed methods of sampling, interviewing, coding, and data processing (Szalai, 1972).[1]

Most developing and developed countries now collect time use data as part of national statistical accounting activities (Hunt & McKay, 2012). Since 1990, 69 countries worldwide have conducted a time use survey (United Nations Economic Commission for Europe [UNECE], 2013). Ireland is unusual in that such time use surveys are not an integral part of Irish social statistics collection (McGinnity, Russell, Williams, & Blackwell, 2005). The Irish Economic and Social Research Institute (ESRI) conducted a pilot national time use survey with a sample of 1000 Irish adults in 2005. The authors of that study (McGinnity et al., 2005) cited the Irish National Statistics Board's *Strategy for Statistics 2003-2008* which proposed that serious consideration be given to the undertaking of a time use survey in Ireland. They argued that conducting time use surveys at regular intervals makes possible the analysis of changes in time use in Ireland, which is considered to be an important indicator of social change. However, no

[1] Bulgaria, Belgium, Czechoslovakia, France, East and West Germany, Hungary, Peru, Poland, the Soviet Union, the U.S.A., and Yugoslavia.

further time use surveys have been conducted with Irish adults. Time use data are being collected from Irish 9- and 13-year-olds as part of the national longitudinal survey *Growing Up in Ireland* (Department of Children and Youth Affairs, 2011b). To date, no time use surveys have been conducted with older Irish adolescents aged 15 to 19 years.

1.8.2 Activity

In 2001 Pierce argued that the terms occupation and activity were two distinct and valuable concepts requiring differentiation to support more sophisticated research in occupational science and occupational therapy. She defined occupation as "a person's personally constructed, one-time experience within a unique context" and activity as "a more general, culturally shared idea about a category of action" (p. 138). Drawing on these definitions Farnworth (2004) further argued that activity is a more appropriate term to use in population-level time use research rather than occupation, which relates to time use at the individual level. Similarly Clark (2006) and Ziviani et al. (2010) advocated the careful use of language that can be understood within the broader health community and wider society. For example, as Moll, Gewurtz, Krupa, and Law (2013) pointed out, the term occupation is "not currently in the lexicon of public health" (p. 115). Accordingly, consistent with the time use literature, the term activity is used in this thesis to describe what the participants do with their time. Importantly this term is also consistent with the "common language" of the WHO (2002, p. 1) *International Classification of Functioning, Disability and Health*.

1.8.3 Health and Well-Being

The WHO (1948) defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (no page). While it acknowledged that there are many different ways of viewing well-being with different ideas of how knowledge about them can be gained, the WHO recently agreed the following definition: "Well-being exists in two dimensions, subjective and objective. It comprises an individual's experience of their life as well as a comparison of life circumstances with social norms and values" (WHO, 2013, p. 9). In this definition health and well-being interact. Health influences overall well-being yet well-being also affects future health. It is argued that "a focus on subjective well-being adds value by capturing precisely those aspects that traditional and objective health measures do not" (p. 6).

1.8.4 Adolescent and Late Adolescence

In their article on adolescence as a foundation for future health, Sawyer et al. (2012, p. 1632) provided useful definitions of adolescence and some of the other terms that are often used somewhat interchangeably in the related literature.

Table 1

Definitions of Adolescence and Young Adulthood (Sawyer et al., 2012)

Term	Definition
Child	Defined by the *United Nations Convention on the Rights of the Child* (1989) as a person younger than 18 years, unless majority (i.e., the legal threshold of adulthood) is attained at a younger age in a particular country.
Adolescence	Historically defined by the World Health Organisation as the period between ages 10 and 19 years.
Youth	The United Nations defines youth as people aged between 15 and 24 years.
Teenager	Refers to people aged 13-19 years. The term was first used in the USA in the 1920s and became widely used within popular culture after World War II.
Young People	A less formally defined term that generally refers to people aged 10-24 years, as does the composite term adolescents and young adults. When data are reported, the 10-24 year age range is increasingly being divided into three categories: 10-14 years (early adolescence); 15-19 years (late adolescence); and 20-24 years (young adulthood) to appropriately examine the extent of changes in health that take place during these years.

Gore et al. (2011), Sawyer et al. (2012), and Hagell et al. (2013), amongst others, encouraged researchers to explicitly describe the developmental stage within adolescence to which their studies relate. The WHO (2014b) also recognised the need for age-specific data on young people and has made age disaggregation a standard feature of its data analysis. Therefore, in this thesis, the term "late adolescence" is used as it relates to the quinary age band of 15 - 19 years (Sawyer et al., 2012, p. 1632). Furthermore, according to the American Psychological Association (2010), male and female adolescent are the correct terms to use for individuals aged 13 - 17 years, rather than boy and girl.

1.9 Underpinning Frameworks

To further contextualise this doctoral research a brief overview of some contemporary frameworks that form a backdrop to this study is next presented. These are depicted in Figure 2.

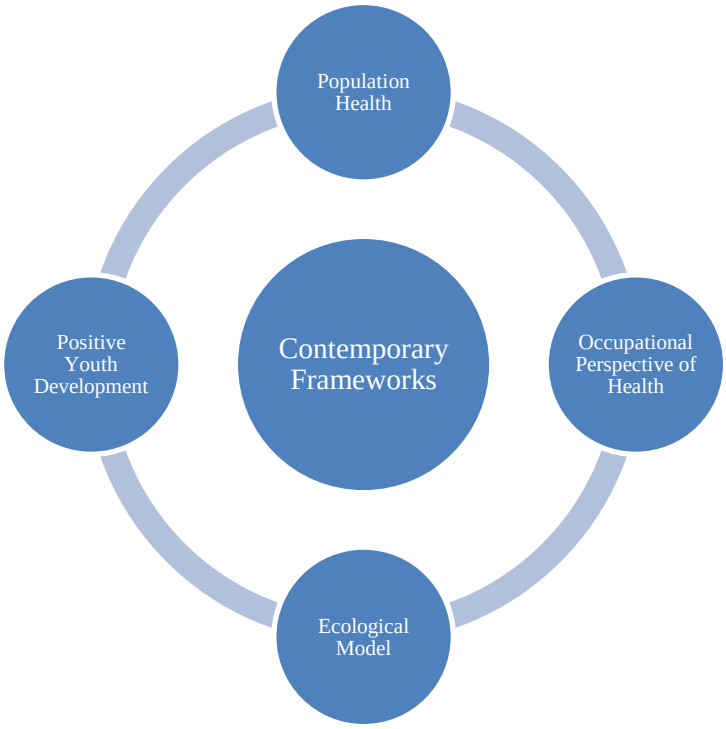


Figure 2: Contemporary frameworks that underpin this research.

1.9.1 Population Health

According to Kindig and Stoddart (2003) "the overall goal of a population health approach is to maintain and improve the health of the entire population and to reduce inequalities in health between population groups" (p. 380). Specific sub-groups within the population merit particular attention and support, for example, children, older persons, people who are economically disadvantaged or unemployed, as well as minority groups (Frank, 1995). While health is seen to be influenced by "social, economic, and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development and health services"

(Kindig & Stoddart, 2003, p. 380), the primary focus is on the impact of these environmental and system variables on the health of the group, not the individuals themselves (Kindig, 2007). A guiding principle of the population health approach is a focus on the measurement of outcomes, such as mortality, morbidity, disability, health status, quality-adjusted life years, and quality of life/health-related quality of life (Kindig, 2007). Frank (1995) believed that the implementation of broad strategies that provide for people's basic social, psychological, and material needs would advance the population health agenda.

1.9.2 Occupational Perspective of Health

Wilcock's (1993) theory of the human need for occupation added a further basic need to the social, psychological, and material needs outlined by Frank (1995). She contended that "occupation fulfils basic human needs essential for survival, provides the mechanism for people to exercise and develop innate capacities of a biological, social, and cultural nature, to adapt to environmental changes, and to flourish as individuals" (p. 17). In her seminal text *An Occupational Perspective of Health,* Wilcock (1998b) further posited that health and well-being result from being in tune with our occupational nature and from being able to engage in meaningful occupation that facilitates growth amongst individuals and communities. Furthermore the health mediating effects of the complex interaction between socio-cultural processes and individuals' biological needs were acknowledged.

Wilcock's occupational perspective of health recognized "units of analysis greater than the individual" (Frank, 2014, p.77) and a domain of concern beyond the provision of quality intervention for individuals with acquired health conditions. Indeed, Wilcock (1999) envisaged a future practice that enabled population-level, health-enhancing opportunities for those who are sick and those who are well as a complement to traditional, individually-oriented practice with people with disabilities.

No doubt inspired by Wilcock's vision (1998b, 2003, 2006, 2010, 2014) there are increasing calls for the strengthening of population and public health perspectives in occupational therapy and occupational science research, policy, and practice (Ciro, 2011; Moll et al., 2013; Hildenbrand & Lamb, 2013; Urbanowski, Shaw, & Chemmuttut, 2013; Whiteford, 2001; Ziviani et al., 2010). Hocking (2013) encouraged occupational therapists to extend their thinking to practice that supports groups and

communities across the whole of society. Moll et al. believed that the benefits associated with occupation should be promoted in the realm of public health as well as how occupation can be a risk factor for ill-health. Similarly, in her editorial in the recent special edition of the *Journal of Occupational Science* on population health, Wicks (2014) encouraged occupational scientists' "quest to understand how occupation has positive and negative implications for health at the personal, local and global levels" (p. 2).

In summary, according to Wilcock and Hocking (2004), an occupational perspective on promoting health at a population level would have two aspects. Firstly, there would be widespread public recognition of the relationship between occupation and health so that everybody could appreciate the health impact of their daily occupations and adapt their lifestyles accordingly. Secondly, public health initiatives would be "directed towards ensuring that all people can engage in socially valued, personally meaningful occupations that satisfy needs, enhance capacities, and provide opportunities to realise aspirations and help cope with environmental challenges" (p. 220). All people would have access to a range and balance of occupations that support optimal health and well-being. An occupational perspective of public health would therefore embrace a holistic view of the lifestyles of groups and how their lifestyles maintain or undermine health (Hocking, 2011).

1.9.3 Ecological Models

It has been suggested that ecological models are crucial to understanding adolescent trajectories of development and health in the 21st century (Blum et al., 2012; Kreipe, 2011). The (bio) ecological model is generally attributed to Urie Brofenbrenner and colleagues who described the interplay of Process-Person-Context-Time in child development, thus "linking lives with contexts" (Bronfenbrenner, 1995, p. 623). The central tenet of the ecological model is that individual development is driven by the interaction of multiple individual and environmental factors that influence each other in dynamic ways. In the first exposition of the ecological model in the 1970s Brofenbrenner (1995) conceptualised the environment as a set of nested levels ranging from the micro to the macro. Later refinement of the model (Brofenbrenner & Morris, 1998) depicted these levels as four concentric circles of environmental influence with time as an underlying factor, recognizing both individual changes over time and historic time (Ben-Arieh, 2010). Thus, youth development occurs "within a complex nested

array of biological, psychological, social, community, cultural, and other relational systems" (Larson & Tran, 2014, p. 1012). Irish psychologists Greene and Moane (2000) used Bronfenbrenner's framework to examine changes in Irish society at the turn of the 20th century and the significance of these changes for the lives of children and young people in Ireland. Evidently, an ecological perspective is also favoured internationally when exploring adolescent health (Park, Scott, Adams, Brindis, & Irwin, 2014). In the report of the international Study Group on Adolescence in the 21st century, Thiede Call et al. (2002) wrote that "macro-level changes are affecting the micro-contexts in which adolescents spend their days – their homes, work settings, schools, and local communities – which in turn affect adolescent's health and well-being" (p. 71). Furthermore, they stated that it is "vital to ask how these macro- and micro-contextual changes will influence the opportunities and choices that adolescents have for good health in the future" (p.71). To that end, much contemporary Irish and international research and policy development relating to young people is guided by ecological systems frameworks (Blum et al., 2012; Currie et al., 2012; Department of Children and Youth Affairs, 2011a; Gavin, Molcho, Kelly, & NicGabhainn, 2013; Sawyer et al., 2012; WHO 2014a).

Occupational therapists have developed a range of ecological models that recognise the interplay between persons, environments, and occupations (Brown, 2014). A particularly pertinent example is the Synthesis of Child, Occupational, Performance and Environment – In Time (SCOPE-IT) model of time use devised by Poulsen and Ziviani (2004) as a conceptual framework for describing "the complex, interrelated contextual, interpersonal, intrapersonal, and temporal aspects of occupational performance" (p. 69). This model enables occupational therapists to better understand the variety of influences on children's occupational performance and assist them in influencing the health and well-being of children at both individual and societal levels (Poulsen & Ziviani, 2004).

1.9.4 Positive Youth Development

Positive youth development represents a promising ecological approach to promoting the health of adolescents (Kreipe, 2011). The concept of Positive Youth Development (PYD) has grown in the last two decades (Geldhof et al., 2013; Lerner et al., 2011) arguably replacing the dominant storm and stress model of adolescence (Lerner et al, 2005). Its emergence reflects a paradigm shift in policy and practice relating to adolescent health from defining youth development in terms of deficits, problems, and

peril to assets, potential, and promise (Kreipe, 2006; Larson, Brown, & Mortimer, 2002; Lippman et al., 2009; Pittman, Martin, & Yohalem, 2006).

The PYD perspective is congruent with developmental and ecological systems theories that recognise the bidirectional interactions between individual and context (Lerner et al., 2005). Physical and institutional resources in the social environment and individual assets are both deemed essential for thriving which is evidenced by a young person who develops what are referred to as the "Six Cs": competence, confidence, connection, character, caring/compassion, and contribution (to self, family, community, and civil society) (Zarrett & Lerner, 2008).

Furthermore, Bernat and Resnick (2006) outlined a number of characteristics of PYD, including that intervention strategies simultaneously promote protective factors and reduce risk factors; target multiple behaviours and multiple systems; and focus on prevention and health promotion. Moreover, Hamilton (2006) argued that youth development, like public health, emphasises prevention rather than treatment and populations rather than individuals. Both challenge the silo approach dominant in the medical model where problems are often considered as unrelated issues. As Sawyer et al. (2012) argued "an international agenda on adolescent health would place the developmental phase of adolescence centre stage rather than any one health issue" (p. 1637).

1.10 Convergence of Approaches

The diagram illustrating the underpinning frameworks of this study (Figure 2, page 37) depicts the approaches as influencing each other. Moreover, the subsequent descriptions of the four perspectives illustrate their complementary nature. They support a positive, strengths-based view of young people as a defined population sub-group; recognise the importance of context in understanding their development; target the lifestyles and health needs of the whole group rather than individuals; and emphasise the measurement of positive indicators of health. Taken together, they provide a strong and coherent foundation and rationale for this study. In fact, they echo the important elements of quantitative developmental research that Larson and Tran (2014) recently outlined, including the adoption of a strengths perspective, the inclusion of positive outcome variables, and the examination of development from an ecological perspective that recognises bidirectional individual-context relationships.

1.11 Problematising 'Doing in Time' in Relation to Health

In the last 50 years, the health of the world's 1.2 billion adolescents has improved to a lesser extent than that of younger children (Sawyer et al., 2012). In fact, worsening mental health outcomes have been noted in Ireland (Cannon, Coughlan, Clarke, Harley, & Kelleher, 2013; UNICEF Ireland, 2011) and internationally (Becker & Kleinman, 2013; Gore et al., 2011; Koh, Blakey, & Roper, 2014; Patel, Flischer, Hetrick, & McGorry, 2007). Moreover, the daily lived experience of young people internationally confronts them with "more complex worlds, with more contractions and challenges" than before (Larson & Tran, 2014, p. 1013). Against this backdrop, recent policies call for increased attention to non-communicable causes of disease burden and lifestyle risk factors in adolescence (Gore et al., 2011), not least because important determinants of health and well-being are imbedded in young people's daily behavior, as reflected in their time-use (Olds, Ferrar, Gomersall, Maher, & Walters, 2012; Zuzanek, 2005). Indeed, how one lives out one's daily life is closely connected with health and quality of life (Erlandsson, 2013a; Harvey, 1993; Hocking, 2013). It is argued that "much of today's ill-health is developed and caused by people's doing; their lifestyle" (Hocking et al., 2014, p. 41). Given this, the promotion of healthy lifestyles amongst adolescents is now particularly important (Hagell, Coleman & Brooks, 2013; The Lancet 2012) to prevent the accelerating burden of non-communicable diseases in adulthood (Viner, 2013).

To that end, research is needed on how "the quantities and qualities of experiences in different activities act in combination" (Larson, 2001, p. 163) to affect adolescent development, health, well-being and quality of life. To date, most studies of young people's lifestyles and time-use have tended to focus on a small number of discrete activities in isolation (Ben-Arieh & Ofir, 2002; Hagell et al., 2012). However, it cannot be assumed that healthy levels of one activity are indicative of an overall healthy lifestyle (Leech, McNaughton, & Timperio, 2014). Indeed, the finite nature of time requires trade-offs or substitutions among necessary and desired activities (Larson & Verma, 1999; Mekary, Willett, Hu, & Ding, 2009; Michelson, 2005). For example, although it is hypothesised that screen time displaces physical activity (American Academy of Pediatrics, 2011; Vandewater, Shim & Caplovitz, 2004), high levels of physical activity and sedentary behaviour can coexist (Leech et al., 2014; Ferrar, Chang, Li, & Olds, 2013). Therefore, macroscopic views are increasingly favoured in research on lifestyles and health with social scientists focusing more on overall patterns of daily

activities (Christiansen & Townsend, 2010; Clark, 1997) necessitating person-centred analytic approaches. The *person-centred* approach seeks to understand the person as a functioning or organised whole rather than a summation of variables (Bergman, 2001). In fact, with this approach, the variable values are of no importance in themselves. Rather, they are meaningful only as parts of a configuration (Bergman, 2001). Importantly, person-centred analyses of adolescent time-use can more effectively capture the interconnectedness of activity choices and portray the complexity of activity participation typical of many young people's lives (Linver, Roth, & Brooks-Gunn, 2009), and the impact on their health, well-being and quality of life (Bartko & Eccles, 2003).

Capturing the complexity of adolescent activity requires not just person-centred analytical methods but also the collection of data on all the activities performed by an individual in a 24-hour cycle, as these are the building blocks that create an overall lifestyle or pattern of time-use (Erlandsson, as cited in Orban, Edberg, & Erlandsson, 2012). As a result, those concerned with adolescents' health have been urged to pay attention to these "...overall patterns of daily life, including sleep, eating habits, mass media consumption, extra-curricular activities, and relationships with parents and peers" (Zuzanek, 2005, p. 413).

The inclusion of positive outcome variables has recently been identified as one of the important requirements of quantitative developmental research (Larson & Tran, 2014). One such variable is health-related quality of life (HRQoL). Indeed, there is growing consensus that the creation of a complete picture of young people's health and well-being requires an assessment of HRQoL outcomes (Matza, Swensen, Flood, Secnik, & Leidy, 2004). No doubt reflecting this and contemporary perspectives that endorse an ecological view of the determinants of adolescent health and well-being (Ford, 2014; WHO, 2014), and that honour young people's subjective perspectives of their own well-being and quality of life (Ben-Arieh, 2010; Huang et al., 2014), studies examining the relationship between HRQoL and discrete time-use behaviours in adolescents are increasing. More time in physical activity and longer sleeping hours have been found to be associated with better HRQoL, while high levels of recreational screen time are associated with poorer HRQoL (Finne, Bucksch, Lampert, & Kolip, 2014; Gopinath, Hardy, Baur, Burlutsky, & Mitchell, 2012; Iannotti, Kogan, Janssen, & Boyce, 2009; Lacy et al., 2012; Lin, Su, & Ma, 2012; Mathers et al., 2009; Xu et al., 2014). However,

these variable-centred studies do not take the previously described time-use trade-offs or displacements into account.

Finally, adolescent health policies increasingly call for cross-sectoral and multi-modal interventions that address multiple risk and positive health behaviours (UNICEF, 2014; WHO, 2014). Altering overall behaviour patterns rather than behaviours in isolation may lead to greater intervention success (Cuenca-Garcia et al., 2013; Leech et al., 2014; Marques, Pizarro, Figueiredo, Mota, & Santos, 2013; Nelson, Gordon-Larson, Adair, & Popkin, 2005; Spengler, Mess, Mewes, Mensink, & Woll, 2012; Trilk et al., 2012). Identifying different time-use patterns amongst adolescents, and their determinants and outcomes, may thus enable the development of tailored time-use and lifestyle interventions that enhance the health, well-being and quality of life of adolescents (Ferrar, Olds et al., 2012; Ferrar, Chang et al., 2013).

1.12 Aim of the Study

Inspired by Yerxa (1993) the aim of this thesis is to examine the relationship between Irish late adolescents' engagement in a daily round of activity and their HRQoL. Using newly-collected time diary data I explore and describe the lives and lifestyles of well late adolescents in contemporary Ireland through an examination of their daily time use with specific consideration of gender and social class differences in time use. Thereafter the relationship between daily time use, life contexts, and HRQoL for males and females is examined. Finally, a person-centred analytic approach is used to examine the adolescents' overall time use and to establish whether distinct profiles of adolescent time use exist. The relationship between overall time use profiles and HRQoL is then examined using recently developed statistical methods.

Chapter Two

Literature Review

2.1 Introduction to this Chapter

This chapter contains three sections. The first two sections are separate scoping literature reviews. The purpose of the first review is to situate the empirical investigations of this thesis within the occupational therapy and occupational science discipline-specific literature. This review seeks to identify and map the extent and nature of time use research in occupational therapy and occupational science journals and the extent to which studies explored the relationship between time use and health. This has been accepted for publication in the *Scandinavian Journal of Occupational Therapy*. It is presented here largely as it will appear in the journal. Therefore there is a degree of overlap with some of the previous sections of this thesis. The tables/figures are presented together at the end of the scoping review. The second scoping review extends beyond occupational therapy and occupational science and maps time diary research with well adolescents across multiple disciplines and the use of person-centred data analysis of overall time use as a multidimensional unit. Additionally, it explores whether and how the included studies analysed the relationship between time use and health, well-being, and quality of life. The *Journal of Adolescent Health* has accepted a proposal for this scoping review (T. Berg, personal communication, May 28, 2014) and the review has been submitted largely as it appears in this chapter. Therefore, as with the first scoping review, there is some overlap. Similarly, the tables/figures appear at the end of the review. The third and final section of this chapter is a brief narrative review of selected HRQoL literature. Taken together, the three sections of this chapter provide a clear rationale and justification for the empirical studies that follow in Chapters Four, Five and Six.

2.2 A Scoping Review of Time Use Research in Occupational Therapy and Occupational Science

2.2.1 Abstract

Background: Time use is a defining interest within occupational therapy and occupational science. This is evident through the broad and sustained range of outputs and contributions to the disciplinary knowledge base. Indeed it has been suggested that time use methods are amongst the most established research techniques used to explore important aspects of human occupation. However, the extent and nature of such activity in occupational therapy and occupational science has not been examined to date. *Aim:* This study sought to identify and map the extent and nature of time use research in

occupational therapy and occupational science journals between 1990 and 2014 and the extent to which studies explored the relationship between time use and health. *Method:* A scoping review method was used. *Results:* Sixty-one studies met the inclusion criteria for this review. Scandinavian countries contributed the most number of studies (n=16, 26%). While time use diaries were used most frequently, occupational therapists and occupational scientists have developed a range of time use data collection instruments. Forty-nine studies (80%) focused on time use in clinical or defined population sub-groups. Ten studies (16%) included an empirical examination of the relationship between time use and health. *Conclusion:* Future research should examine time use and health amongst well populations across the lifespan and in different parts of the world.
Key words: *everyday activities, health, literature review, time diary*

2.2.2 Introduction

Time use is a defining interest in the fields of occupational therapy and occupational science. Adolph Meyer (1922/1977), widely considered the "father of occupational therapy" (Söderback, 2009, p. 44) called for "the awakening to a full meaning of time as the biggest wonder and asset of our lives" (p. 642). Kielhofner (1977) revisited the work of Meyer and Meyer's contemporary, Eleanor Clarke Slagle and credited them with one of occupational therapy's core propositions that "in the richness of man's daily routines and his purposeful use of time, there was both health maintaining and health regenerating potential" (p. 236). To this day occupational therapists remain passionate in their belief that the things people do in their everyday lives are the foundation of health and well-being (Hocking, 2013).

In the first publication from the discipline of occupational science Yerxa et al. (1990) similarly positioned a "concern for time" (p. 8) as central to understanding human occupational behaviour, with consideration required of "how a person occupies time, how satisfied she or he is with the use of time, and how well time use supports values and goals" (p. 8). Yerxa (1993) further argued that occupational science sought to address a major question confronting societies – "what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness" (p. 3). Eminent Canadian economist and time use researcher Andrew Harvey (1998) asserted that what people do minute-by-minute, day-by-day is at the heart of understanding them as occupational beings (p. 2). Wilcock (2014) recently commented on the goodness of fit

between the interdisciplinary field of time use research and occupational science, remembering a key meeting of time use researchers (including Andrew Harvey) interested in exploring time use, health, and well-being that took place in Canada in 1993 as the interdisciplinary potential of occupational science grew.

In 2003 Australian occupational therapist Louise Farnworth renewed attention on occupational therapy's association with time use. She explored the related concepts of time use, tempo, and temporality and questioned whether such topics were the core business of occupational therapy or of other professions. The central and enduring importance of time use in occupational therapy and occupational science is evident through the broad and sustained range of outputs and contributions to the knowledge base (see Table 2, page 58).[1]

Wilcock (2007) has suggested that time use methods are amongst the most established research techniques used in exploring important aspects of human occupation. However, the extent and nature of such research activity in occupational therapy and occupational science has not been examined to date. Therefore the purpose of this study is to map the extent and nature of time use research in occupational therapy and occupational science. A secondary aim is to examine the extent to which the included studies explored the relationship between time use and health. In this regard Yerxa's (1998) definition of health is employed. She described health not as the absence of pathology but as a "positive, dynamic state of 'well-beingness', reflecting adaptability, a good quality of life, and satisfaction in one's own activities" (p. 412).

2.2.3 Method

A scoping review method was used to map the relevant literature. According to Rumrill, Fitzgerald, and Merchant (2010) "many medical and social science fields have witnessed the emergence of scoping literature reviews as an alternative to traditional literature review methods" (p. 399). The Cochrane Public Health Group (Armstrong, Hall, Doyle, & Waters, 2011) described scoping reviews as "a useful and increasingly popular way to collect and organize important background information and develop a picture of the existing evidence base" (p. 147). Unlike traditional systematic reviews, scoping studies do not seek to assess the quality of evidence, synthesise evidence or aggregate findings from different studies (Arksey & O'Malley, 2005). However,

[1] While the information in this table did not emanate from the scoping review process, it provides a useful background to contextualise this review.

scoping reviews are particularly useful when an area is complex or has not been reviewed comprehensively before; where many different study designs are employed (Arksey & O'Malley, 2005); when there is a high volume of published work (Rumrill, Fitzgerald, & Merchant, 2010); and in younger disciplines when the lack of randomized controlled trials makes it difficult to undertake systematic reviews (Levac, Colquhoun, & O'Brien, 2010). Moreover scoping reviews are more time and cost effective than full systematic reviews. Scoping review methodology is growing in popularity in occupational therapy (McKinstry, Brown, & Gustafsson, 2014) and has been used to examine interventions for chronic diseases (Hand, Law, & McColl, 2011), immigration and its impact on daily occupations (Bennett, Scornaiencki, Brzozowski, Denis, & Magalhaes, 2012), occupational and self-identity after a brain injury (Bryson-Campbell, Shaw, O'Brien, Holmes, & Magalhaes, 2013); occupational engagement of older adults with low vision (McGrath & Rudman, 2013); and ecological sustainability (Wagman, 2014).

Arksey and O'Malley (2005) published the first methodological framework for conducting scoping reviews. They outlined five steps to guide researchers through the process: identifying the research question; identifying relevant studies; study selection; data charting; and finally collating, summarizing, and reporting the results. Levac et al. (2010) noted some challenges and limitations with Arksey and O'Malley's framework. They argued that the purpose of scoping studies can lack clarity, that the study selection process is iterative rather than linear and that the analytical method of charting data is poorly defined. Furthermore, they acknowledged the ongoing debate regarding the need or otherwise for quality assessment of included studies, particularly given the large number of studies often included in scoping reviews. Importantly, they also highlighted how the breadth and comprehensiveness of the scoping process needed to be balanced with feasibility. Arksey and O'Malley's five steps are outlined below.

Identifying the research question(s)

This review seeks to address the following two questions:

1. What is the extent and nature of time use research in occupational therapy and occupational science? Specifically, research trends, gaps in evidence, and methodological issues are examined.

2. To what extent do the identified studies examine the relationship between time use and health? Specifically, the review examines whether the studies empirically explored the relationship between time use and health using psychometrically tested instruments.

Identifying relevant studies

The following databases were searched: CINAHL, EMBASE, PsycINFO, Medline, Proquest, OTDBase, PubMed, with the keywords: Activity pattern, time, diary, time use, time budget, yesterday diary, time studies, time utilization, daily activities, time allocation and MeSH terms: time factors, time perceptions, time, occupational therapy, time and motion studies, and time management. Boolean operators were used.

Study selection

The review period was from 1990, when the first occupational science publication emerged, to June 2011 in the first instance. The review was then updated to March 2014. Studies were selected using the inclusion and exclusion criteria detailed in Table 3.

Data charting

The data charting form captured information relating to the author(s) and year of publication; geographical location of the study; study participants; sample size; if data were collected across 24 hours of the day; whether the study employed primary or secondary data analysis; the data collection method and analysis system used; the extent to which the studies addressed the varied methodological issues associated with time use research; and whether the study empirically explored the relationship between time use and subjective health and well-being, or quality of life using psychometrically tested instruments.

Collating, summarizing and reporting the results

Numerical analyses of the extent, nature, and distribution of the studies included in the review were conducted (Arksey & O'Malley, 2005) and the results are mapped in tables and charts. Non-numeric findings (e.g., the methodological issues associated with time use research) were synthesised and these results are presented in narrative form.

2.2.4 Results

Sixty-one studies published between 1990 and 2014 met the inclusion criteria for this review.[2] Figure 3 illustrates the number of publications in each year of the review period.

The number of studies has generally increased with a peak of seven studies in 2010. Of the regions represented in the review Scandinavian authors contributed the most studies (n=16, 26%) followed by the USA, Canada, and Australia (Table 4). The most frequently studied population was people with enduring mental illness followed by other clinical groups, defined population sub-groups, and finally well populations across the lifespan (Table 5). The vast majority of studies (n=50, 82%) were small/medium scale primary research projects with sample sizes ranging from one to 731. An additional seven (11%) studies related their findings (empirically or descriptively) with population-level time use datasets. Secondary analysis of representative population-level time use datasets was employed in five studies (7%). Almost half of the studies (n=30, 49%) used time diaries as data collection instruments. In 10 of these cases the time diary was a modified version of that used in the respective national time use surveys in Australia, Canada, Ireland, Japan, and Sweden. Table 6 presents the data collection methods used in the included studies.

Forty-eight studies (79%) captured data across 24 hours of the day, with three of these studies only reporting selected activities in the featured publication. Six studies (9%) captured data from early morning to late at night. These studies generally used the original Occupational Questionnaire (Smith, Kielhofner, & Watts, 1986) which records time use from 5am – 12midnight. Five studies (8%) employed daytime momentary observations, while the remaining two studies focused on time use during a school day and working day respectively. The studies captured data from various combinations of single weekdays; a weekday and a weekend day; "typical" days; full weeks; and single days recorded at intervals of a few weeks or pre and post an intervention.

A range of data coding approaches was noted. In the majority of studies the researcher(s) coded the activities recorded by the respondents. Coding schemes were derived from discipline-specific sources such as the American Occupational Therapy Association (AOTA) *Uniform Terminology* (1994), the AOTA (2008) *Practice*

[2] These are prefixed with an asterisk in the reference list at the end of this thesis.

Framework and the Canadian Association of Occupational Therapists (CAOT) *Guidelines for Client-Centred Practice* (1991). One study referred to the terminology of the WHO (2002) *International Classification of Functioning, Disability and Health*. Twenty studies (33%) used modified versions of coding schemes developed for use in national time use surveys in Australia, Canada, Ireland, the UK, and the USA, as well as harmonised European coding systems (Eurostat, 2004). A small proportion of studies used a pre-coded diary where respondents recorded what they were doing by choosing one of a number of listed activities largely representative of the diary day. The Occupational Questionnaire requires respondents to record their activities in their own words and also assign one of four codes to each listed activity. Additionally several authors used previous research to guide their data coding. Instrument specific coding systems and analysis software were used where applicable, for example, the Daily Life software (Ellegård & Nordell, 2008) used by time-geographers. Although some of the coding schemes and software have up to 600 individual activity codes, the number of codes reported across all studies ranged from three to 79 and in some cases included the use of sub-categories. Finally some researchers combined their time use data with interview transcripts and used qualitative methods in their analyses.

Ten studies (16%) included empirical examinations of the relationship between time use and health using generic instruments with established reliability and validity. The measures used were the Short Form 36 (in full or part) (Ware, Snow, Kosinski, & Gandek, 1993), the Swedish version of the Manchester Short Assessment of Quality of Life (Björkman & Svensson, 2005), the Göteborg Quality of Life Scale (Tibblin, Tibblin, Peciva, Kullman, & Svärdsudd, 1990), the Life Satisfaction Index-Z (Wood, Wylie, & Sheafor, 1969), the Self-Esteem Scale (Rosenberg, 1965), the Sense of Coherence Scale (Antonovsky, 1993), the Mastery Instrument (Pearlin, Menaghan, Lieberman, & Mullan, 1981), the Life Satisfaction Measure (Michalos, 1973), overall perceived health (McColl, Rosenthal, & McNair, 1991/2) and the Satisfaction with Life Scale (Diener, Emmons, Larson, & Griffen, 1985).

The majority of studies (n=46, 75%) included some consideration of the methodological issues present in time use research. These included the use of quality measures such as explicit training and procedures to maximise accuracy and consistency in data collection and coding; having a defined cut-off for the amount of missing time in a diary day; and the examination of extreme values/outliers. The psychometric properties of instruments were generally reported when applicable. Furthermore many studies assessed the

validity of their data by asking respondents to rate how well the diary day represented an average day. In some cases supplemental interviews were used to enhance diary quality. A smaller number of studies addressed one or more specific time use research issues such as seasonal variation in time use; the potentially high level of variability in time use across days of the week undermining the idea of a "typical day"; the potential under-reporting of simultaneous and short duration activities; the challenge of classifying activities; the time lapse between the designated diary day and diary completion; the error associated with retrospective recall of activities; and the possible social desirability bias when doing so.

2.2.5 Discussion

This is the first scoping review of time use research in occupational therapy and occupational science. Evidently time use is of enduring interest to occupational therapists and occupational scientists. The number of publications has generally grown in the time period. Indeed the decision to focus only on discipline-specific occupational therapy and occupational science journals means that we do not capture the increasing numbers of occupational time use researchers who are publishing to a wider audience in a broad range of interdisciplinary journals, for example Poulsen, Ziviani, and Cuskelly (2007); Sandqvist and Eklund (2008); O'Connell, Farnworth, and Hanson (2010); Desha, Nicholson, and Ziviani (2011); and Scanlan, Bundy, and Matthews (2011). Taken together, there is evidence to suggest that occupational therapists and occupational scientists are making an important contribution to the field of time use research.

The geographical distribution of the included studies may reflect the parameters of the scoping review which included studies written in English only. It may also reflect the Western perspective that dominates the occupational therapy and occupational science literature (Hammell, 2013). This is an important consideration in time use research when there are such variations in the perception and meaning of time across cultures (Levine, 2006; Pentland & Harvey, 1999). There is some evidence of culturally sensitive explorations of unique time perceptions for Maori (Whiteford & Barns, 1999) and Aboriginal (Yalmambirra, 2000) peoples by occupational therapists and occupational scientists. The findings of this scoping review suggest that further time use research is required "to gain a better understanding of occupational engagement for individuals from diverse communities, cultures and in varying geographical locations" (Ziviani et al., 2010, p. 440).

This study provides new evidence in support of Wilcock's (2007) claim that there is a "propensity for studies that are small-scale, individually based, and have significance or relevance to the practice of current day occupational therapy such as disability, care-giving, and ageing" (p. 3). Over half of the included studies involved clinical populations with modest sample sizes. Approximately 20% of the studies (n=12) examined the time use of well populations, with eight of the 12 focusing on the time use of older people. Without doubt the focus on older people is warranted as the WHO (2011b) projected the number of people aged 65 or older will grow from an estimated 524 million in 2010 to nearly 1.5 billion in 2050, with most of the increase in developing countries. As a result it called for coordinated research to discover the most cost-effective ways to maintain healthy lifestyles and everyday functioning in countries at different stages of economic development and with varying resources. However, given that there is also growing international recognition of the need for targeted, holistic, age-appropriate preventive and clinical services for all young people, not just those who are at risk or experiencing difficulties, (Gore et al., 2011; Kreipe, 2011; Viner et al., 2012) occupational researchers are encouraged to advance this agenda and prioritise studies on the lives of well children and young people as Lynch (2009) and Hunt, McKay, Fitzgerald, and Perry (2014) have done.

Secondary analysis of representative population-level time use datasets was employed in only five of the studies (7%) in this review. Evidently occupational researchers have yet to fully realize the potential of large population-level datasets, some of which now include data on time use and well-being (Hunt & McKay, 2012). Pierce (2012) called for large pattern predictive research on population differences in occupation and occupational patterns across 24-hour cycles, requiring methods and instruments that are better fit to the study of large samples. Indeed there are increasing calls for the strengthening of population and public health perspectives in occupational therapy and occupational science research, policy, and practice (Ciro, 2011; Hildenbrand & Lamb, 2013; Moll et al., 2013; Urbanowski et al., 2013; Whiteford, 2001; Ziviani et al., 2010) . Wilcock (1998b, 2003, 2006, 2010, 2014) and Hocking (2013) have been key proponents in this regard. Hocking (2013) argued that "occupational therapists need to look beyond providing good quality intervention for individuals who have already acquired a health condition" (p. 34) and extend their thinking to "practice that influences groups, organisations, communities – the whole of society" (p. 37). Moll et al. believed that the benefits associated with occupation should be promoted in the

realm of public health as well as how occupation can be a risk factor for ill-health. Similarly, in her editorial in the recent edition of the *Journal of Occupational Science* devoted in its entirety to occupation for population health, Wicks (2014) encouraged occupational scientists' "quest to understand how occupation has positive and negative implications for health at the personal, local, and global levels" (p. 2).

Ten studies (16%) were indentified that included an empirical examination of the relationship between time use and subjective well-being. Some studies did collect health and well-being data but did not examine their relationship with time use (Tuchner, Meiner, Parush, & Hartman-Maeir, 2010) while others examined related concepts such as occupational balance and health-related variables (Bejerholm, 2010). Arguably then Yerxa's (1993, 2005) question of how daily occupations including their patterns in time contribute to human happiness, life satisfaction, quality of life, and health requires further empirical attention. Law, Steinwender, and Leclair (1998) found little evidence in the occupational therapy literature to support the belief that there is a relationship between occupation, health, and well-being. More recently Pierce (2012) claimed that the lack of research on the relationship of occupation to health and quality of life is a "critical gap" (p. 302) in occupational science research. Wilcock (2007) has called for further exploration of "the apparent health or illness outcomes of contemporary lifestyles from an occupational perspective" (p. 3-4). Such explorations need to include quantitative and qualitative studies to grasp actual relationships between occupation and health at the population level (Frank, 2014). Crucially longitudinal research is required that may identify causal pathways in the relationship between time use, health, and well-being (Law et al., 1998).

A significant number of the included studies used discipline-specific coding schemes to guide their analyses. Wilcock (2014) recently suggested that the use of discipline-specific terminology by all those who seek to "describe or study particular aspects of all that people do across the wake-sleep continuum from birth to death" has limited knowledge development. For example, the term occupation is "not currently in the lexicon of public health" (Moll et al., 2013, p. 115). Clark (2006) advocated the careful use of language that "travels well in interdisciplinary contexts to describe the relationship of occupation to health" (p. 176). Farnworth (2004) argued that activity is a more appropriate term to use in population-level time use research rather than occupation which relates to time use at the individual level. Occupational researchers

may wish to consider using generic activity coding schemes such as that contained in the recently released *Guidelines for Harmonising Time Use Surveys* (UNECE, 2013). In this way time use research can contribute important and valid information on the "form" or "observable aspects" (Larson & Zemke, 2003, p. 80) of occupation at a population level.

According to Pentland and Harvey (1999) "in order that time use research be maximally useful across disciplines, investigators have a responsibility to consider and consult various theoretical and methodological aspects" (p. 264). While it was reassuring to find that the majority of the studies in this review were sensitive to issues of reliability, validity, and trustworthiness, specific time use research methodological considerations received less attention. Many excellent resources are available to assist occupational researchers in conducting high quality time use research (Pentland, Harvey, Lawton, & McColl, 1999; UNECE, 2013).

Finally, as Michelson (2005) stated, "the whole is greater than the sum of its parts" (p. 103) particularly given the zero-sum nature of time "in which there is only a fixed amount of time to be distributed and traded off among necessary and desired activities" (p. 18). The reporting of aggregate-level statistics and major time allocation estimates does not allow for the full richness of time use data to be utilized (Pentland & Harvey, 1999). Unique patterns that are not represented by the aggregate-level average may be identified by person-centred rather than more traditional variable-centred approaches (Bergman & Magnusson, 1997). While such methods are increasingly popular in contemporary research on lifestyles and health behaviours (Buck & Frosini, 2012; Ferrar, Chang, et al., 2013; Leech et al., 2014; Newby & Tucker, 2004; Ottovaere et al., 2011), none of the studies in our review used these empirical cluster or latent class analytic strategies. However seven studies (11%) in this review used person-centred time-geographic methods (Kroksmark et al., 2006) capturing activity patterns as a multidimensional unit with outputs in the form of graphs that illustrate the complexity of "everyday patterns of doing" (Erlandsson, 2013a, p. 16).

2.2.6 Limitations

As with all research this study has a number of limitations. The review was limited to studies of time use to the exclusion of studies of tempo and temporality of which there are many. Indeed these topics could be the focus of future scoping reviews. While many of the included studies reported affective states or states of mind associated with time

use; and perceived competence, value, and enjoyment in relation to time use, only those studies that examined time use and health using generic instruments with established psychometric properties were considered. Although the two authors did consult each other throughout the scoping review process, resource limitations prohibited the independent review of each of the articles. As is the norm in scoping reviews the findings from these studies were not synthesised. Again a review focusing exclusively on these studies would be an important addition to the knowledge base. This review excluded studies that explored the meaning of time use. However, as Pierce (2001) stated, "occupational therapists require sophisticated understandings of both the cultural repertoire of typical activities for persons of different ages and backgrounds and the complex nature of the personally constructed and fully contexted occupational experiences" (p. 144), thus necessitating both quantitative and qualitative approaches as advocated by Frank (2014).

2.2.7 Conclusion

This scoping review extends the existing literature by identifying and mapping, for the first time, the extent and nature of time use research in occupational therapy and occupational science journals; and the extent to which the identified studies explored the relationship between time use and health. Sixty-one studies were identified. Evidently time use is of enduring interest to occupational therapists and occupational scientists. Studies from Scandinavia, North America, and Australia predominate. While time use diaries were used most frequently, occupational therapists and occupational scientists have developed a range of time use data collection instruments. Forty-nine studies (80%) focused on time use in clinical or defined population sub-groups. A detailed evaluation and synthesis of the evidence emanating from the small number of studies (n=10, 16%) that empirically examined time use and health is warranted. Moreover occupational therapists and occupational scientists should consider more large-scale quantitative research into the time use and health of well populations across the life span at local and global levels. In so doing they will be able to further strengthen the core business of occupational therapy of creating health in everyday patterns of doing (Erlandsson, 2013a) and address Yerxa's (1993, 2005) central question of how work, rest, play, and the quotidian occupations including their patterns in time contribute to human happiness, health, and quality of life.

Table 2

Selected Outputs that Illustrate the Central and Enduring Importance of Time Use in Occupational Therapy and Occupational Science

Conceptual models relating to time use	Temporal Adaptation (Kielhofner, 1977) Value and Meaning in Occupations (ValMO) Model (Persson, Erlandsson, Eklund & Iwarsson, 2001) Synthesis of Child, Occupational Performance and Environment in Time (SCOPE-IT) Model (Poulsen & Ziviani, 2004)
Selected keynote lectures on time use and everyday occupations	Law (2002) Farnworth (2003) Christiansen (2007) Zemke (2004) Erlandsson (2013a)
Literature reviews on aspects of time use	Desha & Ziviani (2007) Eklund, Leufstadius, & Bejerholm (2009) Barclay et al. (2011) Pemberton & Cox (2011)
Overviews of time use methodologies	Farnworth et al. (1996) Holsti & Barr (2006) Ziviani et al. (2008) Daunhauer & Bundy-Fazioli (2008) Hunt & McKay (2012)
Journal of Occupational Science Dialogue on Terminology	Farnworth & Fossey (2003)
International Society for Occupational Science Online international discussion	ISOS 2010"Occupational Patterns in Time and Space".
Selected books and book chapters	Pentland, Harvey, Lawton, & McColl (1999) Farnworth (2004) Ziviani, Desha & Rodger (2006) Harvey & Singleton (2009) Harvey & Pentland (2010)
Assessments	Activity Configuration (Mosey, 1973) Activity in Context and Time (Wood, 2005) Caregiver's Activity and Recording of Events Inventory (Crowe, 2001) Profiles of Occupational Engagement in Schizophrenia (Bejerholm, Hansson, & Eklund, 2006) Modified Occupational Questionnaire (Scanlan & Bundy, 2011) Mother's Time Use Questionnaire (Rassafiani, Kahjoogh, Hosseini, & Sahaf, 2012) Occupational Questionnaire (Smith et al., 1986) Time geography (Kroksmark et al., 2006) Time and Space Use Inventory (McNulty, Crowe, Kroening, VanLeit, & Good, 2009)
Interventions	Action Over Inertia (Edgelow & Krupa, 2011) Redesigning Daily Occupations (ReDO) Programme (Erlandsson, 2013b) Lighter Living (LiLi) program (Orban, Edberg, Thorngren-Jerneck, Önnerfalt, & Erlandsson, 2014)

Table 3

Study One Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1990 – 2014	Not tempo or temporality
Data collected on a broad range of daily activities, not discrete activities in isolation	Not studies of meaning of time use
Human time use	Not time use relating to service delivery, student supervison or the development of assessment tools
English	Not theoretical or methodological papers
Published in peer reviewed occupational therapy and occupational science journals	Not book chapters / theses

Table 4

Geographical Location of Studies

Geographical Location	n (%)
Scandinavia	16 (26)
United States of America (USA)	11 (18)
Canada	11 (18)
Australia	10 (16)
United Kingdom (UK)	4 (6)
Ireland	3 (5)
Middle East	3 (5)
Asia	3 (5)

Table 5

Populations Examined in Study One

			n (%)
Clinical Population	Clinical Diagnosis – Enduring Mental Illness	e.g., schizophrenia	17 (28)
	Clinical Diagnosis - Other	e.g., rheumatoid arthritis, cancer, CVA, traumatic brain injury, spinal cord injury, pain, HIV, binge eating disorder, diabetes, cerebral palsy, obesity, Alzheimer's Disease, environmental sensitivity, low vision, obese children	16 (26)
Defined Population Sub-groups	Adults	e.g., unemployed people, survivors of terrorist attacks, survivors of domestic abuse, mothers of children with/without disabilities, older adults attending community OT, parents of obese children, working married mothers, employed adults, OT/PT students	11 (18)
	Children / Adolescents	e.g., gifted students, young offenders, children in orphanages, teen mothers, children at risk of conduct problems,	5 (8)
Well Population	'Well' older adults		8 (13)
	'Well' general adult population		2 (3)
	'Well' adolescents		1 (2)
	'Well' typically developing children		1 (2)

Table 6

Data Collection Instruments

Instrument	n (%)
Time diaries	30 (49%)
Activity Configuration/Occupational Questionnaire/Modified Occupational Questionnaire	11 (18)
Time geographic method	7 (11)
Experience Sampling Method	3 (5)
Mother's Time Use Questionnaire	2 (3)
Caregiver's Activity and Recording of Events Inventory	2 (3)
Spot observations/Behavioural mapping	2 (3)
Profile of Occupational Engagement in People with Schizophrenia [POES]	2 (3)
Time and Space Use Inventory	1 (2)
Activity in Context and Time [ACT]	1 (2)

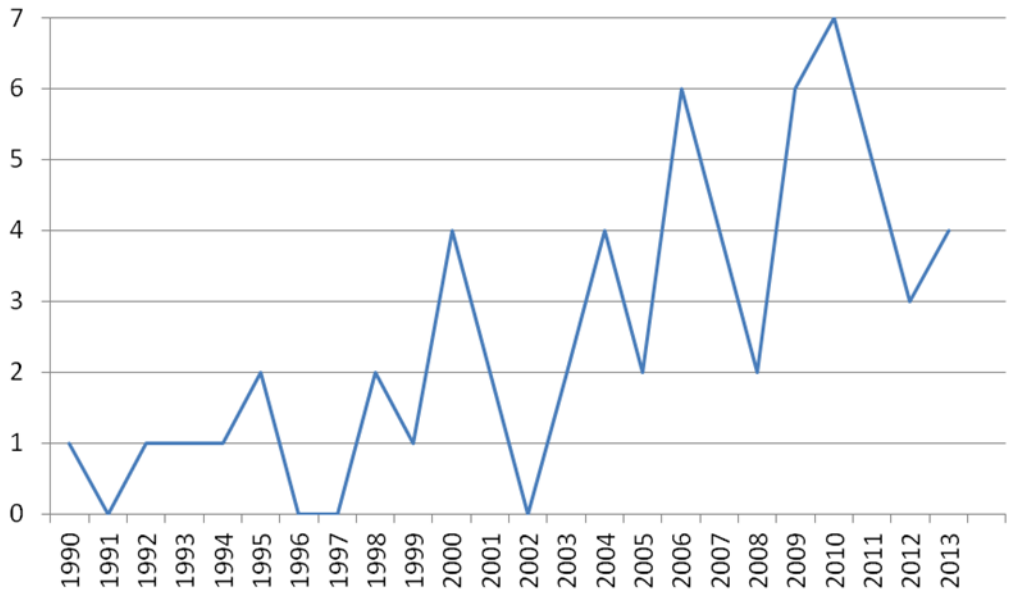


Figure 3. Number of publications in each year of the review period. (2014 is not included in this chart as the review period extended only to the first three months of the year.)

2.3 A Scoping Review of Adolescent Time Diary Research

2.3.1 Abstract

Background: Time use is increasingly being recognised as a determinant and indicator of adolescent well-being internationally. Existing literature reviews of time use research with children and adolescents have identified time use diaries as the preferred data collection method. Furthermore, they have encouraged researchers to examine multidimensional patterns of overall time use in large sample whole child populations in order to better understand the health, well-being, and quality of life of children and young people. However, these three existing reviews differ in the time frames covered; the age ranges targeted; the categories of time use examined; and the time use data collection and analysis methods used. *Aim:* This study aimed to map the extent and nature of time diary studies with well adolescents (aged 10 – 19 years) and the use of person-centred data analysis of overall time use as a multidimensional unit. Finally, it explores whether and how the included studies analysed the relationship between time use and health, well-being, and quality of life. *Method:* A scoping review method was employed using Arksey and O'Malley's (2005) 5-stage framework. *Results:* Thirty-three studies met the inclusion criteria. The majority of studies were secondary analyses of cross-sectional population-level time use or lifestyle survey data. One third of studies (n=11) captured data representing 24 hours of the day. Two studies (6%) used person-centred analyses while six studies (18%) empirically examined time use in relation to health and well-being. No studies examined adolescent 24-hour time use and quality of life. *Conclusion:* Adolescent time use researchers are encouraged to be explicit in identifying the stage of adolescence to which their studies relate; capture 24-hour time use data; consider the analysis of overall activity patterns as multidimensional units using person-centred analyses; and use robust reliable, valid, sensitive, and age-appropriate instruments to empirically examine time use and health, well-being, and quality of life.

Key words: *literature review, time use, young people, teenager*

2.3.2 Background and Need

Around 1 in 6 persons in the world (approximately 1.2 billion people) is an adolescent aged 10 to 19 years (WHO, 2014a). In the last 50 years their health has improved to a lesser extent than that of younger children (Sawyer et al., 2012). As a result there is

growing international recognition of the need for targeted, holistic, age-appropriate preventive and clinical services for all young people, not just those who are at risk or experiencing difficulties (Gore et al., 2011; Kreipe, 2011; Viner et al., 2012). There is now an emphasis on wellness rather than the prevention of poor health (Hamilton, 2006), and on "lives not just risk factors" (Marmot, 2009, p. S126). The promotion of healthy lifestyles amongst adolescents is particularly important (Hagell et al., 2013, The Lancet, 2012) to prevent the accelerating burden of non-communicable diseases in adulthood (Viner, 2013).

According to Harvey and Pentland (1999), "time use methodology can provide a window on actual lifestyles" (p. 3). Indeed time use is increasingly being recognised as a determinant and indicator of adolescent well-being internationally (Ben-Arieh & Ofir, 2002; Brooker & Hyman, 2010; Larson & Verma, 1999; Rees et al., 2010; United Nations, 2005; Vogler et al., 2009). Short (2005) argued that in order to put all parts of young people's lives into context we need to see how they fill their days.

How young people fill their days has been the focus of three published literature reviews in the last 25 years. Developmental psychologists Larson and Verma (1999) conducted a widely cited review of studies of the time use of children and adolescents aged 5 - 18 years from around the world. They examined studies that employed a variety of data collection methods to explore time spent in four categories of daily activity namely school, paid work, housework, and leisure. Personal care, including sleep, was not included as the authors argued that these activities varied comparatively little across populations. Fifty-eight studies published between 1973 and 1999 were included in the review. The most frequently used data collection method was found to be the 24-hour time diary. The authors gave more credibility to findings of time diary studies (along with experience sampling method and spot observations) over stylised time use estimates (i.e., survey questions that ask people to estimate the total time they spend undertaking various activities in a specified time period) because of their proven accuracy.

Three years later social workers Ben-Arieh and Ofir (2002) published their review of the time use of young people aged 0 - 18 years. Studies published between 1980 and 1999 that examined a range of activities across the day rather than discrete activities in isolation (e.g., television viewing) were included. Twenty-two studies met the inclusion criteria. Concluding their review Ben-Arieh and Ofir recommended that 24-hour diaries

be used in time use research with children and adolescents; that the focus should be on overall patterns of activity across the day; and that such studies should target the "whole child population" (p. 238) rather than smaller scale studies involving specific populations.

The third review was conducted more recently and focused exclusively on adolescent overall time use patterns. In this systematic review health and use of time researchers Ferrar, Chang, et al. (2013) identified 19 studies published in the last 10 years that used person-centred cluster analytic techniques to empirically describe adolescent time use patterns, measured by a variety of methods including study specific stylised time use estimates or established tools such as the *Self-Administered Physical Activity Checklist* (Sallis, Strikmiller, Harsha, & Feldman, 1996). Only one study used a 24-hour activity recall, the computer administered *Multimedia Activity Recall for Children and Adolescents* (MARCA) (Ridley, Olds, & Hill, 2006). The included studies related to young people between the ages of 9 and 18 years and had a minimum of two time use variables as cluster analysis inputs.

Clearly the three reviews differ in the time frames covered; the age ranges targeted; the categories of time use examined and the time use data collection and analysis methods used. Furthermore, neither the Larson and Verma (1999) nor the Ben-Arieh and Ofir (2002) reviews sought to quantify whether or how the included studies explicitly addressed time use and health, well-being, and quality of life. While not a primary focus of their review Ferrar, Chang, et al. (2013) did note that, with the exception of weight status, few health-related variables were included as correlates in the adolescent time use cluster studies they reviewed.

The present scoping review thus extends the literature in a number of ways. It focuses on time use studies with well adolescents aged 10 - 19 years rather than studies involving both children and adolescents. Given that time diaries are considered the most robust method of time use data collection (UNECE, 2013), only studies that employed time diaries to capture data across multiple categories of daily activity are included. Furthermore, it examines the extent to which such overall patterns of activity were analysed as a multidimensional unit using person-centred analytic strategies. Finally this review explores whether and how the included studies analysed the relationship between time use and health, well-being, and quality of life. Both objective measures of

health, such as weight status and physical fitness, and subjective positive indicators of well-being and quality of life (Ben-Arieh, 2010; Lippman et al., 2009) are considered.

2.3.3 Method

A scoping review method was used to map the relevant literature. According to Rumrill et al. (2010), "many medical and social science fields have witnessed the emergence of scoping literature reviews as an alternative to traditional literature review methods" (p. 399). Unlike traditional systematic reviews, scoping studies do not seek to assess the quality of evidence, synthesise evidence or aggregate findings from different studies (Arksey & O'Malley, 2005). As the lack of randomized controlled trials in this area makes it difficult to undertake a systematic review (Levac et al., 2010), a scoping review method was deemed most appropriate. This approach has been used successfully in various recent studies relating to adolescent health (Kimber, Couturier, Georgiades, Wahoush, & Jack, 2014; Rahman, Islam, & Alam, 2014; Sawyer, Ambresin, Bennett, & Patton, 2014).

Arksey and O'Malley (2005) published the first methodological framework for conducting scoping reviews. They outlined five steps to guide researchers through the process: identifying the research question; identifying relevant studies; study selection; data charting; and finally, collating, summarizing and reporting the results. Arksey and O'Malley's five steps are outlined below as they relate to the present scoping review.

Identifying the research question(s)

Specifically, this review sought to address the following three questions:

1. What is the extent and nature of time diary studies with well adolescents?
2. To what extent are person-centred analyses used?
3. Whether and how the identified studies examined the relationship between time use and health, well-being and quality of life?

Identifying relevant studies

Nine databases were searched: CINAHL, EMBASE, PsycINFO, Medline, Proquest, OTDBase, PubMed, SCOPUS and Science Direct. The following keywords (singly and in combination) and phrases were used: adolescent time use, time use, time, time diary, time budget, daily activities, daily time use, young people, young person, diary, time use, time budget, yesterday diary, time studies, time utilization, daily activities, and time allocation. Truncation (i.e., the retrieval of all words with the same stem but with

variant endings) was employed as follows: lifestyle*, child*, youth*, teen*, teenage*, adolescen*, as were the MeSH terms: time factors, time perceptions, time, time and motion studies, and time management. Boolean operators were used and the reference lists of key articles were reviewed.

Study selection

The review period was from 1990 to June 2011 in the first instance. The review was then updated to March 2014. Studies were selected using the inclusion and exclusion criteria detailed in Table 7.

Data charting

The data charting form captured information relating to the author(s) and year of publication; study design; the geographical location of the study; study population; sample size; the diary administration method; the number of activity categories[3] and activities recorded; whether the study used variable-centred or person-centred analyses; and whether the study explored the relationship between time use and objective indicators of health or subjective health, well-being, and quality of life.

Collating, summarizing and reporting the results

Numerical analyses of the extent and nature of the studies included in the review were conducted (Arksey & O'Malley, 2005) and the results are mapped in tables and figures or reported in the text. Non-numeric findings were synthesised and are presented in narrative form.

[3] Based on the classification traditionally used in time diary surveys and that used by Zuzanek and Mannell (2005) in the Comparative Study of Adolescent Time Use (CATUS) project, daily activities were considered broadly representative of a 24-hour day if six major categories were addressed, namely personal needs (including sleep), school-related time, work for pay, domestic work, voluntary and religious activities, and free time.

2.3.4 Results

Thirty-three studies published between 1990 and 2014 met the inclusion criteria for this review.[4] Twenty-nine were cross-sectional studies and four were analyses of longitudinal data. Table 8 shows the geographical distribution of the included studies. The USA and mainland Europe ranked the highest with seven studies each. In the latter case, six of the seven studies were part of a multinational adolescent time use research project, the Comparative Study of Adolescent Time Use (CATUS) (Zuzanek & Mannell, 2005).

A significant majority of the included studies (n=29, 88%) were secondary analyses of existing datasets while the remaining four (12%) were smaller studies that gathered new data from small to medium size samples. The datasets used for secondary analysis were national time use datasets (n=17, 52%) or other national lifestyle datasets (n=12, 36%) that afforded large representative samples. Diary data collection methods included self-report paper diaries (n=17, 52%), the MARCA (n=6, 18%) and telephone or face-to-face interview administered diaries (n=10, 30%).

As evidenced in the data charting form (Appendix B) the age periods to which the studies related varied significantly. For example some studies focused on 5 - 18 year olds while others examined time use among 9 - 16 year olds. Those studies that were part of the CATUS project (Zuzanek & Mannell, 2005) primarily focused on 15 - 19 year olds.

Figure 4 shows the number of activity categories represented in the studies, with six categories broadly representing a 24-hour day. Eleven studies (33%) captured data across six activity categories while twelve studies (36%) captured data across five activity categories. The number of individual activity codes that were used in the studies ranged from eight to 365.

Thirty-one (94%) of the studies involved variable-centred analyses of time use. Gender differences in time use were the focus of enquiry in six of these studies (19%). The second most common focus was changes in time use over time (n=4, 13%). Other topics included social inequalities in time use; daily activities and stress; time use and travel;

[4] These studies are prefixed with this symbol in the thesis reference list: ◆

time use and maternal employment; cross-national differences in time use; and the transition to adulthood.

Two studies (6%) used person-centred analytic techniques. Ferrar, Olds, and Maher (2012) used cluster analysis in their examination of Australian adolescents' (n=1,853, 9 - 16 years) multi-dimensional time use as captured by the MARCA. Distinct sex specific time use clusters emerged, namely *social tasker*, *techno-active*, and *techno-studious* for males and *social screenie*, *quiet active*, and *techno-studious* for females. Cluster associations with socio-demographic, anthropometric, health, and dietary variables were analysed. Ferrar, Olds, Maher, and Maddison (2013) also used cluster analysis in their examination of New Zealand adolescents' (n=679, 10 - 16 years) multi-dimensional time use. Different activity patterns characterised the three female clusters (*social sporty*, *screenie tasker* and *super studious*) and three male clusters (*techno-active, quiet movers* and *social studious*). Weight status, diet, and ethnicity were examined as cluster correlates.

Nine studies (27%) examined time use and objective indicators of health (Table 9). In some cases multiple indicators were used in a single study. The most frequently used indicator was weight status or body mass index (BMI). Six studies (18%) used non-standardised questions relating to subjective experiences of time pressure, boredom, happiness, satisfaction with time use, physical fitness, and well-being. However, only two of these studies empirically examined time use in relation to these subjective states. No studies examined adolescent 24-hour time use and quality of life.

2.3.5 Discussion

The purpose of this scoping review was to map the extent and nature of time diary studies with well adolescents; to determine the extent to which person-centred analyses were used; and to explore whether and how the identified studies examined the relationship between time use and health, well-being, and quality of life.

Extent and nature of adolescent time diary studies

Thirty-three studies met the inclusion criteria for this scoping review. The majority of studies were cross-sectional in design, thus no causal inferences can be drawn. However, there are some examples of time use studies using longitudinal data.

Copperman and Bhat (2007) and Forshee, Anderson, and Storey (2009) analysed time use data from the Child Development Supplement (CDS) of the longitudinal US Panel Study of Income Dynamics (Institute for Social Research, 2012). Longitudinal time use studies in particular offer exciting opportunities to understand the lives and worlds of young people and unpack some of the complexities of causation and endogeneity (Duncan, Magnuson, & Ludwig, 2004) characteristic of studies of adolescent development (Agans et al., 2014). As advocated by Larson and Verma (1999) repeated studies of adolescent time use would allow for an assessment of macro-level changes on young people's lifestyles.

The studies identified in this review are diverse in their focus of enquiry, geographical locations, and target populations. The majority of studies involved secondary analyses of existing population-level datasets. This is positive as large-scale samples of the well "whole child population" are examined (Ben-Arieh & Ofir, 2002, p. 238). The extent of diversity in target age ranges is a less positive finding of this review. The significant differences in age ranges make it very difficult to make comparisons across studies. Moreover wide age bands in studies of young people may hide rich information specific to narrower developmental stages (Hagell et al., 2013). Park et al. (2014) and Sawyer et al. (2012) argued that research and development in knowledge and service delivery in adolescent health have been compounded by inconsistent age definitions. They and others (Gore et al., 2011) encouraged researchers to explicitly describe the developmental stage within adolescence to which their studies relate and to that end, recommended the use of quinary age bands, namely early adolescence (10 - 14 years), late adolescence (15 - 19 years), and young adulthood (20 - 24 years). The WHO (2014b) has also recognised the need for age-specific data on young people and has made age disaggregation a standard feature of its data analysis.

One-third of studies captured data across six activity categories, broadly representing 24 hours of the day. Ben-Arieh and Ofir (2002) also found that the majority of studies did not examine children's overall time use and suggested that as a result "we have only a partial knowledge of children's lives, activities, and time use" (p. 234). Zuzanek (2005) encouraged those concerned with adolescents' health to pay attention "to adolescents' overall patterns of daily life, including sleep, eating habits, mass media consumption, extra-curricular activities, and relationships with parents and peers" (p. 413), a view supported more recently by Hagell et al. (2012) who observed that in the United

Kingdom, research on "the patterning of the whole day not just a few discretionary hours" (p. 71) is limited. Within the occupational therapy literature too there have been calls for more research on occupational patterns across 24-hour cycles (Pierce, 2012).

Variable-centred or person-centred analyses

In addition to these calls for data collection from across the whole day, there is growing recognition of the need to analyse activity patterns as multidimensional units, that is, the overall activity pattern rather than discrete activities in isolation (Farb & Matjasko, 2012; Ferrar, Chang, et al., 2013; Hagell et al., 2012; Pentland & Harvey, 1999). This is not surprising given that "time devoted to one domain of activity takes on full meaning only when viewed in terms of its functional relation to time spent in other domains" (Shanahan & Flaherty, 2001, p. 386). Christiansen and Townsend (2010) suggested that the relationship between lifestyles (which are largely defined by daily activities) and health and well-being is now being considered from a more macroscopic viewpoint with interest in overall patterns of daily activities. Unique patterns that are not represented by the aggregate-level average may be identified by person-centred rather than more traditional variable-centred approaches (Bergman & Magnusson, 1997; von Eye, Bogat, & Rhodes, 2006). While such methods are becoming increasingly popular in research on adolescent lifestyles (Leech et al., 2014; Ottovaere et al., 2011) these studies tend to examine discrete behaviours (e.g., physical activity, sedentary behaviour) rather than 24-hour time use and in many cases are based on stylised estimates of time use rather than diary data. For example, in Ferrar, Chang, et al.'s (2013) systematic review of adolescent time use clusters, only one of the 19 studies used data from across the 24 hours of the day as cluster inputs. The current scoping review identified two studies (6%) that used person-centred analyses of 24-hour time use data. Evidently this is a significant gap in the knowledge base.

Studies of time use and health and well-being

Nine studies (27%) examined time use and objective indicators of health, most frequently weight status or BMI. This is not surprising given the widespread concerns about overweight and obesity amongst children and adolescents (McPherson, 2014; Ng et al., 2014; WHO, 2014a). The WHO (2012b) and governments internationally (Active Healthy Kids Australia, 2014; Department of Health and Children, 2013; U.K. Department of Health, 2013; U.S. Department of Health and Human Services, 2010) have targeted the unhealthy physical activity behaviours of children and adolescents as a

key priority to address the increasing prevalence and burden of overweight, obesity, and other non-communicable diseases. Taking a different approach to exploring time use and objective indicators of health, by drawing where possible on national guidelines such as those from the U.S. National Sleep Foundation and the American Academy of Pediatricians (relating to screen time), Wight, Price, Bianchi, and Hunt (2009) constructed objective measures of time use relevant to adolescents (n=2,033, 15 - 17 year olds) well-being, such as sleep, eating, schoolwork, and television viewing, using data from the nationally representative 2003 - 2005 American Time Use Survey. Advances in technology offer exciting opportunities to collect rich objective data on 24-hour time use and health behaviours including physical activity and sleep (Albinali, Intille, Haskell, & Rosenberger, 2010; Runyan et al., 2013). Future adolescent time diary studies should consider using such technologies which are more likely to appeal to current generations of young people who are more proficient users of technology and media (Rideout, Foehr, & Roberts, 2010), thus potentially yielding higher response rates and more accurate data.

Six studies examined time use and subjective health and well-being. Hilbrecht and Zuzanek (2005), Short (2005), Vaage (2005), and Hilbrecht, Zuzanek, and Mannell (2008) used non-standardised questions relating to subjective experiences of time pressure, boredom, happiness, satisfaction with time use, physical fitness, and well-being, but did not examine time use in relation to these subjective states. Only two studies attempted such analyses. Using three separate datasets including the Dutch Time Use Survey 1980 - 2000, Huysmans, Zeijl, and van den Broek (2005) explored adolescent activity and well-being correlates, including physical, emotional, social, and cognitive development, but limited their analyses to leisure activities. Some significant but weak relationships were found suggesting that young people who participated actively in sports, clubs, and cultural activities scored somewhat better on most well-being dimensions compared with those who spent less time in these activities. However, the authors highlighted the inconclusive nature of their results and the fact that the time use and well-being data were drawn from separate datasets. One indicator of well-being, namely self-assessed health, was included in the 1999 Belgian Time Use Survey, allowing Glorieux, Stevens and Vandeweyer (2005) to compare the time use of adolescents (n=750, 12 – 19 years) who rated their health as very good with those with health ratings of good to very poor. Although the authors provided limited details on these results, they did report that Belgian time use data suggested that “adolescents with

a somewhat more active leisure lifestyle and who spend time with their peers enjoy better health" (p. 504). However, the authors noted both the lack of statistical significance in the findings and the limitations inherent in the use of a single health indicator.

Thus this review highlights the very limited empirical research that has examined time use in relation to health, well-being, and quality of life. This echoes the finding of Ferrar, Chang, et al. (2013) who noted that health-related variables were largely unexplored as cluster correlates with the notable exception of weight status associations which were reported in six of the 19 studies. Furthermore, these findings support Glorieux et al.'s belief (2005) that "the questionnaires accompanying time-diaries are not well suited to link activity patterns of adolescents with more sophisticated indicators of health and well-being" (p. 505). This review identified no evidence of the use of standardised, generic, cross-cultural instruments for the subjective measurement of positive health and well-being. This is at odds with current perspectives in adolescent health that favour strengths-based approaches to understanding the lives of young people and that prioritise their self-report of health and well-being (Brooks & Hanafin, 2005; Huang et al., 2014; Lippman et al., 2009; Nic Gabhainn & Sixsmith, 2005; Rees et al., 2010; Statham & Chase, 2010; The Children's Society, 2013). Although quality of life is recognised as an important component in the measurement of well-being (OECD, 2013) no studies were identified that examined adolescent 24-hour time use and quality of life. Reliable, valid, sensitive, and age-appropriate instruments need to be used to robustly examine time use and health, well-being, and quality of life amongst adolescents.

2.3.6 Limitations

Arksey and O'Malley's (2005) framework is not without its limitations, most notably the potential for lack of rigor in data charting and the absence of quality assessment of included studies (Levac et al., 2010). However, it is generally accepted that the breadth and comprehensiveness of the scoping process needs to be balanced with feasibility (Levac et al., 2010). The Cochrane Public Health Group (Armstrong et al., 2011) recognised scoping reviews as a useful means to compile information relating to the existing evidence base. Although the two authors did consult each other throughout the scoping review process, resource limitations prohibited the independent review of each of the articles. Therefore it is possible that some bias may have been introduced.

However, the rigorous application of the study inclusion and exclusion criteria minimised this risk.

2.3.7 Conclusion

This scoping review mapped the extent and nature of time diary studies with well adolescents. Thirty-three studies met the inclusion criteria. The majority of studies were secondary analyses of cross-sectional population-level time use or lifestyle survey data. One-third of studies (n=11) captured data representing 24 hours of the day. Two studies (6%) used person-centred analyses while six studies (18%) examined time use and health and well-being. No studies were identified that examined adolescent 24-hour time use and quality of life. Adolescent time use researchers are encouraged to explicitly identify the stage of adolescence to which their studies relate; capture 24-hour time use data; consider the analysis of overall activity patterns as multidimensional units using person-centred analyses; and use robust, reliable, valid, sensitive, and age-appropriate instruments to empirically examine time use in relation to health, well-being, and quality of life.

Table 7

Study Two Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1990 – 2014	Not primarily focused on children (e.g., 0-13 years)
Empirical data on a broad range of daily activities / multiple activity domains (3 or more activity categories[1])	Not clinical populations (e.g., teenagers with cerebral palsy)
Adolescent age range: 10-19 years	Not discrete activities in isolation (e.g., watching television)
Well adolescents	Not theoretical or methodological papers or literature reviews
Time diaries as data collection instrument	Not book chapters / theses / grey literature
Findings reported as actual time spent in activities	Not time use converted into metabolic equivalents (METS) or energy expenditure
Human time use	
Published in English in peer-reviewed journals	

Table 8

Geographical Distribution of Studies

Region	n (%)
USA	7 (21)
Mainland Europe	7 (21)
Australia	6 (18)
UK	3 (9)
Multi-region	3 (9)
Canada	2 (6)
New Zealand	1 (3)
Taiwan	1 (3)
Indonesia	1 (3)
South Africa	1 (3)
Ireland	1 (3)

Note. Percentages do not total to 100 due to rounding.

Table 9

Objective Indicators of Health in Adolescent Time Diary Studies

Objective Indicator	n (%)
Weight status or body mass index (BMI)	5 (15)
Accelerometry / pedometry	2 (6)
Physical activity intensity levels and metabolic equivalents (METS)	2 (6)
Diet	2 (6)
Health Index (presence of health conditions)	1 (3)
Salivary cortisol	1 (3)

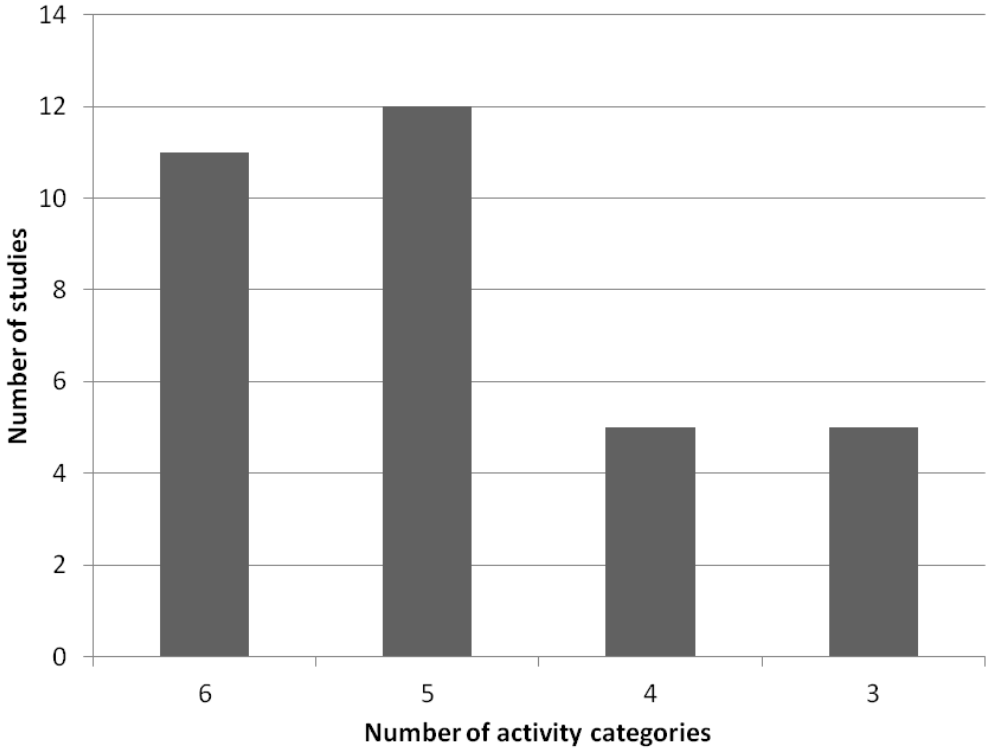


Figure 4. Number of activity categories represented in the included studies.

2.4 Quality of Life and Health-related Quality of Life

2.4.1 Quality of Life

Life expectancy around the world has increased steadily for nearly 200 years (Kirkwood, 2008). In Ireland life expectancy at birth is now 81 years**,** one year higher than the OECD (2013) average of 80 years. This compares starkly with figures from 1950 of 64.5 years for Irish men and 67.1 years for Irish women (Department of Health, 2012). Reduced infant and maternal mortality and advances in sanitation, housing, medicine, and technology have all contributed to these increases. The 21st century has, as Yerxa (1998) forecasted, ushered in "an unprecedented era of chronicity due to medicine's ability to preserve life" (p. 412). Consequently within public health and medicine there is now a focus on *quality* of life in addition to *quantity* of life (KIDSCREEN Group Europe, 2006).

Quality of life (QoL) is complex to define and quantify (Huebner et al., 2004). QoL has been conceptualised from objective and subjective perspectives. Historically objective measures were favoured including individual and population-level indicators such as income levels, employment rates, and gross national product (GNP) and environmental features, for example, housing density, access to medical and recreational services, and air quality (Zullig, Valois, Huebner, & Drane, 2005). More recently individuals' subjective perceptions of the quality of their lives have taken precedence (OECD, 2013). The WHO (1995) Quality of Life Group defined QoL as "people's perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" (p. 1405). Similarly De Civita et al. (2005) considered QoL a broad term that encompasses an "individual's subjective perception of well-being across all domains of life" (p. 661).

Historically subjective quality of life research has involved adults in the main (Huebner et al., 2004; Zullig et al., 2005). However, since the late 1980s, interest in the quality of life of children and adolescents has increased (Edwards, Huebner, Connell, & Patrick, 2002; Wallander, Schmitt, & Koot, 2001). Keenaghan and Kilroe (2008) described three waves of development in QoL research with children. The first wave in the 1980s was concerned with the assessment of QoL in children as a theoretical concept. The construction of QoL measures for children was the focus of the second wave in the mid-1990s followed later by the application of these measures in clinical and epidemiological studies. Concluding their review of QoL measurement in children and

adolescents Wallander et al. (2001) suggested that QoL could represent the "ultimate standard" (p. 583) against which to judge the impact of the varied conditions children encounter in their daily lives and society's efforts to nurture their development. Moreover they argued that "all who work with or are otherwise concerned with children would hold as one of their most important goals to ensure that children experience a life of quality" (p. 583).

2.4.2 Health-related Quality of Life

The measurement of *health-related* quality of life (HRQoL) of young people at a population level has recently begun to be explored (KIDSCREEN Group Europe, 2006). Indeed there is growing consensus that the creation of a complete picture of children's health status requires an assessment of HRQoL outcomes (Matza et al., 2004). HRQoL has evolved as a term since the 1980s and encompasses "those aspects of overall quality of life that can be clearly shown to affect health" (U.S. Department of Health and Human Services, 2000, p. 6) and that are within the remit of the healthcare system (De Civita et al., 2005). In her review article on the domains of HRQoL that are of specific importance to adolescents Frisen (2007) stated that HRQoL is "generally conceptualized as a multi-dimensional construct encompassing several major domains including the physical, social, and emotional functioning of the individual" (p. 963). Additional domains include mental, cultural, and behavioural components of well-being and function as perceived by the young person (Keenaghan & Kilroe, 2008). Furthermore it is recognised that children's HRQoL depends on complex interactions between the child and multiple social contexts, such as family, peer, and community groups (Matza et al., 2004).

Ebrahim (1995) described six specific purposes of HRQoL measurement:

1. Monitoring the health of the population
2. Evaluating the effects of health and social policies
3. Allocating resource in relation to need
4. Diagnosis of the nature, severity, and prognosis of disease
5. Evaluating the effects of treatment
6. Discovering aetiological factors

These purposes are echoed in an Irish context and with specific reference to children and adolescents by Keenaghan and Kilroe (2008) who asserted that young people's subjective measurement of HRQoL is an important component of health surveillance; can aid in the identification of sub-groups of children and adolescents who are at-risk

for health problems; influences public policy decisions related to children's and adolescents' health; and assists the allocation of healthcare resources.

However, the measurement of HRQoL amongst children and adolescents poses some challenges (Harding, 2001; Matza et al., 2004). These include the youngest age at which children can reliably report their HRQoL; whether children themselves or their proxies are the most appropriate respondents; developmental differences in cognition, maturity and literacy across childhood; the identification and inclusion of domains that are important in the lives of children; age-appropriate instrument formatting and design and avoiding child response sets (i.e., the tendency to provide a certain type of response regardless of the question). No doubt reflecting contemporary perspectives on child and adolescent health, young people are increasingly deemed the preferred reporters in assessments of their well-being and HRQoL (Ben-Arieh, 2010; Huang et al., 2014). Moreover it has been shown that when an age-appropriate instrument is used young people can reliably and validly self-report their HRQoL (Varni, Limbers, & Burwinkle, 2007).

Notwithstanding these challenges there has been a proliferation in the development and use of both generic and condition-specific HRQoL measures for use with children and adolescents in the last 20 years (Matza et al., 2004; Rajmil et al, 2004). In their systematic review of currently available generic and disease-specific HRQOL instruments for children and adolescents, Solans et al. (2008) identified 30 generic and 64 disease-specific instruments, 51 of which were published between 2001 and 2005. Considering Ebrahim's (1995) aforementioned purposes of HRQoL measurement, generic instruments are used to monitor the health of the population, evaluate the effects of health and social policies, and allocate resources in relation to need, while condition-specific measures aid in understanding the aetiology, severity and prognosis of disease and the development and evaluation of appropriate treatments. It has been suggested more recently that generic measures should be applied more universally as the impact of a disease may be better understood through comparing the HRQoL of those with and without a specific condition (KIDSCREEN Group Europe, 2006). However, condition-specific HRQoL studies appear more frequently in the literature, for example, studies involving adolescents with low back pain (Pellise et al., 2009), weight status/obesity (Cui, Zack, & Wethington, 2014; Morales et al., 2013; Nicholls et al., 2014), mental illness (Weitkamp, Daniels, Romer, & Wiegand-Grefe, 2013), coeliac disease (Altobelli et al., 2013), eating disorders (Jenkins et al., 2014) and congenital heart disease

(Mellion et al., 2014). Furthermore, the relationship between HRQoL and specific lifestyle behaviours in adolescents has been explored, for example physical activity and sedentary behaviours (Galán et al., 2013; Gopinath et al., 2012; Lacy et al., 2012) and electronic media use (Lacy et al, 2012; Mathers et al., 2009).

Harvey (1993) suggested that a "major part of well-being or quality of life flows from the interaction of the individual with others and the environment. That is, well-being is shaped by the vicissitudes of daily living" (p. 27). He posited that "evaluation of quality of life is closely connected with how one lives out one's daily life" (p. 29) and as such time use studies make an ideal contribution to the evaluation of quality of life. However, as evidenced in the scoping review of adolescent time diary research in the previous section, there is a paucity of research examining adolescents' daily activities across 24-hours and HRQoL. Moreover there is a lack of research on the HRQoL and lifestyles of well young people thus the relationship between HRQoL and time use in this population requires exploration.

Chapter Three

Methodology

3.1 Introduction to this Chapter

This chapter describes the design and implementation of this research study. The measurement of the time use of adolescents is briefly described followed by a detailed description of the development of the survey instrument. Building on the review of selected HRQoL literature in Chapter Two, an overview of recommendations for the measurement of HRQoL of children and adolescents is provided. The ethical principles and practices employed in this study are then described. The involvement of an advisory group of young people in the design and pre-piloting of the survey instrument is presented. Thereafter sampling, recruitment, and data collection procedures are outlined as are data entry, cleaning, and preparation. International guidelines regarding the analysis of time use data are briefly reviewed with specific data analytic plans outlined in the respective results chapters that follow (Chapters Four, Five and Six). The quality enhancement strategies employed in this study are summarized. A critique of this study's methodology is presented later as part of the discussion chapter (Chapter Seven).

3.2 Measuring Time Use

According to Harvey and Pentland, co-editors of the book *Time Use Research in the Social Sciences* (1999), "time use methodology can provide a window on actual lifestyles, thereby permitting a rich, objective, and replicable basis on which to make empirical judgements" (p. 3). There are a range of recognised methods of measuring time use including direct observation, stylized estimates (i.e., survey questions that ask people to estimate the total time they spend undertaking various activities in a specified time period), experience sampling method (ESM), time stamped/spot observations, and time diaries (National Research Council, 2000). Each method has strengths and weaknesses relative to the other (Juster, Ono, & Stafford, 2003; United Nations, 2005). The UNECE (2013) Task Force on Time Use Surveys favoured the time diary method arguing that the resultant data are more accurate and detailed than the alternatives. Eurostat (2004, 2009), the United Nations (2005), and the UNECE (2013) have produced detailed guidelines for the design, implementation, and analysis of time diary surveys.

3.2.1 Measuring Time Use of Young People

While the research literature on children's time use suggests that using a combination of data collection methods yields very rich findings, quantitative data, such as those generated from time use surveys, can provide a good overview of general patterns of activities (Vogler et al., 2009). Indeed in their detailed review of child and adolescent time use research internationally Larson and Verma (1999) found the most frequently used method to be the 24-hour time diary. They gave more credibility to findings of time diary studies (along with ESM and spot observations) over stylised time use estimates because of their proven accuracy. For the same reasons Plewis, Creeser, and Mooney (1990) and Ben-Arieh and Ofir (2002) recommended time diaries over other methodologies in time use research with children and adolescents. The Multinational Time Use Study at the University of Oxford, UK (Fisher & Gershuny, 2012) now includes 18 time use datasets with diaries from young people, ranging in age from 3 - 17 years, from Europe, the USA, and Israel. Additionally countries such as Australia, the USA, and Ireland collect longitudinal time diary data from young people. In 2015 the UK Millennium Cohort Study will collect time diary data from British 14-year-olds. Based on these recommendations and the prevalence of diary studies in research on the time use of young people time diaries were chosen as the data collection method for this study.

3.2.2 Full-scale and Light Time Use Diaries

The United Nations (2005) distinguished between what are referred to as "full-scale" and "light" diaries. Full-scale diaries require participants, usually over the age of 15 years, to write what they were doing in their own words. These diaries are then coded by researchers with reference to detailed coding schemes. Light diaries use pre-defined activity categories from which the participants select the activities they were doing. The UNECE (2013) favoured the full-scale diary format in data collection for national estimates of time use. However, while the light diary format collects fewer episodes, a more limited range of activities, and less overall detail, it is less burdensome for participants and significantly cheaper than the full-scale format with its expensive and time intensive coding requirement (UNECE, 2013). The light diary format has been used successfully in many national time use surveys including the UK, Denmark, Sweden, and Ireland. With the above considerations in mind a light diary format was chosen for this study.

3.3 Development of Survey Instrument

Time use was measured using an adapted form of the light diary instrument used by the Irish Economic and Social Research Institute (ESRI) in their 2005 study of adult time use (McGinnity et al., 2005). Permission was received from the ESRI to use this instrument in this doctoral study and, as described below, the candidate consulted with researchers there regarding the study design and survey instrument amendments. The ESRI light diary contained 26 pre-coded activities (Table 10). Participants were required to indicate the activities in which they were involved over the course of the day. Information on location and co-presence (i.e., who else was present at the time) was also sought. The day was divided into 96 periods of 15 minutes running from 4.00am to 4.00am the following morning. Participants completed one weekday diary and one weekend diary. Data collection in the ESRI study took place between April and July 2005. Potential seasonal variation in time use was not accounted for as it was a feasibility study rather than a full-scale survey.

Table 10

Pre-coded List of Activity Categories and Individual Activities (McGinnity et al., 2005)

Activity Category	Activity
Personal care/resting	Sleeping Resting/relaxing Personal care Eating/drinking/having a meal
Travel	Travel
Paid employment or study	Paid employment Study, education Breaks from work or study
Housework and other household tasks	Cooking Cleaning House repairs
Shopping and appointments	Shopping, messages/errands & appointments
Caring for others	Childcare Playing and talking with children Caring for adults
Voluntary and religious activity	Voluntary activity Religious activity
Socialising and going out	Spending time/chatting with family, friends, neighbours Phoning/texting family, friends, neighbours Eating out/going to the pub Going out
Sports and leisure	Playing sports, exercise and outdoor activity Computer/internet for personal use Hobbies and other leisure activities
TV, radio, reading	Watching TV Reading or listening to music

McGinnity et al. (2005) reported that the core element of their diary instrument worked well, that is, the 26 activity codes and 96 time slots. They found that the analysis of multiple simultaneous activities was problematic and advised that future light diary instruments ask respondents to indicate which of the activities was their main or primary activity (i.e., that which demanded most of their attention). Furthermore McGinnity et al. reported that the location questions had a high item non-response and as a result it was recommended that the location dimension be incorporated into certain key activities (e.g., eating).

For the purposes of this study McGinnity et al.'s (2005) list of activities was revised slightly to ensure age-appropriateness. This was done in consultation with an advisory group. (The work with the advisory group is described in greater detail below.) The main changes were in the housework category where "cooking", "cleaning", and "house repairs" were replaced with "doing housework". "Paid employment or study" was separated into "school and study" and "paid work". A "travelling outside of work/school" and "resting/relaxing" activity option were added on the advice of McGinnity et al. (2005). The final list contained 31 activities across six categories (Table 11) and was in keeping with the activity categories used in adolescent time use surveys internationally thus enabling future cross-national comparisons (Zuzanek & Mannell, 2005).

Table 11

Pre-coded List of Activity Categories and Individual Activities Used in this Study

Activity Category	Activity
Personal needs	Sleeping Personal care Eating/drinking/having a meal
School and study	Attending class and class/school related activities Eating/drinking at school Doing homework/studying at school Travelling to and from school Doing homework/studying at home
Paid work	Paid employment Travelling to and from work Breaks from work
Housework and other household tasks	Doing housework Shopping, errands and appointments Caring for others
Voluntary and religious activity	Voluntary activity Religious activity
Leisure and free time activities	Extracurricular activities Hanging around with friends, boyfriend, girlfriend Socialising with family Talking on the phone, texting Going out Shopping for pleasure Attending cinema/theatre/concerts Playing sports, exercise & physical activity Computer/internet Hobbies/other leisure activities Watching TV etc Listening to radio or music Reading Travelling outside of work/school Resting/relaxing

3.3.1 Designation of Diary Day

Ideally in time use studies weekdays are randomly allocated and equally represented across the sample (UNECE, 2013). However, according to the United Nations (2005), this is generally not strictly achievable. This was the case in this doctoral study as the day of diary distribution was determined by the school and class group timetable and availability. As a result diary days were designated with the aim of being as close as possible in time to the day of initial diary distribution in order to maximise accurate recall of activities. Therefore there was a mix of "yesterday" and "tomorrow" diaries in this study. The usual way in which respondents are asked to provide self-reports of their time use is by asking them to complete a yesterday diary (i.e., a diary in which participants retrospectively record the previous day's activities) or tomorrow diary (i.e., a diary is left with respondents to complete over the course of a designated day in the near future) (United Nations, 2005). Some reports suggest that tomorrow diary data are of marginally higher quality than data from yesterday diaries, but the difference is relatively small and may not warrant the significant difference in cost (United Nations, 2005). Most recently the UNECE (2013) stated that, given the reasonably similar estimates produced by yesterday and tomorrow diaries, it is expected that researchers and national statistical offices choose an approach that best meets their needs.

3.4 Measuring Health-related Quality of Life

A number of authors have offered guidance on the measurement of HRQoL amongst children and adolescents. Ravens-Sieberer et al. (2006) recommended that the selection of child and adolescent HRQoL instruments should be made with consideration to "applicability across different diseases as well as in healthy respondents; the availability of versions in several languages; tested and confirmed psychometric quality; scientific publication of the instrument; a self-report administration method and a conceptual basis primarily focused on children and adolescents" (p. 1204). Furthermore, in their systematic review of generic and disease specific HRQoL instruments for children and young people, Solans et al. (2008) further advocated that consideration be given to "whether the questionnaire suits the purpose of the investigation, if the dimensions covered are relevant to the context, and the availability of the questionnaire for the age group of interest" (p. 759). Finally, Huang et al. (2014) recommended that paediatric patient-reported outcome instruments give careful consideration to content that is appropriate for the cognitive development, reading ability, vocabulary, and language

skill of children. When an age-appropriate instrument is used young people can reliably and validly self-report their HRQoL (Varni et al., 2007). Bearing in mind the above criteria the KIDSCREEN-52 instrument (Ravens-Sieberer et al., 2005) was selected as the most appropriate measure to assess the HRQoL of participants in the present study. Additionally and importantly the KIDSCREEN instruments have been validated for children and adolescents in Ireland and Irish reference data are available (Keenaghan & Kilroe, 2008).

3.4.1 KIDSCREEN Instruments

Following receipt of a signed collaboration agreement the KIDSCREEN Group Europe granted the candidate permission to use the KIDSCREEN instrument. This instrument was developed across Europe as a self-report measure applicable for healthy and chronically ill children and adolescents aged from 8 - 18 years. The KIDSCREEN instruments conceptualise quality of life as a multidimensional construct covering physical, emotional, mental, social, and behavioural components of well-being and functioning as perceived by the young person or his or her proxy (Ravens-Sieberer et al., 2014). The KIDSCREEN-52 assesses 10 dimensions of health-related quality of life: "physical well-being", "psychological well-being", "moods and emotions", "self-perception", "autonomy", "parent relations and home life", "social support and peers", "school environment", "social acceptance", and "financial resources". The questionnaires were constructed, harmonised, and tested in the context of a simultaneous multinational development process and were the first generic HRQoL instrument to comprehensively fulfil the standards promoted by the WHO for a child-suitable measurement of HRQoL (Ravens-Sieberer et al., 2006). When used as a research instrument the KIDSCREEN yields data that can contribute to a better understanding of perceived health in children and adolescents in Europe and to planning, carrying out, and evaluating innovations in health services.

Extensive and rigorous psychometric testing has shown the KIDSCREEN to be a reliable, valid, and sensitive measure (Ravens-Sieberer et al., 2014). During its development phase, Cronbach's alphas, the coefficient commonly used to estimate the reliability of instruments based on internal consistency (Hays, Anderson, & Revicki, 1993) were calculated for the 10 KIDSCREEN-52 dimensions and ranged satisfactorily between 0.76 and 0.89. A global HRQoL score (the KIDSCREEN-10 Index) was also generated from 10 items of the KIDSCREEN-52 (Erhart et al., 2009). The KIDSCREEN-10 Index too demonstrated good psychometric properties (Ravens-

Sieberer et al., 2010). As Cronbach's alpha coefficient is sample specific, the coefficients should be computed each time an instrument is administered (DeVon et al., 2007). Cronbach's alphas for the present doctoral study were 0.95 (KIDSCREEN-52) and 0.86 (KIDSCREEN-10 Index). While there is a rationale for a reliability level of 0.90 in the interpretation of individual level scores, reliabilities exceeding 0.70 are considered acceptable for group comparisons in clinical studies (Hays et al., 1993). The KIDSCREEN items use a 5-point Likert type scale. Interpretations for very low or very high scores for each of the KIDSCREEN-52 domains and the global HRQoL score are shown in Table 12 (KIDSCREEN Group Europe, 2006).

Table 12

Interpretation of KIDSCREEN scores

KIDSCREEN-52 Domains	Low Score	High Score
Physical Well-being	Physically exhausted, physically unwell, feeling unfit, having low energy	Physically fit, active, healthy, energetic
Psychological Well-being	No pleasure in life, dissatisfaction with life	Happy, views life positively, satisfied with life, pleased, cheerful
Moods & Emotions	Feels depressed, unhappy, in a bad mood	Feeling good, feeling in a good mood
Self Perception	Negative body image, self-rejection, unhappy/dissatisfied with self, having low self-esteem, feeling uncomfortable with his/her appearance	Self-confident, satisfied with him/herself, positive body image, happy with him/herself, having good self-esteem, comfortable with his/her appearance
Autonomy	Restricted, oppressed, dependent	Feeling free to decide, independent, autonomous
Parent Relations & Home Life	Feeling alone, overlooked, not appreciated, perceives parents as unavailable/unfair	Feeling secure, supported and loved, feeling well understood, well cared-for, perceives parents as available/fair
Financial Resources	Feeling finances are restricting lifestyle, feeling financially disadvantaged	Feeling satisfied with financial resources, feeling well-off, enjoying financial resources
Social Support & Peers	Feeling excluded, not accepted by peers, not supported by peers, not able to rely on peers	Feeling accepted, supported and included in peer group, able to rely on peers
School Environment	Disliking school and/or teachers, negative feelings about school, not doing well	Feeling happy at school and doing well, enjoying school life
Social Acceptance (Bullying)	Feeling tormented by peers, bullied, feeling rejected by peers	Not feeling bullied, feeling respected and accepted by peers
KIDSCREEN-10 Index	Feeling unhappy, unfit and dissatisfied with regards to family life, peers and school life	Feeling happy, fit and satisfied with regards to family life, peers and school life

3.5 Ethics

The Department of Children and Youth Affairs (2012b) *Guidance for Developing Ethical Research Projects with Children* described the basic ethical principles that apply to all research including: a commitment to the well-being, protection, and safety of participants; a duty to respect the rights and wishes of those involved; a responsibility to conduct high-quality scientific research; and a commitment to disseminate and communicate the results to stakeholders. These principles underpin this doctoral research. Moreover Hill (2005) cites the work of Alderson who developed a framework to translate such core principles of ethical research to research that involves children. Hill groups these together to include involvement of children in the research; consent and choice; possible harm or distress; and privacy and confidentiality. Each of these is considered below.

3.5.1 Involvement of Young People in the Research

As described in more detail below an advisory group of students was convened to seek the input of young people in the design of this study's materials and procedures. The candidate drew on her extensive clinical and university experience in working with young people and endeavoured to ensure that the establishment and operation of this group was as "young person-centred" as possible. The advisory group gave recommendations on the adaptation of the adult light diary activities and were instrumental in determining whether to include primary and secondary activities or primary activities alone. All participant research materials (i.e., information letters and consent/assent forms) were reviewed and approved by the advisory group. Felzman, Sixsmith, O'Higgins, Ni Chonnachtaigh, and NicGabhainn (2010) noted that the preparation of age-appropriate and accessible informed consent materials can be enhanced by the involvement of young people in their design. Finally, to respect and acknowledge the input of all the young people in the project, a preliminary feedback leaflet was designed and circulated to participating schools and young people in February 2008 (Appendix C).

3.5.2 Consent and Choice

Parent and student written information was provided and written consent/assent secured from both parties prior to the establishment of the advisory group (Appendix D).[1] For the pilot and main study, access was negotiated through school principals or nominated staff, who consented to the participation of their school in the project. Within each school, the candidate visited the classes to explain the purpose of the project and to distribute written information and consent/assent forms for parents and students (Appendix D). She then returned on an agreed date (approximately one week later) to collect consent/assent forms and distribute the survey instruments. Certificates of participation were made available to all participants in this project (Appendix E). There was no gift or payment for participation. As a gesture of goodwill, the candidate offered to come to participating schools to give a presentation on occupational therapy as a career or to provide an educational session on lifestyles and health.

3.5.3 Possible Harm or Distress

It was deemed possible that some of the items on the KIDSCREEN-52 instrument may give rise to emotional distress. To minimise this risk participants were encouraged to avail of identified supports within their school setting. It was hoped that advisory group participants would benefit directly from the experience of contributing to a project that directly related to their lives thus giving them a voice in matters that affected them. It was further hoped that survey participants may benefit directly through having the opportunity to reflect on their own time use, lifestyles, and well-being.

3.5.4 Privacy and Confidentiality

To preserve their anonymity, participants (schools and individual students) were identified by a code number only. Data were entered into a statistical programme for analysis. All computer files were password protected. Names and any other identifiable data were not included in the study, or published, discussed, disclosed or used in subsequent reports. Advisory group documentation, completed consent/assent forms, and completed survey questionnaires are all stored securely in locked filing cabinets.

[1] Informed assent, rather than consent, is the term used when a child, defined in Ireland as a person below the age of 18 years, agrees to participate in a research project (Department of Children and Youth Affairs, 2012b)

These materials will be retained for a period of five years after completion of the study and will be destroyed thereafter.

With due consideration for the issues identified above and in accordance with the requirements of the appropriate research ethics committee at University College Cork, a detailed protocol submission form was completed in September 2006. Ethical approval was subsequently granted by the Research Ethics Committee of the Cork Teaching Hospitals (reference number: ECM 4 (a) 10/10/06, Appendix F). Thereafter protocol amendment forms were submitted to notify the ethics committee of changes to the supervisory team and duration of the project as appropriate. Ethics renewal forms were submitted annually.

3.6 Advisory Group

As mentioned above, this study was designed in consultation with teachers and an advisory group of Transition Year students (usually aged 15 - 16 years) from one second-level school in Cork city. This was in keeping with the National Children's Office (2005) policy document *Young Voices – Guidelines on How to Involve Children and Young People in Your Work*, which emphasises the participation of young people in issues that affect them. The school was purposefully selected as the Social and Personal Health Education (SPHE) coordinator was made known to the researcher by the SPHE Regional Development Officer. As part of the second-level school curriculum, SPHE supports the personal development, health, and well-being of young people and helps them create and maintain supportive relationships ("SPHE Welcome", n.d.). Furthermore the school was a designated "Health Promoting School" (Health Service Executive, n.d.). It was therefore hoped that the request to be a host school for the advisory group would be favourably met. A letter of invitation was sent to the SPHE coordinator in May 2006 (Appendix G) and a subsequent meeting was held in September 2006 to consult with her on the proposed advisory group. Following receipt of ethical approval for the study by the university's ethics committee, the school principal, SPHE coordinator, and Transition Year coordinator all gave their permission for their school to host the advisory group. In early October 2006 the candidate met with all the Transition Year students at the school to provide information about the advisory group (Appendix D). The students were advised that a commitment of one school year was requested involving between three and five lunchtime meetings.

Students were invited to indicate if they wished to be involved. Ten names (five male and five female) were then drawn at random. Letters of information (Appendix D) were sent to the parents of the selected students. Two weeks later a lunchtime information meeting took place with the students and their parents at which written consent/assent was secured (Appendix D).

Table 13

Schedule of Work with Student Advisory Group and School Staff

Meeting Date	Focus
20th September 2006	Meeting with the SPHE Coordinator in the school
4th October 2006	Meeting with all TY students Advisory group participants randomly selected
16th October 2006	Meeting with parents and students to secure informed consent/assent
23rd October 2006	Develop group guidelines Distribute draft questionnaire – gather initial feedback
6th November 2006	Discuss completed questionnaire (NB primary/secondary activities; activity categories, layout & instructions; experience of completing questionnaire; complete KIDSCREEN questionnaire)
1st March 2007	Present revised questionnaire Review supplementary materials Presentation of certificates of participation to the students
16th April 2007	Consultation with SPHE coordinator and TY coordinator re. maximising main survey school participation

Note. SPHE = Social and Personal Health Education. TY = Transition Year

Three work meetings took place with the advisory group, as outlined above (Table 13). The most significant input from the students was in adapting the ESRI light diary activity list to make it more age-appropriate. In addition, one half of the group trialled one version of a diary in which only primary activities were recorded while the second half of the group recorded both primary and secondary activities. Based on recommendations from McGinnity et al. (2005), feedback from the students, and discussions with the supervisory team it was decided to capture information on primary

and optional secondary activities in the main survey with participants being asked to "tick" their main activity and use a "star" to denote a secondary activity, if applicable. This largely meets the recommendation from the UNECE (2013) wherein they advocated the recording of at least one parallel activity with participants indicating which activity is the primary or main activity. However, in their recommendations, the recording of a secondary activity was mandatory whereas it was optional in the current study. That said it is well recognised in the literature that time diary surveys are usually adapted for younger participants. For example, Fisher and Gershuny (2012) noted that many of the Harmonised European Time Use Studies (HETUS) did not ask young people to record a secondary activity.

The advisory group also reviewed the draft information leaflets and consent/assent forms for ease of comprehension. They completed the KIDSCREEN-52 survey without difficulty, although one female student did comment that some of the questions might make some people feel sad. The group completed two drafts of the diary. They reported that it was easier to complete the diary the second time round. As a result, it was decided to include time to complete a "practice diary page" as part of the planned data collection procedure, thus allowing participants to raise any questions they had as they arose.

Seven of the 10 advisory group participants returned their completed pre-pilot diary. It was noted that remembering to return the completed questionnaire would be potentially problematic. Only three of the diaries were returned to the school by the agreed date (two weeks after administration), with the remaining four collected at a later date. This was discussed with the advisory group. A number of reminder strategies were identified such as writing a note in homework journal, putting reminders into mobile phones, putting a sticker into school journal, identifying a reminder "buddy", and having teachers remind students. Following this discussion, reminder stickers were designed and printed for the main study (Appendix H).

At the third and final meeting with the advisory group, the students were each presented with certificates of participation for inclusion in their Transition Year portfolios (Appendix E). Letters of thanks were also sent to each student, the principal, SPHE coordinator, and the Transition Year coordinator (Appendix I). The candidate was subsequently asked to be in a photograph with the advisory group for the school magazine.

3.7 Consultation with National and International Time Use Researchers on the Draft Time Use Diary

Consultation with national and international experts from the field of time use research took place on an ongoing basis during the lifetime of this doctoral research. In January 2006, the candidate attended a seminar on the *Time Use in Ireland Survey Report* (McGinnity et al., 2005) at the ESRI offices in Dublin and afterwards met the principal researchers of the report. The candidate participated in the University of Essex one-week summer school on time use data collection and analysis in August 2006 facilitated by Dr. Kimberly Fisher of the International Association of Time Use Research. She remained in email contact with Dr. Fisher thereafter regarding survey design and data analysis issues. Following email correspondence since the meeting in January 2006, the draft time use diary and supplementary materials were emailed to Dr. Frances McGinnity, principal author of the *Time Use in Ireland Survey Report* (2005) in November 2006. She responded that the amendments looked sensible and yet comparisons with the adult data set would still be largely possible. She advised that a "doing nothing/relaxing" activity be included, also an option for travel other than to school or work. She also commented on the challenges of capturing primary and secondary activity data and location/co-presence information. There was ongoing consultation during this doctoral research with Professor Jiri Zuzanek (University of Waterloo, Canada) who was the principal researcher on the Comparative Study of Adolescent Time Use (associated with the International Association for Time Use Research). Professor Zuzanek was also joint editor of the 2005 special edition of the journal *Society & Leisure* devoted to adolescents' time use, leisure participation, and well-being from a cross national perspective (Zuzanek & Mannell, 2005). The candidate met with Professor Zuzanek at the International Association of Time Use Research conferences in 2006 and 2007 and communicated with him via email in the intervening periods.

3.8 Pilot Study

Not surprisingly the pre-testing of diary formats, activity classifications, and field procedures is deemed essential in time use research (United Nations, 2005). The draft survey instrument and data collection procedure were piloted in two schools (one male and one female) in Cork city. These schools were purposively selected as the principals were made known to the candidate through academic colleagues. The principals were asked in writing if they would facilitate the pilot study. The candidate then liaised with

the principal and/or class teachers to secure parent and student consent/assent and administer the questionnaire. Sixty-one students (36 male and 25 female students) completed the pilot survey.

The pilot study proved critical in testing the operational procedures for the survey. As Sleap, Elliott, Paisi, and Reed (2007) found, it was evident that the class teachers would need to be fully briefed on the proposed survey so that they could respond to questions and provide any necessary supports to facilitate maximum questionnaire completion and return. As a result, in the main survey, meetings took place with the class teachers to brief them on the study and written information was provided to the teachers at all stages of the data collection process (Appendix J). A flyer was also created for distribution to other school staff to keep them informed about the study (Appendix K). Parent feedback from the pilot study, channelled via the class teacher, was that the parent information leaflet was off-putting in places especially where the KIDSCREEN-52 instrument was described as having some questions that participants may find upsetting. Based on this feedback the parent and student information sheets underwent further revision and refinement to enhance clarity and appeal.

In July 2007 two sets of parents (work colleagues of the candidate) of senior cycle students were sent survey materials and invited to review them for ease of understanding etc. No issues were identified. Table 14 outlines the timeline of data collection stages.

Table 14

Timeline of Data Collection Stages

Data Collection Timeline		
2006	September	Ethical approval received
	October - November	Instrument development and pre-pilot with advisory group
	November	Consultation with national and international time use researchers on draft instrument
2007	March	Conclusion of pre-pilot and advisory group meetings
	March - April	Pilot study
	May - September	Recruitment of schools for main survey
	September - December	Main data collection

3.9 Final Version of the Main Survey Booklet

The final survey questionnaire booklet thus contained information and instructions, a sample diary page and two 24-hour light diaries (one for a weekday and one for a weekend day) with diary quality questions. These questions were drawn from the *Time Use in Ireland Survey Report* (McGinnity et al., 2005) and included:

1. How long did it take you to fill in this diary?
2. When did you fill in this diary?
3. Was this diary day unusual in any way?
4. Did you have any problems filling out the diary?
5. Were there any activities which you feel were not covered on the list?

The responses to these questions are reported in Chapter 7 in the context of a critique of the quality of the time use data in this study. The questionnaire booklet also contained a copy of the KIDSCREEN-52 instrument and some additional demographic/background questions. Individual participants recorded their age, gender, nationality, and family context. School year and school location were recorded by the candidate. Participants' descriptions of their parents' occupations were coded in accordance with the Irish CSO (2011) system resulting in a 7-item social class scale ranging from "professional

workers" (highest) to "unskilled" and "all others gainfully employed and unknown" (lowest). As described by Gavin et al. (2013), "social class 1 represents professional occupations (e.g., solicitor, doctor), social class 2 represents managerial occupations (e.g., nurse, teacher), social class 3 represents non-manual occupations (e.g., sales person, office clerk), social class 4 represents skilled-manual occupations (e.g., hairdresser, carpenter), social class 5 represents semi-skilled occupation (e.g., post deliverers, driver) and social class 6 represents unskilled occupations (e.g., cleaner, labourer)" (p. 9). Similar to the approach of the CSO and Gavin et al. social class was determined by using the highest social class available for each participant.

The following questions were drawn from the questionnaire used by Zuzanek (2005) and colleagues in the *Ontario Survey of Adolescent Time Use and Well-being (OATUS)* and were used with permission.

- Do you have your own bedroom?
- How many TVs does your family have?
- How many computers does your family have?
- Do you have a TV in your bedroom?
- Do you have a computer in your bedroom?

Although these items were not subsequently used in the three empirical studies reported in this thesis, their presence allows for future research on the relationships between access to TV and computers, time use, and HRQoL. In fact interest in this area is growing, particularly in the context of links between increased sedentary behaviour and obesity (Atkin, Corder, & van Sluijs, 2013; Gilbert-Diamond, Li, Adachi-Mejia, McClure, & Sargent, 2014; Sisson, Broyles, Newton, Baker, & Chernausek, 2011) and the sleep habits of children and adolescents (Nuutinen, Ray, & Roos, 2013). The inclusion of these items complements the *Growing Up in Ireland* data which include information on the presence of a TV in the 9-year-olds' bedrooms and their access to a home computer (Williams et al., 2009).

In the final main survey booklet there were also a number of questions relating to pocket money and the extent and nature of part-time paid employment during schooldays and weekends. These questions were drawn, with permission, from McCoy and Smyth's (2004) study on part-time employment among Irish second-level school students. Again these items were not included in the analyses presented in this thesis but

will likely be included in future studies as the nature and extent of part-time work in relation to the time use and well-being of young people is of interest (Reis Texeira, Fischer, Nagai, & Lemos Turte, 2004; Staff & Schulenberg, 2010; Vernon, 2005). Furthermore these data will allow an examination of the relationship between time use and the economic characteristics of the adolescent (e.g., pocket money or wages from part-time employment) in addition to parental or family socio-economic status (Zick, 2010).

There was an opportunity for participants to write reflective comments on their time use and well-being if they so wished. Again this was to honour the voices of participants and give them an opportunity to communicate their comments and feedback on the survey. Finally a graphic designer was employed to create a visually appealing questionnaire booklet (Hill, 2005). The survey questionnaire booklet can be found in Appendix L.

3.10 Main Survey Sample Selection

Existing international studies of adolescent time use have focused on term-time (i.e., during the school year rather than in holiday time) time use of young people aged 15 - 19 years in full-time education who are living at home (Zuzanek & Mannell, 2005). The Irish second-level school system comprises a 3-year junior cycle and a 2- or 3-year senior cycle. The first year of senior cycle is typically referred to as Transition Year, while the second year of senior cycle is referred to as Fifth Year. Although the vast majority of second-level schools deliver a Transition Year programme this year is not mandatory. This study involved Transition Year and Fifth Year students. Sixth (final) year students were not included as informal consultation with school principals had indicated that accessing this cohort in their Leaving Certificate exam year would be problematic.

The Irish government's 2005-2006 Department of Education and Science Schools list was used as the sampling frame for this study. This list was provided in spreadsheet format by email from the Department. The list included information on:

- school type (single sex or mixed)
- number of students enrolled
- whether the school was an all Irish speaking school

- whether the school was in a Gaeltacht area[2]
- religious denomination
- disadvantaged status
- whether a school was day and boarding or boarding only
- whether the school was free or fee-paying
- catchment code (i.e., city or county location)

The distribution of schools by school location and school type is detailed in Table 15.

Table 15

Breakdown of Sampling Frame

School Type	City	County	Total
Male	8	9	17
Female	11	10	21
Mixed	12	40	52
Total	31	59	90

School-level inclusion and exclusion criteria were applied as outlined in Table 16.

[2] The term "Gaeltacht" is used to denote those areas in Ireland where the Irish language is, or was until the recent past, the main spoken language of a substantial number of the local population.

Table 16

School Inclusion and Exclusion Criteria

Inclusion Criteria	Second-level schools on the Department of Education and Science Schools list
	City and county settings
	Male, female, and mixed schools
Exclusion Criteria	Schools other than those on the Department of Education and Science Schools list
	Did not offer Transition Year
	Vocational Educational Centre (VEC)
	Irish speaking school or Gaeltacht school
	Exclusively a boarding school

As a result of the application of these inclusion and exclusion criteria, 15 modifications were made to the sampling frame. The advisory group host site school was removed. One school was removed as it was a planned amalgamation of three schools and was not yet operational. Two Gaeltacht schools and three further all Irish speaking schools were removed as the survey questionnaire was not available in Irish. The schools list was cross referenced with a separate Department of Education and Science list of schools that offered Transition Year. Two schools were removed from the main list as they did not offer Transition Year. Three schools were removed as they were Vocational Education Centres. Three schools (two city and one county) were reclassified from mixed to male only as, upon examination of enrolment numbers, it was evident that there were only a small number of female students in each school. The final breakdown of the sampling frame by school location and school type is outlined in Table 17.

Table 17

Final Breakdown of Sampling Frame

School Type	City	County	Total
Male	8	9	17
Female	11	9	20
Mixed	4	34	38

Individual schools were randomly selected from the list which was stratified by location and school type. Probability proportional to size (PPS) sampling was employed, so that larger schools had a higher chance of being represented in the sample (Czaga, 2005). From a review of the school enrolment figures average class size was determined to be approximately 20 students in both the Transition Year and Fifth Year classes. A sample size of 1000 students was aimed for with a target class response rate of 70%. On that basis 37 schools were invited to participate in the study.

3.11 Main Survey Recruitment and Data Collection Procedure

Request letters were posted to the 37 school principals in May 2007 with follow up phone calls one week later. Further telephone and written follow up took place over the summer months (Appendix M).

Data collection took place between September and December 2007. The candidate had been advised that gaining access to schools in the second term would be more challenging as there tended to be more breaks with mid-term and Easter holidays and impending end of year exams. For that reason, it was decided to collect data in term one only.

School principals gave consent (Appendix N) and provided the name of a liaison staff member. Each school identified one class group from each of the designated years (Transition Year and Fifth Year). The candidate met with the students in each class group and provided written and verbal information for students and written information for parents (Appendix O). Both students and parents were required to complete the consent/assent form (Appendix P). On receipt of signed consent/assent forms, the candidate met the participants to provide instructions for completion of the questionnaire. They completed a sample diary and could ask any questions arising. Thereafter the class was assigned a weekday and weekend day to complete their diaries. Participants were provided with special stickers to use as memory aides and were also encouraged to put reminders in their mobile phones and school journals. When the designated diary days had passed, the liaison staff member prompted participants to check their diaries for accuracy and completeness. Participants then sealed their completed survey questionnaire booklet in individual envelopes to ensure privacy prior to collection by the liaison teacher and subsequent collection from the school by the candidate. All study recruitment and data collection was conducted by the candidate.

Recruitment and data collection required between three and seven separate visits per school depending on whether an initial information meeting took place with staff and whether both Transition Year and Fifth Year class groups were seen on the same or separate days. Figure 5 summarizes the stages of sampling and data collection.

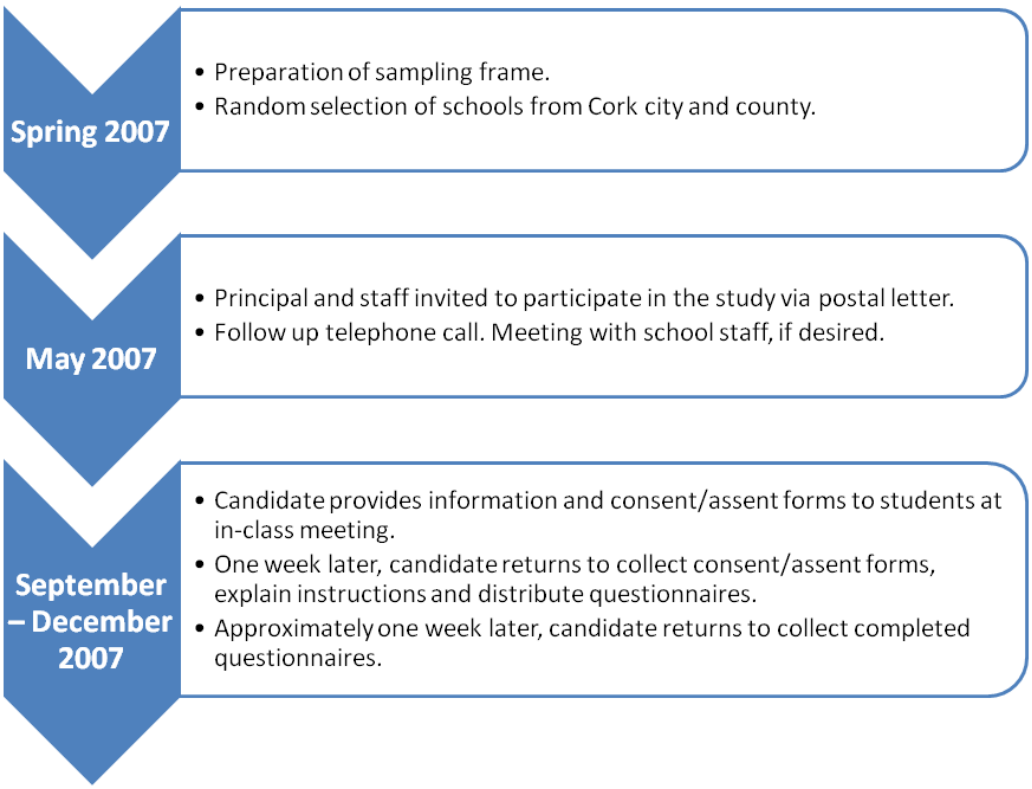


Figure 5. Stages of sampling and data collection.

3.12 End of Survey

At the end of data collection student certificates of participation (Appendix E) were sent to all schools along with personalised letters of thanks to all the staff involved (Appendix Q). The class teachers gave the certificates to each student who could enter his/her own name and retain the certificate as evidence of engagement in non-compulsory activities for their learning portfolios. A preliminary feedback leaflet was then sent to the schools in February 2008 (Appendix C).

3.13 Data Entry, Preparation, and Cleaning

For each participant's weekday and weekend diary each of the 96 main activity timeslots (and secondary activity timeslots if completed) was coded using the pre-coded list of activities and entered into SPSS version 21.0 (IBM, 2012). The number of timeslots ticked for a given main activity were then summed and multiplied by 15 to give the total minutes per day for each activity on weekdays and weekends. Each participant's responses to the KIDSCREEN-52 Likert scale questions were similarly entered into SPSS. Data entry took approximately 15 minutes per questionnaire. Data entry by one person (the candidate) enhanced the quality of data. As a further quality enhancement measure, a research assistant conducted an independent check of data entry on a random selection of 10% of the questionnaires. Negligible errors were noted (0.002%) and subsequently corrected.

Non-compliance with diary completion can threaten the validity of the data as the capture of a representative sampling of experiences is undermined (Stone & Broderick, 2009). For that reason, twenty weekday diaries and 20 weekend diaries were excluded from the analyses as there was more than four hours time with no recorded activities. This was the quality measure used by McGinnity et al. (2005) in their time use study with Irish adults. Consistent with the definition of a school day set out in the Comparative Study of Adolescent Time Use project (Zuzanek & Mannell, 2005), a further 13 weekday diaries were excluded as there was less than 60 minutes recorded at school on the designated diary day. Twenty-five KIDSCREEN questionnaires (3%; male = 19, female = 6) were incomplete and therefore excluded from the analyses. There was some overlap amongst those who had poor quality diaries and/or incomplete KIDSCREEN questionnaires. After the above questionnaires were excluded, frequencies were calculated for all variables. Any errors that were observed were corrected by referring to the original hard copy questionnaire. The minutes across the day were totalled and amounted to 1440 (24-hours x 60 minutes) for each of the quality weekday and weekend diaries.

The distribution of Saturdays and Sundays was approximately equal across the sample. However, while each weekday was represented, the days were not equally balanced across the week or across males and females. This was accounted for in the analyses as described in the respective results chapters.

3.14 Data Analysis

According to the United Nations (2005) "most standard statistical reports on time use present tables on time spent in main activities; in addition separate tables for secondary activities may also be prepared" (p.143). Taking precedence from the *Time Use in Ireland 2005 Survey Report* (McGinnity et al., 2005) and other international adolescent time use studies (Zuzanek & Mannell, 2005) this thesis focuses on an analysis of primary or main activities only. It is further recommended that time use outputs are cross-classified by, at least, gender and age and presented by weekdays and weekends (UNECE, 2013). Generally the analyses in this study are presented separately for males and females and by weekdays and weekends. However as this study's target age range of 15 - 19 years is narrow and well defined as the developmental stage of late adolescence (Sawyer et al., 2012) further disaggregation of the data by age was not useful or appropriate.

Using the KIDSCREEN Group Europe's (2006) computer software, a number of items were re-coded such that higher values indicated better HRQoL in all domains. Rasch scores were then computed for the 10 KIDSCREEN-52 domains and the global HRQoL score. These were transformed into T-values with a mean of 50 and a standard deviation of 10; with higher scores indicating better HRQoL (Ravens-Sieberer et al., 2008). These T-values were used in all the analyses in this study. More detailed data analytic plans are outlined in the respective results chapters (Chapters Four, Five and Six).

3.15 Enhancing the Quality of Time Diary Research

Robinson (1985) and Robinson and Godbey (1999) conducted brief reviews of reliability and validity studies within time use research with the latter concluding that there is a "considerable degree of assurance about the generalizability of time-diary data" (p. 77). More recently, Phipps and Vernon (2009) referenced similar studies supporting the use of time diaries to yield quality data in a cost effective manner. However, Robinson and Godbey (1999) did call for a definitive, well-controlled study to update the limited data that exist on the accuracy of time-diary methodology. Arguably this agenda has not progressed as Sonnenberg, Riediger, Wrzus, and Wagner (2012) identified a lack of knowledge about the quality of time use data captured by the different methods.

Quality assurance measures need to be implemented at each of the time use data collection and processing steps (UNECE, 2013). What follows is a summary of the steps taken in this research project.

- The time diary instrument was based on a light diary format that has been used successfully in Ireland and elsewhere.
- An advisory group of young people and experienced time use researchers were consulted regarding the adaptation of the light diary for an adolescent population.
- Diary quality questions were included at the end of each diary day.
- The instrument and supplemental materials were pre-piloted and piloted with young people.
- The administration of the survey by one person (the candidate) enhanced the quality of the data as all participants were exposed to the same information.
- Participants had the opportunity to complete a "practice diary" and detailed instructions were included in the questionnaire booklet along with a sample completed page of a diary.
- Teachers were asked to prompt participants to check their diaries for completeness.
- All data entry was conducted by the candidate and a random selection of 10% of the data was checked for accuracy.
- Low quality diaries (i.e., those with more than four hours of missing time) were excluded from the analyses.

Notwithstanding these quality enhancement measures the results of the studies in this thesis need to be considered in the context of a number of limitations. These are considered in Chapter 7.

3.16 Final Survey Response Rate

Twenty-eight of the 37 invited schools agreed to participate, representing a school-level response rate of 76%. Data were thus collected from 28 of the 90 (31%) schools on the original Department of Education and Science Schools list for Cork city and county. Seven hundred and thirty one fully consented questionnaires were collected, representing a response rate of 52%. After the removal of poor quality diaries and diaries with less than 60 minutes school time there were 698 usable weekday diaries

(male = 334, female = 364) and 711 usable weekend diaries (male = 331, female = 380). There were 706 usable KIDSCREEN questionnaires. Chapters Four, Five, and Six present the findings of the three empirical studies in this thesis. Figure 6 maps the filtering of the sample for these three studies.

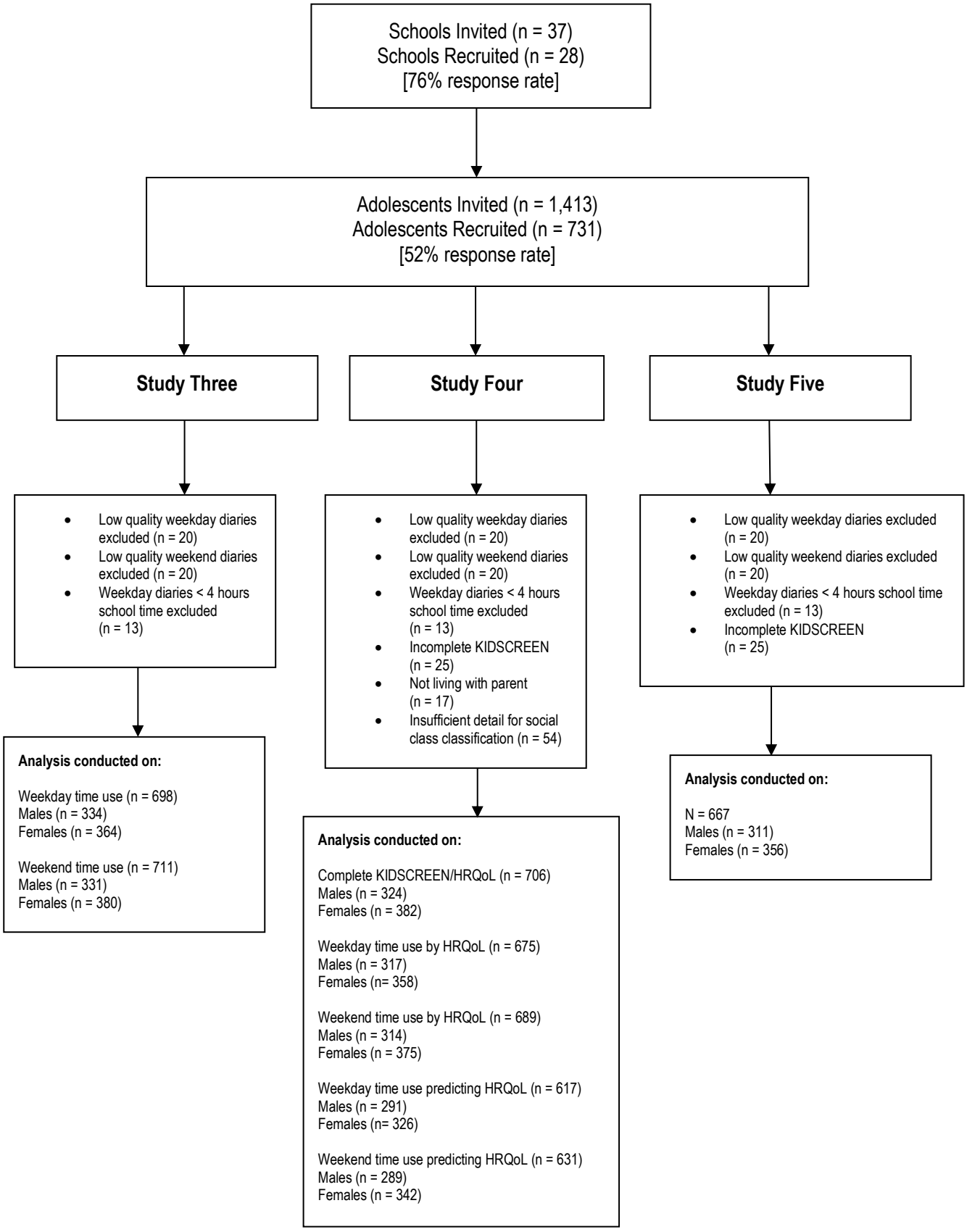


Figure 6. Filtering of sample for studies three, four and five.

Chapter Four

Study Three: Time Use and Daily Activities of Late Adolescents in Contemporary Ireland

4.1 Introduction to this Chapter

The overarching question in this thesis is "what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness" (Yerxa, 1993, p. 3). In order to consider this question in relation to Irish adolescents, information about their "rounds of daily activity" is firstly required. This chapter, the first of the three empirical studies in this thesis, presents this information. Specifically, the adolescents' time use during weekdays and weekends is examined. How time use differs by two key determinants of health, namely gender and social class, is then explored.

This study has been published in the special edition of the *Journal of Occupational Science* on population health (Spring 2014). The study is presented here as it appears in print (Appendix A). Therefore there is a degree of overlap with some of the previous sections of this thesis particularly the methods section of this study. The tables and figures are presented at the end of the chapter.

4.2 Abstract

Background: An occupational perspective of public health embraces a holistic view of the lifestyles of groups of people and how lifestyles influence health (Hocking, 2011). Adolescents, as a defined population group, are being positioned at the centre of global health practice in the belief that investment in the well-being of young people yields a return for the whole of society into the future. Despite the fact that Ireland has the youngest population in Europe little is known about the occupational nature and lifestyles of late adolescents in contemporary Ireland and how they spend their time. *Aim:* This cross-sectional study examined the time use of Irish late adolescents during weekdays and weekends and how time use differed by two key determinants of health, namely gender and social class. *Method:* A time diary survey was conducted with a representative sample of school-going adolescents. *Results:* Seven hundred and thirty one young people participated (response rate 52%; mean age males 16.10 years; mean age females 15.91 years). Non-parametric analyses of participation rates and time spent in activities across the day revealed the gendered nature of adolescent time use particularly at weekends. Social class differences were less evident. *Conclusion:* This study contributes a unique occupational perspective on the time use of well late adolescents in contemporary Ireland.

Key words: *young people, time use, time diary, daily occupations*

4.3 Introduction

Young people (up to the age of 25) make up almost half of the world's seven billion population and have been described as "a new global power reshaping the world" (United Nations Population Fund, 2011, p. 9). Perhaps it is not surprising then that "unprecedented momentum is gathering to put adolescents into the centre of global health practice" (The Lancet, 2012, p. 1561) and to consider the role of adolescence as a foundation for future health for individuals and societies. Indeed it is argued that "how nations harness the contribution of their adolescents and young adults will determine their futures, in terms of economic success and quality of life" (Resnick et al., 2012, p. 1565). However, Currie et al. (2012) stated that young people are often neglected as a population group in health statistics with scant attention paid to inequalities related to age, gender, and socioeconomic status among adolescents. Reflecting these contemporary understandings researchers, policy makers, and health providers working in the field of adolescent health are urged to embrace holistic and ecological perspectives rather than disease specific and deficit models; advance cross-cultural research that gathers comprehensive data on health and behaviour; and invest in evidence-based practice that targets non-communicable diseases in particular, across age, gender, social class, and country of residence subgroups (Blum et al., 2012; Currie et al., 2012; Kreipe, 2011; Sawyer et al., 2012; The Lancet, 2012; UNICEF, 2012; Viner et al., 2012). Furthermore Sawyer et al. (2012) encouraged researchers to explicitly describe the developmental stage within adolescence to which their studies relate. They defined the age period 15 - 19 years as "late adolescence" (p. 1632).

4.4 Adolescent Time Use

No doubt influenced by these imperatives time use is now increasingly being recognised as a determinant and indicator of adolescent well-being internationally (Ben-Arieh & Ofir, 2002; Brooker & Hyman, 2010; Rees et al., 2010; Zuzanek, 2005). Short (2005) argued that in order to put all parts of young people's lives into context it is necessary to see how they fill their days. There is a significant body of international and multidisciplinary literature on diverse aspects of adolescent time use in its "divided form" (Wilcock, 2007, p. 5) including, for example, sleep (Matricciani, Olds, & Petkov, 2012), physical activity (Copperman & Bhat, 2007), sedentary behaviours (Babey, Hastert, & Wolstein, 2013) and leisure activities (Biddle, Marshall, Gorely, & Cameron,

2009). A review of this literature is beyond the scope of this paper. However, there is growing recognition of the need to consider time spent in multiple activity domains and the overall activity pattern rather than on discrete activities (Farb & Matjasko, 2012; Ferrar, Chang, et al., 2013; Hagell et al., 2012). This is not surprising given that "time devoted to one domain of activity takes on full meaning only when viewed in terms of its functional relation to time spent in other domains" (Shanahan & Flaherty, 2001, p. 386).

4.5 Occupational Science

This focus on activities and occupations across the day is a central concern for the discipline of occupational science with occupation defined as "chunks of culturally and personally meaningful activity in which humans engage that can be named in the lexicon of our culture" (Clark et al., 1991, p. 301). Specifically occupational scientists seek to advance understanding of "how the form, function, and meaning of daily activities influence health and well-being" (Larson & Zemke, 2003, p. 80).

In 2001 Pierce argued that the terms occupation and activity were two distinct and valuable concepts requiring differentiation to support more sophisticated research in occupational science and occupational therapy. Drawing on Pierce's (2001) definitions, Farnworth (2004) further argued that activity is a more appropriate term to use in population-level time use research rather than occupation which relates to time use at the individual level. Clark (2006) advocated the careful use of language that "travels well in interdisciplinary contexts to describe the relationship of occupation to health" (p. 176). Accordingly, consistent with the time use literature, the term activity is used in this paper to describe what the participants do with their time.

Eminent Canadian economist and time use researcher Andrew Harvey (1998), in his editorial in the *Journal of Occupational Science*, wrote "at the heart of understanding people as occupational beings is understanding what they do minute-by-minute, day-by-day" (p. 2). How daily occupations including their patterns in time contribute to human happiness, life satisfaction, quality of life, and health remains a major question confronting societies (Yerxa, 1993, 2005). Further exploration is needed of "the apparent health or illness outcomes of contemporary lifestyles from an occupational perspective" (Wilcock, 2007, p. 3-4) defined by Njelesani, Tang, Jonsson, and Polatajko (2014) as "a way of looking at or thinking about human doing" (p. 233). An

occupational perspective of public health embraces a holistic view of the lifestyles of groups and how their lifestyles maintain or undermine health (Hocking, 2011). By bringing this occupational perspective to public health and health promotion initiatives and the understanding of occupation and health at individual and population levels, occupational therapists and occupational scientists can contribute to the development of occupationally healthy public policy (Wilcock & Hocking, 2004). Occupational scientists and therapists are beginning to use time use research to explore key population health issues such as unemployment (Scanlan et al., 2011), childhood obesity (Orban, Ellegård et al., 2012; Ziviani et al., 2010) and enduring mental illness (Desha et al., 2011; Eklund et al., 2010), in some cases leading to the development of occupation-based interventions (Edgelow & Krupa, 2011). In addition to examining health issues for at-risk groups, occupational scientists also examine the daily lives of different age groups within the well population including children (Lynch, 2009) and older people (Chilvers et al., 2010; King & Hunt, 2010), although studies of well adolescents are absent. There remains an identified need for studies of population differences and an examination of occupational patterns across 24-hour cycles (Pierce, 2012). Furthermore "detailed investigations are necessary to gain a better understanding of occupational engagement for individuals from diverse communities, cultures, and in varying geographical locations" (Ziviani et al., 2010, p. 440).

4.6 Youth in Ireland

In 2011 Ireland had the highest percentage of children and young people in the European Union (EU) with 25% compared with the EU-27 average of 19% (Department of Children and Youth Affairs, 2012). The health of Irish young people has been the subject of increasing public, professional, and political attention in recent years. Resources such as the *State of the Nation's Children* (Department of Children and Youth Affairs, 2012) and the *Health Behaviour in School-Aged Children* study (Currie et al., 2012) gathered important data on aspects of children's lives and health and risk behaviours, for example, on drug and alcohol use, physical activity, screen time, and nutrition, in some cases making comparisons with available international data (Currie et al., 2012; UNICEF, 2012, 2013). Such surveys typically use stylised estimates of time use in specific activities. However, just as Hagell et al. (2012) observed in the United Kingdom, research on "the patterning of the whole day not just a few discretionary hours" (p. 71) is less extensive. As a result little is known about the occupational nature of late adolescents in contemporary Ireland and the rounds of daily activities in which

they engage. Time use data are being collected from Irish 9- and 13-year-olds as part of the national longitudinal survey *Growing Up in Ireland* (Department of Children and Youth Affairs, 2011a). To date no time use surveys have been conducted with older Irish adolescents aged 15 - 19 years. The purpose of this study therefore is to bridge this gap by gathering time use information on this large section of the Irish population.

4.7 Influences on Adolescent Time Use

In keeping with contemporary research policy and practice (Department of Children and Youth Affairs, 2011b; Greene et al., 2010) many time use researchers have recognised the range of contexts and relationships that influence the daily lives of children and young people and shape how their time is used (Ferrar, Chang, et al., 2013; Lynch, 2009; Regan & Heary, 2013). Of these Shanahan and Flaherty (2001) drew particular attention to the potential constraints and opportunities to adolescent time use associated with gender and social class.

4.7.1 Gender

A review of selected literature demonstrated evidence in support of Robinson and Godbey's (1999) assertion that "gender differences in adolescent time use tend to follow traditional patterns" (p. 210). Through an analysis of national time use surveys from 1980 to 2001, Zuzanek (2005) compared time diary data of Canadian adolescents with that of adolescents in nine other developed industrial societies, namely Australia, Belgium, Finland, France, Germany, Netherlands, Norway, United Kingdom, and the United States. Although the reported data were not disaggregated by gender the author commented on a number of gender differences evident across countries with males watching more television, engaging in more sports and outdoor activities, and playing more computer/video games, while females spent more time in grooming, homework, domestic activities, reading, and hobbies. The author noted an apparent "narrowing of the digital gap between genders" (p. 406) in part due to the increasing use of the Internet amongst males and females alike.

Also in Canada Hilbrecht et al. (2008) collected time diary data from a non-random, stratified sample of school-going adolescents (n=2,154) to explore time use in early and late adolescence and in particular to examine gender differences in time spent on total workload, personal needs, and free time. Total workload on schooldays was almost identical for females and males while a significant gender gap was found on Sundays,

with a disproportionately heavy domestic workload for females. On school days and weekends females spent significantly more time on personal care than males. Gender differences were again noted in the amount of free time during weekdays and weekends, with females having less discretionary time than males.

Through a descriptive analysis of data from French national time use surveys Chenu and Lesnard (2005) explored whether gender inequalities in adolescent time use narrowed between 1986 (n=559) and 1998 (n=1,198). While they found weekday time use to be relatively gender-neutral, weekend or out-of-school time was strongly gendered, with females spending more time in personal care and work-related (school-related, domestic duties, and paid work) activities and males having more free time. Males spent more time in sports, playing games and going to the cinema, while females read more. However, the authors did not test for statistically significant gender differences relying more on presentations of descriptive accounts of time use by gender. Similarly Blanke and Cornelißen (2005) found no clear evidence of greater gender symmetry in German adolescents' time use from 1991 (n=962) to 2001 (n=1,024), considering weekdays and weekends together.

Wight et al. (2009) used data from the nationally representative 2003 - 2005 American Time Use Survey to describe the time use of 15 – 17 year olds (n=2,033) in 22 different activities on school and non-school days. Although gender differences were not the specific focus of their study, stereotypical differences were noted with females spending more time in housework, caregiving, and studying. While the authors did not comment on gender differences on weekdays compared with weekends, a review of the time use tables suggests that differences were present across a range of activities.

A challenge to Chenu and Lesnard's (2005) opinion regarding the suggested gender-neutral nature of weekday time use came from Olds et al.'s (2009) findings. In their study of the school-day time use of 6,024 Australian adolescents (mean age 13 years), collected using the computer administered Multimedia Activity Recall for Children and Adolescents (MARCA) (Ridley et al., 2006), they found that at all ages males spent significantly more time in physical activity, organised sport, watching TV, and playing videogames. Females spent more time shopping, doing chores, playing with pets, and using their phones. Supporting Zuzanek's (2005) assertion of the narrowing of the digital divide no differences in computer time were found in the Australian study.

More recently Ferrar, Olds, and Walters (2012) examined 24-hour MARCA time use recalls to explore gender-specific time use patterns amongst Australian adolescents (n=2,200, mean age 13 years). They found that males spent significantly more time in screen-based and physical activities, while females spent more time in grooming, using their phones, doing housework, walking, "chilling out", and studying.

Building on the increasing popularity and use of cluster analysis in dietary research and other health behaviours (Buck & Frosini, 2012; Newby & Tucker, 2004), Ferrar, Olds, and Maher (2012) applied this method in their recent examination of Australian adolescents' (n=1,853, 9 - 16 years) multi-dimensional time use. Distinct gender-specific time use clusters emerged, namely *social tasker*, *techno-active*, and *techno-studious* for males and *social screenie*, *quiet active*, and *techno-studious* for females. In New Zealand, Ferrar, Olds, Maher, & Maddison (2013) used the same method in their study of time use clusters of adolescents (n=679, 10 - 16 years). Different activity patterns characterised the three female clusters (*social sporty*, *screenie tasker*, and *super studious*) and three male clusters (*techno-active, quiet movers*, and *social studious*). The authors drew attention to the *techno-active* cluster in particular as this is frequently identified as a male cluster, characterised by high physical activity and high screen time participation. While the clusters were gender-specific one similarity was noted with the presence of one cognitively based cluster for both females (*super studious*) and males (*social studious*). Both these studies utilised the MARCA as a data collection instrument.

From this brief review there does appear to be support, as Ferrar, Olds, and Walters (2012) concluded, to uphold common stereotypical beliefs about gender differences in adolescent time use.

4.7.2 Social Class

Social class, defined by Krieger, Williams, and Moss (1997) as "social groups arising from interdependent economic relationships" (p. 344), is amongst the strongest known predictors of health (Solar & Irwin, 2010). While social class gradients are consistently reported in child and adult health, Starfield, Riley, Witt, and Robertson (2002) noted that there is debate about the existence of social gradients in late childhood and adolescence, perhaps due to "conceptualisation, measurement, choice of health outcomes, and differences in social context" (p. 360). However, they did find evidence

of social class gradients in some indicators of adolescent health. In their later review Hanson and Chen (2007) found that, while lower socio-economic status was associated with greater cigarette smoking, poorer diets, and less physical activity amongst adolescents, these associations were not as robust as those found in adulthood.

Some researchers have examined social class and time use generally (Chatzitheochari & Arber, 2012), as opposed to specific health and risk behaviours, albeit with an adult population in the main. McLaren, Godley, and MacNairn (2009) considered time use data a starting point for a holistic exploration of class and lifestyle, arguing the benefit of taking a broader view of lifestyle and daily routines in research on the social drivers of health outcomes. The limited adolescent time use literature that does include data on social class appears to show inconsistent results. For example, in their exploration of parents' occupational status amongst adolescents from six different activity clusters, Bartko and Eccles (2003) found only one significant difference, namely that parents of adolescents in the "school-focused" cluster had significantly higher reported occupational status than adolescents in the "uninvolved" cluster. Furthermore, Wight et al. (2009) found that family income correlated positively with adolescents' paid work, homework, computer use, and time eating with parents, but was negatively correlated with sleep. Looking specifically at health-related time use patterns captured with the MARCA, Ferrar, Olds, Maher, and Gomersall (2012) reported consistent time use differences amongst Australian children and adolescents (n=2,200, 9 - 16 years) from the four different household income groups represented in their sample. Participants from higher income families spent significantly more time reading, doing homework, playing instruments, and playing sports and considerably less time watching television and playing videogames.

Conversely socioeconomic background did not appear to influence time use patterns in the studies by Shanahan and Flaherty (2001) and Ferrar, Olds, Maher, and Maddison (2013). Zick (2010) observed virtually no effect of total family income in her multivariate analysis of how socioeconomic and other familial factors influenced adolescent time allocation. She did note that this may be a result of measurement error inherent in data of this nature. Currie et al. (2008) similarly considered the conceptual and methodological issues in measuring adolescent socio-economic status, arguing that it is a complex, multidimensional construct.

That said, Currie et al. (2012) argued that the evidence base around age, gender, and socioeconomic inequalities in young people's health and well-being must continue to develop. Furthermore Viner et al. (2012), in their detailed exploration of adolescence and the social determinants of health, called for further research and interventions that improve adolescents' daily lives with family, friends and in school; that address risk and protective factors in the social environment at a population level; and focus on factors that are protective across various health outcomes.

4.8 Methodology

4.8.1 Aims

In response to these calls, this study sought to explore and describe the lives and lifestyles of well late adolescents in contemporary Ireland through an examination of their daily time use by addressing the following research questions:

1. How do Irish late adolescents allocate their time to multiple activities during the week and at the weekend?
2. Does time use differ by gender?
3. Does time use differ by social class?

4.8.2 Methods

Sample

This cross-sectional study was designed in keeping with existing international studies of adolescent time use which focused on term-time time use of late adolescents aged 15 to 19 years in full-time education who were living at home (Zuzanek & Mannell, 2005). A two-stage stratified sampling strategy was employed. Firstly, second-level schools were randomly selected, with probability proportionate to size, from the governmental schools' register for the designated region. Reflecting the distribution of schools in the sampling frame, the sample was stratified by school type (male, female, and mixed) and location (city and county). Twenty-eight schools (76%) agreed to participate. Thereafter, students from the first two of the three senior cycle years were invited to participate (n=1,413). Final year students were not included as informal consultation with school principals had indicated that accessing this cohort in their final State examination year would be problematic. Seven hundred and thirty one students consented yielding a response rate of 52%.

Measures

According to Harvey and Pentland (1999) "time use methodology can provide a window on actual lifestyles, thereby permitting a rich, objective and replicable basis on which to make empirical judgements" (p. 3). Indeed, in Wilcock's (2007) opinion, such methodologies are "arguably the most established research techniques to explore important aspects of human occupation" (p. 7). There are a range of recognised methods of measuring time use including direct observation, stylised survey questions, experience sampling method (ESM), time stamped/spot observations and time diaries (National Research Council, 2000). The UNECE (2013) Task Force on Time Use Surveys favoured the time diary method, arguing that the resultant data are more accurate and detailed than the alternatives. Eurostat (2009) and the United Nations (2005) presented detailed guidelines for the design, implementation, and analysis of time diary surveys. Robinson and Godbey (1999) conducted a brief review of reliability and validity studies within time use research and concluded that there is a "considerable degree of assurance about the generalizability of time-diary data" (p. 77). More recently, Phipps and Vernon (2009) referenced similar studies supporting the use of time diaries to yield quality data in a cost effective manner. In their detailed review of child and adolescent time use research internationally Larson and Verma (1999) found the most frequently used method to be the 24-hour time diary. They gave more credibility to findings of time diary studies (along with ESM and spot observations) over stylised time use estimates, because of their proven accuracy. Similarly Ben-Arieh and Ofir (2002) recommended time diaries over other methodologies in time use research with children and adolescents.

In the present study time use was measured using an adapted version of the diary instrument developed by the Irish Economic and Social Research Institute (ESRI) in their 2005 survey of Irish adults' time use (n=1,023) (McGinnity et al., 2005). The diary contained a relatively short but comprehensive list of 26 pre-coded activities (see Table 10, page 86). In consultation with the ESRI and an advisory group of young people the pre-coded list of activities was revised to ensure age-appropriateness. This resulted in a pre-coded diary format with six main activity categories comprising 31 individual activities (see Table 11, page 88). The activities listed were in keeping with those used in adolescent time use surveys internationally (Zuzanek & Mannell, 2005). Participants were asked to record their main activity for each block of 15 minutes of the designated day. Optional secondary activities could also be recorded. Participants completed one

diary for a weekday and one diary for a weekend day along with a number of demographic questions and the KIDSCREEN-52 HRQoL instrument (Ravens-Sieberer et al., 2005). The KIDSCREEN-52 was developed across Europe as a self-report measure applicable for healthy and chronically ill children and adolescents (aged 8 - 18 years). It assesses 10 dimensions of health-related quality of life, namely "physical well-being", "psychological well-being", "moods and emotions", "self-perception", "autonomy", "parent relations and home life", "social support and peers", "school environment", "social acceptance", and "financial resources". Each diary took approximately 15 minutes to complete and could be filled in at intervals throughout the diary day or retrospectively after the designated diary day.

Procedures

Ethical approval was granted by the University College Cork Research Ethics Committee of the Cork Teaching Hospitals (reference number: ECM 4 (a) 10/10/06). School principals gave consent and provided the name of a liaison staff member. Each school was asked to identify one class group from each of the two designated years. The candidate met with all the students in each class group and provided written and verbal information for students and written information for parents. Both students and parents were required to complete the consent/assent form. On receipt of signed consent/assent forms the candidate met with the students to provide instructions for completion of the questionnaire. Students had the opportunity to complete a sample diary and ask any questions arising. Thereafter the class was assigned a designated weekday and weekend day to complete their diaries. Diary days were designated by the candidate with the aim of being as close as possible in time to the day of initial diary distribution in order to maximise accurate recall of activities. Participants were provided with special stickers to use as memory aides and were also encouraged to put reminders in their mobile phones and school journals. When the designated diary days had passed the liaison staff member prompted participants to check their diaries for accuracy and completeness. Participants then sealed their completed diaries in individual envelopes to ensure privacy. All study recruitment and data collection was conducted by the candidate.

Data analysis

To maximise data quality all data entry was completed by the candidate. An independent data entry check was conducted by a research assistant on a random selection of 10% of the questionnaires. Negligible errors were noted (0.002%).

Thereafter frequencies were calculated for all variables. Any errors that were observed were corrected by referring to the original hard copy questionnaire.

Participants' descriptions of their parents' work were coded in accordance with the coding system used by the CSO (2011) in the most recent census of the Irish population resulting in a 7-item social class scale ranging from "professional workers" (highest) to "unskilled" and "all others gainfully employed and unknown" (lowest). For the present study social classes were further collapsed into three categories: social class one (higher), social class two (lower), and social class three ("gainfully occupied and unknown", used where no precise allocation was possible).

From the dataset 20 weekday diaries and 20 weekend diaries were excluded from the analyses as there was more than four hours time with no recorded activities. This was the quality measure used by McGinnity et al. (2005) in their time use study with Irish adults. Consistent with the definition of a school day set out in the Comparative Study of Adolescent Time Use project (Zuzanek & Mannell, 2005) a further 13 weekday diaries were excluded as there was less than 60 minutes recorded at school on the designated diary day. Thus there were 698 usable weekday diaries (male=334, female=364) and 711 usable weekend diaries (male=331, female=380).

Ideally in time use studies weekdays are equally represented across the sample (UNECE, 2013). For procedural reasons it was not possible to designate diary days in this way as the day of diary distribution was determined by the school and class group timetable and availability. While each weekday was represented the days were not equally balanced across the week or across males and females. Therefore, when generating time use totals, gender-specific probability weights were applied to ensure that each day of the week (Monday to Friday) was represented equally. Weekend data were not weighted as the distribution of Saturdays and Sundays was approximately equal across the sample. According to the United Nations (2005), "most standard statistical reports on time use present tables on time spent in main activities; in addition separate tables for secondary activities may also be prepared" (p. 143). Taking precedence from the *Time Use in Ireland 2005 Survey Report* (McGinnity et al., 2005) and other international adolescent time use studies (Zuzanek & Mannell, 2005), this paper focuses on an analysis of primary or main activities only.

Suggested outputs from time use surveys include the average time spent per person per day across the whole survey population, the percentage of the population who performed the activity on his/her diary day (participation rate), and the average time spent in the activity by those people who performed it (UNECE, 2013). While the latter two outputs are the focus of most of the attention in this paper, a snapshot of average time spent by the whole population in the six main activity categories is provided to set the scene. For this, in keeping with custom and practice in time use reports, time use is presented with means (and medians) to allow for ease of comparison with other studies. In the weekday data, Personal Needs, School and Study, and Leisure and Free Time activities were normally distributed. Thus t-tests and ANOVA were used to test for differences by gender and social class respectively. This was the case also in the weekend data for Personal Needs and Leisure and Free Time activities. As the other main activity category data were skewed non-parametric tests were used (Mann-Whitney *U*-test and Kruskal-Wallis test for gender and social class respectively).

With regard to the more detailed analysis of the 31 individual activities Pearson's chi-squared test was used to examine gender and social class differences in participation. Time use data were largely skewed thus median and quartiles (first, third) are reported. Gender and social class differences in median time use were examined using the Mann-Whitney *U*-test and Kruskal-Wallis test respectively (Machin, Campbell, & Walters, 2007). Because these non-parametric tests do not support the use of probability weights unweighted data were used in the examination of gender and social class differences in weekday time use. Alpha was set at .05 for all the tests in this study. Because of the large number of tests Bonferroni correction was applied when determining statistical significance (Machin, Campbell, & Walters). Unadjusted *p*-values are reported but those that remain significant after applying the Bonferroni correction are highlighted in bold and with an asterisk. Analysis was conducted using SPSS version 20.0 (IBM, 2011) and Stata release 12 (StataCorp., 2011).

4.9 Results

Participants are profiled in Table 18. Males' ages ranged from 15 to 18 years (mean 16.10 years) and females' ages ranged from 14 to 18 (mean 15.91 years). The higher social class group was significantly larger than the other two groups for both males (70%) and females (61%).

4.9.1 Average Time Use Across the Whole Population

Table 19 provides an overview of average time spent by the whole population in the six main activity categories on weekdays and weekends, by gender. On weekdays, males spent 623 minutes or 44% of their day in Personal Needs. One-third of the day (461 minutes) was spent in School and Study related activities. Negligible time was spent in Paid Work, Household Duties or Voluntary & Religious Activities. The remainder of the day was spent on Leisure and Free Time Activities (322 minutes, 22%). Females spent marginally longer in Personal Needs activities (637, 44%). School and Study activities accounted for the same amount of time as for males, while Leisure and Free Time Activities represented 21% of the day (300 minutes). Although the actual times were very small females did spend significantly longer than males on Household Duties during the week.

The weekend data show that both males and females spend longer in Personal Needs at weekends. For both genders weekend days were characterised largely by Personal Needs activities (males 679 minutes / 47% and females 710 minutes / 49%) and Leisure and Free Time Activities (males 608 minutes / 42% and females 545 minutes / 38%). Females spent significantly longer in Personal Care and Household Duties while males spent longer in Leisure and Free Time Activities.

Table 20 provides an overview of average time spent by the whole population in the six main activity categories on weekdays and weekends, by social class.

From Tables 19 and 20, it is clear that at this level of aggregation some gender differences are apparent in weekday and weekend time use. There were no statistically significant differences in the time use of males and females across the three social groups on weekdays or weekends. The percentage of the population who performed the activity on his or her diary day (participation rate) and the average time spent in the activity by those people who performed the activity by gender and social class are now examined in greater detail for weekdays and weekends.

4.9.2 Weekday Participation Rates and Time Use by Gender and Social Class

Participation rates varied significantly for different activities on weekdays, for males and females alike, from 1% participation in Shopping for Pleasure to 100% for Sleep (Table 21). As expected, almost all participants recorded some time in Personal Needs activities (Sleeping, Personal Care, Eating) and School Related Activities. Outside of

these activities, 82% of males spent some time Watching TV/DVDs, 60% spent time doing Homework at home, 59% spent time Hanging around with Friends and 57% spent some time Using the Computer/Internet. Eighty-two percent of females reported time spent Watching TV/DVDs, 66% recorded time on Homework and 56% recorded time spent Hanging around with Friends.

Significant gender differences in participation rates were found in four of the 31 pre-coded activities listed in the diary. More females than males recorded participation in Socialising with Family ($p < .001$), Talking/texting on a Mobile Phone ($p < .001$) and Reading ($p < .001$), while more males than females reported Using the Computer/Internet ($p < .001$). In terms of actual time use females spent significantly longer in Personal Care ($p < .001$) while males spent more time Sleeping ($p < .001$), Using the Computer/Internet ($p = .001$), and Resting/relaxing ($p = .002$).

Weekday participation rates did not vary significantly by social class apart from participation in Hobbies which was recorded by 26% in the higher social class, 12% in the lower social class, and 17% in the unknown social class group ($p = .002$) (table not shown). There were no statistically significant differences in median time use across social class groups for any of the 31 activities.

4.9.3 Weekend Participation Rates and Time Use by Gender and Social Class

As with the weekday data participation rates varied significantly for different activities during the weekend, for males and females alike, from 2% participation in Voluntary Activities to 100% for Sleep (Table 22). Beyond Personal Needs activities, which understandably are recorded by close to 100% of participants, the activities with highest participation rates for males were Watching TV/DVDs (80%), Using Computer/Internet (62%), and Hanging around with Friends (52%) while for females they were Watching TV/DVDs (80%), Hanging around with Friends (53%), and Socialising with Family (50%).

Significant gender differences were noted in participation rates in 10 of 31 pre-coded activities. More females than males reported spending time in Personal Care activities ($p = .02$); Homework ($p = .001$); Housework ($p < .001$); Socialising with Family ($p < .001$); Talking/texting on a Mobile Phone ($p < .001$); Shopping for Pleasure ($p < .001$); and Reading ($p = .001$). More males than females recorded time in Physical Activity (p

< .001), Computer/Internet use (p < .001), and in Hobbies (p < .001). With regard to median time spent in the activity amongst those who reported doing the activity on the diary day, gender differences were found in five activities. Females spent more time in Personal Care (p < .001) and Religious Activity (p = .03) than males, while males spent more time in Physical Activity (p < .001); Computer/Internet use (p = .004), and Watching TV/DVDs (p < .001).

Social class differences in weekend time use are almost non-existent within this study (table not shown) with the following exceptions. A significant difference in participation rates was found with two activities. Thirty percent in the lower social class group participated in Paid Employment compared with 19% and 13% in the higher and unknown social class groups respectively (p = .002). Forty-three percent of participants in the higher social class group recorded some time in Travel, compared with 32% and 20% for the lower social class and unknown social class groups respectively (p = .001). In terms of actual time spent one difference was noted, namely that those in the lower social class group reported less time spent in Eating/drinking (p = .003).

4.10 Discussion

The findings of this study provide evidence for the gendered nature of Irish late adolescents' time use particularly at weekends while social class differences did not emerge as clearly.

4.10.1 Time Use Across the Whole Population

The findings in relation to the distribution of time across the six main activity categories (Personal Needs including Sleep; School and Study; Paid Work; Household Tasks; Voluntary and Religious Activities; and Leisure and Free Time Activities) are largely in keeping with Zuzanek's (2005) cross-national comparisons of adolescent time use, lending further support to his statement that "adolescent time use in developed industrialised societies shows many common trends and lifestyle similarities" (p. 397). However, despite the very different geographical contexts included in this comparative study, it is likely that the comparable study designs (with their focus on the time use of adolescents in full-time education) contribute strongly to the similar findings. More diverse studies of adolescents outside the school system and in less economically developed countries would allow for the presence or otherwise of the suggested globalised patterns of adolescent time use to be further examined.

Chenu and Lesnard (2005) described the homogenising effect of full-time schooling. Similarly the examination of the distribution of time across the six broad activity categories in the present study suggests a largely gender neutral use of time during the week, with a statistically significant gender difference evident in only one of the six categories, namely Household duties. However Hagell et al. (2012) noted that while time diary research traditionally reports time use collapsed into groups of related activities, "there is a constant tension between wanting to retain the detail of the data, and needing to group variables for summary purposes" (p. 64). This study's findings also support this observation as analyses at the level of individual activities reveal a greater degree of gender difference in adolescent time use during weekdays and even more so at weekends.

4.10.2 The Influence of Gender on Participation Rates and Time Spent in Individual Activities

More females than males reported time spent in Personal Care at the weekend and females spent longer in Personal Care activities on weekdays and weekends mirroring the findings of Hilbrecht et al. (2008) in Canada and Ferrar, Olds, and Walters (2012) in Australia. There is a high value placed on women's physical appearance in contemporary Western society. As a result attention to image and personal care are part of the feminine gender schema (Hilbrecht et al., 2008). The findings of the present study suggest that these cultural norms appear to be equally influential in an Irish context.

Another stereotypical gender difference widely reported in the international literature relates to household duties (Blanke & Cornelißen, 2005; Zuzanek, 2005). Statistically significant differences in time in Household duties were found averaged across the whole population in the present study with females spending longer in such activities both on weekdays and weekends. At weekends more females than males reported spending time on Household duties. However, amongst those who reported some time in this activity, no significant gender differences were found in actual time spent.

At weekends more males than females reported spending time in Physical Activity and amongst those who participated, males spent longer being physically active, a long established pattern widely reported in the literature (Chenu & Lesnard, 2005; Csikszentmihalyi & Larson, 1984; Currie et al., 2012, Ferrar, Olds, & Walters, 2012; Zuzanek, 2005). Other Irish studies have also reported gender differences in physical

activity. The Irish *State of the Nation's Children* (Department of Children and Youth Affairs, 2012a) reported that 53.2% of males aged 15 to 17 years participated in physical activity for at least 60 minutes on more than 4 days per week, compared with 28.9% of females. These findings may reflect differences both in expectation and opportunity for males and females. According to Chalabaev, Sarrazin, Fontayne, Boiche, and Clement-Guillotin (2013), while biological factors may in part explain sex differences in participation in sport and exercise, sex stereotypes and gender roles exerted a greater influence. Currie et al. (2012) also suggested that opportunities for participation in moderate to vigorous physical activity may be more biased in favour of males and may account for the fact that males continue to be significantly more physically active than females in most countries.

The findings in the present study mirror the international trend of differences in computer/Internet use amongst males and females (Ferrar, Olds, & Walters, 2012; McCauley Ohannessian, 2009). On weekdays and at weekends, more males than females spent time Using the Computer/Internet and spent longer engaged in this activity. The use of a person-centred rather than an activity-centred analytic approach (Bartko & Eccles, 2003) may illuminate whether these patterns relating to physical activity and screen time co-occur in the same group of males, like the male *techno-active* profile, as identified by Ferrar, Olds, and Maher (2012) and Ferrar, Chang, et al. (2013).

Socialising with family and using their mobile phones for texting and talking featured strongly in the daily lives of females but less so for males. Currie et al.'s (2012) claim that "males' social networks are based on activities, with higher levels of physical activities and sports, while females' networks and friendships are based on personal communication" (p. 211) may account for this difference. At weekdays and weekends spending time with friends was equally important to males and females accounting for 60 minutes of time for both genders during the week and between 180 and 210 minutes at weekends. Currie et al. (2012) also found high levels of friendships in their study of Irish 15-year-olds. However, they did find that significantly more females (91%) than males (88%) had three or more close friends of the same gender. The time spent with friends for both genders is not surprising given the special role that peer groups have in adolescence (Coleman, 2011). It is interesting to note that large proportions of young people did not report spending time with friends on weekdays or weekends. Given that

Currie et al. (2012) believed that "developing positive peer relationships and friendships is crucial in helping adolescents deal with developmental tasks such as forming identity, developing social skills and self-esteem and establishing autonomy" (p.7), this finding warrants attention.

Significantly more females than males recorded time spent Reading during weekdays and weekends. This result is consistent with other Irish data which describe notable gender differences in the numbers of 15-year-olds who report reading as one of their favourite hobbies (Department of Children and Youth Affairs, 2012a). Furthermore the finding that more females than males reported spending time in Homework at the weekend may support the presence of a cognitively based *super studious* activity profile, as reported by Ferrar, Olds, Maher, & Maddison (2013). Taken together this detailed examination of participation rates and time spent in activities across the day provides further evidence for the gendered nature of adolescent time use particularly at weekends.

4.10.3 The Influence of Social Class on Participation Rates and Time Spent in Activities

The influence of social class on time use was less apparent in the findings. Only three statistically significant differences across the three social groups were found in the participation data, namely participation in Hobbies (weekdays), and Paid Employment and Travel (weekends). No differences in weekday time spent in activities were found while at weekends one difference emerged in time spent in Eating/drinking. As noted earlier the influence of social class on adolescent time use is mixed in the literature. It is possible that by collapsing the seven social class groups into three some potential social class differences were hidden. Moreover the three social groups were not equally represented in this study. Perhaps, as Currie et al. (2012) suggested, the use of a range of indicators of socio-economic status rather than a single measure of social class may have shed more light on the impact of socio-economic factors on time use.

4.11 Limitations and Contribution

There were a number of methodological limitations in the present study. A response rate of 52% was achieved with no subsequent weighting for non-response, introducing the possibility of non-response bias. However relevant studies in this area show little evidence of bias due to non-response (Phipps & Vernon, 2009).

As this was the first time use survey to be conducted with late adolescents in Ireland some of the study design was guided by the experience and expertise of McGinnity et al. (2005) who conducted the first (and only) time use survey with Irish adults. They found the location and co-presence questions in their survey to have very low response rates and on that basis they advised that these not be included as separate diary sections in future light diary studies. Again similar to McGinnity et al. and as is customary in time use reports (United Nations, 2005) the initial analyses focus on main activities only. However, as optional secondary activities could be recorded by participants, in the future these data can be examined to explore the complex nature of simultaneous activities, or *enfolded occupations* as described in the occupational science literature (Bateson, 1996). A simultaneous activity that features strongly in the time use of adolescents in the present day is the use of smart phones. When the data collection in the present study took place in late 2007 such technologies were largely unavailable. Therefore the data do not reflect the widespread penetration of mobile technologies in the lives of today's adolescents (Rideout et al., 2010). Furthermore the diary instrument did not distinguish between Computer/Internet use for gaming or social networking, two activities reported in more recent literature as significantly gendered. In 2007 the global phenomenon of social networking did not exist in the mainstream society or youth culture whereas, between March 2012 and March 2013 alone, Facebook® (2013) reported an increase of 26%, or 665 million daily users, clear evidence of the challenging nature of conducting research in a "constantly changing virtual world" (Subrahmanyam & Greenfield, 2008, p. 417). More data on this important topic is needed. Moreover the dissemination of results from such research needs to happen much more quickly to allow for contemporaneous interpretation of findings.

Data collection took place between September and December 2007. Therefore potential seasonal variations (e.g., weather, hours of daylight, study and exam commitments across the academic year) in time use were not taken into account. However, accounting for seasonal variation needed to be balanced with maximising access to the study population. Gaining research access to schools in the second term was predicted to be more challenging as there tended to be more breaks with mid-term and Easter holidays and impending end of year exams. For that reason it was decided to collect data in the first half of the academic year only.

Time diaries rely on recall of participation in activities which is a potential source of error (Hunt & McKay, 2012). Short duration activities (e.g., going to the bathroom or snacking) can be under-reported. The data on participation in main activities reflect this under-reporting with a small percentage of young people not recording time spent in personal care or eating activities. It is possible that some of these activities were reported as secondary activities (e.g., eating).

Despite these limitations this study makes an important contribution to knowledge development within the discipline of occupational science and on adolescent lifestyles. It complements and builds on existing work by focusing on a well population and examining time use "in the round" (Hagell et al., 2012, p. 71) across 24 hours rather than on discrete activities in isolation based on diary data rather than stylised estimates. The study was designed in keeping with the parameters agreed by those involved in the Comparative Study of Adolescent Time Use (Zuzanek & Mannell, 2005) thus making cross-cultural comparisons possible and contributing, for the first time, an Irish perspective to the growing international body of knowledge on adolescent time use, health, and well-being. By examining gender and social class influences on adolescent time use it was recognised that adolescents are not a homogenous cohort (WHO, 2011a).

This research contributes important and valid information on the "form" or "observable aspects" (Larson & Zemke, 2003, p. 80) of occupation in the lives of Irish adolescents at a population level generating insights into the "cultural repertoire of typical activities" in contemporary Ireland (Pierce, 2001, p. 144), thus complementing qualitative research that illuminates the meaning of occupation at an individual level. It paves the way for the next phase of analysis which will use person-centred analysis to examine multi-dimensional patterns of time use, paying particular attention to the profiles of activity participation of those adolescents who report high HRQoL on the KIDSCREEN-52. This is a recognised "critical gap" in occupational science research (Pierce, 2012, p. 302). Similarly, within adolescent time use research, little work has been done to explore the relationship between time use and subjective well-being or HRQoL (Ferrar, Chang, et al., 2013; Glorieux et al., 2005).

4.12 Conclusion and Future Research

This study gathered for the first time in Ireland time diary data from a representative sample of well late adolescents. Reflecting an occupational perspective this research was "inclusive of the minute but from the perspective of the whole picture" (Wilcock, 2007, p. 5). The detailed examination of participation rates and time spent in occupations across the day provides evidence for the gendered nature of adolescent time use, particularly at weekends. Established international trends are mirrored in the findings with stereotypical gender role differences in physical activity, household tasks, personal care, computer/Internet use, and reading. Social class differences were less evident.

This level-one descriptive research (Pierce, 2012) provides a solid foundation for level two and three research into person-centred patterns of time use and how such patterns relate to HRQoL. Furthermore cross-cultural analysis of Irish late adolescents' time use is now possible. According to Soupourmas (2005), "understanding how young people spend their time… is crucial for the formulation of appropriate and effective policies and interventions aimed at improving the health and well-being of young people" (p. 586). The findings of this study suggest that such policies and interventions need to be gender-specific. With the knowledge gained from this and subsequent studies Irish adolescents can be educated and supported to engage in a daily round of occupations that enhance their health, meet their needs, and enable them to balance the demands of a 21st century lifestyle.

Table 18

Demographic Characteristics of Sample in Study Three (N = 731)

	Male	Female
n (%)	343 (46.9)	388 (53.1)
Mean age in years (SD)	16.10 (0.76)	15.91 (0.73)
Social class n (%)		
Higher	238 (70)	234 (60.8)
Lower	78 (22.9)	127(33)
Unknown	24 (7.1)	24 (6.2)

Table 19

Average Time in Minutes and Proportion of the Day Spent in Main Activity Categories on Weekdays and Weekends by all Participants by Gender

	Weekdays					Weekends				
	Male (n=334)		Female (n=364)		*p*	Male (n=331)		Female (n=380)		*p*
Personal needs incl. sleep	623 (630)	44	637 (645)	44	.31	679 (690)	47	710 (720)	49	**.000***
School & study	461 (450)	32	460 (450)	32	.37	30 (0)	2.08	41 (0)	2.84	.002
Paid work	14 (0)	0.90	14 (0)	0.90	.49	75 (0)	5.20	86 (0)	5.97	.31
Household duties	9 (0)	0.62	15 (0)	1	**.003***	28 (0)	1.9	36 (0)	2.5	**.000***
Voluntary & religious activity	3 (0)	0.20	4 (0)	0.27	.81	14 (0)	0.97	13 (0)	0.90	.99
Leisure & free time activities	322 (315)	22	300 (300)	21	.17	608 (630)	42	545 (555)	38	**.000***

Note. Time in shown as mean (median), plus percentage of the day. Data include those who spent no time in the occupation. Testing for difference in unweighted mean/median time use using t-test or Mann-Whitney U test, as appropriate. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing.

Table 20

Average Time in Minutes and Proportion of the Day in Main Activity Categories on Weekdays and Weekends by all Participants by Social Class

	Weekdays							Weekends						
	SC1		SC2		SC3		*p*	SC1		SC2		SC3		*p*
	Time	%	Time	%	Time	%		Time	%	Time	%	Time	%	
Personal needs incl. sleep	630 (645)	44	638 (630)	44	598 (630)	42	.55	697 (705)	48	692 (705)	48	714 (705)	50	.80
School & study	466 (450)	32	451 (450)	61	450 (450)	31	.24	36 (0)	3	37 (0)	3	31 (0)	2	.95
Paid work	13 (0)	0.90	18 (0)	1	15 (0)	1	.71	71 (0)	5	107 (0)	7	44 (0)	3	.05
Household duties	9 (0)	0.62	16 (0)	1	17 (0)	1	.60	30 (0)	2	34 (0)	2	44 (0)	3	.92
Voluntary & religious activity	4 (0)	0.27	3 (0)	0.20	0.5 (0)	0.03	.90	15 (0)	1	11 (0)	0.70	13 (0)	0.90	.77
Leisure & free time activities	311 (300)	22	301 (300)	21	355 (360)	25	.21	585 (600)	41	548 (555)	38	567 (555)	39	.37

Note. Time in shown as mean (median), plus percentage of the day. Data include those who spent no time in the activity. Testing for difference in unweighted mean/median time use using ANOVA or Kruskal-Wallis test, as appropriate. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing.

Table 21

Difference in Numbers who Report Some Time in the Activity and Difference in Time (minutes per day) Spent in each Activity on Weekdays by Gender

Activity Category	Activity	Percentage Reporting some Time in the Activity			Time Use (Minutes) of those Reporting some Time in Activity		
		Male n (%)	Female n (%)	*p*	Male	Female	*p*
Personal needs	Sleeping	334 (100)	364 (100)	1.0	495 (450, 525)	480 (450, 525)	**.000***
	Personal care	326 (98)	359 (99)	.48	30 (15, 45)	60(30, 75)	**.000***
	Eating / Drinking / Having a meal	323 (97)	349 (96)	.56	45 (30, 75)	45 (30, 75)	.31
School & study	Attending class / School-related activities	334 (100)	364 (100)	1.0	345 (330, 360)	345 (330, 360)	.95
	Eating / Drinking at school	303 (91)	339 (92)	.86	60 (30, 60)	60 (45, 60)	.27
	Doing homework / Studying at school	101 (28)	72 (21)	.04	45 (30, 90)	45 (15, 120)	.27
	Travelling to and from School	318 (96)	346 (97)	.70	45 (30, 60)	45 (30, 75)	.28
	Doing homework / Studying at home	213 (60)	245 (66)	.17	75 (45, 120)	75 (45, 105)	.57
Paid work	Paid employment	22 (8)	28 (7)	.79	-	-	-
	Travelling to and from work	15 (4)	19 (5)	.85	-	-	-
	Breaks from work	4 (1)	3 (.3)	.12	-	-	-
Household tasks	Doing housework	69 (20)	90 (24)	.36	30 (15, 45)	30 (15, 30)	.42
	Shopping, errands & appointments	9 (3)	26 (7)	.04	-	-	-
	Caring for others	7 (3)	19 (4)	.38	-	-	-
Voluntary & religious activity	Voluntary activity	9 (3)	11 (4)	.35	-	-	-
	Religious activity	7 (3)	5 (2)	.48	-	-	-

Table 21 (contd.)

Difference in Numbers who Report Some Time in the Activity and Difference in Time (minutes per day) Spent in each Activity on Weekdays by Gender

Activity Category	Activity	Percentage Reporting some Time in the Activity			Time Use (Minutes) of those Reporting some Time in Activity		
		Male n (%)	Female n (%)	*p*	Male	Female	*p*
Leisure & free time activities	Extracurricular activities	33 (9)	32 (9)	.83	-	-	-
	Hanging around with friends	190 (59)	204 (56)	.59	60 (30, 120)	60 (45, 135)	.34
	Socialising with family	78 (23)	128 (36)	**.000***	30 (15,60)	45 (30, 75)	.26
	Talking on the phone / Texting	73 (22)	155 (43)	**.000***	45 (30, 75)	45 (30, 75)	.25
	Going out	221 (6)	19 (7)	.83	-	-	-
	Shopping for pleasure	3 (1)	14 (4)	.03	-	-	-
	Attending Cinema / Theatre / Concerts	6 (2)	7 (2)	.71	-	-	-
	Playing Sports, Exercise & Physical Activity	99 (30)	83 (22)	.04	75 (45, 105)	60 (45, 105)	.19
	Computer / Internet	185 (57)	162 (43)	**.000***	60 (45, 120)	60 (30, 90)	**.001***
	Hobbies / Other leisure activities	78 (23)	74 (20)	.42	60 (30, 105)	45 (30, 75)	.83
	Watching TV, DVDs etc	269 (82)	302 (82)	.99	90 (60,150)	75 (45, 120)	.02
	Listening to radio or music	80 (26)	106 (28)	.55	30 (15, 45)	30 (30, 45)	.97
	Reading	49 (15)	97 (27)	**.000***	30 (30, 60)	30 (15, 60)	.62
	Travelling outside of work / school	51 (16)	60 (15)	.79	45 (30, 60)	45 (15, 60)	.95
	Resting / Relaxing	120 (35)	150 (41)	.13	45 (30, 60)	30 (15, 60)	**.002***

Note. Dash denotes data not reported as number of cases less than 10. Time use shown as median (Q1, Q3). Testing for difference in unweighted median time use using Mann-Whitney U-test. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing.

Table 22

Difference in Numbers Reporting Some Time in the Activity and Difference in Time (Minutes per Day) Spent in Each Activity at Weekend by Gender

Activity Category	Activity	Percentage Reporting some Time in the Activity			Time Use (Minutes) of those Reporting some Time in Activity		
		Male n (%)	Female n (%)	*p*	Male	Female	*p*
Personal needs	Sleeping	331 (100)	380 (100)	1.0	585 (495, 660)	600 (514, 660)	.17
	Personal care	300 (91)	363 (96)	**.02***	30 (30, 60)	60 (45, 90)	**.000***
	Eating / Drinking / Having a meal	310 (94)	367 (97)	.10	60 (45, 90)	60 (45, 90)	.09
School & study	Doing homework / Studying at home	95 (29)	157 (41)	**.001***	75 (45, 150)	90 (45, 120)	.59
Paid work	Paid employment	66 (20)	87 (23)	.39	338 (236, 409)	315 (240, 405)	.73
	Travelling to and from work	41 (12)	70 (18)	.04	30 (30, 60)	30 (30, 45)	.29
	Breaks from work	27 (8)	42 (11)	.29	-	-	-
Household tasks	Doing housework	84 (25)	150 (40)	**.000***	45 (30, 60)	45 (30, 75)	.58
	Shopping, errands & appointments	36 (11)	42 (11)	1.0	60 (30, 90)	60 (30, 105)	.85
	Caring for others	12 (4)	31 (8)	.02	-	-	-
Voluntary & religious activity	Voluntary activity	7 (2)	13 (3)	.41	-	-	-
	Religious activity	65 (20)	66 (17)	.50	45 (30, 60)	60 (45, 60)	**.03***

Table 22 (contd.)

Difference in Numbers Reporting Some Time in the Activity and Difference in Time (Minutes per Day) Spent in Each Activity at Weekend by Gender

Activity Category	Activity	Percentage Reporting some Time in the Activity			Time Use (Minutes) of those Reporting some Time in Activity		
		Male n (%)	Female n (%)	*p*	Male	Female	*p*
Leisure & free time activities	Extracurricular activities	16 (5)	21 (6)	.81	-	-	-
	Hanging around with friends	173 (52)	200 (53)	.98	180 (105, 315)	210 (120, 330)	.17
	Socialising with family	115 (35)	188 (50)	**.000***	60 (30, 75)	60 (30, 105)	.96
	Talking on the phone / Texting	89 (27)	170 (45)	**.000***	45 (30, 75)	45 (30, 90)	.38
	Going out	73 (22)	83 (22)	1.0	150 (60, 315)	120 (60, 270)	.20
	Shopping for pleasure	28 (9)	77 (20)	**.000***	-	-	-
	Attending cinema / theatre / concerts	28 (9)	44 (12)	.21	-	-	-
	Playing sports, exercise & physical activity	137 (41)	102 (27)	**.000***	105 (60, 150)	60 (45, 120)	**.000***
	Computer / Internet	204 (62)	172 (45)	**.000***	90 (45, 165)	60 (45, 105)	**.004***
	Hobbies / other leisure activities	102 (31)	71 (19)	**.000***	75 (45, 180)	60 (30, 120)	.06
	Watching TV, DVD etc	265 (80)	302 (80)	.92	135 (90, 225)	105 (60, 165)	**.000***
	Listening to radio or music	89 (27)	110 (29)	.60	45 (30, 75)	45 (30, 60)	.31
	Reading	65 (20)	117 (31)	**.001***	60 (30, 90)	45 (30, 75)	.85
	Travelling outside of work / School	128 (39)	146 (38)	1.0	60 (30, 135)	60 (30, 105)	.26
	Resting / Relaxing	139 (42)	172 (45)	.42	45 (30, 75)	45 (30, 60)	.33

Note. Dash denotes data not reported as number of cases less than 10. Time use shown as median (Q1, Q3). Testing for difference in median time use using Mann Whitney U-test. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing. School & Study activities not applicable at weekends other than 'Doing homework / Studying at home'.

Chapter Five

Study Four: Time Use, Daily Activities and Health-related Quality of Life of Late Adolescents in Ireland

5.1 Introduction to this Chapter

The last chapter presented an analysis of newly-collected information on the "rounds of daily activity" (Yerxa, 1993, p. 3) in which this group of Irish school-going late adolescents engaged. This chapter reports the second of the three empirical studies in this thesis. Data on the adolescents' HRQoL across life contexts (i.e., school year, school location, family context, and social class) is firstly presented, paving the way for the subsequent examination of the relationship between their daily activities and HRQoL.

This study is under second review with the *Journal of Adolescence.* The study is presented here as it was submitted following revision. As before, there is a degree of overlap with some of the previous sections of this thesis and the tables/figures are at the end of the chapter.

5.2 Abstract

Aim: This cross-sectional study examined the time use and HRQoL of Irish school-going late adolescents. *Method:* Weekday and weekend day 24-hour time diaries were collected along with the KIDSCREEN-52 providing data on 10 domains of HRQoL and global HRQoL. *Results:* Seven hundred and thirty one young people participated (response rate 52%; mean age males 16.10 years; females 15.91 years). Gender accounted for the most differences across the HRQoL domains. There was some variation in global HRQoL by time use particularly for females at weekends. For males time Socialising with Family was associated with increased odds of high HRQoL at weekends. For females spending time in Physical Activity was associated with increased odds of high HRQoL on weekdays and at weekends. *Conclusion:* Adolescent lifestyles and well-being cannot be fully understood by focusing on discrete health or risk behaviours in isolation. Further person-centred research on overall multidimensional activity patterns is required.

Keywords: young people, time use, time diary, health, quality of life

5.3 Introduction

Adolescents comprise 20% of the global population (Patton et al., 2012). However, in the last 50 years, their health has improved to a lesser extent than that of younger children (Sawyer et al., 2012). As a result there is growing international recognition of the need for targeted, holistic, age-appropriate preventive and clinical services for all young people not just those who are at risk or experiencing difficulties (Gore et al., 2011; Kreipe, 2011; Viner et al., 2012). There is now an emphasis on wellness rather than the prevention of poor health (Hamilton, 2006), and on "lives not just risk factors" (Marmot, 2009, p. S126). The promotion of healthy lifestyles amongst adolescents is particularly important (Hagell et al., 2013, The Lancet, 2012) to prevent "the accelerating burden of non-communicable diseases in later life" (Viner, 2013, p. 9).

According to Harvey and Pentland (1999), "time use methodology can provide a window on actual lifestyles" (p. 3). Indeed time use is increasingly being recognised as a determinant and indicator of adolescent well-being internationally (Ben-Arieh & Ofir, 2002; Brooker & Hyman, 2010; Larson & Verma, 1999; Rees et al., 2010; Vogler et al., 2009). Short (2005) argued that in order to put all parts of young people's lives into context we need to see how they fill their days. Canadian sociologist Jiri Zuzanek coordinated the *Comparative Study of Adolescent Time Use* (CATUS), bringing together researchers from 10 developed industrial societies[1] to examine term-time time use of adolescents aged 15 - 19 years in full-time education who were living at home (Zuzanek & Mannell, 2005), largely through the secondary analysis of population-level time use datasets compiled by national statistical agencies (Hunt & McKay, 2012). Zuzanek (2005) concluded that those concerned with adolescents' health must pay attention "to adolescents' overall patterns of daily life, including sleep, eating habits, mass media consumption, extra-curricular activities and relationships with parents and peers" (p. 413), a view supported more recently by Hagell et al. (2012).

These overall patterns of daily life were the focus of a systematic review by Ferrar, Chang, et al. (2013) who identified 19 studies that used cluster analytic techniques to empirically describe adolescent time use patterns. Included studies related to adolescents between the ages of 9 and 18 years and had a minimum of two time use

[1] The ten industrialised societies were Australia, Belgium, Canada, Finland, France, Germany, Netherlands, Norway, U.K. and the USA.

variables as cluster analysis inputs. Only one study used a 24-hour activity recall. Health-related variables were largely unexplored as cluster correlates with the exception of weight status associations which were reported in 6 of the 19 studies (Ferrar, Chang, et al., 2013). In their review of adolescent 24-hour time-diary studies, Hunt, Mc Kay and Perry (2011) identified the use of non-standardised questions relating to the experience of time pressure, boredom, feelings of happiness, satisfaction with time use, physical fitness, and well-being. However, they found no evidence of use of standardised, generic, cross-cultural instruments for the subjective measurement of positive health and well-being. Together, these findings support Glorieux et al.'s belief (2005) that "the questionnaires accompanying time-diaries are not well suited to link activity patterns of adolescents with more sophisticated indicators of health and well-being" (p. 505). One important component in the measurement of well-being is quality of life (OECD, 2013).

Quality of life is a broad term that encompasses an "individual's subjective perception of well-being across all domains of life" (De Civita et al., 2005, p. 661). Health is one of a range of domains of overall quality of life that also includes housing, schools, employment, culture, and spirituality (U.S. Department of Health and Human Services, 2000). HRQoL has evolved as a term since the 1980s and encompasses "those aspects of overall quality of life that can be clearly shown to affect health" (U.S. Department of Health and Human Services, 2000, p. 6) and that are within the remit of the healthcare system (DeCivita et al., 2005). In her review article on the domains of HRQoL that are of specific importance to adolescents Frisen (2007) stated that HRQoL is "generally conceptualized as a multi-dimensional construct encompassing several major domains including the physical, social and emotional functioning of the individual" (p. 963). The relationship between HRQoL and specific lifestyle behaviours in adolescents has been explored, for example physical activity and sedentary behaviours (Gopinath et al., 2012; Lacy et al., 2012). Furthermore, the HRQoL of young people living with specific health conditions has been widely investigated, for example low back pain (Pellise et al., 2009), obesity (Morales et al., 2013), mental illness (Weitkamp et al., 2013), coeliac disease (Altobelli et al., 2013), eating disorders (Jenkins et al., 2014) and congenital heart disease (Mellion et al., 2014). However, there is a paucity of research examining daily activities across 24 hours and HRQoL. Moreover there is a lack of research on the HRQoL and lifestyles of well young people thus the relationship between HRQoL and time use in this population is not well understood. Therefore in this paper we build on

the existing literature by collecting and examining new Irish data on the time use of well "late adolescents", defined by Sawyer et al. (2012, p. 1632) as the age period 15 - 19 years, across two 24-hour periods, one weekday and one weekend day based on detailed time diaries. Mirroring the ecological perspective (Blum et al., 2012) evident in contemporary Irish and international research and policy development (Currie et al., 2012; Gavin et al., 2013) we examine the relationship between daily time use, life contexts (year at school, family context, school location, and social class), and HRQoL for males and females. We extend existing research in the fields of adolescent time use and HRQoL by examining how self-reported global HRQoL status differs by time use and explore if time use is a useful predictor of HRQoL. Specifically we explore the following questions in relation to well adolescents:

1. How does HRQoL vary by gender, school year, school location, family context, and social class?
2. Does HRQoL differ with different levels of time use for males and females?
3. Does time spent in particular activities predict overall HRQoL?

5.4 Method

5.4.1 Sample and Participant Selection

This cross-sectional study was designed in keeping with the CATUS project which focused on the term-time (i.e., during the school year rather than in holiday time) time use of late adolescents aged 15 - 19 years in full-time education who were living at home (Zuzanek & Mannell, 2005). A two-stage stratified sampling strategy was employed. Firstly second-level schools were randomly selected, with probability proportionate to size, from the governmental schools' register for the designated region. Reflecting the distribution of schools in the sampling frame, the sample was stratified by school type (male, female and mixed) and location (city and county). Twenty-eight schools (76%) agreed to participate. Thereafter students from the first two of the three senior cycle years were invited to participate (n=1413)[2]. Seven hundred and thirty one fully consented questionnaires were returned yielding a response rate of 52%.

[2] The Irish second-level school system comprises a 3-year junior cycle and a 3-year senior cycle. The first year of senior cycle is typically referred to as Transition Year, while the second year of senior cycle is referred to as Fifth Year. Sixth (final) year students were not included as informal consultation with school principals had indicated that accessing this cohort in their final State examination year would be problematic.

5.4.2 Measures

Time use

While there are several recognised methods of measuring time use the UNECE (2013) favoured the time diary method arguing that the resultant data are more accurate and detailed than the alternatives. Larson and Verma (1999) found the 24-hour time diary to be the most frequently used method in child and adolescent time use research internationally. Similarly, Ben-Arieh and Ofir (2002) recommended time diaries over other methodologies in time use research with children and adolescents. The time diary method has acceptable reliability and validity (Phipps & Vernon, 2009; Robinson & Godbey, 1999). In the present study time use was measured using an adapted version of the diary instrument developed by the Irish Economic and Social Research Institute (ESRI) in their 2005 survey of Irish adults' time use (n=1,023) (McGinnity et al., 2005). Their diary contained a relatively short but comprehensive list of 26 pre-coded activities. In consultation with the ESRI and an advisory group of young people this pre-coded list of activities was revised to ensure age-appropriateness, resulting in a pre-coded diary format with six main activity categories comprising 31 individual activities.[3] The activities listed were in keeping with those used in adolescent time use surveys internationally (Zuzanek & Mannell, 2005). Participants were asked to record their main (primary) activity for each block of 15 minutes of the designated day. Optional secondary activities could also be recorded. Participants completed one diary for a weekday and one diary for a weekend day. Each diary took approximately 15 minutes to complete and could be filled in at intervals throughout the diary day or retrospectively after the designated diary day.

Health-related quality of life

HRQoL was measured using the 52-item KIDSCREEN questionnaire (Ravens-Sieberer et al., 2005). This instrument was developed across Europe as a self-report measure applicable for healthy and chronically ill children and adolescents (aged from 8 - 18

[3] The main changes were in the housework category where "cooking", "cleaning" and "house repairs" were replaced with "doing housework". "Paid employment or study" was separated into "school and study" and "paid work". A "travelling outside of work/school" and "resting/relaxing" activity option were added on the advice of McGinnity et al. (2005).

years). It assesses 10 domains of HRQoL, namely "physical well-being", "psychological well-being", "moods and emotions", "self-perception", "autonomy", "parent relations and home life", "social support and peers", "school environment", "social acceptance", and "financial resources". Extensive and rigorous psychometric testing has shown the KIDSCREEN to be a reliable, valid, and sensitive measure (Ravens-Sieberer et al., 2014). A global HRQoL score (the KIDSCREEN-10 Index) was also generated from 10 items of the KIDSCREEN-52 (Erhart et al., 2009). The KIDSCREEN-10 Index has also demonstrated good psychometric properties (Ravens-Sieberer et al., 2010). Cronbach's alphas for the present study were 0.95 (KIDSCREEN-52) and 0.86 (KIDSCREEN-10 Index). The KIDSCREEN instruments have been validated for children and adolescents in Ireland and Irish norm reference data are available (Keenaghan & Kilroe, 2008). Interpretations for very low or very high scores for each of the KIDSCREEN-52 domains and the global HRQoL score are shown in Table 12 (KIDSCREEN Group Europe, 2006).

Demographic questions

Individual participants recorded their age, gender, nationality and family context, while school year and school location were recorded by the candidate. Participants' descriptions of their parents' occupations were coded in accordance with the Irish CSO system (2011), resulting in a 7-item social class scale ranging from "professional workers" (highest) to "unskilled" and "all others gainfully employed and unknown" (lowest). Social class was determined by using the highest social class available for each participant.

5.4.3 Procedures

Ethical approval was granted by the University College Cork Research Ethics Committee of the Cork Teaching Hospitals. School principals gave consent and provided the name of a liaison staff member. Each school identified one class group from each of the designated years (Transition Year and Fifth Year). The candidate met with all the students in each class group and provided written and verbal information for students and written information for parents. Both students and parents were required to complete the consent/assent form. On receipt of signed consent/assent forms the candidate met the participants to provide instructions for completion of the questionnaire. They completed a sample diary and could ask any questions arising.

Thereafter the class was assigned a weekday and weekend day to complete their diaries. Diary days were designated by the candidate with the aim of being as close as possible in time to the day of initial diary distribution in order to maximise accurate recall of activities. Participants were provided with special stickers to use as memory aides and were also encouraged to put reminders in their mobile phones and school journals. When the designated diary days had passed the liaison staff member prompted participants to check their diaries for accuracy and completeness. Diaries were then sealed in individual envelopes by participants to ensure privacy prior to collection by the liaison teacher. All study recruitment and data collection was conducted by the candidate.

5.4.4 Data Analysis

In keeping with other Irish surveys (Gavin et al., 2013) social classes were collapsed into three categories: social class 1-2 (higher), social class 3-4 (middle), and social class 5-6 (lower). Nationality was aggregated into Irish and other. Twenty weekday diaries and 20 weekend diaries were excluded as there was more than four hours time with no recorded activities. This was the quality measure used by McGinnity et al. (2005) in their time use study with Irish adults. Consistent with the definition of a schoolday set out in the CATUS project (Zuzanek & Mannell, 2005) a further 13 weekday diaries were removed as there was less than 60 minutes recorded at school on the designated diary day. Thus, there were 698 usable weekday diaries (male = 334, female = 364) and 711 usable weekend diaries (male = 331, female = 380). Twenty-five KIDSCREEN questionnaires (3%; male = 19, female = 6) were incomplete. Those who lived with a guardian/had incomplete family context information (2%, n=17) and those who did not provide sufficient detail for the social class classification (7%, n=54) were also excluded.

Using the KIDSCREEN Group Europe's (2006) scoring guidelines and software Rasch scores were computed for each of the 10 KIDSCREEN-52 domains and the KIDSCREEN-10 Index. These were transformed into T-values with a mean of 50 and a standard deviation of 10 with higher scores indicating better HRQoL (Ravens-Sieberer et al., 2008). To allow for comparison with national norm data, results are presented as mean (standard deviation). However, as the KIDSCREEN data were not normally distributed, non-parametric tests (Machin et al., 2007) were used to examine differences

by gender, school year, school location, family context (Mann-Whitney *U*-test), and social class (Kruskal-Wallis test).

As is customary in time use reports (United Nations, 2005), our analyses focused on main (primary) activities only. For each participant, each of the 96 main activity timeslots was coded using the pre-coded list of activities and entered into SPSS. The number of timeslots ticked for a given main activity were then summed and multiplied by 15 to give the total minutes per day for each activity. We tested for differences in global HRQoL (KIDSCREEN-10 Index) scores by time spent in a given activity. As the time use data had a very strong positive skew we created categorical time use variables. Non-zero time spent in the activity was dichotomised around the median into some time and more time. A third category represented zero time in the activity. Non-parametric analyses were used as the data were not normally distributed in each of the categories. Separate analyses were conducted for males and females as our previous analyses had shown significant gender differences in time use, particularly at the weekend (Hunt et al., 2014).

We estimated ordinal logistic regression models to examine the strength of the relationship between time use and HRQoL for males and females. The outcome variable in our regression analyses was the global KIDSCREEN-10 Index score. As these data were not normally distributed, even after log transformations, linear regression models were not appropriate. Therefore the scores were grouped into quartiles with higher scores in the highest quartile. When the categories of the outcome variable have a natural order ordinal logistic regression can be used (Kleinbaum & Klein, 2010). For these regression analyses non-zero time spent in the activity (in units of 15 minutes) was dichotomised around the median into some time and more time. A third category represented zero time in the activity. If any of these three categories contained less than 5% of respondents the categories were merged as appropriate, that is, into no time and some time, or some time and more time. In all cases the chosen reference category was the largest. We adjusted for school year, school location, family context, social class, nationality, and diary day. Using the likelihood ratio test we tested the assumption of proportional odds that underlies ordinal logistic regression.[4] Thereafter we estimated the odds ratios and confidence intervals with robust standard errors. However *p*-values were

[4] Five of the 77 separate ordinal logistic regressions failed the test of proportional odds. In these cases, we ran less restrictive multinomial logistic regression models. The results of these 5 regressions are presented separately in Table 29.

based on the Wald test as it is not possible to obtain likelihood based *p*-values using robust estimates (Long & Freese, 2001).

Alpha was set at .05 for all the tests in this study. Because of the large number of tests, Bonferroni correction was applied when determining statistical significance (Machin et al., 2007). Unadjusted *p*-values are reported throughout but, in the tables, those that remain significant after applying the Bonferroni correction are highlighted in bold and with an asterisk. Analyses were conducted using SPSS version 21.0 (IBM, 2012) and Stata release 13 (StataCorp., 2013).

5.5 Results

Participants are profiled in Table 23. Males' ages ranged from 15 - 18 years (mean 16.10 years) and females' ages ranged from 14 - 18 years (mean 15.91 years). There were slightly more females than males in the sample, and more Fifth Year than Transition Year students. The distribution of city and county schools mirrors their distribution in the sampling frame. Eighty-seven percent of young people lived with both parents. The Department of Children and Youth Affairs (2013) reported that approximately 81% children in Ireland resided with both parents, a proportion that has remained relatively stable between 2006 and 2011. At 52%, the higher social class groups were over-represented in the sample. In the 2011 Irish census the two higher social class groups accounted for 35% of the population (CSO, 2012). Ninety-three percent of the sample was Irish. Approximately 10% reported a long-term illness, disability or medical condition, matching the finding of the 2005 Irish national KIDSCREEN survey (Keenaghan & Kilroe, 2008). Asthma was most frequently reported by both males (51%, n=20) and females (66%, n=21).

5.5.1 Health-related Quality of Life

Table 24 shows mean scores for each of the 10 KIDSCREEN-52 domains and the KIDSCREEN-10 Index, by gender, school year, school location, family context, and social class. The top scoring domains for females were "social support and peers", "financial resources" and "social acceptance" while the lowest (in ascending order) were "self-perception", "physical well-being" and "autonomy". For males the highest domains were "financial resources", "self-perception", and "physical well-being" and the lowest were "autonomy", "school environment", and "parent relations and home life". Significant gender differences were found in five of the 10 domains and in global HRQoL, which was rated more highly by males than females (p = .01). After

adjustment for multiple testing males scored significantly higher than females in "physical well-being" ($p < .001$) and "self-perception" ($p < .001$), while females scored higher in "social support & peers" ($p < .001$) and "social acceptance" ($p = .001$). Significant school year differences were found in four of the KIDSCREEN-52 domains. After adjustment only the global HRQoL score remained statistically significant ($p = .002$) with higher scores in the younger Transition Year group. There were no significant differences in any of the domains by school location. Significant family context differences were found in two domains, namely "financial resources" and "school environment" but these did not remain significant after adjustment. Those in the highest social class category rated their "physical well-being" significantly higher than those in the other two categories. Conversely, those in the lowest social class group rated the highest in the "financial resources" domain. However neither of these results remained significant after adjustment. The scores for the KIDSCREEN-10 Index are illustrated in Figure 7.

5.5.2 Differences in HRQoL by the Amount of Time Spent in Activities

We examined how males' and females' global HRQoL scores differed by time use on weekdays (Table 25) and weekends (Table 26). On weekdays differences in the amount of time males spent Reading and Resting/Relaxing showed significant differences in HRQoL scores ($p = .04$ and $p = .02$, respectively). For females HRQoL scores differed by time spent Doing Homework/Studying at Home ($p = .04$) and Sports, Exercise and Physical Activity ($p = .04$). These results did not remain significant post adjustment. At weekends there were no differences in HRQoL by time use for males. For females seven significant differences emerged: Eating/Drinking/Having a Meal ($p = .02$), Doing Housework ($p = .01$), Extracurricular Activities ($p = .04$), Attending Cinema/Theatre/Concerts ($p = .005$), Computer/Internet ($p = .05$), Travelling Outside Work/School, and Sports, Exercise & Physical Activity ($p < .001$) with only the latter remaining significant post adjustment. Adjusted post-hoc pairwise comparisons showed that there were significant differences in HRQoL between both no time – low time ($p = .03$) and no time – high time ($p = .001$) pairs but not between low time – high time groups ($p = .88$).

5.5.3 Time Use as a Predictor of HRQoL

In the male weekday data (Table 27) spending some time Doing Housework was associated with increased odds of high HRQoL Odds Ratio/OR 2.88 [Confidence

Interval/CI 1.16, 7.16] while spending more time Resting/Relaxing was associated with decreased odds of high HRQoL OR 0.39 (CI 0.22, 0.69). For females on weekdays (Table 27) spending no/some time in Personal Care was associated with increased odds of high HRQoL OR 1.69 (CI 1.07, 2.66). Spending some time Playing Sports, Exercise & Physical Activity was also associated with increased odds of high HRQoL OR 1.98 (CI 1.13, 3.45).

At weekends (Table 28) for males spending more time Socialising with Family was associated with higher odds of high HRQoL OR 1.92 (CI 1.11, 3.32). For females (Table 28) spending some time in Attending Cinema/Theatre/Concerts OR 2.38 (CI 1.14, 4.93) and using the Computer/Internet OR 1.59 (CI 1.02, 2.47) were associated with higher odds of high HRQoL. Some time in Housework OR 2.34 (CI 1.36, 4.01) and some and more time Playing Sports, Exercise & Physical Activity [OR 1.97 (CI 1.31 – 2.96) and OR 1.49 (CI 1.01 – 2.20), respectively] were associated with higher odds of being in the higher HRQoL group. Both of these activities remained significant post adjustment.

5.6 Discussion

To our knowledge, this is the first study of 24-hour time use and HRQoL amongst well late adolescents. It is important to preface the discussion of our results with the explicit statement that no causal inferences can be drawn from these cross-sectional data. Notwithstanding that fact, we found strong evidence of an association between gender and adolescent HRQoL. Five of the 10 KIDSCREEN-52 domains differed significantly by gender, with four of these differences remaining strongly significant after Bonferroni adjustment. Males scored higher than females in "physical well-being" and "self-perception", while females scored higher in "social support and peers" and "social acceptance". Furthermore, males global HRQoL was significantly higher than females'. In the 2005 Irish national KIDSCREEN survey Keenaghan and Kilroe (2008) similarly found that "self-perception" and "physical well-being" were amongst the lowest rated domains for females, while they fared better in "social acceptance" and "social support and peers". Likewise for males they found low scores in "school environment" and "autonomy" and better scores in "self-perception". Again using the KIDSCREEN instrument, Bisegger et al. (2005) found that HRQoL is frequently lower for adolescent females than males. Our findings match Bisegger et al.'s results in relation to males reporting significantly higher "physical well-being" and "self-perception". Interestingly

while their results did not support their *a priori* hypotheses that females would have higher values in "social support and peers" and "social acceptance", our results are strongly significant in these two domains. Viner et al. (2012) reported that, compared to males, females in Europe and North America "consistently have poorer well-being indicators, such as self-rated health, psychosomatic complaints or symptoms, and life satisfaction" (p. 1646). Females recorded lower life satisfaction, considered an evaluation of quality of life, in almost all countries in the Health Behaviour in School Children (HBSC) surveys (Currie et al., 2012). Cavallo et al. (2006) also found females in their study had a poorer perception of health. They theorised that this may be due to the different onset and experiences of puberty and the accompanying physical and psychological changes. They suggested that such experiences and changes often give rise to body image difficulties for females and the "different orientation of males and females in externalising or internalising their own feelings and emotions" (p. 1583). Thus our study provides further evidence in support of existing Irish and international literature regarding significant gender differences in HRQoL and the need for gender-specific interventions to support the health and well-being of young people (Currie et al., 2012; WHO, 2011a).

An unexpected HRQoL finding was that adolescents in the lowest social class group rated the highest in global HRQoL and significantly higher in the "financial resources" domain. These reverse trends run counter to what is known regarding social class gradients in health generally (Solar & Irwin, 2010) and specifically regarding the association between low socio-economic status and lower KIDSCREEN scores amongst European children and adolescents as reported by Erhart et al. (2009). Our results should be interpreted with some caution given the fact that the lower social class group were under-represented in the sample. Interestingly however, "financial resources" was amongst the highest ranked HRQoL domains for males and females in this study. This may reflect that fact that these data were collected at what is regarded as the peak of the economic boom in Ireland, quarter four in 2007, when real gross domestic product (GDP) reached its highest level (Department of Children and Youth Affairs, 2013) and many young people had access to larger disposable incomes than before (Cunningham, 2007). As advocated by Larson and Verma (1999), repeated studies of adolescent time use would allow for an assessment of the impact of economic change on the lifestyles in this developmental period. This study contributes important baseline data to enable such analysis in the future.

Post Bonferroni-adjustment there were no statistically significant differences in global HRQoL by time use on weekdays for males or females. The suggested homogenising effect of full-time schooling (Chenu & Lesnard, 2005) may contribute to the observed lack of difference in the weekday data. Interestingly, the weekend data showed no differences for males but seven differences for females with one result remaining strongly significant, namely those who spent more time Playing Sports, Exercise & Physical Activity reporting the highest global HRQoL. Moreover we found that for females spending time at weekends Playing Sports, Exercise & Physical Activity was significantly associated with higher odds of being in the higher HRQoL group. This is not surprising given that regular physical activity is known to maintain and create physical and mental health and improve quality of life (Booker, Skew, Sacker, & Kelly, 2014; Burns & Murray, 2014; Galan et al., 2013; Gopinath et al., 2012; Lacy et al., 2012). Unfortunately however, our time use data suggest that a minority of females appear to be experiencing these benefits. Seventy-three percent of females reported no time spent in physical activity on their weekend diary day, with the weekday data being of even greater concern (77% reporting no time in physical activity). There is consistent international evidence that physical activity declines over adolescence (Dumith, Gigante, Domingues, & Kohl, 2011), more so for females than males (Currie et al., 2012; Labbrozzi, Robazza, Bertollo, Bucci, & Bortoli, 2013). The WHO (2012b) and governments internationally (Active Healthy Kids Australia, 2014; Department of Health and Children, 2013; U.K. Department of Health, 2013; U.S. Department of Health and Human Services, 2010) have targeted the unhealthy physical activity behaviours of children and adolescents as a key priority to address the increasing prevalence and burden of non-communicable diseases.

We found that spending more time Socialising with Family was associated with increased odds of high HRQoL for males at weekends. It is well recognised that positive family relationships are associated with higher self-rated health and life satisfaction (Currie et al., 2012). Based on the analysis of HBSC data from Europe and North America, Moreno et al. (2009) found that young people who reported greater ease of communication with their parents were more likely to report fewer psychological complaints. In their study of New Zealand adolescents Jose, Ryan, and Pryor (2012) found that family connectedness had a particularly strong role to play in predicting well-being outcomes, even more so than peer connectedness, often considered to be of prime importance in adolescence. Parent–child connectedness specifically has been found to

predict increased self-esteem and decreased depressive symptoms in adolescent males and females (Boutelle, Eisenberg, Gregory, & Neumark-Sztainer, 2009). Similarly, based on the secondary analysis of American time use data Desha et al. (2011) found that time spent with parents offered an important protective effect against adolescent depression. Again, based on time use data, Offer (2013) reported that family leisure time was positively associated with adolescents' emotional well-being. In fact, the participants in Offer's study reported higher positive affect during time spent with, rather than without, both parents. Enhancing youth connectedness with family and quality parent-adolescent time can thus yield positive benefits for adolescent health and well-being.

On weekdays, spending more time Resting/Relaxing was associated with decreased odds of high HRQoL for males. Passmore (2003) found a significant and negative association between passive "time-out leisure" (p. 78) and mental health in Australian adolescents. Therefore, our finding may have implications for males' mental health. Supporting the mental health of Irish young people is a national priority (Department of Children and Youth Affairs, 2014). Fifteen to 20% of Irish 9-year-olds have significant levels of emotional or behavioural problems (Department of Children and Youth Affairs, 2014) while the mortality rate from suicide is the third highest in Europe among males aged 15 - 19 years (Department of Health and Children, 2013). Adolescent mental health is an area of great concern internationally too with early intervention deemed essential to reduce the enormous global burden of mental disorders (Becker & Kleinman, 2013; Coughlan et al., 2013; Currie et al., 2012; Patel et al., 2007; WHO, 2012a). Regarding this global public health challenge of youth mental ill-health, Patel et al. (2007) recommended the development of integrated, cross-sectoral interventions that target multiple health behaviours.

A noteworthy finding is that Doing Housework was associated with higher HRQoL for males during the week and for females at the weekend. There is a dearth of literature to illuminate our understanding of this result. It could be argued that spending more time in Housework influences HRQoL as the young person may perceive a positive and valued contribution to family life. Conversely, as the direction of causality cannot be established in these cross-sectional data, generally feeling better about life may give rise to the adoption of pro-social behaviours such as contributing to household duties.

In sum, based on aggregate-level analyses, we found some significant associations between HRQoL and individual activities for males and females, independent of school year, school location, family context, social class, nationality or diary day. While our findings in relation to physical activity and time with family are well supported in the literature some of our results are more difficult to interpret in isolation. As Michelson (2005) stated, "the whole is greater than the sum of its parts" (p. 103) particularly given the zero-sum nature of time "in which there is only a fixed amount of time to be distributed and traded off among necessary and desired activities" (p. 18). Such time use tradeoffs are also referred to as activity displacements (Larson & Verma, 1999). For example, it is hypothesised that screen time displaces physical activity (American Academy of Pediatrics, 2011; Vandewater et al., 2004). However, high levels of physical activity can coexist with high levels of sedentary behaviour (Ferrar, Chang, et al., 2013; Leech et al., 2014). Unique patterns that are not represented by the aggregate-level average may be identified by person-centred rather than more traditional variable-centred approaches (Bergman & Magnusson, 1997; von Eye et al., 2006). Such methods are becoming increasingly popular in research on adolescent lifestyles (Leech et al., 2014; Ottovaere et al., 2011).

5.7 Limitations and Conclusion

As with all studies our results need to be considered in the context of several limitations. While there is an acknowledged need for data collection from the most marginalized adolescents (UNICEF, 2014), the present study was designed in keeping with an international study which focused on school-going adolescents (Zuzanek & Mannell, 2005). According to Patton et al. (2012) "school-based surveys are efficient where a high proportion of adolescents are in school" (p. 1672) as is the case in Ireland. A response rate of 52% was achieved with no subsequent weighting for non-response, introducing the possibility of non-response bias. However, studies in this area show little evidence of bias due to non-response (Phipps and Vernon, 2009). As is customary in time use reports (United Nations, 2005), the initial analyses focused on main activities only. However, as optional secondary activities could be recorded by participants, in the future the data can be examined to explore the complex nature of simultaneous activities. Data collection took place between September and December 2007. Therefore potential seasonal variations (e.g., weather, hours of daylight, and examination commitments across the academic year) in time use were not taken into

account. Time diaries rely on retrospective recall of participation in activities which is a potential source of error (Hunt & McKay, 2012). Short duration activities (e.g., going to the bathroom or snacking) can be under-reported. Finally, as stressed by Larson and Verma (1999), "assessment of amounts of time spent in an activity takes us only so far and ... issues regarding the quality of that time may be much more important" (p. 727). However they also argued that while "scholars and practitioners need to recognize the limits of time as a variable nonetheless it seems essential that they have good data on what children and adolescents spend their day doing" (p. 728).

Notwithstanding these limitations the present study has extended the literature in several ways. It complements and builds on existing knowledge by focusing on a well population and examining time use across 24 hours rather than on discrete activities in isolation, based on diary data rather than stylised estimates. As recommended by Hagell et al. (2013), amongst others, we focused on a defined quinary age band, that of late adolescence (15 - 19 years). The study was designed in keeping with the parameters of the CATUS project (Zuzanek & Mannell, 2005) and used a standardised HRQoL instrument designed specifically for adolescents across Europe, thus making cross-cultural comparisons possible. By generating insights into the "cultural repertoire of typical activities" (Pierce, 2001, p. 144) in contemporary Ireland, this study provides country-based data that may aid the identification of local priorities by Irish policy makers and service providers (Catalano et al., 2012; Patton et al., 2012). Our data reinforce the need for health promotion and disease prevention strategies to be tailored differently for males and females. Furthermore, we argue that the lifestyles and well-being of adolescents cannot be sufficiently understood by focusing on discrete health or risk behaviours in isolation. We support more recent calls to consider multiple activity domains and the overall activity pattern as a multidimensional unit (Farb & Matjasko, 2012; Ferrar, Chang, et al., 2013; Hagell et al., 2012, Regan & Heary, 2013; Zarrett & Bell, 2014). In the next phase of our analysis we use person-centred analyses to examine multi-dimensional patterns of time use. Such a shift from variable-centred to person-centred analyses may yield greater insights into the complex relationship between adolescent time use and HRQoL.

Table 23

Demographic Characteristics of Sample in Study Four (N = 731)

		Male n (%)	Female n (%)
		343 (47)	388 (53)
School Year	Transition Year (TY)	136 (40)	184 (47)
	Fifth Year (5Y)	207 (60)	204 (53)
School Location	City	70 (20)	123 (32)
	County	273 (80)	265 (68)
Family Context	Two Parents	303 (88)	334 (86)
	One Parent	34 (10)	43 (11)
	Guardian/Not completed	6 (2)	11 (3)
Social Class	Higher Social Class (SC1)	191 (56)	186 (48)
	Middle Social Class (SC2)	101 (29)	130 (34)
	Lower Social Class (SC3)	24 (7)	45 (12)
	Unknown/Not completed	27 (8)	27 (7)
Nationality	Irish	319 (93)	357 (92)
	Other/Not completed	16 (7)	30 (8)
Have a Long Term Illness, Disability or Medical Condition		39 (11)	35 (9)

Table 24

Differences in Health-related Quality of Life by Gender, School Year, School Location, Family Context, and Social Class (N = 706)

		Gender			School Year			School Location			Family Context			Social Class			
		Male (n=324)	Female (n=382)	*p*	TY (n=307)	5Y (n=399)	*p*	City (n=184)	County (n=522)	*p*	Two Parent (n=615)	One Parent (n=75)	*p*	High (n=364)	Middle (n=226)	Low (n=67)	*p*
KIDSCREEN-52 Domains	Physical Well-being	48.63 (9.04)	44.15 (8.63)	**<.001***	46.92 (8.99)	45.66 (9.14)	**.03**	45.70 (9.25)	46.38 (9.04)	.24	46.45 (9.09)	45.17 (9.19)	.36	46.96 (8.74)	45.22 (9.93)	45.82 (7.64)	**.01**
	Psychological Well-being	46.82 (9.14)	47.09 (9.18)	.72	47.40 (8.98)	46.63 (9.28)	.24	47.40 (10.20)	46.81 (8.76)	.42	47.21 (8.84)	45.28 (11.17)	.05	46.96 (8.72)	47.32 (9.39)	47.04 (11.20)	.86
	Moods & Emotions	48.57 (7.79)	47.52 (8.32)	**.03**	48.58 (8.07)	47.56 (8.09)	.07	48.30 (8.31)	47.90 (8.02)	.16	48.17 (7.87)	46.10 (9.01)	.06	48.06 (7.98)	48.14 (8.12)	48.32 (8.94)	.93
	Self Perception	49.19 (8.99)	43.55 (8.22)	**<.001***	45.24 (8.50)	46.83 (9.36)	.08	45.11 (8.11)	46.50 (9.31)	.07	46.18 (8.95)	45.38 (9.70)	.29	46.50 (9.05)	45.93 (8.74)	45.51 (8.91)	.33
	Autonomy	46.16 (9.37)	44.85 (8.77)	.06	46.28 (9.30)	44.81 (8.84)	**.01**	45.88 (9.10)	45.30 (9.06)	.28	45.27 (9.11)	46.47 (8.54)	.34	44.89 (8.98)	46.22 (9.29)	45.78 (9.89)	.28
	Parent Relations & Home Life	46.64 (9.97)	46.62 (10.83)	.82	46.59 (10.63)	46.66 (10.30)	.97	47.11 (10.53)	46.46 (10.41)	.53	46.84 (10.67)	44.79 (8.52)	.06	45.97 (10.12)	46.89 (10.49)	48.14 (11.22)	.26
	Financial Resources	52.67 (8.99)	52.11 (9.69)	.53	51.98 (9.54)	52.67 (9.25)	.37	51.37 (9.69)	52.72 (9.24)	.11	52.58 (9.42)	50.47 (8.90)	**.04**	51.63 (9.60)	53.09 (8.87)	54.76 (9.12)	**.03**
	Social Support & Peers	48.40 (9.63)	52.41 (10.38)	**<.001***	50.56 (10.55)	50.58 (9.99)	.99	50.38 (10.16)	50.64 (10.26)	.79	50.84 (10.42)	49.27 (8.90)	.20	49.85 (10.22)	51.52 (10.38)	51.33 (10.84)	.25
	School Environment	46.33 (8.55)	47.63 (8.23)	.10	47.93 (8.63)	46.34 (8.16)	**.01**	47.74 (8.25)	46.78 (8.45)	.35	47.22 (8.53)	45.66 (7.31)	**.04**	46.99 (7.71)	47.00 (9.52)	47.28 (8.19)	.89
	Social Acceptance	47.84 (9.58)	50.18 (9.44)	**.001***	48.23 (9.80)	49.78 (9.35)	**.04**	49.00 (9.75)	49.14 (9.52)	.94	49.02 (9.59)	49.35 (9.51)	.84	49.48 (9.46)	48.74 (9.69)	49.89 (9.81)	.51
KIDSCREEN-10 Index	Global HRQoL	46.17 (7.29)	45.06 (7.31)	**.01**	46.33 (7.34)	44.99 (7.26)	**.002***	45.73 (7.52)	45.51 (7.25)	.61	45.62 (7.00)	45.14 (9.13)	.23	45.50 (7.08)	45.56 (7.54)	46.24 (8.63)	.97

Note. TY = Transition Year. 5Y = Fifth Year. HRQoL scores shown as mean (SD, standard deviation). Testing for difference using Mann-Whitney-U or Kruskal-Wallis tests, as appropriate. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing.

Table 25

Differences in Health-related Quality of Life by the Amount of Time Spent in Each Activity on Weekdays by Gender (N = 675)

Activity Category	Activity	Male (n = 317)							Female (n = 358)						
		No time		Some time		More time			No time		Some time		More time		
		N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*
Personal Needs	Sleeping	0 (0)	-	147 (46)	46.37 (8.26)	170 (54)	45.87 (6.18)	.82	0 (0)	-	198 (55)	44.99 (7.58)	160 (45)	45.29 (7.24)	.58
	Personal Care	8 (3)	46.92 (6.68)	181 (57)	46.08 (7.26)	128 (40)	46.09 (7.22)	.92	5 (1)	49.30 (13.73)	171 (48)	45.95 (8.00)	182 (51)	44.24 (6.52)	.21
	Eating / Drinking / Having a Meal	10 (3)	43.36 (9.93)	147 (46)	45.90 (6.64)	160 (51)	46.46 (7.52)	.52	15 (4)	46.36 (7.17)	185 (52)	44.80 (7.32)	158 (44)	45.38 (7.59)	.58
School & Study	Class / School Related Activities	0 (0)	-	194 (61)	46.18 (7.22)	123 (38.8)	45.98 (7.21)	.84	0 (0)	-	207 (58)	44.96 (7.30)	151 (42)	45.35 (7.61)	.79
	Eating / Drinking at School	27 (9)	45.83 (6.48)	129 (41)	45.35 (6.25)	161 (51)	46.75 (7.98)	.41	25 (7)	44.52 (6.69)	140 (39)	45.42 (7.57)	193 (54)	44.99 (7.43)	.90
	Doing Homework / Studying at School	220 (69)	46.19 (6.93)	40 (13)	44.69 (5.64)	57 (18)	46.74 (9.01)	.51	288 (80)	45.46 (7.81)	33 (9)	43.32 (5.03)	37 (10)	44.14 (5.75)	.33
	Travelling to and from School	14 (4)	48.37 (12.88)	128 (40)	46.53 (7.70)	175 (55)	45.61 (6.16)	.69	18 (5)	45.28 (7.60)	192 (54)	44.52 (7.23)	148 (41)	45.89 (7.63)	.24
	Doing Homework / Studying at Home	111 (35)	45.56 (7.80)	109 (34)	46.07 (6.46)	97 (31)	46.76 (7.32)	.29	119 (33)	45.74 (7.38)	116 (32)	45.59 (7.17)	123 (34)	44.09 (7.65)	**.04**
Paid Work	Paid Employment	295 (93)	46.13 (6.81)	11 (4)	44.61 (5.81)	11 (4)	46.88 (15.58)	.72	330 (92)	45.21 (7.50)	15 (4)	43.50 (7.52)	13 (4)	44.85 (5.24)	.72
	Travelling to and from Work	302 (95)	46.11 (6.79)	4 (1)	47.10 (10.09)	11 (4)	45.38 (14.99)	.54	339 (95)	45.21 (7.51)	5 (1)	44.29 (1.48)	14 (4)	43.26 (6.56)	.88
	Breaks from Work	313 (99)	46.11 (7.14)	1 (0.3)	41.24 (-)	3 (0.9)	47.06 (15.40)	.51	355 (99)	45.06 (7.36)	1 (0.3)	48.29 (-)	2 (0.6)	55.10 (16.63)	.43
Household Tasks	Doing Housework	255 (80)	45.88 (7.58)	42 (13)	47.29 (5.83)	20 (6)	46.40 (4.30)	.13	269 (75)	45.06 (6.80)	32 (9)	45.69 (9.17)	57 (16)	45.11 (9.14)	.84
	Shopping, Errands & Appointments	308 (97)	46.05 (7.25)	6 (2)	46.35 (5.85)	3 (1)	50.59 (4.13)	.32	332 (93)	45.21 (7.49)	10 (3)	40.54 (5.23)	16 (5)	46.18 (6.44)	.08
	Caring for Others	312 (98)	46.05 (7.11)	4 (1)	46.44 (12.95)	1 (0.3)	59.85 (-)	.23	339 (95)	44.96 (7.10)	10 (3)	48.55 (15.04)	9 (3)	47.61 (7.10)	.47
Voluntary & Religious Activity	Voluntary Activity	308 (97)	46.05 (7.27)	5 (2)	47.20 (3.55)	4 (1)	48.59 (5.70)	.51	348 (97)	45.06 (7.47)	6 (2)	47.96 (6.13)	4 (1)	46.31 (4.20)	.37
	Religious Activity	310 (98)	45.95 (6.94)	5 (2)	54.78 (16.94)	2 (1)	48.51 (4.02)	.33	353 (98)	45.14 (7.47)	2 (0.6)	44.09 (4.03)	3 (0.8)	44.50 (1.16)	.99

Table 25 (contd.)

Differences in Health-related Quality of Life by the Amount of Time Spent in Each Activity on Weekdays by Gender (N = 675)

Activity Category	Activity	Male (n = 317)							Female (n = 358)						
		No time		Some time		More time			No time		Some time		More time		
		N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*
Leisure & Free Time Activities	Extracurricular Activities	286 (90)	45.81 (6.90)	16 (5)	49.14 (12.08)	15 (5)	48.40 (5.57)	.26	326 (91)	45.24 (7.42)	18 (5)	44.55 (8.44)	14 (4)	43.23 (6.27)	.63
	Hanging Around with Friends	134 (42)	46.54 (7.68)	85 (27)	44.63 (5.66)	98 (31)	46.77 (7.62)	.11	157 (44)	45.49 (7.68)	107 (30)	44.83 (7.53)	94 (26)	44.85 (6.89)	.60
	Socialising with Family	243 (77)	45.94 (7.62)	41 (13)	46.30 (5.40)	33 (10)	47.01 (6.02)	.49	232 (65)	44.99 (7.73)	62 (17)	44.07 (6.04)	64 (18)	46.63 (7.39)	.12
	Talking on the Phone / Texting	247 (78)	46.31 (7.47)	40 (13)	45.84 (7.07)	30 (9)	44.76 (4.90)	.53	207 (58)	45.30 (7.40)	70 (20)	45.31 (6.62)	81 (22)	44.52 (8.16)	.44
	Going Out	297 (94)	46.04 (7.25)	10 (3)	47.72 (7.43)	10 (3)	46.24 (6.15)	.76	339 (95)	45.11 (7.35)	9 (2)	44.42 (7.69)	10 (3)	46.29 (10.21)	.99
	Shopping for Pleasure	314 (99)	46.05 (7.19)	1 (0.3)	55.07 (-)	2 (0.6)	49.26 (11.35)	.35	345 (96)	45.16 (7.53)	6 (2)	44.49 (4.62)	7 (2)	44.18 (3.21)	.98
	Attending Cinema / Theatre / Concerts	312 (98)	46.09 (7.23)	2 (0.6)	51.48 (8.21)	3 (0.9)	44.07 (4.96)	.48	351 (98)	45.06 (7.19)	3 (1)	42.01 (2.61)	4 (1)	52.99 (20.65)	.65
	Sports, Exercise & Physical Activity	226 (71)	46.12 (7.16)	46 (15)	46.85 (8.76)	45 (14)	45.26 (5.64)	.75	277 (77)	44.59 (7.21)	48 (13)	47.52 (8.69)	33 (9)	46.13 (6.55)	**.04**
	Computer / Internet	143 (45)	46.10 (7.52)	90 (28)	46.77 (7.58)	84 (27)	45.39 (6.19)	.59	199 (56)	45.28 (8.29)	70 (20)	44.50 (5.18)	89 (25)	45.27 (6.89)	.79
	Hobbies / Other Leisure Activities	241 (76)	46.04 (7.26)	33 (10)	46.91 (8.36)	43 (14)	45.84 (5.99)	.65	285 (80)	45.15 (7.41)	38 (11)	45.96 (9.07)	35 (9)	44.01 (5.33)	.81
	Watching TV, DVDs etc	58 (18)	46.73 (9.35)	132 (42)	46.14 (6.63)	127 (40)	45.78 (6.69)	.99	61 (17)	44.23 (7.60)	150 (42)	44.82 (6.79)	147 (41)	45.81 (7.94)	.33
	Listening to Radio or Music	239 (75)	46.06 (6.98)	47 (15)	45.64 (7.15)	31 (10)	47.15 (9.00)	.90	252 (70)	45.26 (7.50)	65 (18)	44.77 (6.25)	41 (12)	44.87 (8.69)	.80
	Reading	270 (85)	46.13 (7.34)	23 (7)	48.36 (5.22)	24 (8)	43.57 (6.85)	**.04**	263 (74)	45.41 (7.65)	51 (14)	43.74 (5.88)	44 (12)	45.05 (7.59)	.41
	Travelling outside of Work / School	269 (85)	46.17 (7.56)	25 (8)	46.29 (4.51)	23 (7)	45.04 (5.22)	.77	300 (84)	44.96 (7.13)	29 (8)	45.56 (6.80)	29 (8)	46.41 (10.51)	.85
	Resting / Relaxing	207 (65)	46.61 (7.14)	52 (16)	46.29 (7.63)	58 (18)	44.11 (6.83)	**.02**	212 (59)	45.00 (6.66)	89 (25)	45.67 (9.31)	57 (16)	44.76 (6.88)	.98

Note. Non-zero time dichotomised around median to give some time and more time. Numbers in time use categories shown as N (%). Health related quality of life shown as mean (SD, standard deviation). Testing for differences conducted using Mann Whitney-U and Kruskal Wallis tests as appropriate. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing.

Table 26

Differences in Health-related Quality of Life by the Amount of Time Spent in Each Activity on Weekends by Gender (N = 689)

Activity Category	Activity	Male (n = 314)							Female (n = 375)						
		No time		Some time		More time			No time		Some time		More time		
		N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*
Personal Needs	Sleeping	0 (0)	-	159 (51)	46.02 (7.78)	155 (49)	46.29 (6.51)	.25	0 (0)	-	180 (48)	44.67 (7.16)	195 (52)	45.40 (7.51)	.41
	Personal Care	31 (10)	47.27 (6.27)	155 (49)	45.82 (7.99)	128 (41)	46.28 (6.28)	.45	17 (5)	43.34 (7.34)	155 (41)	45.08 (7.52)	203 (54)	45.17 (7.23)	.28
	Eating / Drinking / Having a Meal	21 (67)	47.21 (7.93)	158 (50)	45.49 (6.97)	135 (43)	46.76 (7.26)	.32	13 (4)	39.89 (4.68)	215 (57)	44.91 (6.56)	147 (39)	45.70 (8.40)	**.02**
School & Study	Doing Homework / Studying at Home	223 (71)	46.14 (7.48)	44 (14)	45.39 (6.10)	47 (15)	46.94 (6.62)	.71	219 (58)	45.54 (7.26)	74 (20)	45.32 (8.84)	82 (22)	43.50 (5.78)	.10
Paid Work	Paid Employment	249 (79)	46.42 (6.84)	33 (11)	44.22 (5.12)	32 (10)	46.04 (10.64)	.24	289 (77)	45.51 (7.58)	42 (11)	43.65 (6.88)	44 (12)	43.37 (5.70)	.16
	Travelling to and from Work	274 (87)	46.30 (7.11)	23 (7)	44.94 (8.29)	17 (5)	45.44 (6.74)	.82	306 (82)	45.37 (7.49)	49 (13)	43.61 (6.54)	20 (5)	43.67 (6.56)	.35
	Breaks from Work	288 (92)	46.46 (7.06)	9 (3)	42.47 (11.32)	17 (5)	42.84 (5.03)	.05	334 (89)	45.25 (7.43)	26 (7)	43.09 (6.07)	15 (4)	44.01 (7.17)	.28
Household Tasks	Doing Housework	233 (74)	46.18 (7.64)	35 (11)	46.40 (4.87)	46 (15)	45.84 (6.21)	.81	227 (61)	44.66 (6.88)	74 (20)	46.99 (7.30)	74 (20)	44.30 (8.46)	**.01**
	Shopping, Errands & Appointments	280 (89)	46.14 (7.36)	16 (5)	46.83 (5.95)	18 (6)	45.75 (5.04)	.83	334 (89)	45.13 (7.53)	18 (5)	44.65 (6.38)	23 (6)	44.17 (5.11)	.94
	Caring for Others	303 (97)	46.17 (7.26)	4 (1)	44.54 (1.90)	7 (2)	46.19 (5.03)	.89	344 (92)	44.73 (6.88)	13 (4)	51.83 (13.16)	18 (5)	46.19 (8.30)	.15
Voluntary & Religious Activity	Voluntary Activity	307 (98)	46.19 (7.16)	3 (1)	45.86 (8.04)	4 (1)	43.81 (9.12)	.50	363 (97)	45.03 (7.41)	6 (2)	44.45 (4.34)	6 (2)	46.57 (5.96)	.62
	Religious Activity	252 (80)	46.15 (7.29)	42 (13)	45.68 (7.44)	20 (6)	47.16 (4.83)	.37	310 (83)	44.91 (7.35)	31 (8)	45.39 (7.37)	34 (9)	46.02 (7.38)	.75

Table 26 (contd.)

Differences in Health-related Quality of Life by the Amount of Time Spent in Each Activity on Weekends by Gender (N = 689)

Activity Category	Activity	Male (n = 314)							Female (n = 375)						
		No time		Some time		More time			No time		Some time		More time		
		N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)	*p*
Leisure & Free Time Activities	Extracurricular Activities	299 (95)	46.06 (6.94)	8 (3)	45.77 (3.46)	7 (2)	50.72 (15.72)	.85	354 (94)	44.73 (6.90)	10 (3)	50.02 (8.81)	11 (3)	50.83 (14.13)	**.04**
	Hanging Around with Friends	150 (48)	45.55 (6.85)	80 (26)	46.66 (7.02)	84 (27)	46.75 (7.84)	.53	178 (48)	44.88 (7.35)	103 (28)	45.13 (7.77)	94 (25)	45.27 (6.90)	.75
	Socialising with Family	203 (64)	45.67 (7.07)	55 (18)	46.74 (7.60)	56 (18)	47.34 (7.04)	.10	191 (51)	44.55 (6.78)	88 (24)	44.45 (7.80)	96 (26)	46.60 (7.84)	.05
	Talking on the Phone / Texting	227 (72)	46.32 (7.09)	46 (15)	45.84 (7.42)	41 (13)	45.59 (7.47)	.50	209 (56)	44.69 (7.01)	87 (23)	46.26 (8.18)	79 (21)	44.66 (7.18)	.36
	Going Out	244 (78)	45.91 (7.06)	35 (11)	45.40 (6.92)	35 (11)	48.61 (7.88)	.28	295 (79)	44.94 (7.00)	42 (11)	46.13 (9.52)	38 (10)	44.70 (7.31)	.73
	Shopping for Pleasure	288 (92)	46.15 (7.11)	13 (4)	45.70 (7.23)	13 (4)	46.68 (8.79)	.95	299 (80)	44.73 (7.33)	36 (10)	45 (7.24)	40 (11)	47.45 (7.26)	.08
	Attending Cinema / Theatre / Concerts	288 (92)	46.06 (7.21)	15 (5)	46.08 (6.73)	11 (4)	48.79 (6.72)	.18	331 (88)	44.64 (7.01)	28 (8)	50.01 (9.71)	16 (4)	44.86 (6.67)	**.005**
	Sports, Exercise & Physical Activity	183 (58)	45.62 (7.10)	69 (22)	47.67 (7.67)	62 (20)	46.03 (6.66)	.09	274 (73)	44.04 (6.68)	56 (15)	46.96 (7.99)	45 (12)	48.84 (8.70)	**<.001***
	Computer / Internet	121 (38)	46.53 (8.27)	99 (32)	46.67 (6.43)	94 (30)	45.12 (6.29)	.37	204 (54)	44.73 (7.37)	92 (25)	46.19 (6.58)	79 (21)	44.53 (8.03)	**.05**
	Hobbies / Other Leisure Activities	215 (69)	46.45 (7.69)	52 (17)	45.91 (5.80)	47 (15)	45.05 (5.97)	.45	306 (82)	44.92 (7.28)	33 (9)	47.04 (7.98)	36 (10)	44.33 (7.20)	.31
	Watching TV, DVDs etc	60 (19)	45.91 (7.94)	130 (41)	46.93 (7.59)	124 (40)	45.46 (6.24)	.54	77 (21)	44.86 (7.63)	154 (41)	45.30 (6.95)	144 (38)	44.88 (7.64)	.90
	Listening to Radio or Music	231 (74)	46.47 (7.55)	36 (12)	46.08 (5.35)	47 (15)	44.64 (6.34)	.37	266 (71)	44.98 (7.55)	52 (14)	46.57 (7.83)	57 (15)	44 (5.60)	.20
	Reading	252 (80)	46.48 (7.41)	31 (10)	43.52 (6.22)	31 (10)	46.12 (5.48)	.09	260 (69)	44.76 (7.34)	61 (16)	45.58 (6.18)	54 (14)	45.86 (8.51)	.44
	Travelling outside of Work / School	190 (61)	46.06 (7.21)	64 (20)	46 (7.41)	60 (19)	46.59 (6.86)	.73	231 (62)	44.17 (6.61)	81 (22)	45.63 (7.26)	63 (17)	47.53 (9.25)	**.03**
	Resting / Relaxing	181 (58)	46.41 (7.31)	76 (24)	46.10 (6.93)	57 (18)	45.42 (7.10)	.61	204 (54)	44.83 (6.23)	77 (21)	46.36 (9.77)	94 (25)	44.45 (7.23)	.61

Note. Non-zero time dichotomised around median to give some time and more time. Numbers in time use categories shown as N (%). Health related quality of life shown as mean (SD, standard deviation). Testing for differences conducted using Mann Whitney-U and Kruskal Wallis tests as appropriate. $p = 0.05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing

Table 27

Individual Ordinal Logistic Regressions of Time in Each Activity and Overall Health-related Quality of Life on Weekdays by Gender

Activity Category	Activity	Male (n=291)		Female (n=326)	
		OR [95% CI]	*p*	OR [95% CI]	*p*
Personal Needs	Sleeping (ref: some time)		.30		.66
	More time	1.29 [0.80, 2.08]		1.10 [0.71, 1.72]	
	Personal Care (ref: more time)		.78		**.02**
	No/Some time	1.06 [0.69, 1.63]		**1.69 [1.07, 2.66]**	
	Eating / Drinking / Having a Meal (ref: no/some time)		.60		.22
	More time	1.12 [0.73, 1.72]		1.30 [0.85, 2.00]	
School & Study	Attending Class / School Related Activities (ref: some time)		.69		.89
	More time	0.91 (0.58, 1.44]		0.97 [0.64, 1.47]	
	Eating / Drinking at School (ref: more time)		.51		^
	No time	1.01 [0.50, 2.03]		1.08 [0.47, 2.47]	
	Some time	0.77 [0.49, 1.21]		1.15 [0.74, 1.80]	
	Doing Homework / Studying at School (ref: no time)		.45		.57
	Some time	0.64 [0.32, 1.28]		0.74 [0.42, 1.29]	
	More time	0.93 [0.52, 1.68]		0.96 [0.53, 1.76]	
	Travelling to and from School (ref: no/some time)		.80		^
	More time	1.06 [0.67, 1.67]		1.21 [0.77, 1.88]	
	Doing Homework / Studying at Home (ref: more time)		.08		.70
	No time	0.58 [0.32, 1.02]		1.20 [0.67, 2.15]	
	Some time	0.95 [0.53, 1.72]		1.25 [0.74, 2.12]	
Household Tasks	Doing Housework (ref: no time)		**.04**		.72
	Some time	**2.88 [1.16, 7.16]**		0.70 [0.28, 1.74]	
	More time	1.53 [0.86, 2.70]		0.92 [0.52, 1.62]	
Leisure & Free Time Activities	Hanging Around with Friends (ref: no time)		^		.14
	Some time	0.74 [0.46, 1.20]		0.58 [0.34, 1.01]	
	More time	1.05 [0.58, 1.90]		0.76 [0.47, 1.22]	
	Socialising with Family (ref: no time)		.61		.19
	Some time	1.23 [0.68, 2.25]		1.07 [0.62, 1.85]	
	More time	1.37 [0.66, 2.84]		1.71 [0.96, 3.04]	
	Talking on the Phone / Texting (ref: no time)		.59		.44
	Some time	0.69 [0.30, 1.62]		1.14 [0.66, 1.98]	
	More time	0.80 [0.43, 1.51]		0.77 [0.47, 1.26]	
	Playing Sports, Exercise & Physical Activity (ref: no time)		.96		**.05**
	Some time	1.09 [0.56, 2.12]		**1.98 [1.13, 3.45]**	
	More time	1.00 [0.54, 1.84]		1.34 [0.65, 2.75]	
	Computer / Internet (ref: no time)		.27		^
	Some time	0.81 [0.45, 1.46]		1.24 [0.77, 2.02]	
	More time	0.67 [0.42, 1.09]		0.99 [0.59, 1.68]	
	Hobbies / Other Leisure Activities (ref: no time)		.83		.82
	Some time	1.32 [0.53, 3.29]		0.87 [0.42, 1.80]	
	More time	1.08 [0.58, 1.99]		0.83 [0.43, 1.61]	
	Watching TV, DVDs etc (ref: more time)		.77		.38
	No time	1.07 [0.58, 1.96]		0.64 [0.35, 1.20]	
	Some time	0.87 [0.55, 1.38]		0.89 [0.57, 1.38]	
	Listening to Radio or Music (ref: no time)		.66		.80
	Some time	0.71 [0.34, 1.49]		1.10 [0.63, 1.90]	
	More time	0.93 [0.49, 1.77]		0.85 [0.44, 1.66]	
	Reading (ref: no time)		.21		.48
	Some time	1.98 [0.78, 5.02]		0.67 [0.35, 1.28]	
	More time	0.68 [0.30, 1.52]		0.91 [0.48, 1.72]	
	Travelling outside of Work / School (ref: no time)		.58		.76
	Some time	1.25 [0.66, 2.40]		0.82 [0.38, 1.74]	
	More time	0.74 [0.33, 1.67]		1.22 [0.56, 2.69]	
	Resting / Relaxing (ref: no time)		**.006**		.90
	Some time	0.89 [0.46, 1.73]		0.90 [0.55, 1.45]	
	More time	**0.39 [0.22, 0.69]**		1.00 [0.60, 1.79]	

Note. OR = Odds Ratio. CI = Confidence Interval. Model adjusted for school year, school location, family context, social class, nationality, and day of the week. $p = .05$. Unadjusted *p*-values reported. * Remains significant after adjusting for multiple testing. ^ Results not reported as assumption of proportional odds violated.

Table 28

Individual Ordinal Logistic Regressions of Time in Each Activity and Overall Health-related Quality of Life on Weekends by Gender

Activity Category	Activity	Male (n=289)		Female (n=342)	
		OR [95% CI]	*p*	OR [95% CI]	*p*
Personal Needs	Sleeping (ref: more time)		.06		.54
	Some time	0.65 [0.42, 1.01]		0.88 [0.59, 1.32]	
	Personal Care (ref: some time)		.34		.86
	No time	1.40 [0.66, 2.95]		**0.39 [0.18, 0.85]**	
	More time	1.26 [0.78, 2.04]		0.96 [0.64, 1.46]	
	Eating / Drinking / Having a Meal (ref: no/some time)		.11		.96
	More time	1.45 [0.92, 2.28]		1.01 [0.69, 1.48]	
School & Study	Doing Homework / Studying at Home (ref: no time)		.27		.94
	Some time	1.58 [0.88, 2.83]		1.12 [0.61, 2.06]	
	More time	1.40 [0.69, 2.87]		1.05 [0.60, 1.84]	
Paid Work	Paid Employment (ref: no time)		.26		.29
	Some time	0.60 [0.31, 1.15]		0.60 [0.32, 1.13]	
	More time	0.76 [0.35, 1.63]		0.92 [0.50, 1.69]	
	Travelling to and from Work (ref: no time)		.89		.86
	Some time	0.81 [0.32, 2.08]		0.93 [0.51, 1.69]	
	More time	0.90 [0.37, 2.19]		0.80 [0.34, 1.90]	
	Breaks from Work (ref: no time)				.59
	Some time	-	-	0.83 [0.43, 1.62]	
Household Tasks	Doing Housework (ref: no time)		.45		**.005***
	Some time	1.45 [0.81, 2.59]		**2.34 [1.36, 4.01]**	
	More time	1.06 [0.62, 1.80]		0.89 [0.52, 1.52]	
	Shopping, Errands & Appointments (ref: no time)		.80		.80
	Some time	1.30 [0.58, 2.91]		1.32 [0.56, 3.12]	
	More time	1.13 [0.48, 2.68]		1.07 [0.49, 2.36]	
Voluntary & Religious Activity	Religious Activity (ref: no time)		.28		.34
	Some time	0.75 [0.43, 1.30]		1.42 [0.70, 2.90]	
	More time	1.48 [0.69, 3.20]		1.44 [0.82, 2.53]	
Leisure & Free Time Activities	Hanging Around with Friends (ref: no time)		.26		.94
	Some time	1.41 [0.88, 2.26]		1.04 [0.63, 1.70]	
	More time	0.93 [0.52, 1.67]		0.94 [0.57, 1.56]	
	Socialising with Family (ref: no time)		**.05**		.13
	Some time	1.46 [0.86, 2.48]		0.88 [0.53, 1.47]	
	More time	**1.92 [1.11, 3.32]**		1.51 [0.94, 2.44]	
	Talking on the Phone / Texting (ref: no time)		.48		.24
	Some time	0.72 [0.42, 1.23]		1.43 [0.88, 2.32]	
	More time	0.94 [0.48, 1.84]		0.89 [0.55, 1.47]	
	Going Out (ref: no time)		.86		.75
	Some time	1.07 [0.58, 1.99]		1.10 [0.58, 2.09]	
	More time	1.19 [0.62, 2.27]		0.82 [0.45, 1.49]	
	Shopping for Pleasure (ref: no time)				.16
	Some time	-	-	1.06 [0.47, 2.42]	
	More time	-	-	1.92 [0.98, 3.74]	
	Attending Cinema / Theatre / Concerts (ref: no time)				**.02**
	Some time	-	-	**2.38 [1.14, 4.93]**	
	Playing Sports, Exercise & Physical Activity (ref: no time)		.31		**.001***
	Some time	1.65 [0.87, 3.14]		**2.38 [1.33, 4.26]**	
	More time	1.11 [0.67, 1.82]		**2.44 [1.26, 4.71]**	
	Computer / Internet (ref: no time)		.23		**.03**
	Some time	1.29 [0.76, 2.18]		**1.59 [1.02, 2.47]**	
	More time	0.80 [0.48, 1.33]		0.74 [0.43, 1.29]	
	Hobbies / Other Leisure Activities (ref: no time)		.70		.36
	Some time	0.98 [0.55, 1.77]		1.29 [0.65, 2.56]	
	More time	0.78 [0.44, 1.39]		0.63 [0.29, 1.36]	
	Watching TV, DVDs etc (ref: some time)		.53		.86
	No time	0.70 [0.40, 1.29]		0.93 [0.55, 1.57]	
	More time	0.86 [0.53, 1.38]		0.96 [0.62, 1.49]	

Table 28 (contd.)

Individual Ordinal Logistic Regressions of Time in Each Activity and Overall Health-related Quality of Life on Weekends

Activity Category	Activity	Male (n=289)		Female (n=342)	
		OR [95% CI]	*p*	OR [95% CI]	*P*
	Listening to Radio or Music (ref: no time)		.88		.42
	Some time	1.05 [0.59, 1.89]		1.48 [0.82, 2.69]	
	More time	0.87 [0.47, 1.60]		1.14 [0.64, 2.04]	
	Reading (ref: no time)		.11		.32
	Some time	0.57 [0.31, 1.05]		1.48 [0.87, 2.51]	
	More time	1.40 [0.62, 3.19]		1.20 [0.69, 2.10]	
	Travelling outside of Work / School (ref: no time)		.68		.15
	Some time	0.90 [0.56, 1.47]		1.27 [0.78, 2.07]	
	More time	1.23 [0.67, 2.24]		1.73 [0.97, 3.06]	
	Resting / Relaxing (ref: no time)		^		.89
	Some time	0.98 [0.62, 1.55]		0.89 [0.55, 1.43]	
	More time	0.65 [0.34, 1.24]		0.96 [0.56, 1.66]	

Note. OR = Odds Ratio. CI = Confidence Interval. Model adjusted for school year, school location, family context, social class, nationality, and day of the weekend. Dash denotes data not reported as more than 90% of males reported no time in the activity. $p = .05$. Unadjusted *p*-values reported. ***** Remains significant after adjusting for multiple testing. ^ Result not reported as assumption of proportional odds violated.

Table 29

Individual Multinomial Logistic Regressions of Time in Each Activity and Overall Health-related Quality of Life on Weekdays or Weekends

Gender / Diary Day / n	Activity	Quartile 1 RRR [95% CI]	Quartile 2 RRR [95% CI]	Quartile 3 RRR [95% CI]	*p*
Male Weekday (n=291)	Hanging Around with Friends (ref: no time)				.07
	Some time	2.02 [0.81, 5.05]	1.66 [0.74, 3.71]	2.80 [1.20, 6.53]	
	More time	1.36 [0.57, 3.26]	0.53 [0.24, 1.15]	1.12 [0.49, 2.55]	
Female Weekday (n=326)	Eating / Drinking at School (ref: more time)				.10
	No time	0.75 [0.21, 2.69]	0.79 [0.21, 2.96]	0.63 [0.15, 2.61]	
	Some time	0.61 [0.31, 1.20]	0.77 [0.40, 1.48]	0.30 [0.14, 0.66]	
Female Weekday (n=326)	Travelling to and from School (ref: no/some time)				.10
	More time	0.89 [0.50, 1.72]	0.47 [0.24, 0.91]	0.86 [0.43, 1.72]	
Female Weekday (n=326)	Computer / Internet (ref: no time)				.06
	Some time	0.98 [0.36, 2.63]	1.65 [0.67, 4.04]	3.30 [1.32, 8.29]	
	More time	1.14 [0.54, 2.39]	0.76 [0.35, 1.68]	1.31 [0.57, 3.03]	
Male Weekend (n=289)	Resting / Relaxing (ref: no time)				.06
	Some time	1.19 [0.49, 2.91]	1.08 [0.48, 2.43]	2.30 [1.07, 4.95]	
	More time	1.98 [0.84, 4.66]	0.99 [0.43, 2.26]	0.69 [0.26, 1.85]	

Note. RRR = Relative Risk Ratio. CI = Confidence Interval. Reference category is quartile 4, the highest HRQoL scores. Model adjusted for school year, school location, family context, social class, nationality and day of the week/weekend. $p = .05$. Unadjusted *p*-values reported.

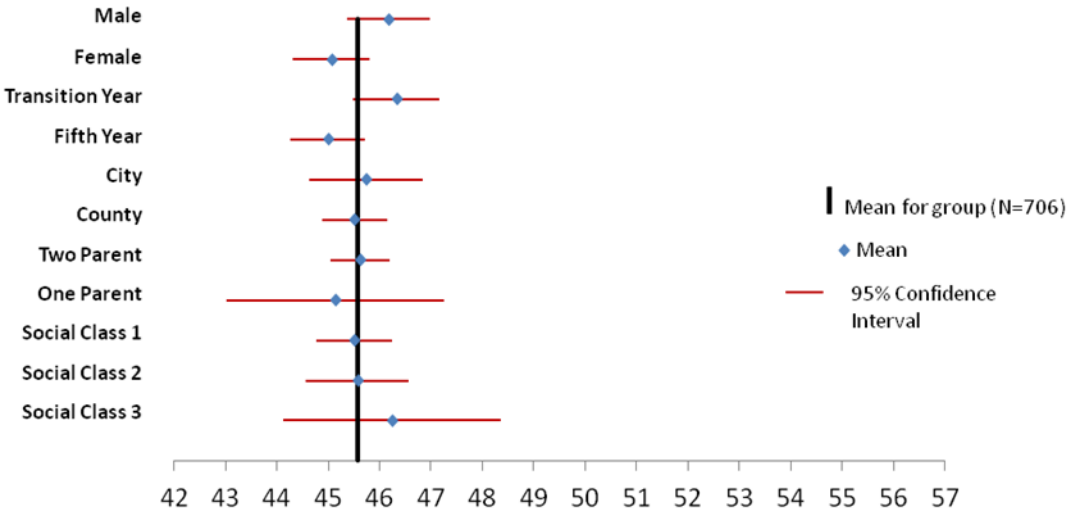


Figure 7. Mean scores and 95% confidence interval for the KIDSCREEN-10 Index by gender, school year, school location, family context, and social class.

Chapter Six

Study Five: A Person-centred Analysis of the Time Use, Daily Activities, and Health-related Quality of Life of Irish School-going Late Adolescents

6.1 Introduction to this Chapter

The previous two empirical studies used traditional variable-centred approaches to analyse aggregate-level data on the time use, daily activities, and HRQoL of this group of Irish school-going late adolescents. The third study, reported in this chapter, uses a person-centred analytic approach to examine the adolescents' overall time use and to establish whether distinct profiles of adolescent time use exist and how these relate to HRQoL.

This study has been submitted to the journal *Quality of Life Research.* The study is presented here as it was submitted. Therefore, as before, there is a degree of overlap with some of the previous sections of this thesis. The tables/figures are presented at the end of the chapter.

6.2 Abstract

Purpose: The health, well-being and quality of life of the world's 1.2 billion adolescents are global priorities. A focus on their patterns or profiles of time use and how these relate to HRQoL can help to enhance their well-being and address the increasing burden of non-communicable diseases in adulthood. This study sought to establish whether distinct profiles of adolescent 24-hour time use exist and to examine the relationship of any identified profiles to self-reported HRQoL. *Method:* This cross-sectional study gathered data from a random sample of 731 adolescents (response rate 52%) from 28 schools (response rate 76%) across Cork city and county. Latent profile analysis was used to examine adolescent 24-hour time use and relate the identified profiles to HRQoL as a distal outcome. *Results:* Three male profiles emerged, namely *productive, high leisure* and *all-rounder*. Two female profiles, *higher study/lower leisure* and *moderate study/higher leisure,* were identified. The quantitative and qualitative differences in male and female profiles support the gendered nature of adolescent time use. There was tentative support for the association between higher HRQoL and more balanced time use profiles. *Conclusion:* Distinct time use profiles can be identified among adolescents but their relationship with HRQoL is complex. Rich mixed-method research is required to illuminate our understanding of the time use and HRQoL of adolescents in the 21st century.

Key words: *time diary, person-centred, young people, well-being, health*

6.3 Background

There are now 1.2 billion adolescents (aged 10 - 19 years) in the world (WHO, 2014a). While the last 50 years has seen significant improvements in child health, the same gains have not been recorded for adolescents (Sawyer et al., 2012). Consequently their health and well-being is now a global priority (UNICEF, 2014; WHO, 2014a).

Time use is increasingly recognised as a determinant of adolescent health and well-being (Ben-Arieh & Ofir, 2002; Brooker & Hyman, 2010; Larson & Verma, 1999; Rees et al., 2010; United Nations, 2005; Vogler et al., 2009). Most studies of young people's time use tend to focus on a small number of discrete activities in isolation (Ben-Arieh & Ofir, 2002; Hagell et al., 2012). However, Short (2005) argued that we need to see how adolescents fill the rest of their days to contextualise these results, while Zuzanek (2005) similarly encouraged those concerned with adolescent health to pay attention to their "...overall patterns of daily life, including sleep, eating habits, mass media consumption, extra-curricular activities, and relationships with parents and peers" (p. 413). Thus *all* the activities performed by an individual in a 24-hour cycle should be seen as the building blocks that create an overall pattern of time use (Erlandsson, as cited in Orban, Edberg et al., 2012). Accordingly, there is growing recognition of the need to analyse time use patterns as the multidimensional units that they are (Farb & Matjasko, 2012; Ferrar, Chang, et al., 2013; Hagell et al., 2012), necessitating *person-centred* approaches that complement more traditional variable-centred methods (Bergman & Magnusson, 1997; von Eye et al., 2006). However, there is a lack of such person-centred studies of adolescent 24-hour time use (Ferrar, Chang, et al., 2013), with a few exceptions (Ferrar, Olds, & Maher, 2012; Ferrar, Olds, Maher, & Maddison, 2013; Shanahan & Flaherty, 2001).

Ben-Arieh and Ofir (2002) stressed the importance of obtaining knowledge of young people's overall time use as a means to study their well-being. However, there is a lack of research relating 24-hour time use to health and well-being in young people (Hunt et al., 2011). One important component of well-being is quality of life (OECD, 2013). Adolescent HRQoL encompasses "several major domains including the physical, social, and emotional functioning of the individual" (Frisen, 2007, p. 963). The relationship between specific behaviours, such as physical and sedentary activities, and HRQoL has been explored in adolescents (Gopinath et al., 2012; Lacy et al., 2012). Furthermore, the HRQoL of young people living with specific health conditions has been widely investigated. Examples of the latter include studies of low back pain (Pellise et al.,

2009), obesity (Morales et al., 2013), mental illness (Weitkamp et al., 2013), coeliac disease (Altobelli et al., 2013), eating disorders (Jenkins et al., 2014) and congenital heart disease (Mellion et al., 2014). However, Hunt et al. identified no studies that examined adolescent 24-hour time use and HRQoL among well adolescents.

To help fill this gap in our current knowledge, we aimed to establish whether distinct patterns, or profiles, of adolescent 24-hour time use exist in a cross-sectional sample of Irish late adolescents and to examine the relationship of any identified profiles to self-reported HRQoL.

6.4 Methods

6.4.1 Sample and Participant Selection

In 2007, we recruited a cross-sectional, random sample of adolescents aged 15 - 19 years in full-time education who were living at home (consistent with previous international studies [Zuzanek & Mannell, 2005]) in County Cork, Ireland. A two-stage stratified sampling strategy was employed. Second-level schools were randomly selected, from the governmental schools' register, with probability of selection proportionate to enrolment. School principals were asked to provide consent and 28 of 37 selected schools (76%) agreed to participate. Each school then identified one class group from the two designated years (Transition Year and Fifth Year), resulting in 1413 students being invited to participate. The candidate provided written and verbal information for students and written information for parents. Students and parents were required to complete the consent/assent form. Consent/assent was obtained for 731 students (52%) who were subsequently enrolled in the study.

6.4.2 Measures

Time use

Time use was measured using a pre-coded 24-hour diary with six main activity categories comprising 31 individual activities. The time diary is the most frequently used data collection method in child and adolescent time use research (Ben-Arieh & Ofir, 2002; Larson & Verma, 1999). Although there is an acknowledged lack of information about the quality of time use data captured by the different methods (Sonnenberg et al., 2012), the time diary method is considered to have acceptable reliability and validity (Phipps & Vernon, 2009; Robinson & Godbey, 1999) and is the method recommended by the UNECE (2013) Task Force on Time Use Surveys.

The diary in the present study was adapted from that used by the Irish Economic and Social Research Institute (ESRI) in their 2005 survey of Irish adults' time use (McGinnity et al., 2005). The activity categories were in keeping with those used in adolescent time use surveys internationally (Zuzanek & Mannell, 2005). Participants were asked to record their main (primary) activity for each block of 15 minutes of the designated day. Participants completed one diary for a weekday and one diary for a weekend day. The focus of this study was the time use of participants measured during the school year.

The six main activity categories were Personal Care, School/Study, Paid Work, Housework, Voluntary/Religious Activity, and Leisure. Personal Care was then disaggregated into Sleep and Self-Care, as the association between sleep and HRQoL has been the focus of increased attention in recent years (Xu et al., 2014). School/Study was similarly disaggregated into two distinct categories given the significance of homework and study in the lives of adolescents (Gillen-O'Neel, Huynh, & Fuligni, 2013; Witkow, 2009). Similar to previous studies (Fuligni & Stevenson, 1995; Hofferth & Sandberg, 2001; Lin et al., 2012) we computed weekly time in these eight activity categories by multiplying weekday time by 5 and adding to weekend time use totals that were multiplied by 2.

Health-related quality of life

HRQoL was measured using the 52-item KIDSCREEN questionnaire (Ravens-Sieberer et al., 2005). This instrument was developed across Europe as a self-report measure applicable for healthy and chronically ill children and adolescents (aged from 8 - 18 years) and assesses 10 domains of HRQoL, namely "physical well-being", "psychological well-being", "moods and emotions", "self-perception", "autonomy", "parent relations and home life", "social support and peers", "school environment", "social acceptance" and "financial resources". Psychometric testing has shown the KIDSCREEN to be a reliable, valid, and sensitive measure (Ravens-Sieberer et al., 2014). A global HRQoL score (the KIDSCREEN-10 Index) was also generated from 10 items of the KIDSCREEN-52 (Erhart et al., 2009). The KIDSCREEN-10 Index has also demonstrated good psychometric properties (Ravens-Sieberer et al., 2010). Cronbach's alphas for the present study were .95 (KIDSCREEN-52) and .86 (KIDSCREEN-10 Index). The KIDSCREEN instruments have been validated for children and adolescents in Ireland and Irish norm reference data are available (Keenaghan & Kilroe, 2008). Using the KIDSCREEN Group Europe's (2006) scoring guidelines and software, Rasch

scores were computed for each of the 10 KIDSCREEN-52 domains and the KIDSCREEN-10 Index. These were transformed into T-values with a mean of 50 and a standard deviation of 10; with higher scores indicating better HRQoL (Ravens-Sieberer et al., 2008). As the HRQoL data were not normally distributed, even after log transformations, the scores were grouped into quartiles, with higher scores in the highest quartile.

6.4.3 Procedures

The candidate met the participants to provide instructions for completion of the survey instrument. They completed a sample diary and could ask any questions arising. Thereafter, the class was assigned a weekday and weekend day to complete their diaries. Diary days were designated by the candidate with the aim of being as close as possible in time to the day of initial diary distribution, in order to maximise accurate recall of activities. Participants were provided with special stickers to use as memory aides and were also encouraged to put reminders in their mobile phones and school journals. When the designated diary days had passed, a liaison teacher prompted participants to check their diaries for accuracy and completeness. Diaries were then sealed in individual envelopes by participants to ensure privacy prior to collection by the liaison teacher.

6.4.4 Statistical Analysis

We aimed to identify holistic patterns, or profiles, of time spent across eight activity categories measured by the time use diaries, and then relate any identified profiles to HRQoL. To identify time use profiles, we used finite mixture models to model the observed multivariate distribution of weekly time use in the eight activity categories as a function of a single, multinomial latent profile variable. Clustering of individuals was accomplished through the assumption that the time use variables were independent, conditional on profile membership. These models thus maximise within profile homogeneity and between profile heterogeneity in the observed indicators (Collins & Lanza, 2010) and are often referred to as latent class or latent profile models, depending on whether the indicator variables are measured categorically or continuously.

The eight observed weekly time use variables were all continous in nature. However, four of the variables were strongly skewed and/or had a preponderance of zeros. Consequently, to simplify model estimation, we categorised each of these variables (i.e.,

Study, Paid Work, Housework, and Voluntary/Religious Activity) into zero/some/more time by splitting the non-zero time at the median. Weekly minutes in the remaining four time use categories (i.e., Sleep, Self-Care, School, and Leisure) were entered as continuous variables standardized as *z*-scores. The multivariate probability distribution for the eight variables is thus represented by 16 parameters: two thresholds for each of the 3-level categorical variables and a mean and variance for each z-score.

We investigated the plausibility of models specifying one to six latent profiles, thus comparing a single profile solution to a series of more complex models. For each model all 16 parameters were freely estimated within each specified profile (one to six). Separate analyses were conducted for males and females given the significant gender differences in time use found in this sample (Hunt et al., 2014) and others (Ferrar, Olds, & Walters, 2012).

Relative fit indices (Akaike Information Criterion [AIC], the Bayesian Information Criterion [BIC] and the sample size-adjusted Bayesian Information Criterion [aBIC] and statistical tests were examined to determine optimal model fit. The Lo-Mendell-Rubin adjusted likelihood ratio test (LMRT) and the parametric bootstrapped likelihood ratio test (BLRT) were examined as statistical indicators of the number of profiles that best fitted the data. Finally the entropy criterion was considered. Entropy is an index that determines the accuracy of classifying people into their respective profiles, with higher values (i.e., closer to 1.0) indicating better discrimination between profiles. No one method for comparing models with differing numbers of latent profiles is widely accepted as best (Masyn, 2013). Indeed, in practice it is likely that there will be more than one "best" model identified across the different indices (Masyn, 2013). Taking precedence from Herman, Ostrander, Walkup, Silva, and March (2007) and Arbeit et al. (2014), we examined all these indices but gave special weight to the BIC and BLRT as these have been found to be most accurate in determining the appropriate number of profiles (Nylund, Asparouhov, & Muthén, 2007).

Profile membership is probabilistic rather than deterministic (Samuelson & Raczynski, 2013). Recent advances in statistical methods take this into account and allow for improved estimation of the relationship between latent profiles and auxiliary variables (covariates or distal outcomes) while all the time maintaining the uncertainty in profile membership (McIntosh, 2013). Using these latest statistical methods (Asparouhov &

Muthén, 2013; Lanza, Tan, & Bray, 2013), the relationship between 24-hour time use and HRQoL was examined. As the age range of the sample was well specified as the developmental stage of late adolescence (Sawyer et al., 2012) we did not stratify or otherwise adjust the model for age. In our previous analyses we adjusted for the unequal distribution of weekdays across the sample. However, we found that HRQoL did not differ by day of the week therefore we did not adjust for day of the week in the model. For the same reason we did not add social class as a covariate to the model.

Because of the large number of tests, a Bonferroni corrected *p*-value of .005 was applied when determining the statistical significance of the scores from the 10 domains of the KIDSCREEN-52 (Machin et al., 2007). A *p*-value of .05 was used in the case of the KIDSCREEN-10 Index. All analyses were conducted using Mplus version 7.11 (Muthén & Muthén, 1998-2012).

6.5 Results

Twenty weekday diaries and 20 weekend diaries were excluded as there was more than four hours time with no recorded activities. This was the quality measure used by McGinnity et al. (2005) in their time use study with Irish adults. Consistent with previous studies (Zuzanek & Mannell, 2005), a further 13 weekday diaries were removed as there was less than 60 minutes recorded at school on the designated diary day. Thus the included diaries were of high quality with less than 0.005% of unspecified time recorded. Twenty-five KIDSCREEN questionnaires were incomplete. There was some overlap in the low quality diaries and incomplete KIDSCREEN questionnaires. In total, 64 questionnaires (9%) were excluded from the analyses. Therefore the latent profile analysis was performed on a sample of 311 males and 356 females. Mean age for males was 16.13 years and mean age for females was 15.91 years. Participants are profiled in Table 30.

A 3-profile solution was chosen for the males and a 2-profile solution for the females due lower BIC values, a significant BLRT value and the interpretability of the solution. Figures 8a and 8b show the fit indices for one to six solutions. Results of a latent profile analysis include two sets of parameters: probabilities of latent profile membership and the within-profile parameters for indicator variables. Interpretation of the latent profiles is based on these indicator parameter estimates (Collins & Lanza, 2010). Table 31 provides the estimated values of the categorical indicator variables for each profile and Figure 9 provides the estimated mean (and 95% confidence interval) of the continuous variables for each profile.

The three male profiles separated into two larger groups and one smaller group. Profile one, which we labelled the *productive* group, accounted for 40% of males. They were more likely to spend more time in Study (58%), some/more time in Paid Work (53%), some/more time in Housework (47%), and less time in Leisure (*z*-score = - 0.84). We labelled profile two (14%) as the *high leisure* group who had a higher probability of spending no time in Study (61%), Paid Work (94%) or Housework (75%); below average time in Sleep (*z*-score = – 0.54), Self-Care (*z*-score = - 0.62), School (*z*-score = - 0.50); and higher than average time in Leisure (*z*-score = 1.25). The third profile (46%), which we labelled as *all-rounder*, was characterised by near average time in Sleep (*z*-score = 0.07), Self-Care (*z*-score = 0.07), School (*z*-score = - 0.03), and Leisure (*z*-score = 0.35). This group was likely to spend some time in Study (53%) and some/more time in Housework (47%).

The two female profiles had broadly similar time use in Self-Care, School, Paid Work and Voluntary/Religious activity. The profiles separated around Sleep, Study, Leisure, and to a lesser extent Housework. Profile one (74%) was characterised by marginally more time in Sleep (*z*-score = .21) and a greater likelihood of time in Housework (63%), considerably more chance of time in Study (85%) and less time in Leisure (*z*-score = - 0.27), thus we labelled this group *higher study/lower leisure*. The second profile (26%), labelled *moderate study/higher leisure,* had less time in Sleep (*z*-score = - 0.61), a moderate chance of spending time in Study (61%) and higher than average time in Leisure (*z*-score = 0.76).

While taking into account the uncertainty in profile membership (McIntosh, 2013), we examined the relationship between latent profiles and HRQoL as a distal outcome using equality tests of probabilities across profiles (Table 32). Two significant differences emerged across the male profiles, namely in the "financial resources" domain (p = < .001) and the "social support and peers" domain, with the former remaining significant post Bonferroni-correction. For the females, there were four statistically significant differences in probabilities across classes, in "physical well-being" (p = .04), "autonomy" (p = .01), "financial resources" (p = .01) and global HRQoL (p = .006), with the latter remaining significant post correction.

We then examined the likelihood of being in the highest quartile of each of the HRQoL domains and global HRQoL across each of the profiles (Table 33). For the males, relative to the *all-rounder group*, those in the *productive* group had a higher chance of

higher scores in "financial resources" (p = .05). For the females, relative to the *moderate study/higher leisure profile*, the *higher study/lower leisure* group were less likely to be in the highest quartile for "physical well-being" (p = .05), "autonomy" (p = .01) and global HRQoL (p = .006) and more likely to be in the highest quartile for "financial resources" (p = .03). Only the female global HRQoL score remained significant post Bonferroni-correction.

6.6 Discussion

We used a model-based, person-centred approach to examine adolescent 24-hour time use and related the identified profiles to HRQoL. We successfully identified distinct male and female profiles based on the amount of time spent in eight categories of activity. We named the male profiles *productive* (40%), *high leisure* (14%) and *all-rounder* (46%) and the female profiles *higher study/lower leisure* (74%) and *moderate study/higher leisure* (26%). There is a suggestion of a link between more "balanced" profiles but we are inclined to interpret this association with caution given the number of potential associations examined, the cross-sectional nature of the data and the challenge of endogeneity in research on adolescent development (Agans et al., 2014). Nonetheless, across the three male profiles, those in the *all-rounder group* had the highest probability of highest global HRQoL. Females in the *moderate study/higher leisure* group were more than twice as likely to have the highest global HRQoL compared to the *higher study/lower leisure* profile.

The three male profiles identified through the latent profile analysis are similar to three of the six/seven classes identified by Shanahan and Flaherty (2001) in their study of American adolescents. They found that the majority of their participants fell into the *active workers* or *active non-workers* clusters, with the latter similar in description to the *all-rounder* profile of the present study. A smaller *high leisure* cluster also emerged from Shanahan and Flaherty's analysis, in which males were over-represented, in the two younger adolescent age cohorts at least. Ferrar, Chang, et al. (2013) questioned whether the commonalities they observed in adolescent time use clusters, found despite substantial between-study differences, may reflect globalisation across the developed world; characteristic adolescent behaviour patterns that exist independent of geography or culture; or may be an artefact of the instruments used that measure similar behaviours.

In their systematic review Ferrar, Chang, et al. (2013) found that, of the six studies that conducted gender-specific clustering, different cluster patterns amongst males and

females were noted in five cases. Our findings are in keeping with this trend and contribute further evidence in support of existing studies on the gendered nature of adolescent time use (Hunt et al., 2014; Zuzanek, 2005) and the need for gender-specific interventions to support the health and well-being of young people (Currie et al., 2012; WHO, 2011a).

The equality tests of probabilities across profiles (Table 32) clearly convey the complex relationship between time use profiles and HRQoL for this group of young people. No identifiable unifying trends emerged. To illustrate with one of many possible examples, those in the male *productive* group had the highest probability for lowest scores in "moods and emotions" (31%) and "autonomy" (34%) but the highest probability of the highest scores in "social support and peers" (30%) and "social acceptance" (37%). Across the three male profiles, those in the *all-rounder group* had the highest probability of highest global HRQoL. It is noteworthy that females in the *moderate study/higher leisure* group were more than twice as likely to have the highest global HRQoL as those in the *higher study/lower leisure* profile. Harvey (1993) argued that "a major part of well-being or quality of life flows from the interaction of the individual with others and the environment. That is, well-being is shaped by the vicissitudes of daily living" (p. 27). While our results point to the complexities of creating health in everyday patterns of doing (Erlandsson, 2013a) arguably they provide some tentative support to the association between HRQoL and a balanced lifestyle, defined by Matuska and Christianen (2008) as "a satisfying pattern of daily activity that is healthful, meaningful, and sustainable to an individual within the context of his or her current life circumstances" (p.11). Håkansson, Dahlin-Ivanoff, and Sonn (2006) posited that well-being is the outcome of balance in everyday life with such balance derived from respecting one's own values, needs, and resources; employing strategies to manage everyday life; and having a harmonious repertoire of personally meaningful daily activities. Perhaps, as Zuzanek (2009) suggested, the "middle ground" does indeed present "the most rewarding and helpful way to a life of ease and pleasure" (p. 220).

We recognise several limitations in the present study. Due to the cross-sectional nature of these data, the causal relationship between profile membership and HRQoL is uncertain. A response rate of 52% was achieved with no subsequent weighting for non-response, introducing the possibility of non-response bias. However, according to Phipps and Vernon (2009), relevant studies in this areas show little evidence of bias due to non-response. We have no information about those who chose not to participate in

this study. We examined the HRQoL of the 64 excluded questionnaires and found only one difference between the two groups across the 11 HRQoL domains that remained significant after adjustment for multiple testing ("school environment", $p = .003$). Accounting for all 24 hours of a day is believed to reduce the potential for social desirability bias and recall errors associated with self-report data (Dollman et al., 2009). As Patnode et al. (2011) noted, a different method of categorizing time use could have resulted in a somewhat different latent profile structure. As they reported "while dichotomizing variables is an approach that is commonly applied in latent class methods and may help in the communication and application of findings there may be some loss of sensitivity that results from categorizing the data in this way" (p. 465). Furthermore, the extent of prior aggregation of time use indicator variables influences the resultant profiles. Although Ferrar, Chang, et al.'s (2013) review demonstrated that up to 18 cluster inputs had been used successfully, we encountered difficulties with model non-identification when we used 19 indicator variables. This potentially resulted in the lack of identification of some frequently observed time use patterns, particularly those characterised by time spent in physical activity or screen time. Finally, an issue acknowledged in the methodological literature (De Leeuw, van der Heijden, & Verboon, 1990) but notably absent in empirical studies is the compositional nature of time use data, that is, the total time spent in activities across the day is constrained at 24-hours (Aitchison, 2003). While the use of log-ratio transformations (Kucera & Malmgren, 1998) can be helpful, this is less effective with time use data given the preponderance of zeros. De Leeuw et al. presented a latent time-budget model but this was based on data gathered from random spot observations rather than diaries and does not appear to have been utilised greatly since its publication nearly 25 years ago. The compositional nature of the data may also undermine the assumption of conditional independence that is a feature of latent profile analysis. These unresolved challenges require further consideration.

Notwithstanding these limitations, the present study reflects contemporary perspectives in adolescent health policy and research that favour strengths-based and population health approaches in understanding the lives of young people and that prioritise their self-report of health and well-being (Brooks & Hanafin, 2005; Huang et al., 2014; Lippman et al., 2009; Nic Gabhainn & Sixsmith, 2005). We successfully identified distinct profiles of adolescent time use and found some differences in HRQoL across profiles. This study thus extended the literature in a number of ways. In line with

current best practice (Hagell et al., 2013; Sawyer et al., 2012), we focused on the defined quinary age band of late adolescence (15 - 19 years). We adopted a person-centred rather than a variable-centred approach to analysing time use. Finite mixture models, such as latent profile analysis, use statistical probability-based models to detect latent categorical subgroups (Masyn, 2013). Model selection in mixture models is therefore less subjective than with algorithmic approaches as both relative fit indices and statistical tests are provided to determine which model solution fits the data better (Masyn, 2013). Data were collected on adolescents' overall time use using diary data as recommended by the UNECE (2013). Finally we used the latest statistical methods to examine the relationship between 24-hour time use and HRQoL (McIntosh, 2014).

6.7 Conclusion

The health, well-being, and quality of life of the world's 1.2 billion adolescents are global priorities. A focus on their profiles of time use and how these relate to HRQoL is necessary to enhance their well-being and address the increasing burden of non-communicable diseases. We used a model-based, person-centred approach to examine adolescent 24-hour time use and related the identified profiles to HRQoL. We successfully identified distinct male and female profiles based on the amount of time spent in eight categories of activity. Three male profiles emerged, namely *productive*, *high leisure* and *all-rounder*. Two female profiles, *higher study/lower leisure* and *moderate study/higher leisure,* were identified. The quantitative and qualitative differences in male and female profiles support the gendered nature of adolescent time use. No identifiable unifying trends emerged in the analysis of probable responses in the HRQoL domains across profiles, reinforcing the complex nature of HRQoL for this group of young people. There was tentative support for the association between higher HRQoL and more balanced time use profiles.

As eminent adolescent developmental psychologist Reed Larson (2001) wrote, the "evaluation of [adolescents'] time allocation is a useful entry point for examining links between experience and development, but only one small piece of a much more complex inquiry" (p. 163). Moreover, it has been said that youth development is "not readily reducible to variables" (Larson & Tran, 2014, p. 1014). Increasingly, scholars are calling for a mix of variable-centred, person-centred and qualitative research (Agans et al., 2014; Hamilton, 2014; Masten, 2014) to create a more complete picture of the many systems that comprise the complex "disorderly world" (Larson, 2011, p. 317) of

today's adolescents. Equally, rich mixed-method research is required to illuminate our understanding of the time use and HRQoL of adolescents in the 21st century.

6.8 Ethical Standards

Ethical approval was granted by the University College Cork Research Ethics Committee of the Cork Teaching Hospitals. Therefore this study has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All participants provided written consent/assent.

Table 30

Demographic Characteristics of Sample in Study Five (N = 667)

		Male n (%)	Female n (%)
		311 (47)	356 (53)
Age (years)		16.13	15.91
School Year	Transition Year	119 (38)	169 (48)
	Fifth Year	192 (62)	187 (52)
School Location	City	63 (20)	110 (31)
	County	248 (80)	246 (69)
Family Context	Two Parents	273 (88)	309 (87)
	One Parent	32 (10)	38 (11)
	Guardian/Not completed	6 (2)	9 (2)
Social Class	Higher Social Class	179 (58)	166 (47)
	Middle Social Class	90 (29)	122 (34)
	Lower Social Class	22 (7)	43 (12)
	Unknown/Not completed	20 (6)	25 (7)
Nationality	Irish	293 (94)	329 (92)
	Other	18 (6)	27 (8)

Table 31

Conditional Item-Response Probabilities (%) for Categorical Indicator Variables by Latent Profile by Gender (N = 667)

Activity Category	Time	Males (n=311)			Females (n=356)	
		Productive (40%)	High Leisure (14%)	All-Rounder (46%)	Higher Study /Lower Leisure (74%)	Moderate Study / Higher Leisure (26%)
Study	No time	15	61	13	15	39
	Some time	27	33	53	35	52
	More time	58	07	34	50	09
Paid Work	No time	47	94	96	69	76
	Some time	25	03	04	16	10
	More time	28	03	00	15	14
Housework	No time	53	75	53	37	46
	Some time	26	05	28	33	22
	More time	21	20	20	30	33
Voluntary & Religious Activity	No time	77	87	70	73	87
	Some time	12	10	17	11	04
	More time	11	04	14	16	09

Note. Probabilities may not equal 100% due to rounding. Activities categorised into zero/some/more time by splitting the non-zero time at the median.

Table 32

Distribution of Conditional Probabilities (%) and Equality Tests of Probabilities Across Profiles for the KIDCREEN-52 and KIDSCREEN-10 by Gender (N = 667)

		Male (n=311)				Female (n=356)		
		Productive (40%)	High Leisure (14%)	All-Rounder (46%)	*p*	Higher Study/ Lower Leisure (74%)	Moderate Study/ Lower Leisure (26%)	*p*
KIDSCREEN-52 Domains	**Physical Well-being**				.39			**.04**
	Quartile 1	24	38	16		24	14	
	Quartile 2	33	25	32		33	18	
	Quartile 3	23	13	26		23	32	
	Quartile 4	20	25	26		20	37	
	Psychological Well-being				.24			.21
	Quartile 1	22	37	23		29	14	
	Quartile 2	25	24	18		21	27	
	Quartile 3	31	15	35		25	32	
	Quartile 4	23	24	24		25	28	
	Moods & Emotions				.79			.32
	Quartile 1	31	36	23		27	17	
	Quartile 2	17	17	22		30	23	
	Quartile 3	28	22	23		23	27	
	Quartile 4	24	26	32		20	33	
	Self Perception				.92			.34
	Quartile 1	24	25	28		25	33	
	Quartile 2	34	27	24		27	32	
	Quartile 3	21	24	27		19	10	
	Quartile 4	21	25	21		29	26	
	Autonomy				.34			**.01**
	Quartile 1	34	25	17		34	16	
	Quartile 2	39	24	29		26	19	
	Quartile 3	13	17	22		22	27	
	Quartile 4	24	33	33		18	38	
	Parent Relations & Home Life				.36			.74
	Quartile 1	25	41	23		24	29	
	Quartile 2	25	11	18		27	23	
	Quartile 3	26	29	34		23	15	
	Quartile 4	24	20	26		26	33	

Table 32 (contd.)

Distribution of Conditional Probabilities (%) and Equality Tests of Probabilities Across Profiles for the KIDCREEN-52 and KIDSCREEN-10 by Gender (N = 667)

		Male (n=311)				Female (n=356)		
		Productive (40%)	High Leisure (14%)	All-Rounder (46%)	*p*	Higher Study/ Lower Leisure (74%)	Moderate Study/ Lower Leisure (26%)	*p*
KIDSCREEN-52 Domains	**Financial Resources**				**< .001***			**.01**
	Quartile 1	18	33	23		24	29	
	Quartile 2	18	22	30		23	47	
	Quartile 3	26	04	25		16	08	
	Quartile 4	39	42	23		37	16	
	Social Support & Peers				**.05**			.99
	Quartile 1	25	47	17		22	20	
	Quartile 2	25	22	30		30	29	
	Quartile 3	20	20	30		26	28	
	Quartile 4	30	11	23		23	23	
	School Environment				.06			.07
	Quartile 1	28	48	12		28	25	
	Quartile 2	24	22	32		30	13	
	Quartile 3	27	12	24		19	22	
	Quartile 4	22	18	33		24	40	
	Social Acceptance				.75			.57
	Quartile 1	24	20	23		28	36	
	Quartile 2	16	23	10		21	29	
	Quartile 3	23	30	32		-	-	
	Quartile 4	37	27	35		50	35	
KIDSCREEN-10 Index	**Global HRQoL**				.21			**.006***
	Quartile 1	23	30	12		31	21	
	Quartile 2	27	35	28		33	15	
	Quartile 3	23	19	26		18	25	
	Quartile 4	27	17	34		18	38	

Note. * Remains significant after adjusting for multiple testing.

Table 33

Item-Response Probabilities (%) for Being in the Highest Quartile of HRQoL and Tests of Equality of Probabilities Across the Profiles (N = 667)

		Male (n=311)					Female (n=356)		
		Productive (40%)	**High Leisure (14%)**	**All-Rounder (46%)** [reference]	**Overall Level of Significance** (*p*-value)	**Individual Level of Significance** *(p-value)*	**Higher Study/ Lower Leisure (74%)**	**Moderate Study/ Higher Leisure (26%)** [reference]	**Overall Level of Significance** (*p*-value)
KIDSCREEN-52 Domains	Physical Well-being	20	25	26	.79		20	36	**.05**
	Psychological Well-being	23	25	24	.98		25	28	.72
	Moods & Emotions	24	26	32	.53		20	33	.20
	Self Perception	21	25	21	.91		29	27	.84
	Autonomy	24	34	33	.59		18	40	**.01**
	Parent Relations & Home Life	24	20	26	.80		26	33	.45
	Financial Resources	39	43	23	**.05**	Productive vs. All-Rounder p = .03	37	14	**.03**
	Social Support & Peers	29	10	23	**.04**	Productive vs. High Leisure p = .01	23	23	.97
	School Environment	21	19	32	.19		24	39	.09
	Social Acceptance	27	27	35	.65		50	35	.32
KIDSCREEN-10 Index	Global HRQoL	27	17	34	.15		18	40	**.006***

Note. * Remains significant after adjusting for multiple testing.

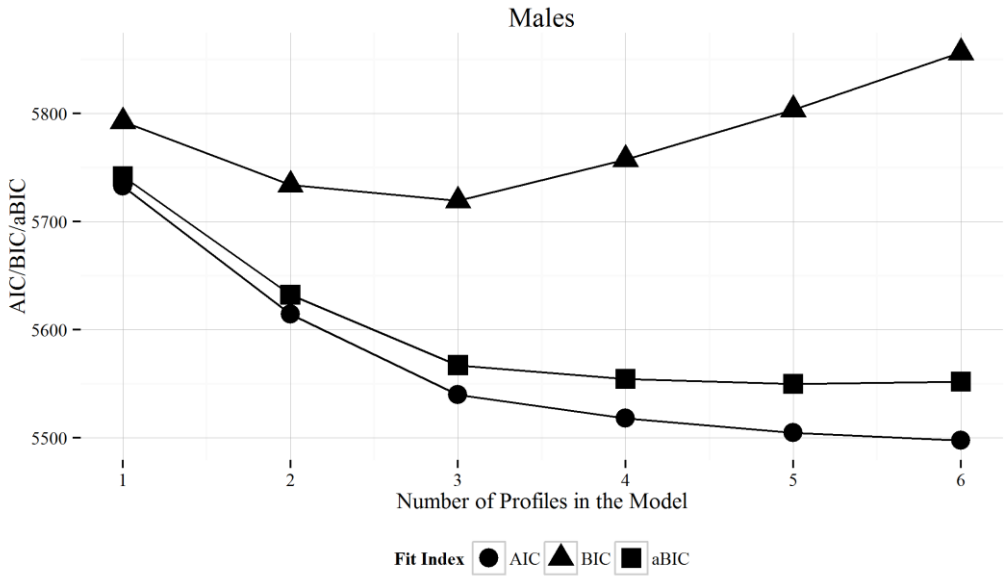


Figure 8a. Model fit indices for 1 to 6 profiles (Males)

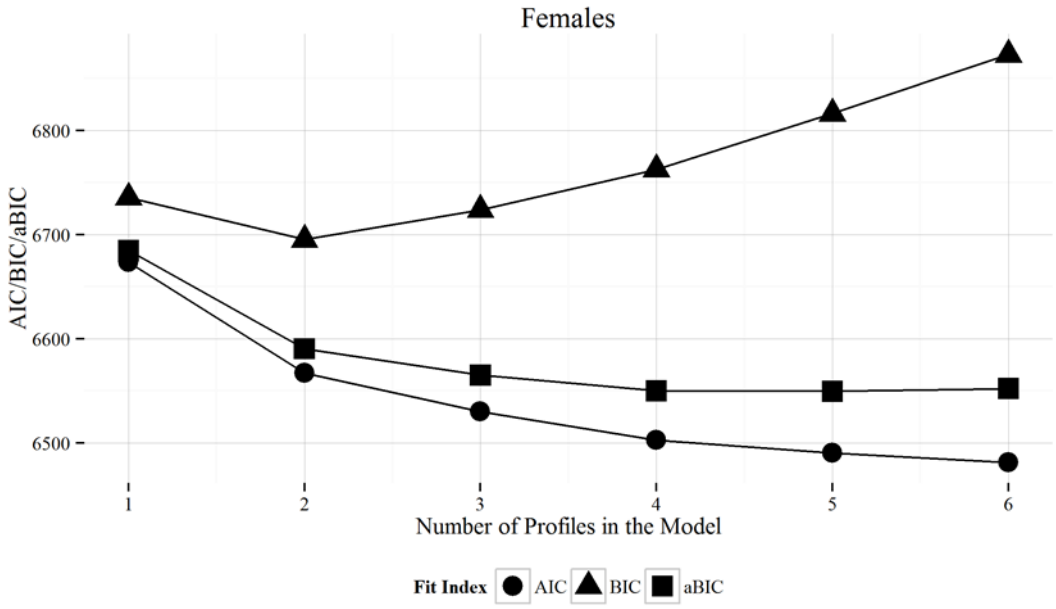


Figure 8b. Model fit indices for 1-6 profiles (Females)

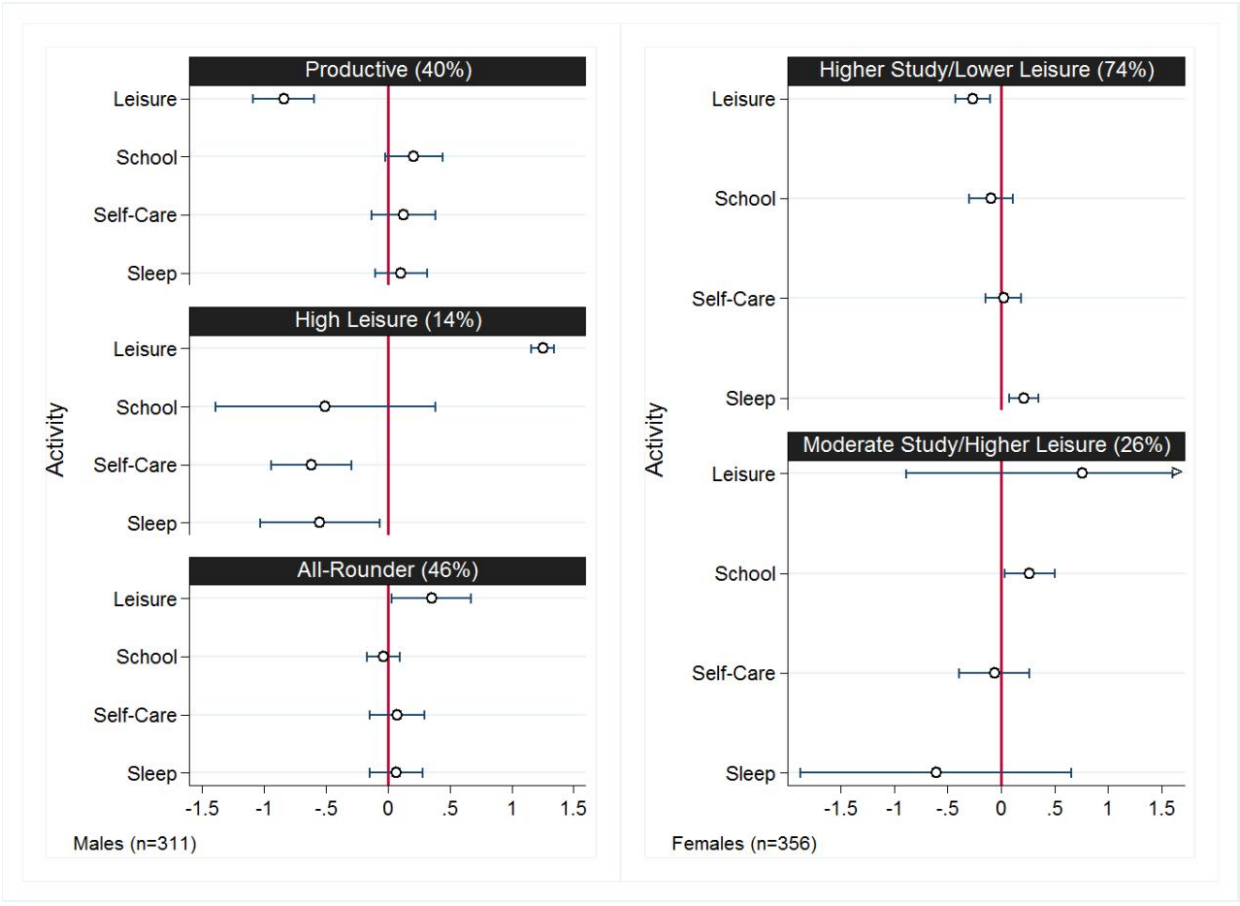


Figure 9. Conditional mean z-scores and 95% confidence intervals for continous indicator variables by latent profile by gender.

Chapter Seven

Conclusion

7.1 Introduction

In this thesis, inspired by Dr. Elizabeth Yerxa (1993), I set out to explore "a major question confronting societies – what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness" (p. 3). With my background in child and adolescent mental health and my current role educating recent school-leavers, I was interested in examining Yerxa's question specifically in relation to the quotidian activities and HRQoL of young people, who comprise a large section of the population of Ireland. This research enquiry was informed by an occupational perspective of health and by population health, ecological, and positive youth development perspectives.

In this concluding chapter, I present a summary of the main findings from the five studies that comprise this thesis and consider the generalizability of the empirical results. I reflect on the limitations and strengths of the overall research design as well as ethical issues that arose during the study and follow with a critical analysis of the overall contribution of this doctoral thesis. Implications for research, policy, and practice are identified. I conclude with a brief outline of some of the plans I have for continued mining of the dataset that was created through this PhD.

7.2 Summary of Main Findings

Five studies comprise this thesis. Two scoping literature reviews informed the three empirical studies. The first review **(Study One, Chapter Two)** sought to identify and map the extent and nature of time use research in occupational therapy and occupational science journals and the extent to which studies explored the relationship between time use and health. Sixty-one studies published between 1990 and 2014 met the inclusion criteria for this review. Clearly, time use is of enduring interest to occupational therapists and occupational scientists. There is considerable expertise on instrument development and in understanding the daily lives of people with illnesses, disabilities or particular needs. However, this review identified the lack of studies of the daily lives of people in Ireland. Furthermore, few studies focused on well populations, with just one (authored by the candidate and colleagues) focused specifically on well adolescents. Finally, the review demonstrated the limited extent of research testing the assumption underlying much occupational therapy intervention that time use is related to overall well-being and quality of life. Just 10 studies (16%) included an empirical examination of the relationship between time use and health. Occupational therapists and

occupational scientists were encouraged to consider more large-scale quantitative research into the time use and health of well populations across the life span at local and global levels.

The second scoping review (**Study Two, Chapter Two**) mapped the extent and nature of time diary research with well adolescents (aged 10 – 19 years) and the use of person-centred data analysis of overall time use as a multidimensional unit. Additionally, it explored whether and how the included studies analysed the relationship between time use and health, well-being, and quality of life. Thirty-three studies met the inclusion criteria for the review. One-third of studies (n=11) captured data representing 24 hours of the day. Two studies (6%) used person-centred analyses while six studies (18%) examined time use and health and well-being. No studies were identified that examined adolescent 24-hour time use and quality of life. On foot of this review, adolescent time use researchers were encouraged to explicitly identify the stage of adolescence to which their studies relate; capture 24-hour time use data; consider the analysis of overall activity patterns as multidimensional units using person-centred analyses; and use robust, reliable, valid, sensitive, and age-appropriate instruments to empirically examine time use in relation to health, well-being, and quality of life.

Study Three (Chapter Four) presented a cross-sectional study that examined, for the first time in Ireland, the time use of Irish school-going late adolescents during weekdays and weekends, and how time use differed by two key determinants of health, gender and social class. The detailed examination of participation rates and time spent in activities across the day highlighted the gendered nature of adolescent time use, particularly at weekends. Established international trends were mirrored in the findings with stereotypical gender role differences in physical activity, household tasks, personal care, computer/Internet use and reading. Social class differences were less evident.

The relationship between daily time use, life contexts (year at school, family context, school location, and social class) and HRQoL for males and females was examined in **Study Four (Chapter Five)**. Data from weekday and weekend day 24-hour time diaries were used, along with the KIDSCREEN-52, providing data on 10 domains of HRQoL and global HRQoL. Gender accounted for the most differences across the HRQoL domains. There was some variation in global HRQoL by time use, particularly for females at weekends. Based on aggregate-level analyses, some significant associations between HRQoL and individual activities such as physical activity and socialising with

family for males and females were found, independent of school year, school location, family context, social class, nationality or diary day.

Finally, **Study Five (Chapter Six)** sought to establish whether distinct patterns or profiles of adolescent time use exist and to examine the relationship of any identified profiles with self-reported HRQoL. A model-based, person-centred analytic approach was used to identify adolescents' profiles of time use. Recently developed statistical methods were employed to examine the relationship between these time use profiles and HRQoL as a distal outcome. Three male profiles emerged, namely *productive*, *high leisure* and *all-rounder*. Two female profiles, *higher study/lower leisure* and *moderate study/higher leisure,* were identified. The quantitative and qualitative differences in male and female profiles supported the gendered nature of adolescent time use. There was tentative support for the association between higher HRQoL and more balanced time use profiles.

7.3 Generalizability of the Findings – Ireland Then, Ireland Now

The extent to which the results presented in this thesis are generalizable to a wider adolescent population is an important question. The explicitly defined parameters of the target population (i.e., school-going late adolescents in full-time education who were living at home) and the randomly selected sample may allow for extrapolation of the results to similar populations in Ireland or elsewhere. Indeed, as discussed in **Study Three (Chapter Four)** and **Study Four (Chapter Five)**, some of the findings mirror existing international data on time use of adolescents and, separately, their HRQoL. As noted in **Study Five (Chapter Six)** identified commonalities may be a product of globalisation, an artefact of the research tools used or may in fact be specific behaviour patterns characteristic of adolescents (Ferrar, Chang, et al., 2013).

Notwithstanding the above, the economic and social landscape of Ireland has changed radically and irrevocably in the seven years since the data were collected. Against that backdrop, the generalizability of the findings requires careful consideration. The data in this thesis were collected from September to December 2007, a time period that was subsequently identified as the peak of the "Celtic Tiger" economic boom in Ireland when real gross domestic product (GDP) reached its highest level (Department of Children and Youth Affairs, 2013). Just over 2% of fathers and 3% of mothers of the adolescents in this survey were recorded as unemployed. Fifty-six percent of

participants (n=399) reported that they had a part-time job. "Financial resources" was amongst the highest ranked HRQoL domains for males and females in this study.

In 2007, few would have foreseen the global financial and economic crisis that would ensue, described by the OECD (2014a) as the "Great Recession" (p. 9). The peak-to-trough fall in gross national product was 13% (OECD, 2009). The rate of unemployment in Ireland pre-crisis was 4.6%. These rates peaked at 14.7% in 2012 before dropping to 11.4% in 2014 (OECD, 2014b). The incomes of Irish households registered one of the biggest falls in the Eurozone region. The proportion of Irish people reporting insufficient money to buy food increased from 4.2% to 9% (OECD, 2014b). The economic crisis has affected young people in particular, with unemployment and inactivity rates consistently higher than for other age groups in most Member States (Eurofound, 2014). Between 2007 and 2011, the European Union-27 youth unemployment rate (for 15- to 24-year-olds) rose from 15% to 21%. The rate of youths (up to the age of 25) neither in employment, education nor training was 13% and is now 16.7% (Eurofound, 2014). Gross emigration of Irish people (of all ages) increased by nearly 400% in the seven years from the onset of the economic crisis to 2013 (Glynn, Kelly, & MacÉinrí, 2013). Economic recovery is underway and is projected to continue (OECD, 2014c). However seven years of tightening of fiscal policy and budgetary consolidation, or austerity measures, have taken €28 billion out of the economy in spending cuts and tax rises, equal to 17% of today's GDP (The Economist, 2013). While the longer-term effects of the recession on people's health cannot yet be quantified it is known that unemployment and economic difficulties contribute to a range of health problems (OECD, 2014a). American adolescents' self-rated health has declined significantly between 2001 and 2010, reportedly consistent with recession effects (Cui & Zack, 2013). In Ireland, the mental well-being and optimism for the future of 18- to 29-year-olds decreased significantly between 2007 and 2011 (Eurofound, 2014). Almost 19% of young people who participated in the consultation for the Department of Children and Youth Affairs (2012c) document *Life as a Child and Young Person in Ireland* indicated that the worst thing about living in Ireland was the recession. They expressed concerns about the lack of jobs and the high cost of living. Against this backdrop, it is likely that, should the studies in this thesis be replicated, the rates of parental employment and the adolescents' rate of part-time employment would be considerably lower, as might the HRQoL scores. Nevertheless the internal validity of the results presented in this thesis remains high. The potential for

such significant macro-level changes in societies over time reinforces the need to adopt, as described in Chapter One, an ecological approach in studies of the lives of adolescents (Ben-Arieh, 2010; Brofenbrenner & Morris, 1998; Park et al., 2014) and points to the need to be explicit in identifying when data are collected and the likely time lag that may exist between data collection and the dissemination of research results.

7.4 Limitations and Strengths of the Research Design

The limitations and contributions of each study were considered in each respective chapter of this thesis. However, a number of key limitations and strengths of the research design are re-iterated to inform future research.

7.4.1 Limitations

In keeping with previous studies of adolescent time use internationally (Zuzanek & Mannell, 2005) a cross-sectional design was chosen. This was appropriate given the study's exploratory and descriptive aims, the absence of existing Irish adolescent time use data, the anticipated access to the target population and the resources of the candidate. However, such a study design means that no causal inferences can be drawn regarding the adolescents' time use, participation in daily activities and HRQoL (Sedgwick, 2014). Endogeneity is a further challenge in research on activity participation amongst adolescents (Agans et al., 2014). The associations identified in this thesis may thus be the result of unmeasured characteristics of the participants themselves, their parents or other aspects of their wider world (Bronfenbrenner & Morris, 1998; Duncan, Magnuson, & Ludwig, 2004).

Cross-sectional studies are vulnerable to non-response bias (Sedgwick, 2014). Mulligan, Schneider, and Wolfe (2005) noted the argument that those who agree to participate in a time use survey and who successfully complete their diaries represent a biased sample of the population. They recommended the use of appropriate weighting procedures to account for these issues. However, other studies in this area show little evidence of bias due to non-response (Phipps & Vernon, 2009). A response rate of 52% was achieved in this study with no subsequent weighting for non-response. Information about those who chose not to participate in this study is unavailable. As described in Chapter Three, every effort was made to maximise the clarity, visual appeal, and user-friendliness of

the diary instrument. However, it is possible that students with lower levels of literacy may have experienced difficulties with diary completion (Vogler et al., 2009). Sixty-four questionnaires (9%) were excluded from **Study Five (Chapter Six)** on the basis of low quality diaries or incomplete KIDSCREEN questionnaires. Across the 11 HRQoL domains, only one difference between this group and the main study sample remained significant after adjustment for multiple testing ("school environment", $p = .003$). Overall those who were excluded in the final analysis do not appear to have had a significantly different HRQoL status. A further limitation in the present study is that the lower social class groups were under-represented in the sample. Therefore these data may not accurately reflect the time use and HRQoL of those with lower socio-economic status.

Time diaries rely on recall of participation in activities which is a potential source of error (Hunt & McKay, 2012). Short duration (e.g., going to the bathroom), personal (e.g., sexual) and illegal (e.g., drug use) activities are often under-reported. It is possible that some activities are reported as secondary activities (e.g., eating). However, accounting for all 24 hours of a day is believed to reduce the potential for social desirability bias and recall errors associated with self-report data (Dollman et al., 2009; United Nations, 2005).

While there is an acknowledged need for data collection from the most marginalized adolescents in Ireland and internationally (Kelleher, Seymour, & Halpenny, 2014; UNICEF, 2014), the present study was designed in keeping with previous studies which focused on school-going adolescents (Zuzanek & Mannell, 2005). When a high proportion of adolescents attend school, as is the case in Ireland, school-based surveys are efficient and acceptable (Patton et al., 2012).

Data collection in the present study took place in late 2007. At that time, smart phones and social media were largely unavailable. Therefore, the data do not reflect the widespread penetration of mobile technologies and social media in the lives of today's adolescents (O'Keeffe & Clarke-Pearson, 2011; Rideout et al., 2010). Furthermore, the diary instrument did not distinguish between Computer/Internet use for gaming or social networking. In 2007, the global phenomenon of social networking did not exist in the mainstream society or youth culture, whereas between March 2012 and March 2013 alone, Facebook® (2013) reported an increase of 26%, or 665 million daily users, clear

evidence of the challenging nature of conducting research in a "constantly changing virtual world" (Subrahmanyam & Greenfield, 2008, p. 417).

Although not a primary interest in this thesis, arguably the inclusion of questionnaire items on body height and weight (anthropometric data), enabling the calculation of Body Mass Index (BMI), and information relating to the intensity of reported physical activities would have extended the utility of the dataset.

7.4.2 Strengths

As described in Chapter Three this study was designed in consultation with teachers and an advisory group of second-level school students. This was in keeping with the National Children's Office (2005) policy document *Young Voices – Guidelines on How to Involve Children and Young People in Your Work*, which emphasised the participation of young people in issues that affect them. Furthermore extensive consultation took place with time use experts nationally and internationally. A defined quinary age band was used as recommended by Sawyer et al. (2012), Gore et al. (2012) and Hagell et al. (2013). This thesis examined adolescents' time use "in the round" (Hagell et al., 2012, p. 71) across 24 hours rather than discrete activities in isolation. Consistent with the recommendations of the UNECE (2013) Task Force on Time Use Surveys and others (Ben-Arieh & Ofir, 2002; Larson & Verma, 1999) time use was measured using a 24-hour time diary method. Specifically, a pre-coded light diary instrument was chosen as the most appropriate for the population under study. In line with current best practice (Ben-Arieh, 2010; Huang et al., 2014; Lippman et al., 2009), the adolescents in this study self-reported their HRQoL. A robustly developed age-appropriate, reliable, and valid instrument, the KIDSCREEN-52 (and the KIDSCREEN-10 Index) was used.

A further strength of this study's design is the comprehensive steps taken to maximise the quality of the data in this study as described in Chapter Three. Tables 34 - 37 in Appendix R show participants' responses to the data quality questions at the end of each weekday and weekend diary in the questionnaire. Compared with similar results from the ESRI survey of the time use of Irish adults (McGinnity et al., 2005), more of the adolescents completed their weekday diary "now and then during the day" (adolescent males 45%; adolescent females 42%; adults 16%). This suggests that there was less

reliance on recall of activities. Similarly the number of adolescents who completed their weekday diary "at a later time" was considerably less than that of adults (adolescent males 8%; adolescent females 4%; adults 18%). The numbers who completed their weekend diary "at a later time" were broadly similar amongst adolescents and adults (adolescent males 19%; adolescent females 24%; adults 21%). While these figures may raise questions about the quality of those diaries, in fact some data collection school visits took place on a Tuesday. On those occasions, some participants were required to complete their weekend diary for the previous Sunday, thus contributing to the proportion of participants who completed their weekend diary "at a later time".

Many of the time use studies in the scoping review of time use research in occupational therapy and occupational science (**Study Two, Chapter Two**) assessed the validity of their data by asking respondents to rate how well the diary day represented an average day. In the present study, participants were asked if the diary day was unusual in any way. Seventy-nine percent of males and 76% of females reported that their weekday diary day was not unusual, while the corresponding results for the weekend diaries were 71% and 72% respectively. Thus for the majority of participants the recorded diary days validly represented an average day. However, three participants challenged the idea of a "typical day" commenting as follows:

> *"I don't think that two days is enough as I don't train on those two days and know it looks like I do no physical activities."* (Male, 15 years)

> *"This really won't give any real insight into our lives as you picked the worst 2 days. You should have covered a week long time period because most young people do different things and more exciting things on Friday and Saturday. Also there is a huge difference between competitive exercise and non-competitive. The heading of "Playing sports, exercise and physical activity" does not really cover it. Thanks."* (Male, 17 years)

> *"I thought the survey was a good idea but I think it should have been over more than 2 days. Each day varies – some days it takes up to an hour to get to school others only 10 minutes depending on the bus."* (Female, 15 years)

Participants' stated reasons for days being identified as unusual included such instances as school masses, school matches, bad weather, and sickness. Only a small number of adolescents reported problems completing the diaries (3% to 6% across males/females and weekdays/weekends). Approximately 10% of participants recorded that there were some activities that should have been included in the pre-coded list within the diary.

Some of these were baking, attending matches, smoking, drinking alcohol and sexual activity. Taken together, the responses to these questions provide further evidence in support of the high quality of the diary data in this study.

A final strength of the research design is that the latest statistical methods (Asparouhov & Muthén, 2013; Lanza et al., 2013, McIntosh, 2013) were used to explore the relationship between adolescent time use profiles and HRQoL as a distal outcome. These advances take the probabilistic nature of profile membership into account and allow for improved estimation of the relationship between latent profiles and auxiliary variables (covariates or distal outcomes) while all the time maintaining the uncertainty in profile membership (McIntosh, 2013). Interesting methodological issues were raised in the latent profile analysis, particularly in relation to the compositional nature of the data. These challenges highlight the complexity of time use data and provide an important platform for future research.

7.5 Ethical Issues in the Research Process

As described in Chapter Three, this research was designed in accordance with the Department of Children and Youth Affairs (2012b) *Guidance for Developing Ethical Research Projects with Children*. Ethical approval was subsequently granted by the Research Ethics Committee of the Cork Teaching Hospitals. Thereafter, protocol amendment forms were submitted to notify the ethics committee of changes to the supervisory team and duration of the project as appropriate. Ethics renewal forms were submitted annually.

Some difficulties arose with securing written consent/assent from some participants in this study. On a number of occasions when the candidate went on the second visit to a school to collect completed consent/assent forms and distribute the survey instrument, some young people reported that they wished to participate, had secured their parents' written consent but had forgotten the consent/assent form. A tension then arose between upholding the duty to respect the rights and wishes of the young people (Department of Children and Youth Affairs, 2012b) and, where possible, accommodating their preferences (Grady et al., 2014) while adhering to best ethical practice. In these situations, the young person was urged to return the consent form with their completed questionnaire and the liaison teacher was given a list the names of those who were to return a consent form. However, when the completed questionnaires were collected, in a

small number of instances, the number of consent forms and questionnaires did not tally. Eight-hundred and ninety completed questionnaires were returned but 64 consent forms (7%) were not accounted for. The advice of the Research Ethics Committee was sought. The Chairperson advised that, in the classes where discrepancies in the number of questionnaires and consent forms were found, the diaries of participants aged 16 years or under be removed. He advised that young people who were aged 17 years and over could consent on their own account. In some instances it was possible to identify that there was consent either by age (17 years or over) or by gender, that is, all consent forms for females were accounted for therefore only males' diaries were omitted for that class (or vice versa). Even though the actual number of unaccounted consent forms was 64, 159 (18%) questionnaires had to be removed. This resulted in the 731 (52%) fully consented questionnaires analysed in the studies in this thesis. Although the loss of data was extremely disappointing, the candidate was satisfied that she had taken all possible steps to act in accordance with best ethical practice. In the future, in research that was deemed non-invasive and not highly sensitive, ethical approval would be sought to use "opt-out" or passive consent (i.e., where the consent of the parent is assumed unless written instructions are provided by the parent to the contrary). Such an approach has previously been used in an Irish school-based research context (Morey, Corcoran, Arensman, & Perry, 2008).

One participant wrote in the comments section at the back of the questionnaire that she had been upset by some of the KIDSCREEN questions. The specific details of her comments are not recorded here in order to protect her identity. However, the comments were reported to the Research Ethics Committee in the annual renewal form in the section relating to adverse reactions. Furthermore, additional supportive resources were detailed in the preliminary feedback leaflet that was circulated to all participants via the school staff two months after completion of data collection (Appendix C).

It was hoped that survey participants may experience a direct benefit by having the opportunity to reflect on their own time use, lifestyles, and well-being. Twenty-one participants did write comments to that effect at the end of the questionnaire. These are detailed in Appendix S.

7.6 Critical Analysis of the Overall Contribution of this Thesis

Notwithstanding the limitations reported above, the two scoping reviews and three empirical studies that comprise this thesis each make an original contribution to knowledge development. The first scoping review was a state of the art review that examined time use research in occupational therapy and occupational science over the last 25 years. Although the wide-ranging research designs precluded the synthesis of findings, this review contributed important information that can guide further time use research (e.g., use of language, identification of under-researched populations, methodological considerations etc.). The second scoping review broadened the lens beyond occupational therapy and occupational science and mapped time diary research with well adolescents across multiple disciplines and the use of person-centred data analysis of overall time use as a multidimensional unit. This review provided useful guidance for prospective adolescent time use researchers. Together, the reviews laid a clear foundation for the three empirical studies that ensued.

Influenced by contemporary perspectives in adolescent health, the studies in this thesis focused on the whole child population (Ben-Arieh, 2010) and employed a holistic ecological perspective, with adolescents and their well-being in real-life daily contexts placed centre stage, rather than specific diseases, ill-health or risk behaviours (The Lancet, 2012). This adoption of a strengths perspective, the inclusion of positive outcome variables, and the examination of development from an ecological perspective that recognises bidirectional individual-context relationships are important elements of quantitative developmental research (Larson & Tran, 2014).

The empirical studies provide new data on 24-hour time use and HRQoL in a large, representative sample of well school-going late adolescents aged 15 - 19 years in Ireland. The use of time diaries offered a window onto the lifestyles of Irish adolescents. **Study Three (Chapter Four)** contributes an important and heretofore absent occupational perspective on the lives and lifestyles of young people in Ireland. Understanding daily life in different parts of the world is necessary in occupational therapy and occupational science (Ziviani et al., 2010). By generating insights into the "cultural repertoire of typical activities" (Pierce, 2001, p. 144) for late adolescents in contemporary Ireland, this study provides country-based data that may aid the identification of local priorities by Irish policy makers and service providers (Catalano et al., 2012; Patton et al., 2012). It contributes an Irish perspective to the growing

international body of knowledge on adolescent time use, health, and well-being (Zuzanek & Mannell, 2005). Furthermore, as the overall study was designed in keeping with the parameters of an international adolescent time use research project (Zuzanek & Mannell, 2005); used a diary instrument with activities comparable to previous research; and a standardised HRQoL instrument designed specifically for adolescents across Europe, it paves the way for future cross-cultural studies that can further our understanding of the extent of globalization or diversity and macro-level influences on adolescent time use, well-being, and quality of life (Zuzanek, 2005).

Such macro-level influences were described in Chapter One, in the context of the dramatic social, cultural, and economic changes in "Celtic Tiger" Ireland at the turn of the 20th century which presented challenges and considerable opportunities that were not previously envisaged (Department of Health and Children, 2000; Greene & Moane, 2000). The swift and stark reversal in prospects and opportunities in less than 10 years was also not anticipated. The daily lived experience of Irish young people, and their peers internationally, confronts them with "more complex worlds, with more contractions and challenges" than before (Larson & Tran, 2014, p. 1013). Viewed through Bronfenbrenner's bio-ecological lens, the influence of the "historic time" (Ben-Arieh, 2010) of the recession in Ireland on the lives of Irish adolescents is as yet unmeasured. As advocated by Larson and Verma (1999), repeated studies of the time use of adolescents in Ireland would allow for an assessment of the impact of economic change on lifestyles in this developmental period. The data in this thesis represent a unique time in Irish economic and social history and as such contribute important baseline data to enable such analysis in the future.

This thesis contributes new population-level data, much needed in occupational therapy and occupational science research, policy, and practice (Ciro, 2011; Hildenbrand & Lamb, 2013; Hocking, 2013; Moll et al., 2013; Wilcock, 2014). **Study Three (Chapter Four)** provides solid level-one descriptive data (Pierce, 2012) on an under-studied population, namely well adolescents. The lack of evidence in the occupational therapy literature to support the belief that there is a relationship between occupation, health, and well-being has been identified (Law et al., 1998) as has the paucity of research on the relationship of occupation and contemporary lifestyles to health and quality of life (Wilcock, 2007). **Study Four (Chapter Five)** and **Study Five (Chapter Six)** both help

to fill this "critical gap" (Pierce, 2012, p. 302) in occupational science research. Time spent in some daily activities was associated with HRQoL. In addition, there was tentative support for the association between higher HRQoL and more balanced time use profiles. However, whether participation in daily activities, singly or in combination, gives rise to higher HRQoL, or whether those with higher HRQoL actively seek out different types of activities or activity configurations remains uncertain. The inclusion of modules on self-reported well-being generally (National Research Council, 2012) and child positive well-being and quality of life indicators particularly (Lippman et al., 2011) in large time use surveys will illuminate our understanding of the bidirectional and interactive processes that occur within and between nested environmental spheres (Duncan et al., 2004), and inform policy development and service provision targeting increased positive behaviours, relationships, and competencies. The inclusion of time use components within larger scale representative surveys allows for detailed studies of the diverse influences on time use at points in time, and in the case of longitudinal studies, across lifetimes and generations of individuals and families. Longitudinal time use studies in particular offer exciting opportunities to understand the lives and worlds of young people and unpack some of the complexities of causation and endogeneity.

Occupational scientists and occupational therapists may assert that time use research that captures information about daily activities lacks necessary information about the meaning of the occupation (Hunt & McKay, 2012). However, the studies in this thesis are underpinned with the belief that such time use research makes an important and valid contribution to knowledge development on the form and function of human occupation at a population level within and across cultures, complementing qualitative research that illuminates the meaning of occupation (Farnworth, 2004). This position is echoed by Larson and Verma (1999) who, although acknowledging the limitations of research on quantities of adolescent time use rather than the quality of that time, also argued that good data on what children and adolescents spend their day doing is essential. Similarly Pierce (2001) asserted that such data were required in addition to data on "the complex nature of the personally constructed and fully contexted occupational experiences" (p. 144). Quantitative and qualitative data complement each other and enable a more nuanced appreciation of children's realities (UNICEF, 2014).

Study Three and **Study Four (Chapters Four** and **Five** respectively) presented variable-centred analyses of the time use and HRQoL of the participants in this study.

Data in these studies were analysed at the aggregate level as is the norm in time use research (UNECE, 2013). Average time spent in individual daily activities was examined by gender and social class and in relation to aggregated HRQoL scores. Thus inter-individual differences in these relationships were not taken into account (Zarrett et al., 2009). However, "the whole picture has information beyond what is contained in the separate parts" (Magnusson, 2003, p. 11). For that reason, a person-centred approach was used in **Study Five (Chapter Six).** Moving from variables to individuals reflects the holisitic-interactionist perspective on individual development characteristic of person-centred analyses (Magnusson, 2003). Such a holistic-interactionist perspective clearly fits with the occupational perspective of health, ecological, and positive youth development approaches described in Chapter One.

When using person-centred analyses, it is important to remember that individuals are not statically assigned to profiles for once and for all. Rather, as Magnusson (2003) stated, "the boundaries of many clusters are fuzzy and permeable" (p. 17) and a person may move from one profile to another over time. With that in mind latent profile analysis was chosen as it retains the probabilistic feature of person-centred analysis more explicitly. This more accurately reflects the complex and ever-changing lifestyles of adolescents (Larson, 2011).

Taken together the studies in this thesis contribute new knowledge on the time use and HRQoL of Irish school-going late adolescents. Throughout the research process, every effort was taken to bracket my personal and professional beliefs through ongoing discussions with my thesis supervisors and to avoid bias in the design, analysis and interpretation of the findings. Nonetheless, as with all scientific inquiry, these findings remain open to interpretation and fresh debate as newer data come to light.

7.7 Implications for Research, Policy, and Practice

According to UNICEF (2014) "credible data about children's situations are critical to the improvement of their lives" but "data do not of themselves change the world. They make change possible – by identifying needs, supporting advocacy, and gauging progress" (p. 1). With this in mind, implications of this research are next presented as they relate to research, policy, and practice that seek to understand and improve the lives of adolescents.

7.7.1 Implications for Research

This thesis presented a rationale for the use of the word activity in population-level time use research rather than occupation which, it was argued, relates to time use at the individual level (Farnworth, 2004). Occupational therapists and occupational scientists are encouraged to use language that can be understood within the broader health community and wider society (Clark, 2006; Moll et al., 2013; Ziviani et al., 2010).

The explicit and consistent use of the quinary age bands of 10 - 14 years (early adolescence); 15 - 19 years (late adolescence); and 20 - 24 years (young adulthood) is recommended to facilitate greater ease of comparison of research findings and to allow for increased understanding of the unique developmental stages within adolescence (Gore et al., 2012; Hagell et al., 2013; Park et al., 2014; Sawyer et al., 2012).

Given the aforementioned widespread use of mobile technologies and social media by today's adolescents, it seems natural that future time use research studies with this population should primarily use electronic means of data collection. This would likely increase response rates and data accuracy. The considerable financial burden of data coding would be largely eliminated. Furthermore it would enable faster data analysis and dissemination of findings, thus enabling contemporaneous interpretation of findings. The UK Millennium Cohort Study will go into the field in 2015 to collect data from its age 14 participants. After successful piloting, a mixed-mode data collection approach is planned (S. Chatzitheochari, personal communication, May 27, 2014). Participants will be offered a mobile phone app and an online diary to choose from in the first instance. A paper alternative will be offered to those without internet access. Participants will also wear accelerometers on the designated days. Given that accelerometry apps and global positioning systems (GPS) are generally available on mobile phones nowadays, future time use surveys should capitalise on these technologies to enhance the depth and breadth of activity and location data. Naturally, the privacy issues associated with this use of technology require sensitive consideration (Michael, McNamee, & Michael, 2006).

Time use researchers are encouraged to include standardised assessments of health, well-being or quality of life in their data collection to enable robust empirical analysis of outcomes of participation in daily activities. Furthermore it is recommended that such assessments include positive indicators of well-being of the whole child population

(Ben-Arieh & Ofir, 2002; Lippman et al., 2011). The secondary analysis of existing time use datasets that include modules on well-being should also be considered (Hunt & McKay, 2012; National Research Council, 2012).

Fifty-four participants (7%) were excluded from the analyses in **Study Four (Chapter Five)** as they did not provide sufficient detail for to enable social class classification. Although the questionnaire items used to generate social classes were taken from those used in other surveys with school-going young people (McCoy & Smyth, 2004), in future, researchers may consider using the Family Affluence Scale (FAS) (Currie et al., 2008) which is more age-appropriate. In fact two items included in this study are almost identical to two of the four FAS items – do you have your own bedroom and how many computers do your family own? The other two FAS items relate to family car ownership and family holidays in the previous 12 months. As suggested in **Study Three (Chapter Four)** the use of a range of indicators of socio-economic status rather than a single measure of social class may have shed more light on the impact of socio-economic factors on time use (Currie et al., 2012). In addition, as the FAS is used internationally in the Health Behaviour in School-Aged Children (HBSC) studies, direct cross-national comparison of socioeconomic status would be easier.

As described in **Study Five (Chapter Six)**, an issue acknowledged in the methodological literature but notably absent in empirical studies is the compositional nature of time use data, that is, the total time spent in activities across the day is constrained at 24-hours (Aitchison, 2003). While the use of log-ratio transformations (Kucera & Malmgren, 1998) can be helpful, this is less effective with time use data given the preponderance of zeros in the data. De Leeuw et al. (1990) presented a latent time-budget model but this was based on data gathered from random spot observations rather than diaries and does not appear to have been utilised greatly since its publication nearly 25 years ago. Thus, this unresolved challenge requires further consideration in future person-centred time use research. Moreover, such research would benefit from the expanded use of the more robust recently developed probabilistic methods to examine the relationship between latent clusters or profiles and auxiliary variables (Asparouhov & Muthén, 2013; Lanza et al., 2013; McIntosh, 2013).

The three empirical studies in this thesis identified associations between time spent in daily activities, singly and in combination, and HRQoL. Increasingly, scholars are

calling for a mix of variable-centred, person-centred and qualitative research (Agans et al., 2014; Hamilton, 2014; Masten, 2014) to create a more complete picture of the many systems that comprise the complex "disorderly world" (Larson, 2011, p. 317) of today's adolescents. Equally, researchers are urged to use rich mixed-method approaches to illuminate our understanding of the time use and HRQoL of adolescents in the 21st century.

7.7.2 Implications for Policy and Practice

According to Soupourmas (2005), "understanding how young people spend their time… is crucial for the formulation of appropriate and effective policies and interventions aimed at improving the health and well-being of young people" (p. 586). Principally, the findings of the studies in this thesis suggest that such policies and interventions need to be gender-specific. This is recognised at an international level (WHO, 2011a) but needs to translate to national policies and interventions too. For example, the findings relating to the very low levels of physical activity amongst the participants of this study **(Study Four, Chapter Five),** while stark, are not new (Department of Health and Children/Health Service Executive, 2009). It is disappointing then that the Irish Department of Education and Skills (2012) guiding framework *Get Active - Physical Education, Physical Activity and Sport for Children and Young People* does not recommend that physical activity interventions in schools or the wider community take gender differences into account. It is recognised that this is a challenge given the high numbers of mixed (male and female) schools in Ireland (more than half of the participants in this survey attended mixed schools), but it remains a pressing issue nonetheless.

Two further findings from **Study Four (Chapter Five)** point to the need for health education and promotion strategies to be tailored differently for males and females. On weekdays, spending more time Resting/Relaxing was associated with decreased odds of high HRQoL for males. Spending more time Socialising with Family was associated with increased odds of high HRQoL for males at weekends. Interventions in clinical or educational settings may benefit from taking these findings into account.

In addition to "safe and supportive families", "safe and supportive schools" are now deemed crucial for adolescents' development and health (Viner et al., 2012). Schools are now included amongst the social determinants of adolescent health (Viner, 2013).

The influential nature of full-time education on the time use of adolescents was identified in **Study Three (Chapter Four)** and **Study Four (Chapter Five)**. Schools may well then be the ideal context to deliver interventions to support the health and well-being of adolescents. The WHO (2014) encouraged a move beyond individual-level interventions directed to a few health issues to provide more support for parents and schools to protect adolescents' overall health. In addition, the complex relationship between time use profiles and HRQoL for the adolescent in this study was clearly identified in **Study Five (Chapter Six)**. With that in mind, policy and practice in health and education should prioritise interventions that address multiple risk and positive health behaviours.

Underpinned by the belief that people of all ages can appreciate the health impact of their daily occupations and adapt their lifestyles accordingly, interventions based on an occupational perspective of health as described by Wilcock and Hocking (2004) offer exciting potential to target these multiple risk and positive health behaviours. In her seminal text *An Occupational Perspective of Health*, Wilcock (1998b) proposed risks to health that can arise from a lack of fit, through choice or circumstance, between contemporary lifestsyles and the environment in which people work, rest, and play. She identified these occupational risk factors as occupational alienation, occupational deprivation, and occupational imbalance, with the latter of particular relevance in the context of time use and health interventions. Occupational imbalance "involves a state that occurs because people's engagement in occupation fails to meet their unique physical, social, mental, or rest needs and allows insufficient time for their own occupational interests and growth as well as for the occupations each feels obliged to undertake in order to meet family, social, and community commitments" (Wilcock, 1998b, p. 138). Importantly, balance does not suggest an equal allocation of time to necessary and desired activities, rather "a balance of occupations across the sleep-wake continuum and a variety throughout days and weeks to exercise a range of capacities; to meet the basic requirements for health; to provide meaning, purpose, satisfaction, and belonging; and to encourage potentialities" (Wilcock, 2006, p.310). Wilcock (1998b) suggested that the outcome of occupational risk factors can include boredom; burnout; anxiety and mood disorders; and changes in sleep patterns, body weight and blood pressure, amongst other health concerns.

With occupational imbalance as a risk factor in mind, adolescents can and need to be educated and supported to engage in a daily round of activities that enhance their health, meet their needs, and enable them to balance the demands of a 21st century lifestyle. Such goals could be achieved through the delivery of tailored occupation-based interventions. These interventions are "centred around occupations people find meaningful and important; are attuned to how cultural, social, and physical contexts influence what people do and are responsive to the full complex of routines and occupational challenges that comprise a person's life" (Larson, Wood & Clark, 2003, p.24). Occupation-based interventions have been developed to address the lifestyles and time use patterns of children who are overweight/obese and their parents (Önnerfalt et al., 2012; Orban et al., 2014); women with stress-related disorders (Erlandsson, 2013b); well elders (Jackson, Carlson, Mandel, Zemke, & Clark, 1998); retirees (Mountain & Craig, 2011); adults post-stroke (Ng, Chan, Chan, & Chow, 2013); people with enduring mental illness (Edgelow & Krupa, 2011) and in diabetes self-management (Pyatak, 2011).

Occupationally focused interventions are needed also in primary mental health-care and in schools, with consumers, families and carers partnering in the development of these services (Fossey & Scanlan, 2014). Reflecting Wilcock's (2006) view that the results of time use research studies can be particularly useful as foundation material for occupation-focused preventive approaches to illness, it is hoped that this thesis will lay the foundation for the creation of an innovative, occupation-based intervention programme for school-going young people, possibly as part of the Senior Cycle Social and Personal Health Education (SPHE) Programme (National Council for Curriculum and Assessment, n.d.). SPHE aims to support students in making choices for health and well-being now and in their future lives. Such an intervention, delivered in consultation and collaboration with educators within the school system, is one exciting potential practice opportunity within the emergent primary care arena (Department of Health and Children, 2001). This intervention would be based on facilitating young people to analyse how they spend their time in order to optimize their patterns of everyday occupations (Eklund & Erlandsson, 2014). The goal would be "to create or retrieve a repertoire of occupations that enhance the experience of health" (Erlandsson, 2014, p. 21). It is argued that supporting children and families to examine the way in which they engage in everyday activities of self-care, work, and leisure is a more salient means of identifying behaviour change/modifications than simply focussing on nutrition and

physical activitiy and allows for individuals to consider how they can embed health-enhancing behaviours within their daily routines (Ziviani et al., 2010). The comments in Appendix S indicate the potential for such an intervention. Some participants reported experiencing greater self-awareness of their time use and, in some cases, identified aspects of their time use that they wished to change in the interest of their well-being.

7.8 Future Research Plans

As this thesis draws to a close, it is timely to consider future research plans. I am interested in analysing the sleep data in this study in greater detail. There is considerable interest in this topic in the child and adolescent health literature (Asarnow, McGlinchey, & Harvey, 2014; Jenni, 2013; Maslowsky & Ozer, 2014; Matricciani et al., 2012; Williams, Zimmerman, & Bell, 2013). For example, Xu et al. (2014) recently reported that longer sleeping hours (>8 hours/day) was associated with higher HRQoL among children and adolescents. Sleep is of interest within occupational therapy and occupational science too (Green, 2008; Picard, 2012; Pierce, 2012). After all, as Pierce (2003) stated, "to be true connoisseurs of occupation, in our own lives and in the lives of our patients, we must look at the full 24-hour round of activities in which humans engage. As occupational therapists, we must understand not only where energy is spent, but also how it is created" (p. 98). In this proposed analysis of the adolescents' sleep data, I will use the reports of number of TVs in the home and in the bedroom that were collected but not subsequently used in the three empirical studies reported in this thesis. There is increased interest in use of electronic media and the sleep habits of children and adolescents (Nuutinen et al., 2013).

I also plan to replicate some of the analysis in Wight et al.'s (2009) study of the time use of American teenagers. As described in **Study Two (Chapter Two)**, drawing where possible on national guidelines such as those from the U.S. National Sleep Foundation and the American Academy of Pediatricians (relating to screen time), they constructed objective measures of time use relevant to adolescents' well-being, such as sleep, eating, schoolwork and television viewing, using data from the nationally representative 2003-2005 American Time Use Survey.

I would like to use qualitative methods to explore late adolescents' experience of balance in everyday life.

Dr. Darren Dahly and I plan to conduct further analysis on this time use dataset from a compositional data perspective. Dr. Dahly will present the time use data from this thesis at the European Regional Section of the International Association for Statistical Computing Summer School on Compositional Data Analysis (CoDA) in July 2014 at the University of Girona, Spain.

Details of the dataset will be uploaded on the UK Centre for Time Use Research database (K. Fisher, personal communication, May 27, 2014). The Irish Social Sciences Data Archive has also confirmed that it will accepting the dataset (J. Barrett, personal communication, June 13, 2014).

The *Growing Up in Ireland* research team consulted with me on the design of their time use instrument for the 13-year-old cohort (B. Merriman, personal communication, December 7, 2010). I was also asked to contribute my expertise to the consultation on the time diary element of the UK Millennium Cohort Study Age 14 Survey (Appendix T). I am interested in forging stronger links with both these research programmes to build mutual expertise on the collection and analysis of time use data from early and late adolescents.

7.9 Concluding Statement

Informed by an occupational perspective of health, and by population health, ecological and positive youth development perspectives, this thesis contributes a detailed analysis of newly-collected data on the time use, daily activities, and HRQoL of school-going late adolescents in contemporary Ireland. Mirroring existing research, the findings highlight and reflect the gendered nature of adolescent time use and HRQoL. Participation in daily activities, singly and in combination, appears to be associated with HRQoL. However, the nature of this relationship is complex. Policy and practice in health and education should prioritise gender-specific interventions that address multiple risk and positive health behaviours. Individually and collectively, adolescents need to be educated and supported from an early age to create health through their everyday patterns of doing. By engaging in a daily round of activities that enhances their health, well-being, and quality of life adolescents can flourish and fulfil their potential for a life of quality in the 21st century.

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*** Denotes the 61 studies included in the scoping review of time use research in occupational therapy and occupational science.**

◆ Denotes the 33 studies included in the scoping review of adolescent time diary research.

Appendices

Appendix A

PhD Outputs and Related Activities and Published Papers

PhD Related Activities (Updated November 2014)

Publications

Hunt, E. & McKay, E. A. (2012). Using population-level time use datasets to advance knowledge on human activity, participation, and health. *British Journal of Occupational Therapy, 75(10),* 478-480. **[Impact Factor 2013: .897]**

Hunt, E., McKay, E.A., Fitzgerald, A.P., & Perry, I.J. (2014). Time use and daily activities of late adolescents in contemporary Ireland. *Journal of Occupational Science,* 21(1), 42-64. **[Impact Factor: N/A]**

Hunt, E., & McKay, E.A. (2014). A scoping review of time use research in occupational therapy and occupational science. *Scandinavian Journal of Occupational Therapy,* Aug 19:1-12. [Epub ahead of print] **[Impact Factor 2013: 1.125]**

Hunt, E., McKay, E.A., Dahly, D., Fitzgerald, A.P., & Perry, I.J. (2014). A person-centred analysis of the time use, daily activities, and health-related quality of life of Irish school-going late adolescents. *Quality of Life Research***,** Nov 15, Early online. **[Impact Factor 2013: 2.864]**

Hunt, E., & McKay, E.A. (In print). What can be learned from adolescent time diary research. *Journal of Adolescent Health*. **[Impact Factor 2013: 2.748]**

Presentations

Hunt, E., McKay, E.A., Fitzgerald, A.P., & Perry, I.J. (2014, May). *Counting time: participation in daily activities and health-related quality of life of late adolescents in contemporary Ireland.* Paper presented at the Count Me In! Children and Youth Occupations Conference, London, UK.

Hunt, E., McKay, E.A., Fitzgerald, A.P., & Perry, I.J. (2014, March). *Participation in daily activities and health-related quality of life of late adolescents in contemporary Ireland.* Seminar presented at the Department of Epidemiology, UCC Cork, Ireland.

Hunt, E., McKay, E.A., Fitzgerald, A.P., & Perry, I.J. (2013, September). *Time use and daily activities of late adolescents in contemporary Ireland.* Paper presented at the UCC/Occupational Science Europe Conference Occupation: Awakening to the Everyday Cork, Ireland.

Hunt, E., & McKay, E.A. (2012, June). *Time use research in occupational science and occupational therapy: challenges and opportunities*. Paper presented at the 36th College of Occupational Therapists Annual Conference Glasgow, Scotland.

Hunt, E., McKay, E.A. & Perry, I. (2012, June). *Perspectives on adolescent time use and wellbeing*. Paper presented at the 36th College of Occupational Therapists Annual Conference Glasgow, Scotland.

Hunt, E., McKay, E.A. & Perry, I. (2011, August). *Measuring and mapping adolescent time use & well-being – an occupational perspective*. Paper presented at the 33rd International Association of Time Use Research Conference Oxford, UK.

Hunt, E. (2008, April). *Time for life - time use, participation in daily occupation and wellbeing of adolescents in contemporary Ireland*. Paper presented at the Association of Occupational Therapists of Ireland Conference Kilkenny, Ireland.

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PhD Related Conferences Attended [in addition to the above]

International Association of Time Use Research conference, Washington DC, U.S.A. 17 – 19 October 2007

International Association of Time Use Research conference, Copenhagen, Denmark 16 – 18 August 2006

PhD Related Courses Taken

1. Children's Research Network for Ireland and Northern Ireland Summer School- Quantitative methodologies in Policy and Practice for Child Health and Well-being Dublin, 28-30 September 2011

2. UCC Scientific Training for Enhanced Postgraduate Study (STEPS) module 15-17 December 2010

3. Turbocharge your Writing Workshop 14 December 2010

4. University of Essex Summer School: Time Use Data Collection and Analysis 31 July – 4 August 2006

PhD Related Funding

1. **2014:** UCC College of Medicine and Health travel bursary to attend the Count Me IN! Conference in London

2. **2011:** Children's Research Network for Ireland and Northern Ireland Summer School Quantitative methodologies in policies and practice for child health and wellbeing Bursary: Registration, travel and accommodation

3. **2008:** Health Research Board Summer Student Scholarship, paid for an undergraduate student to work with me for six weeks to code the parental occupation data in my study, and perform other tasks.

4. **2008:** Office of the Minister for Children/Health Research Board. Travel bursary to present at the Researching Children's Worlds Conference, Galway, February 2008.

5. **2007:** International Association of Time Use Research Andrew Harvey Scholarship

Consultancy

February 2013	Asked to contribute to the consultation on the diary design for the age 14 cohort in the UK Millennium Cohort Study
December 2010	Consulted by the ESRI on the design of Growing Up in Ireland diary for 13 year old cohort

Using Population-level Time Use Datasets to Advance Knowledge on Human Activity, Participation and Health

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Abstract

Time use is of enduring interest to occupational therapists and occupational scientists. However, occupational researchers have yet to exploit the full potential of large population level time use datasets. We present a brief overview of the historical development and current activities within time use research internationally. Whilst acknowledging the challenging nature of this type of research, we explore some of the opportunities offered by the secondary analysis of large time use datasets for occupational therapy and occupational science researchers who seek to advance knowledge of human activity, participation and health.

Introduction

In 2003, Farnworth asked whether time use was occupational therapy's core business or someone else's, while more recently Pemberton and Cox (2011) ask 'what happened to the time?' A conference hosted by the *International Association of Time Use Research (IATUR)* at the University of Oxford gave the opportunity to reflect on these questions. The authors were amongst the conference delegates, from a range of disciplines, who were urged to consider how they could mine large population datasets to measure and map human activities.

A Concern for Time

In considering humans as temporal beings and patterns of time use in daily life in particular, contemporary scholars (Farnworth 2003, Christiansen 2007) acknowledge the influential ideas of Adolph Meyer, the American psychiatrist who, in his seminal address to the National Society for the Promotion of Occupational Therapy, called for 'the awakening to a full meaning of time as the biggest wonder and asset of our lives' (1922 p. 642). He asserted that it is the use we make of ourselves, our doing in time, that 'gives the ultimate stamp to our every organ' (p. 641). The founders of occupational science similarly positioned a 'concern for time' as central to understanding human occupational behaviour, with consideration required of 'how a person occupies time, how satisfied she or he is with the use of time, and how well time use supports values and goals' (Yerxa et al 1990 p. 8). Despite this enduring interest, we believe that occupational researchers have yet to fully realize the potential that time use research using existing population datasets offers the profession.

International Research

While the use of time budgets or time use surveys can be traced to the end of the nineteenth century, most scholars identify the defining contribution of Hungarian sociologist Alexander Szalai in the coordinated gathering of time use data. In 1965, under the auspices of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), he supervised the parallel collection of time use data from nine European countries, Peru, Russia and the USA, using commonly agreed methods of sampling, interviewing, coding and data processing (Szalai 1972).

Most developing and developed countries now collect time use data as part of national statistical accounting activities. Researchers on the Multinational Time Use Study at the University of Oxford work to harmonise large-scale multinational time use datasets conducted between the 1960s and 2010. They maintain a comprehensive database of over 60 time use surveys from 25 countries,, including population studies conducted by government statistical agencies in the UK, Canada, USA and Australia and smaller scale time use studies by independent researchers.

Within Europe, Eurostat has worked with national statistical agencies to match the collection of time use data amongst member states. The Harmonised European Time Use Surveys (HETUS) guidelines (Eurostat 2009) provide detailed information on the design, collection and analysis of time use data. The HETUS database now contains comparable data from fifteen European states. Pre-prepared tables are available on the website, showing mean time spent on main and secondary activities and participation rates for main activities during an average day, by sex and country. Researchers can generate statistical tables illustrating and comparing everyday life activities for people within and across Europe.

The inclusion of time use components within larger scale representative surveys allows for detailed studies of the diverse influences on time use at points in time, and in the case of longitudinal studies, across lifetimes and generations of individuals and families. For example, the mission of the longitudinal US Panel Study of Income Dynamics (PSID, Institute for Social Research, 2012) is to examine socioeconomics and health across the generations of families who participate in the survey. The Child Development Supplement (CDS) of the PSID consists of two waves of data collection (1997 and 2002/2003), bringing together an array of information on the health, development and

education of young people to complement the existing socio-demographic information on their family unit. Both datasets are available for researchers and analysts free of charge. In 2009, the PSID gathered supplemental information on disability, time use and well-being from a sub-group of older couples in the main PSID sample. The preliminary research file is now available and is likely to be of significant interest to researchers, policy makers and service providers who seek to understand the lives of older people.

Research in Occupational Science and Occupational Therapy

A scoping review of empirical time use research published in occupational science and occupational therapy journals (Hunt et al, 2011) found that, of the 44 studies that met the inclusion criteria, only four studies employed secondary analysis of nationally representative datasets while a further six studies compared the findings from primary research with findings from population datasets Evidently, the secondary analysis of population time use datasets is underutilised within occupational science and occupational therapy research.

Opportunities

Hunt et al (2011) found limited research testing the assumption underpinning occupational therapy that time use is related to overall well-being and quality of life. Using time use datasets would allow occupational researchers to respond to the central question posed by Yerxa (2005 p. 111), 'how do work, rest, play and the quotidian occupations, including their patterns in time, contribute to human happiness and satisfaction?'

Population datasets offer advantages for researchers interested in addressing such questions. In most cases, these datasets are available at no cost. Access is typically granted on application and acceptance of user terms and conditions. User manuals, training videos and technical papers are often available. Up to date bibliographies are maintained and dataset users can link with other researchers, electronically or in person, at seminars or conferences. This opens up valuable opportunities for interdisciplinary and cross-national research collaborations.

The free access to data obviously reduces the time and cost of participant recruitment and data collection, entry and coding. Furthermore, with research governance requirements often resulting in protracted and time consuming ethics procedures

(Whitehead et al 2011), secondary analysis of existing datasets incurs no such costs or delays. Indeed, funding agencies are required to provide value for money and many now favour research proposals that utilise existing datasets. For example in the Republic of Ireland, the Office of the Minister for Children and Youth Affairs 2011/2012 scholarship programme plans to award at least one of its scholarships to applicants whose research utilises the longitudinal Growing Up in Ireland (GUI, http://www.growingup.ie, 06.02.12) data. The wide use of such datasets makes the renewal of funding for the primary research much more likely and as a result, offers a mutual benefit for primary and secondary researchers alike.

While there are advantages to using existing datasets, prospective researchers are obliged to consider the theoretical and methodological issues pertaining to time use data collection and analysis (Pentland & Harvey 1999). These include theoretical matters such as: how time is perceived and experienced differently across cultures and how activities can usefully and meaningfully be categorised. Occupational therapists and occupational scientists are well placed to sensitively consider these complex topics (for example Whalley Hammell 2009). Methodological considerations include sampling, instrument design, data coding and data quality. The number of days for which time diaries were collected and whether seasonal variation in activity participation was accounted for are sampling examples. Dataset users must understand the design of the diary instrument, for example if it was a pre-coded light or 'own word' heavy diary format, how long the time interval was, if multiple simultaneous activities were captured and the extent to which contextual information was collected. Issues such as these ultimately determine the direction that analysis will take.

Challenges

One limitation of many population datasets is their frequently cross-sectional nature, making inferences about causal relationships impossible. However, longitudinal datasets offer exciting opportunities for more in depth analysis of time use in the bioecological [Process-Person-Context-Time] context (Bronfenbrenner & Morris, 1998).

Diary studies are vulnerable to issues of recall. Therefore, prospective researchers should consider the quality measures that were in place to enhance the accuracy and completeness of the dataset. Short duration (e.g. going to the bathroom), personal (e.g. sexual) and illegal (e.g. drug use) activities are often underreported so not all datasets

will provide insight into all aspects of daily activity participation, while minority groups within the population may not be adequately represented in the sampling frame.

Secondary analysis of population datasets requires significant statistical knowledge. Pre-registration occupational therapy programmes should equip students with the statistical knowledge to understand and conduct basic analyses of time use datasets. For more in-depth studies, teams of researchers should include statisticians who have the requisite knowledge and expertise to perform the analyses and interpret the results.

Occupational scientists and occupational therapists may assert that time use research that captures information about daily activities lacks necessary information about the meaning of the occupation. However, like Farnworth (2004), we argue that such time use research makes an important and valid contribution to knowledge development on the form and function of human occupation at a population level within and across cultures, complementing qualitative research that illuminates the meaning of occupation. As Pierce (2001 p.144) stated 'occupational therapists require sophisticated understandings of both the cultural repertoire of typical activities for persons of different ages and backgrounds and the complex nature of the personally constructed and fully contexted occupational experiences'.

Conclusion

Notwithstanding the challenges inherent in using time use datasets, we believe that occupational scientists and occupational therapists have much to gain from secondary analyses of existing time use datasets. Furthermore, we believe that scholars who understand the complex relationship between daily activities and health have much to offer the interdisciplinary field of time use research. Ultimately, we believe that time use is everyone's business....

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Time Use and Daily Activities of Late Adolescents in Contemporary Ireland

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Abstract

An occupational perspective of public health embraces a holistic view of the lifestyles of groups of people and how lifestyles influence health (Hocking, 2011). Adolescents, as a defined population group, are being positioned at the centre of global health practice, in the belief that investment in the well-being of young people yields a return for the whole of society into the future. Despite the fact that Ireland has the youngest population in Europe, little is known about the occupational nature and lifestyles of late adolescents in contemporary Ireland and how they spend their time. This cross-sectional study examined the time use of Irish late adolescents during weekdays and weekends, and how time use differed by two key determinants of health, gender and social class. A time diary survey was conducted with a representative sample of school-going adolescents. Seven hundred and thirty one young people participated (52%; mean age boys 16.10 years; mean age girls 15.91 years). Non-parametric analyses of participation rates and time spent in activities across the day revealed the gendered nature of adolescent time use, particularly at weekends. Social class differences were less evident. This study contributes a unique occupational perspective on the time use of 'well' late adolescents in contemporary Ireland.

Keywords: Young people, Time use, Time diary, Daily occupations

Young people make up almost half of the world's seven billion population and have been described as "a new global power reshaping the world" (United Nations Population Fund, 2011, p. 9). Perhaps it is not surprising then that "unprecedented momentum is gathering to put adolescents into the centre of global health practice" (The Lancet, 2012, p. 1561) and to consider the role of adolescence as a foundation for future health for individuals and societies. Indeed, it is argued that "how nations harness the contribution of their adolescents and young adults will determine their futures, in terms of economic success and quality of life" (Resnick, Catalono, Sawyer, Viner, & Patton, 2012, p. 1565). However, Currie et al. (2012) stated that young people are often neglected as a population group in health statistics, with scant attention paid to inequalities related to age, gender and socioeconomic status among adolescents. Reflecting these contemporary understandings, researchers, policy makers and health providers working in the field of adolescent health are urged to embrace holistic and ecological perspectives rather than disease specific and deficit models, advance cross-cultural research that gathers comprehensive data on health and behaviour, and invest in evidence-based practice that targets non-communicable diseases in particular, across age, gender, social class and country of residence subgroups (Blum, Bastos, Kabiru, & Le, 2012; Currie et al., 2012; Kreipe, 2011; Sawyer et al., 2012; The Lancet, 2012; United Nations Children's Fund/UNICEF, 2012; Viner et al., 2012). Furthermore, Sawyer et al. (2012) encouraged researchers to explicitly describe the developmental stage within adolescence to which their studies relate. They defined the age period 15-19 years as "late adolescence" (p. 1632).

Adolescent Time Use

No doubt influenced by these imperatives, time use is now increasingly being recognised as a determinant and indicator of adolescent well-being internationally (Ben-Arieh & Ofir, 2002; Brooker & Hyman, 2010; Rees, Goswani, & Bradshaw, 2010; Zuzanek, 2005). Short (2005) argued that in order to put all parts of young people's lives into context, it is necessary to see how they fill their days. There is a significant body of international and multidisciplinary literature on diverse aspects of adolescent time use in its "divided form" (Wilcock, 2007, p. 5) including, for example, sleep (Matricciani, Olds, & Petkov, 2012), physical activity (Copperman & Bhat, 2007), sedentary behaviours (Babey, Hastert, & Wolstein, 2013) and leisure activities (Biddle, Marshall, Gorely, & Cameron, 2009). A review of this literature is beyond the scope of

this paper. However, there is growing recognition of the need to consider time spent in multiple activity domains and the overall activity pattern, rather than on discrete activities (Feldman Farb & Matjasko, 2012; Ferrar, Chang, Li, & Olds, 2013; Hagell, Peck, Zarrett, Gimenez-Nadal, & Symonds, 2012). This is not surprising given that "time devoted to one domain of activity takes on full meaning only when viewed in terms of its functional relation to time spent in other domains" (Shanahan & Flaherty, 2001, p. 386).

Occupational Science

This focus on activities and occupations across the day is a central concern for the discipline of occupational science, with occupation defined as "chunks of culturally and personally meaningful activity in which humans engage that can be named in the lexicon of our culture" (Clark et al., 1991, p. 301). Specifically occupational scientists seek to advance understanding of "how the form, function and meaning of daily activities influence health and well-being" (Larson & Zemke, 2003, p. 80).

In 2001, Pierce argued that the terms occupation and activity were two distinct and valuable concepts requiring differentiation to support more sophisticated research in occupational science and occupational therapy. Drawing on Pierce's (2001) definitions, Farnworth (2004) further argued that activity is a more appropriate concept to use in population level time use research rather than occupation, which relates to time use at the individual level. Clark (2006) advocated the careful use of language that "travels well in interdisciplinary contexts to describe the relationship of occupation to health" (p. 176). Accordingly, consistent with the time use literature, the term activity is used in this paper to describe what the participants do with their time.

Eminent Canadian economist and time use researcher Andrew Harvey (1998), in his editorial in the *Journal of Occupational Science*, wrote "at the heart of understanding people as occupational beings is understanding what they do minute by minute, day by day" (p. 2). How daily occupations, including their patterns in time, contribute to human happiness, life satisfaction, quality of life and health remains a major question confronting societies (Yerxa, 1993, 2005). Further exploration is needed of "the apparent health or illness outcomes of contemporary lifestyles from an occupational perspective" (Wilcock, 2007, p. 3-4), defined by Njelesani, Tang, Jonsson, and

Polatajko (2012) as "a way of looking at or thinking about human doing" (p. 8). An occupational perspective of public health embraces a holistic view of the lifestyles of groups and how their lifestyles maintain or undermine health (Hocking, 2011). By bringing this occupational perspective to public health and health promotion initiatives, and the understanding of occupation and health at individual and population levels, occupational therapists and occupational scientists can contribute to the development of occupationally healthy public policy (Wilcock & Hocking, 2004). Occupational scientists and therapists are beginning to use time use research to explore key population health issues such as unemployment (Scanlan, Bundy, & Matthews, 2011), childhood obesity (Orban, Ellegård, Thorngren-Jerneck, & Erlandsson, 2012; Ziviani, Desha, Poulsen, & Whiteford, 2010) and enduring mental illness (Desha, Nicholson, & Ziviani, 2011; Eklund, Erlandsson, & Leufstadius, 2010), in some cases leading to the development of occupation-based interventions (Edgelow & Krupa, 2011). In addition to examining health issues for at-risk groups, occupational scientists also examine the daily lives of different age groups within the 'well' population including children (Lynch, 2009) and older people (Chilvers, Corr, & Singlehurst, 2010; King & Hunt, 2010), although studies of 'well' adolescents are absent. There remains an identified need for studies of population differences and an examination of occupational patterns across 24 hour cycles (Pierce, 2012). Furthermore, "detailed investigations are necessary to gain a better understanding of occupational engagement for individuals from diverse communities, cultures and in varying geographical locations" (Ziviani et al., 2010, p. 440).

Youth in Ireland

In 2011, Ireland had the highest percentage of children and young people in the European Union (EU), with 25% compared with the EU-27 average of 19% (Department of Children and Youth Affairs, 2012). The health of Irish young people has been the subject of increasing public, professional and political attention in recent years. Resources such as the *State of the Nation's Children* (Department of Children and Youth Affairs, 2012) and the *Health Behaviour in School-Aged Children* study (Currie et al., 2012) gathered important data on aspects of children's lives and health and risk behaviours, for example, on drug and alcohol use, physical activity, screen time and nutrition, in some cases making comparisons with available international data (Currie et al., 2012; United Nations Children's Fund/UNICEF, 2012, 2013). Such surveys

typically use stylised estimates of time use in specific activities. However, just as Hagell et al. (2012) observed in the United Kingdom, research on "the patterning of the whole day not just a few discretionary hours" (p. 71) is less extensive. As a result, little is known about the occupational nature of late adolescents in contemporary Ireland and the rounds of daily activities in which they engage. Time use data are being collected from Irish 9 and 13 year olds as part of the national longitudinal survey *Growing Up in Ireland* (Department of Children and Youth Affairs, 2011a). To date, no time use surveys have been conducted with older Irish adolescents aged 15 to 19 years. This purpose of this study therefore is to bridge this gap by gathering time use information on this large section of the Irish population.

Influences on Adolescent Time Use

In keeping with contemporary research policy and practice (Department of Children and Youth Affairs, 2011b; Greene et al., 2010), many time use researchers have recognised the range of contexts and relationships that influence the daily lives of children and young people and shape how their time is used (Ferrar, Chang, et al., 2013; Lynch, 2009; Regan & Heary, 2013). Of these, Shanahan and Flaherty (2001) drew particular attention to the potential constraints and opportunities to adolescent time use associated with gender and social class.

Gender

A review of selected literature demonstrated evidence in support of Robinson and Godbey's (1999) assertion that "gender differences in adolescent time use tend to follow traditional patterns" (p. 210). Through an analysis of national time use surveys from 1980 to 2001, Zuzanek (2005) compared time diary data of Canadian adolescents with that of adolescents in nine other developed industrial societies, namely Australia, Belgium, Finland, France, Germany, Netherlands, Norway, United Kingdom and the United States. Although the reported data were not disaggregated by gender, the author commented on a number of gender differences evident across countries with boys watching more television, engaging in more sports and outdoor activities, and playing more computer/video games, while girls spent more time in grooming, homework, domestic activities, reading, and hobbies. The author noted an apparent "narrowing of

the digital gap between genders" (p. 406), in part due to the increasing use of the Internet amongst boys and girls alike.

Also in Canada, Hilbrecht, Zuzanek, and Mannell (2008) collected time diary data from a non-random, stratified sample of school-going adolescents (n = 2,154) to explore time use patterns in early and late adolescence, and in particular to examine gender differences in time spent on total workload, personal needs and free time. Total workload on schooldays was almost identical for girls and boys, while a significant gender gap was found on Sundays, with a disproportionately heavy domestic workload for girls. On school days and weekends, girls spent significantly more time on personal care than boys. Gender differences were again noted in the amount of free time during weekdays and weekends, with girls having less discretionary time than boys.

Through a descriptive analysis of data from French national time use surveys, Chenu and Lesnard (2005) explored whether gender inequalities in adolescent time use narrowed between 1986 (n = 559) and 1998 (n = 1,198). While they found weekday time use to be relatively gender-neutral, weekend or out of school time was strongly gendered, with girls spending more time in personal care and work related (school related, domestic duties and paid work) activities and boys having more free time. Boys spent more time in sports, playing games and going to the cinema, while girls read more. However, the authors did not test for statistically significant gender differences, relying more on presentations of descriptive accounts of time use by gender. Similarly, Blanke and Cornelißen (2005) found no clear evidence of greater gender symmetry in German adolescents' time use from 1991 (n = 962) to 2001 (n = 1024), considering weekdays and weekends together.

Wight, Price, Bianchi, and Hunt (2009) used data from the nationally representative 2003-2005 American Time Use Survey to describe the time use of 15 – 17 year olds (n = 2033) in 22 different activities on school and non-school days. Although gender differences were not the specific focus of their study, stereotypical differences were noted, with girls spending more time in housework, caregiving and studying. While the authors did not comment on gender differences on weekdays compared with weekends, a review of the time use tables suggests that differences were present across a range of activities.

A challenge to Chenu and Lesnard's (2005) opinion regarding the suggested gender-neutral nature of weekday time use came from Olds, Wake, Patton, Ridley, Waters, Williams, and Hesketh's (2009) findings. In their study of the school-day time use of 6,024 Australian adolescents (mean age 13 years), collected using the computer administered Multimedia Activity Recall for Children and Adolescents (MARCA) (Ridley, Olds, & Hill, 2006), they found that at all ages, boys spent significantly more time in physical activity, organised sport, watching TV and playing videogames, while girls spent more time shopping, doing chores, playing with pets and using their phones. Supporting Zuzanek's (2005) assertion of the narrowing of the digital divide, no differences in computer time were found in the Australian study.

More recently, Ferrar, Olds, and Walters (2012) examined 24 MARCA time use recalls to explore gender specific time use patterns in Australian adolescents (n = 2,200, mean age 13 years). They found that boys spent significantly more time in screen-based and physical activities, while girls spent more time in grooming, using their phones, doing housework, walking, 'chilling out' and studying.

Building on the increasing popularity and use of cluster analysis in dietary research and other health behaviours (Buck & Frosini, 2012; Newby & Tucker, 2004), Ferrar, Olds, and Maher (2012) applied this method in their recent examination of Australian adolescents' (n = 1,853, 9-16 years) multi-dimensional time use. Distinct gender specific time use clusters emerged, namely *social tasker*, *techno-active* and *techno-studious* for boys and *social screenie*, *quiet active* and *techno-studious* for girls. In New Zealand, Ferrar, Olds, Maher, and Maddison (2013) used the same method in their study of time use clusters of adolescents (n = 679, 10-16 years). Different activity patterns characterised the three girls' clusters (*social sporty*, *screenie tasker* and *super studious*) and three boys' clusters (*techno-active*, *quiet movers* and *social studious*). The authors draw attention to the *techno-active* cluster in particular as this is frequently identified as a male cluster, characterised by high physical activity and high screen time participation. While the clusters were gender specific, one similarity was noted with the presence of one cognitively based cluster for both girls (*super studious*) and boys (*social studious*). Both these studies utilised the MARCA as a data collection instrument.

From this brief review, there does appear to be support, as Ferrar, Olds, and Walters (2012) concluded, to uphold common stereotypical beliefs about gender differences in adolescent time use.

Social Class

Social class, defined by Krieger, Williams, and Moss (1997) as "social groups arising from interdependent economic relationships" (p. 344), is amongst the strongest known predictors of health (Solar & Irwin, 2010). While social class gradients are consistently reported in child and adult health, Starfield, Riley, Witt and Robertson (2002) noted that there is debate about the existence of social gradients in late childhood and adolescence, perhaps due to "conceptualisation, measurement, choice of health outcomes, and differences in social context" (p. 360). However, they did find evidence of social class gradients in some indicators of adolescent health. In their later review, Hanson and Chen (2007) found that, while lower socio-economic status was associated with greater cigarette smoking, poorer diets, and less physical activity amongst adolescents, these associations were not as robust as those found in adulthood.

Some researchers have examined social class and time use generally (Chatzitheochari & Arber, 2012), as opposed to specific health and risk behaviours, albeit with an adult population in the main. McLaren, Godley, and MacNairn (2009) considered time use data a starting point for a holistic exploration of class and lifestyle, arguing the benefit of taking a broader view of lifestyle and daily routines in research on the social drivers of health outcomes. The limited adolescent time use literature that does include data on social class appears to show inconsistent results. For example, in their exploration of parents' occupational status amongst adolescents from six different activity clusters, Bartko and Eccles (2003) found only one significant difference, namely that parents of adolescents in the 'school-focused' cluster had significantly higher reported occupational status than adolescents in the 'uninvolved' cluster. Furthermore, Wight et al. (2009) found that family income correlated positively with adolescents' paid work, homework, computer use and time eating with parents, but was negatively correlated with sleep. Looking specifically at health-related time use patterns captured with the MARCA, Ferrar, Olds, Maher, and Gomersall (2012) reported consistent time use differences amongst Australian children and adolescents (n = 2,200; 9-16 years) from the four different household income groups represented in their sample. Participants

from higher income families spent significantly more time reading, doing homework, playing instruments, playing sports and considerably less time watching television and playing videogames.

Conversely, socioeconomic background did not appear to influence time use patterns in the studies by Shanahan and Flaherty (2001) and Ferrar et al. (2013). Zick (2010) observed virtually no effect of total family income in her multivariate analysis of how socioeconomic and other familial factors influence adolescent time allocation. She did note that this may be a result of measurement error inherent in data of this nature. Currie, Molcho, Boyce, Holstein, Torsheim and Richter (2008) similarly considered the conceptual and methodological issues in measuring adolescent socio-economic status, arguing that it is a complex, multidimensional construct.

That said, Currie et al. (2012) argued that the evidence base around age, gender and socioeconomic inequalities in young people's health and well-being must continue to develop. Furthermore, Viner et al. (2012), in their detailed exploration of adolescence and the social determinants of health, called for further research and interventions that improve adolescents' daily lives with family, friends and in school, that address risk and protective factors in the social environment at a population level and focus on factors that are protective across various health outcomes.

Methodology

Aims

In response to these calls, this study sought to explore and describe the lives and lifestyles of well late adolescents in contemporary Ireland through an examination of their daily time use, by addressing the following research questions:

1. How do Irish late adolescents allocate their time to multiple activities during the week and at the weekend?
2. Does time use differ by gender?
3. Does time use differ by social class?

Methods

Sample

This cross-sectional study was designed in keeping with existing international studies of adolescent time use which focused on term-time time use of late adolescents aged 15 to 19 years in full time education who were living at home (Zuzanek & Mannell, 2005). A two-stage stratified sampling strategy was employed. Firstly, second level schools were randomly selected, with probability proportionate to size, from the governmental schools' register for the designated region. Reflecting the distribution of schools in the sampling frame, the sample was stratified by school type (male, female and mixed) and location (city and county). Twenty-eight schools (76%) agreed to participate. Thereafter, students from the first two of the three senior cycle years were invited to participate (n=1,413). Final year students were not included as informal consultation with school principals had indicated that accessing this cohort in their final State examination year would be problematic. Seven hundred and thirty one students consented, yielding a response rate of 52%.

Measures

According to Harvey and Pentland (1999) "time use methodology can provide a window on actual lifestyles, thereby permitting a rich, objective and replicable basis on which to make empirical judgements" (p. 3). Indeed, in Wilcock's (2007) opinion, such methodologies are "arguably the most established research techniques to explore important aspects of human occupation" (p.7). There are a range of recognised methods of measuring time use including direct observation, stylised survey questions, experience sampling method (ESM), time stamped/spot observations and time diaries (National Research Council, 2000). The United Nations (2013) Task Force on Time Use Surveys favoured the time diary method, arguing that the resultant data are more accurate and detailed than the alternatives. Eurostat (2009) and the United Nations (2005, 2013) presented detailed guidelines for the design, implementation and analysis of time diary surveys. Robinson and Godbey (1999) conducted a brief review of reliability and validity studies within time use research and concluded that there is a "considerable degree of assurance about the generalizability of time-diary data" (p. 77). More recently, Phipps and Vernon (2009) referenced similar studies supporting the use of time diaries to yield quality data in a cost effective manner. In their detailed review of child and adolescent time use research internationally, Larson and Verma (1999) found the most frequently used method to be the 24-hour time diary. They gave more credibility to findings of time-diary studies (along with ESM and spot observations) over stylised time use estimates, because of their proven accuracy. Similarly, Ben-Arieh

and Ofir (2002) recommended time-diaries over other methodologies in time use research with children and adolescents.

In the present study, time use was measured using an adapted version of the diary instrument developed by the Irish Economic and Social Research Institute (ESRI) in their 2005 survey of Irish adults' time use (n=1,023) (McGinnity, Russell, Williams, & Blackwell, 2005). The diary contained a relatively short but comprehensive list of 26 pre-coded activities (see Table 1). In consultation with the ESRI and an advisory group of young people, the pre-coded list of activities was revised to ensure age appropriateness, resulting in a pre-coded diary format with six main activity categories comprising thirty one individual activities (see Table 2). The activities listed were largely in keeping with those used in adolescent time use surveys internationally (Zuzanek & Mannell, 2005). Participants were asked to record their main activity for each block of 15 minutes of the designated day. Optional secondary activities could also be recorded. Participants completed one diary for a weekday and one diary for a weekend day, along with a number of demographic questions and the KIDSCREEN-52 health related quality of life instrument (Ravens-Sieberer et al., 2005). The KIDSCREEN-52 was developed across Europe as a self-report measure applicable for healthy and chronically ill children and adolescents (aged 8-18 years). It assesses 10 dimensions of health related quality of life, namely physical well-being, psychological well-being, moods and emotions, self-perception, autonomy, parent relations and home life, social support and peers, school environment, social acceptance and financial resources. Each diary took approximately 15 minutes to complete, and could be filled in at intervals throughout the diary day, or retrospectively after the designated diary day.

Insert Tables 1 and 2 about here

Procedures

Ethical approval was granted by the University College Cork Research Ethics Committee of the Cork Teaching Hospitals (reference number: ECM 4 (a) 10/10/06). School principals gave consent and provided the name of a liaison staff member. Each school was asked to identify one class group from each of the two designated years. The researcher met with all the students in each class group and provided written and verbal information for students and written information for parents. Both students and parents were required to complete the consent form. On receipt of signed consent forms, the researcher met with the students to provide instructions for completion of the

questionnaire. Students had the opportunity to complete a sample diary and ask any questions arising. Thereafter, the class was assigned a designated weekday and weekend day to complete their diaries. Diary days were designated by the researcher with the aim of being as close as possible in time to the day of initial diary distribution, in order to maximise accurate recall of activities. Participants were provided with special stickers to use as memory aides and were also encouraged to put reminders in their mobile phones and school journals. When the designated diary days had passed, the liaison staff member prompted participants to check their diaries for accuracy and completeness. Participants then sealed their completed diaries in individual envelopes to ensure privacy. All study recruitment and data collection was conducted by the first author.

Data analysis

To maximise data quality, all data entry was completed by the first author. An independent data entry check was conducted by a research assistant on a random selection of 10% of the questionnaires. Negligible errors were noted (0.002%). Thereafter, frequencies were calculated for all variables. Any errors that were observed were corrected by referring to the original hard copy questionnaire.

Participants' descriptions of their parents' work were coded in accordance with the coding system used by the Central Statistics Office (2011) in the most recent census of the Irish population, resulting in a seven item social class scale ranging from 'professional workers' (highest) to 'unskilled' and 'all others gainfully employed and unknown' (lowest). For the present study, social classes were further collapsed into three categories: social class one (higher), social class two (lower) and social class three ('gainfully occupied and unknown' were used where no precise allocation was possible).

From the dataset, 20 weekday diaries and 20 weekend diaries were excluded from the analyses as there was more than 4 hours time with no recorded activities. This was the quality measure used by McGinnity et al. (2005) in their time use study with Irish adults. Consistent with the definition of a school day set out in the Comparative Study of Adolescent Time Use project (Zuzanek & Mannell, 2005), a further 13 weekday diaries were excluded as there was less than 60 minutes recorded at school on the designated diary day. Thus, there were 698 usable weekday diaries (male = 334, female = 364) and 711 usable weekend diaries (male = 331, female = 380).

Ideally in time use studies, weekdays are equally represented across the sample (United Nations, 2013). For procedural reasons, it was not possible to designate diary days in this way as the day of diary distribution was determined by the school and class group timetable and availability. While each weekday was represented, the days were not equally balanced across the week or across boys and girls. Therefore, when generating time use totals, gender specific probability weights were applied to ensure that each day of the week (Monday to Friday) was represented equally. Weekend data were not weighted as the distribution of Saturdays and Sundays was approximately equal across the sample. According to the United Nations (2005), "most standard statistical reports on time use present tables on time spent in main activities; in addition separate tables for secondary activities may also be prepared" (p. 143). Taking precedence from the *Time Use in Ireland 2005 Survey Report* (McGinnity et al., 2005) and other international adolescent time use studies (Zuzanek & Mannell, 2005), this paper focuses on an analysis of primary or main occupations only.

Suggested outputs from time use surveys include the average time spent per person per day across the whole population, the percentage of the population who performed the activity on his/her diary day (participation rate) and the average time spent in the activity by those people who performed it (United Nations, 2013). While the latter two outputs are the focus of most of the attention in this paper, a snapshot of average time spent by the whole population in the six main activity categories is provided to set the scene. For this, in keeping with custom and practice in time use reports, time use is presented with means (and medians) to allow for ease of comparison with other studies. In the weekday data, Personal Needs, School and Study and Leisure and Free Time activities were normally distributed. Thus, t-tests and ANOVA were used to test for differences by gender and social class respectively. This was the case also in the weekend data for Personal Needs and Leisure and Free Time activities. As all the other main activity category data were skewed, non-parametric tests were used (Mann-Whitney *U*-test and Kruskal-Wallis test for gender and social class respectively).

With regard to the more detailed analysis of the 31 individual activities, Pearson's chi-squared test was used to examine gender and social class differences in participation. Time use data were largely skewed thus median and quartiles (first, third) are reported. Gender and social class differences in median time use were examined using the Mann-

Whitney *U*-test and Kruskal-Wallis test respectively (Machin, Campbell, & Walters, 2007). Because these non-parametric tests do not support the use of probability weights, unweighted data were used in the examination of gender and social class differences in weekday time use. Alpha was set at .05 for all the tests in this study. Because of the large number of tests, Bonferroni correction was applied when determining statistical significance (Machin, Campbell, & Walters). Unadjusted p-values are reported but those that remain significant after applying the Bonferroni correction are highlighted in bold and with an asterisk. Analysis was conducted using SPSS version 20.0 (IBM, 2011) and Stata release 12 (StataCorp., 2011).

Results

Participants are profiled in Table 3. Boys' ages ranged from 15 to 18 years (mean 16.10 years) and girls' ages ranged from 14 to 18 (mean 15.91 years). The higher social class group was significantly larger than the other two groups for both boys (70%) and girls (60.8%).

Insert Table 3 about here

Average time use across the whole population

Table 4 provides an overview of average time spent by the whole population in the six main activity categories on weekdays and weekends, by gender. On weekdays, boys spent 623 minutes or 44% of their day in Personal Needs. One-third of the day (461 minutes) was spent in School and Study related activities. Negligible time was spent in Paid Work, Household Duties or Voluntary & Religious Activities. The remainder of the day was spent on Leisure and Free Time Activities (322 minutes, 22%). Girls spent marginally longer in Personal Needs activities (637, 44%). School and Study activities accounted for the same amount of time as for boys, while Leisure and Free Time Activities represented 21% of the day (300 minutes). Although the actual times were very small, girls did spend significantly longer than boys on Household Duties during the week.

The weekend data show that both boys and girls spend longer in Personal Needs at weekends. For both genders, weekend days were characterised largely by Personal Needs activities (boys 679 minutes / 47% and girls 710 minutes / 49%) and Leisure and

Free Time Activities (boys 608 minutes / 42% and girls 545 minutes / 38%). Girls spent significantly longer in Personal Care and Household Duties, while boys spent longer in Leisure and Free Time Activities.

Insert Table 4 about here

Table 5 provides an overview of average time spent by the whole population in the six main activity categories on weekdays and weekends, by social class.

Insert Table 5 about here

From Tables 4 and 5, it is clear that, at this level of aggregation, some gender differences are apparent in weekday and weekend time use. There were no statistically significant differences in the time use of boys and girls across the three social groups on weekdays or weekends. The percentage of the population who performed the activity on his or her diary day (participation rate) and the average time spent in the activity by those people who performed the activity, by gender and social class are now examined in greater detail for weekdays and weekends.

Weekday participation rates and time use by gender and social class

Participation rates varied significantly for different activities on weekdays, for boys and girls alike, from 1% participation in Shopping for Pleasure to 100% for Sleep (Table 7). As expected, almost all participants recorded some time in Personal Needs activities (Sleeping, Personal Care, Eating) and School Related Activities. Outside of these activities, 82% of boys spent some time Watching TV/DVDs, 60% spent time doing Homework at home, 59% spent time Hanging around with Friends and 57% spent some time Using the Computer/Internet. Eighty-two percent of girls reported time spent Watching TV/DVDs, 66% recorded time on Homework and 56% recorded time spent Hanging around with Friends.

Insert Table 6 about here

Significant gender differences in participation rates were found in four of the 31 pre-coded activities listed in the diary. More girls than boys recorded participation in Socialising with family (p = .000), Talking/texting on a mobile phone (p = .000) and

Reading (p = .000), while more boys than girls reported Using the Computer/Internet (p = .000). In terms of actual time use, girls spent significantly longer in Personal Care (p = .000) while boys spent more time Sleeping (p = .000), Using the Computer/Internet (p = .001) and Resting/relaxing (p = .002).

Weekday participation rates did not vary significantly by social class, apart from participation in Hobbies which was recorded by 26% in the higher social class, 12% in the lower social class and 17% in the unknown social class group (p = .002) (table not shown). There were no statistically significant differences in median time use across social class groups for any of the thirty one activities.

Weekend participation rates and time use by gender and social class

As with the weekday data, participation rates varied significantly for different activities during the weekend, for boys and girls alike, from 2% participation in Voluntary Activities to 100% for Sleep. Beyond Personal Needs activities, which understandably are recorded by close to 100% of participants, the activities with highest participation rates for boys were Watching TV/DVDs (80%), Using Computer/Internet (62%) and Hanging around with Friends (52%) while for girls, they were Watching TV/DVDs (80%), Hanging around with Friends (53%) and Socialising with family (50%).

Insert Table7 about here

Significant gender differences were noted in participation rates in 10 of 31 pre-coded activities. More girls than boys reported spending time in Personal Care activities (p = .02); Homework (p = .001); Housework (p = .000); Socialising with family (p = .000); Talking/texting on a mobile phone (p = .000); Shopping for pleasure (p = .000) and Reading (p = .001). More boys than girls recorded time in Physical activity (p = .000), Computer/Internet use (p = .000) and in Hobbies (p = .000).

With regard to median time spent in the activity amongst those who reported doing the activity on the diary day, gender differences were found in five activities. Girls spent more time in Personal Care (p = .000) and Religious Activities (p = .03) than boys, while boys spent more time in Physical activity (p = .000); Computer/Internet use (p = .004) and Watching TV/DVDs (p = .000).

Social class differences in weekend time use are almost non-existent within this study (table not shown), with the following exceptions. A significant difference in participation rates was found with two activities. Thirty percent in the lower social class group participated in Paid Employment compared with 19% and 13% in the higher and unknown social class groups, respectively (p = .002). Forty-three percent of participants in the higher social class group recorded some time in Travel, compared with 32% and 20% for the lower social class and unknown social class groups respectively (p = .001). In terms of actual time spent, one difference was noted: those in the lower social class group reported less time spent in Eating/drinking (p = .003).

Discussion

The findings of this study provide evidence for the gendered nature of Irish late adolescents' time use, particularly at weekends, while social class differences did not emerge as clearly.

Time use across the whole population

The findings in relation to the distribution of time across the six main activity categories (Personal Needs including Sleep; School and Study; Paid Work; Household Tasks; Voluntary and Religious activities; and Leisure and Free Time activities) are largely in keeping with Zuzanek's (2005) cross-national comparisons of adolescent time use, lending further support to his statement that "adolescent time use in developed industrialised societies shows many common trends and lifestyle similarities" (p. 397). However, despite the very different geographical contexts included in this comparative study, it is likely that the comparable study designs (with their focus on the time use of adolescents in full time education) contribute strongly to the similar findings. More diverse studies of adolescents outside the school system and in less economically developed countries would allow for the presence, or otherwise, of the suggested globalised patterns of adolescent time use to be further examined.

Chenu and Lesnard (2005) described the homogenising effect of full-time schooling. Similarly, the examination of the distribution of time across the six broad activity categories in the present study suggests a largely gender neutral use of time during the week, with a statistically significant gender difference evident in only one of the six categories, namely Household duties. However, Hagell et al. (2012) noted that while time diary research traditionally reports time use collapsed into groups of related

activities, ‘there is a constant tension between wanting to retain the detail of the data, and needing to group variables for summary purposes’ (p. 64). This study’s findings also support this observation as analyses at the level of individual activities reveal a greater degree of gender difference in adolescent time use during weekdays and even more so at weekends.

The influence of gender on participation rates and time spent in individual activities

More girls than boys reported time spent in Personal Care at the weekend, and girls spent longer in Personal Care activities on weekdays and weekends, mirroring the findings of Hilbrecht et al. (2008) in Canada and Ferrar, Olds, and Walters (2012) in Australia. There is a high value placed on women’s physical appearance in contemporary Western society. As a result, attention to image and personal care are part of the feminine gender schema (Hilbrecht et al., 2008). The findings of the present study suggest that these cultural norms appear to be equally influential in an Irish context.

Another stereotypical gender difference widely reported in the international literature relates to household duties (Blanke & Cornelißen, 2005; Zuzanek, 2005). Statistically significant differences in time in Household duties were found averaged across the whole population in the present study, with girls spending longer in such activities both on weekdays and weekends. At weekends, more girls than boys reported spending time on Household duties. However, amongst those who reported some time in this activity, no significant gender differences were found in actual time spent.

At weekends more boys than girls reported spending time in Physical Activity and amongst those who participated, boys spent longer being physically active, a long established pattern widely reported in the literature (Chenu & Lesnard, 2005; Csikszentmihalyi & Larson, 1984; Currie et al., 2012, Ferrar, Olds, & Walters, 2012; Zuzanek, 2005). Other Irish studies have also reported gender differences in physical activity. The Irish *State of the Nation’s Children* (Department of Children and Youth Affairs, 2012) reported that 53.2% of boys aged 15 to 17 participated in physical activity for at least 60 minutes on more than 4 days per week, compared with 28.9% of girls. These findings may reflect differences both in expectation and opportunity for boys and girls. According to Chalabaev, Sarrazin, Fontayne, Boiche, and Clement-Guillotin (2013), while biological factors may in part explain sex differences in participation in sport and exercise, sex stereotypes and gender roles exerted a greater

influence. Currie et al. (2012) also suggested that opportunities for participation in moderate to vigorous physical activity may be more biased in favour of boys and may account for the fact that boys continue to be significantly more physically active than girls in most countries.

The findings in the present study mirror the international trend of differences in computer/Internet use amongst boys and girls (Ferrar, Olds, & Walters, 2012; McCauley Ohannessian, 2009). On weekdays and at weekends, more boys than girls spent time Using the Computer/Internet and spent longer engaged in this activity. The use of a person-centred rather than an activity-centred analytic approach (Bartko & Eccles, 2003) may illuminate whether these patterns relating to physical activity and screen time co-occur in the same group of boys, like the male *techno-active* profile, as identified by Ferrar, Olds and Maher (2012) and Ferrar et al. (2013).

Socialising with family and using their mobile phones for texting and talking featured strongly in the daily lives of girls but less so for boys. Currie et al.'s (2012) claim that "boys' social networks are based on activities, with higher levels of physical activities and sports, while girls' networks and friendships are based on personal communication" (p. 211) may account for this difference. At weekdays and weekends, Spending time with friends was equally important to boys and girls, accounting for 60 minutes of time for both genders during the week and between 180 and 210 minutes at weekends. Currie et al. (2012) also found high levels of friendships in their study of Irish 15 year olds. However they did find that significantly more girls (91%) than boys (88%) had three or more close friends of the same gender. The time spent with friends for both genders is not surprising given the special role that peer groups have in adolescence (Coleman, 2011). However, it is interesting to note that large proportions of young people did not report spending time with friends on weekdays or weekends. Given that Currie et al. (2012) believed that "developing positive peer relationships and friendships is crucial in helping adolescents deal with developmental tasks such as forming identity, developing social skills and self-esteem and establishing autonomy" (p. 7), this finding warrants attention.

Significantly more girls than boys recorded time spent Reading during weekdays and weekends. This result is consistent with other Irish data which describe notable gender differences in the numbers of 15 year olds who report reading as one of their favourite

hobbies (Department of Children and Youth Affairs, 2012). Furthermore, the finding that more girls than boys reported spending time in Homework at the weekend may support the presence of a cognitively based *super studious* activity profile, as reported by Ferrar et al. (2013). Taken together, this detailed examination of participation rates and time spent in activities across the day provides further evidence for the gendered nature of adolescent time use, particularly at weekends.

The influence of social class on participation rates and time spent in activities

The influence of social class on time use was less apparent in the findings. Only three statistically significant differences across the three social groups were found in the participation data, namely participation in Hobbies (weekdays), and Paid Employment and Travel (weekends). No differences in weekday time spent in activities were found, while at weekends one difference emerged in time spent in Eating/drinking. As noted earlier, the influence of social class on adolescent time use is mixed in the literature. It is possible that by collapsing the seven social class groups into three, some potential social class differences were hidden. Moreover, the three social groups were not equally represented in this study. Perhaps, as Currie et al. (2012) suggested, the use of a range of indicators of socio-economic status rather than a single measure of social class may have shed more light on the impact of socio-economic factors on time use.

Limitations and Contribution

There were a number of methodological limitations in the present study. A response rate of 52% was achieved with no subsequent weighting for non-response, introducing the possibility of non-response bias. However, according to Phipps and Vernon (2009), relevant studies in this areas show little evidence of bias due to non-response.

As this was the first time use survey to be conducted with late adolescents in Ireland, some of the study design was guided by the experience and expertise of McGinnity et al. (2005), who conducted the first (and only) time use survey with Irish adults. They found the location and co-presence questions in their survey to have very low response rates and on that basis they advised that these not be included as separate diary sections in future light diary studies. Again similar to McGinnity et al., and as is customary in time use reports (United Nations, 2005), the initial analyses focus on main activities only. However, as optional secondary activities could be recorded by participants, in the future the data can be examined to explore the complex nature of simultaneous

activities, or *enfolded occupations* as described in the occupational science literature (Bateson, 1996). A simultaneous activity that features strongly in the time use of adolescents in the present day is the use of smart phones. When the data collection in the present study took place in late 2007, such technologies were largely unavailable. Therefore the data do not reflect the widespread penetration of mobile technologies in the lives of today's adolescents (Rideout, Foehr, & Roberts, 2010). Furthermore, the diary instrument did not distinguish between Computer/Internet use for gaming or social networking, two activities reported in more recent literature as significantly gendered. In 2007, the global phenomenon of social networking did not exist in the mainstream society or youth culture, whereas between March 2012 and March 2013 alone, Facebook® (2013) reported an increase of 26%, or 665 million daily users, clear evidence of the challenging nature of conducting research in a "constantly changing virtual world" (Subrahmanyam & Greenfield, 2008, p. 417). More data on this important topic is needed. Moreover, the dissemination of results from such research needs to happen much more quickly to allow for contemporaneous interpretation of findings.

Data collection took place between September and December 2007. Therefore, potential seasonal variations (e.g. weather, hours of daylight, study and exam commitments across the academic year) in time use were not accounted for. However, accounting for seasonal variation needed to be balanced with maximising access to the study population. Gaining research access to schools in the second term was predicted to be more challenging, as there tended to be more breaks with mid-term and Easter holidays and impending end of year exams. For that reason, it was decided to collect data in the first half of the academic year only.

Time diaries rely on recall of participation in occupations which is a potential source of error (Hunt & McKay, 2012). Short duration activities e.g. going to the bathroom or snacking can be underreported. The data on participation in main activities reflect this underreporting with a small percentage of young people not recording time spent in personal care or eating activities. It is possible that some of these activities were reported as secondary activities e.g. eating.

Despite these limitations, this study makes an important contribution to knowledge development within the discipline of occupational science and on adolescent lifestyles.

It complements and builds on existing work by focusing on a well population and examining time use "in the round" (Hagell et al., 2012, p. 71) across 24 hours rather than on discrete activities in isolation, based on diary data rather than stylised estimates. The study was designed in keeping with the parameters agreed by those involved in the Comparative Study of Adolescent Time Use (Zuzanek & Mannell, 2005), thus making cross-cultural comparisons possible and contributing, for the first time, an Irish perspective to the growing international body of knowledge on adolescent time use, health and well-being. By examining gender and social class influences on adolescent time use, it was recognised that adolescents are not a homogenous cohort (World Health Organization, 2011).

This research contributes important and valid information on the "form" or "observable aspects" (Larson E. & Zemke, 2003, p. 80) of occupation in the lives of Irish adolescents at a population level, generating insights into the "cultural repertoire of typical activities" in contemporary Ireland (Pierce, 2001, p. 144), thus complementing qualitative research that illuminates the meaning of occupation at an individual level. It paves the way for the next phase of analysis which will use latent class analysis to examine multi-dimensional patterns of time use, paying particular attention to the profiles of occupational participation of those adolescents who report high health related quality of life on the KIDSCREEN-52. This is a recognised "critical gap" in occupational science research (Pierce, 2012, p. 302). Similarly, within adolescent time use research, little work has been done to explore the relationship between time use and subjective well-being or health related quality of life (Ferrar, Chang, et al., 2013; Glorieux, Stevens, & Vandeweyer, 2005).

Conclusion and Future Research

This study gathered, for the first time in Ireland, time diary data from a representative sample of well late adolescents. Reflecting an occupational perspective, this research was "inclusive of the minute but from the perspective of the whole picture" (Wilcock, 2007, p. 5). The detailed examination of participation rates and time spent in occupations across the day provides evidence for the gendered nature of adolescent time use, particularly at weekends. Established international trends are mirrored in the findings with stereotypical gender role differences in physical activity, household tasks,

personal care, computer/Internet use and reading. Social class differences were less evident.

This level one descriptive research (Pierce, 2012) provides a solid foundation for level two and three research into person centred patterns of time use and how such patterns relate to health related quality of life. Furthermore, cross-cultural analysis of Irish late adolescents' time use is now possible. According to Soupourmas (2005), "understanding how young people spend their time… is crucial for the formulation of appropriate and effective policies and interventions aimed at improving the health and wellbeing of young people" (p. 586). The findings of this study suggest that such policies and interventions need to be gender specific. With the knowledge gained from this and subsequent studies, Irish adolescents can be educated and supported to engage in a daily round of occupations that enhance their health, meet their needs and enable them to balance the demands of a 21st century lifestyle.

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Table 1: Pre-coded List of Activity Categories and Individual Activities – Adults (McGinnity et al., 2005)

Activity Category	Activity
Personal care/Resting	Sleeping
	Resting/Relaxing
	Personal care
	Eating/Drinking/Having a meal
Travel	Travel
Paid employment or study	Paid employment
	Study, education
	Breaks from work or study
Housework and other household tasks	Cooking
	Cleaning
	House repairs
Shopping and appointments	Shopping, messages/Errands & appointments
Caring for others	Childcare
	Playing and Talking with Children
	Caring for adults
Voluntary and Religious Activity	Voluntary activity
	Religious activity
Socialising and going out	Spending time/Chatting with family, friends, neighbours
	Phoning/Texting family, friends, neighbours
	Eating out/Going to the pub
	Going out
Sports and leisure	Playing sports, exercise and outdoor activity
	Computer/Internet for personal use
	Hobbies and other leisure activities
TV, radio, reading	Watching TV
	Reading or listening to music

Table 2: Pre-coded List of Activity Categories and Individual Activities Used in this Study – Adolescents

Activity Category	Activity
Personal needs	Sleeping
	Personal care
	Eating/Drinking/Having a meal
School and study	Attending class and Class/School related activities
	Eating/Drinking at school
	Doing homework/ Studying at school
	Travelling to and from school
	Doing homework/Studying at home
Paid work	Paid employment
	Travelling to and from work
	Breaks from work
Housework and other household tasks	Doing housework
	Shopping, errands and appointments
	Caring for others
Voluntary and religious activities	Voluntary activities
	Religious activities
Leisure and free time activities	Extracurricular activities
	Hanging around with friends, boyfriend, girlfriend
	Socialising with family
	Talking on the phone, Texting
	Going out
	Shopping for pleasure
	Attending cinema/Theatre/Concerts
	Playing sports, exercise & physical activity
	Computer/Internet
	Hobbies/Other leisure activities
	Watching TV etc
	Listening to radio or music
	Reading
	Travelling outside of work/school
	Resting/Relaxing

Table 3: Demographic Characteristics of Sample

	Male	Female
n (%)	343 (46.9)	388 (53.1)
Average age in years (SD)	16.10 (.756)	15.91 (.730)
Social class n (%)		
Higher	238 (70)	234 (60.8)
Lower	78 (22.9)	127(33)
Unknown	24 (7.1)	24 (6.2)

Table 4: Average Time and Proportion of the Day Spent in Main Activity Categories on Weekdays and Weekends by all Participants by Gender

	Weekdays					Weekends				
	Male (n=334)		Female (n=364)			Male (n=331)		Female (n=380)		
	Time	%	Time	%	***p***	Time	%	Time	%	***p***
Personal needs incl. sleep	623 (630)	44	637 (645)	44	.31	679 (690)	47	710 (720)	49	**.000***
School & study	461 (450)	32	460 (450)	32	.37	30 (0)	2.08	41 (0)	2.84	.002
Paid work	14 (0)	.90	14 (0)	.90	.49	75 (0)	5.20	86 (0)	5.97	.31
Household duties	9 (0)	.62	15 (0)	1	**.003***	28 (0)	1.9	36 (0)	2.5	**.000***
Voluntary & religious activities	3 (0)	.20	4 (0)	.27	.81	14 (0)	.97	13 (0)	.90	.99
Leisure & free time activities	322 (315)	22	300 (300)	21	.17	608 (630)	42	545 (555)	38	**.000***

Note. Time in shown as mean (median), plus percentage of the day. Data include those who spent no time in the occupation. Testing for difference in unweighted mean/median time use using t-test or Mann-Whitney *U* test, as appropriate. p = 0.05. Unadjusted p-values reported. ***** Remains significant after adjusting for multiple testing.

Table 5: Average Time and Proportion of the Day in Main Activity Categories on Weekdays and Weekends by all Participants by Social Class

	Weekdays							Weekends						
	SC1		SC2		SC3			SC1		SC2		SC3		
	Time	%	Time	%	Time	%	*p*	Time	%	Time	%	Time	%	*p*
Personal needs incl. sleep	630 (645)	44	638 (630)	44	598 (630)	42	.55	697 (705)	48	692 (705)	48	714 (705)	50	.80
School & study	466 (450)	32	451 (450)	61	450 (450)	31	.24	36 (0)	3	37 (0)	3	31 (0)	2	.95
Paid work	13 (0)	.90	18 (0)	1	15 (0)	1	.71	71 (0)	5	107 (0)	7	44 (0)	3	.05
Household duties	9 (0)	.62	16 (0)	1	17 (0)	1	.60	30 (0)	2	34 (0)	2	44 (0)	3	.92
Voluntary & religious activities	4 (0)	.27	3 (0)	.20	0.5 (0)	.03	.90	15 (0)	1	11 (0)	.70	13 (0)	.90	.77
Leisure & free time activities	311 (300)	22	301 (300)	21	355 (360)	25	.21	585 (600)	41	548 (555)	38	567 (555)	39	.37

Note. Time in shown as mean (median), plus percentage of the day. Data include those who spent no time in the activity. Testing for difference in unweighted mean/median time use using ANOVA or Kruskal-Wallis test, as appropriate. p = 0.05. Unadjusted p-values reported. * Remains significant after adjusting for multiple testing.

Table 6: Difference in Numbers who Report Some Time in the Activity and Difference in Time (minutes per day) Spent in each Activity on Weekdays by Gender

Activity Category	Activity	Percentage Reporting some Time in the Activity			Time Use (Minutes) of those Reporting some Time in Activity		
		Male n (%)	Female n (%)	*p*	Male	Female	*p*
Personal needs	Sleeping	334 (100)	364 (100)	1.0	495 (450, 525)	480 (450, 525)	**.000***
	Personal care	326 (98)	359 (99)	.48	30 (15, 45)	60(30, 75)	**.000***
	Eating / Drinking / Having a meal	323 (97)	349 (96)	.56	45 (30, 75)	45 (30, 75)	.31
School & study	Attending class / School-related activities	334 (100)	364 (100)	1.0	345 (330, 360)	345 (330, 360)	.95
	Eating / Drinking at school	303 (91)	339 (92)	.86	60 (30, 60)	60 (45, 60)	.27
	Doing homework / Studying at school	101 (28)	72 (21)	.04	45 (30, 90)	45 (15, 120)	.27
	Travelling to and from School	318 (96)	346 (97)	.70	45 (30, 60)	45 (30, 75)	.28
	Doing homework / Studying at home	213 (60)	245 (66)	.17	75 (45, 120)	75 (45, 105)	.57
Paid work	Paid employment	22 (8)	28 (7)	.79	-	-	-
	Travelling to and from work	15 (4)	19 (5)	.85	-	-	-
	Breaks from work	4 (1)	3 (.3)	.12	-	-	-
Household tasks	Doing housework	69 (20)	90 (24)	.36	30 (15, 45)	30 (15, 30)	.42
	Shopping, errands & appointments	9 (3)	26 (7)	.04	-	-	-
	Caring for others	7 (3)	19 (4)	.38	-	-	-

Voluntary & religious activities	Voluntary	9 (3)	11 (4)	.35	-	-	-
	Religious	7 (3)	5 (2)	.48	-	-	-
Leisure & free time activities	Extracurricular activities	33 (9)	32 (9)	.83	-	-	-
	Hanging around with friends	190 (59)	204 (56)	.59	60 (30, 120)	60 (45, 135)	.34
	Socialising with family	78 (23)	128 (36)	**.000***	30 (15,60)	45 (30, 75)	.26
	Talking on the phone / Texting	73 (22)	155 (43)	**.000***	45 (30, 75)	45 (30, 75)	.25
	Going out	221 (6)	19 (7)	.83	-	-	-
	Shopping for pleasure	3 (1)	14 (4)	.03	-	-	-
	Attending Cinema / Theatre / Concerts	6 (2)	7 (2)	.71	-	-	-
	Playing Sports, Exercise & Physical Activity	99 (30)	83 (22)	.04	75 (45, 105)	60 (45, 105)	.19
	Computer / Internet	185 (57)	162 (43)	**.000***	60 (45, 120)	60 (30, 90)	**.001***
	Hobbies / Other leisure activities	78 (23)	74 (20)	.42	60 (30, 105)	45 (30, 75)	.83
	Watching TV, DVDs etc	269 (82)	302 (82)	.99	90 (60,150)	75 (45, 120)	.02
	Listening to radio or music	80 (26)	106 (28)	.55	30 (15, 45)	30 (30, 45)	.97
	Reading	49 (15)	97 (27)	**.000***	30 (30, 60)	30 (15, 60)	.62
	Travelling outside of work / school	51 (16)	60 (15)	.79	45 (30, 60)	45 (15, 60)	.95
	Resting / Relaxing	120 (35)	150 (41)	.13	45 (30, 60)	30 (15, 60)	**.002***

Note. Dash denotes data not reported as number of cases less than 10. Time use shown as median (Q1, Q3). Testing for difference in unweighted median time use using Mann-Whitney *U*-test. p = 0.05. Unadjusted p-values reported. * Remains significant after adjusting for multiple testing.

Table 7: Difference in Numbers Reporting Some Time in the Activity and Difference in Time (Minutes per Day) Spent in Each Activity at Weekend by Gender

Activity Category	Activity	Percentage Reporting some Time in the Activity			Time Use (Minutes) of those Reporting some Time in Activity		
		Male n (%)	Female n (%)	*p*	Male	Female	*p*
Personal needs	Sleeping	331 (100)	380 (100)	1.0	585 (495, 660)	600 (514, 660)	.17
	Personal care	300 (91)	363 (96)	**.02***	30 (30, 60)	60 (45, 90)	**.000***
	Eating / Drinking / Having a meal	310 (94)	367 (97)	.10	60 (45, 90)	60 (45, 90)	.09
School & study	Doing homework / Studying at home	95 (29)	157 (41)	**.001***	75 (45, 150)	90 (45, 120)	.59
Paid work	Paid employment	66 (20)	87 (23)	.39	338 (236, 409)	315 (240, 405)	.73
	Travelling to and from work	41 (12)	70 (18)	.04	30 (30, 60)	30 (30, 45)	.29
	Breaks from work	27 (8)	42 (11)	.29	-	-	-
Household tasks	Doing housework	84 (25)	150 (40)	**.000***	45 (30, 60)	45 (30, 75)	.58
	Shopping, errands & appointments	36 (11)	42 (11)	1.0	60 (30, 90)	60 (30, 105)	.85
	Caring for others	12 (4)	31 (8)	.02	-	-	-
Voluntary & religious activities	Voluntary occupations	7 (2)	13 (3)	.41	-	-	-
	Religious activities	65 (20)	66 (17)	.50	45 (30, 60)	60 (45, 60)	**.03***
Leisure & free time occupations	Extracurricular activities	16 (5)	21 (6)	.81	-	-	-
	Hanging around with friends	173 (52)	200 (53)	.98	180 (105, 315)	210 (120, 330)	.17
	Socialising with family	115 (35)	188 (50)	**.000***	60 (30, 75)	60 (30, 105)	.96
	Talking on the phone / Texting	89 (27)	170 (45)	**.000***	45 (30, 75)	45 (30, 90)	.38

Going out	73 (22)	83 (22)	1.0	150 (60, 315)	120 (60, 270)	.20
Shopping for pleasure	28 (9)	77 (20)	**.000***	-	-	-
Attending cinema / theatre / concerts	28 (9)	44 (12)	.21	-	-	-
Playing sports, exercise & physical activity	137 (41)	102 (27)	**.000***	105 (60, 150)	60 (45, 120)	**.000***
Computer / Internet	204 (62)	172 (45)	**.000***	90 (45, 165)	60 (45, 105)	**.004***
Hobbies / other leisure activities	102 (31)	71 (19)	**.000***	75 (45, 180)	60 (30, 120)	.06
Watching TV, DVD etc	265 (80)	302 (80)	.92	135 (90, 225)	105 (60, 165)	**.000***
Listening to radio or music	89 (27)	110 (29)	.60	45 (30, 75)	45 (30, 60)	.31
Reading	65 (20)	117 (31)	**.001***	60 (30, 90)	45 (30, 75)	.85
Travelling outside of work / School	128 (39)	146 (38)	1.0	60 (30, 135)	60 (30, 105)	.26
Resting / Relaxing	139 (42)	172 (45)	.42	45 (30, 75)	45 (30, 60)	.33

Note. Dash denotes data not reported as number of cases less than 10. Time use shown as median (Q1, Q3). Testing for difference in median time use using Mann Whitney *U*-test. p = 0.05. Unadjusted p-values reported. ***** Remains significant after adjusting for multiple testing. School & Study activities not applicable at weekends other than 'Doing homework / Studying at home'.

A Scoping Review of Time Use Research in Occupational Therapy and Occupational Science

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Abstract

Background: Time use is a defining interest within occupational therapy and occupational science. This is evident through the range of contributions to the disciplinary knowledge base. Indeed it has been suggested that time use methods are amongst the most established research techniques used to explore aspects of human occupation. However the extent and nature of such activity in occupational therapy and occupational science has not been examined to date. *Aim:* This study sought to map the extent and nature of time use research in occupational therapy and occupational science journals and the extent to which studies explored the relationship between time use and health. *Method:* A scoping review method was used. *Results:* Sixty-one studies were included. Scandinavian countries contributed the most number of studies (n=16, 26%). While time use diaries were used most frequently (n=30, 49%) occupational therapists and occupational scientists have developed a range of data collection instruments. Forty-nine studies (80%) focused on time use in clinical or defined population sub-groups. Ten studies (16%) included an empirical examination of the relationship between time use and health. *Conclusion:* Future research should examine time use and health amongst well populations across the lifespan and in different parts of the world.

Key words: *everyday activities, health, literature review, time diary*

Introduction

Time use is a defining interest in the fields of occupational therapy and occupational science. Adolph Meyer [(1), p. 642], widely considered the 'father of occupational therapy' [(2), p.44] called for 'the awakening to a full meaning of time as the biggest wonder and asset of our lives'. Kielhofner revisited the work of Meyer and Meyer's contemporary Eleanor Clarke Slagle and credited them with one of occupational therapy's core propositions that 'in the richness of man's daily routines and his purposeful use of time, there was both health maintaining and health regenerating potential' [(3), p. 236]. To this day occupational therapists are passionate in their belief that the things people do in their everyday lives are the foundation of health and well-being (4).

In the first publication from the discipline of occupational science Yerxa et al. [(5), p. 8]) similarly positioned a 'concern for time' as central to understanding human occupational behaviour, with consideration required of 'how a person occupies time, how satisfied she or he is with the use of time and how well time use supports values and goals'. Yerxa [(6), p. 3] further argued that occupational science sought to address a major question confronting societies – 'what is the relationship between human engagement in a daily round of activity (such as work, play, rest, and sleep) and the quality of life people experience including their healthfulness'. Eminent Canadian economist and time use researcher Andrew Harvey [(7), p. 2] asserted that what people do minute-by-minute day-by-day is at the heart of understanding them as occupational beings. Wilcock (8) recently commented on the goodness of fit between the interdisciplinary field of time use research and occupational science, remembering a key meeting of time use researchers (including Andrew Harvey) interested in exploring time use, health, and well-being that took place in Canada in 1993 as the interdisciplinary potential of occupational science grew.

In 2003 Australian occupational therapist Louise Farnworth (9) renewed attention on occupational therapy's association with time use. She explored the related concepts of time use, tempo, and temporality and questioned whether such topics are the core business of occupational therapy or of other professions. The central and enduring importance of time use in occupational therapy and occupational science is evident through the broad and sustained range of outputs and contributions to the knowledge base (see Table I). While the information in this table did not emanate from the scoping review process, it provides a useful background to contextualise this review.

[Insert Table I about here]

Wilcock (44) suggested that time use methods are amongst the most established research techniques used in exploring important aspects of human occupation. However, to date, the extent and nature of such research activity in occupational therapy and occupational science has not been examined. Therefore the purpose of this study is to map the extent and nature of time use research in occupational therapy and occupational science. A secondary aim is to examine the extent to which the included studies explored the relationship between time use and health. In this regard, Yerxa's [(45), p. 412] definition of health is employed. She described health not as the absence of pathology, but as a 'positive, dynamic state of 'well-beingness', reflecting adaptability, a good quality of life and satisfaction in one's own activities'.

Method

A scoping review method was used to map the relevant literature. According to Rumrill, Fitzgerald, and Merchant [(46), p. 399) 'many medical and social science fields have witnessed the emergence of scoping literature reviews as an alternative to traditional literature review methods'. The Cochrane Public Health Group [(47), p. 147] described scoping reviews as 'a useful and increasingly popular way to collect and organize important background information and develop a picture of the existing evidence base'. Unlike traditional systematic reviews, scoping studies do not seek to assess the quality of evidence, synthesise evidence or aggregate findings from different studies (48). However scoping reviews are particularly useful when an area is complex or has not been reviewed comprehensively before, where many different study designs are employed (48), when there is a high volume of published work (46), and in younger disciplines when the lack of randomized controlled trials makes it difficult to undertake systematic reviews (49). Moreover scoping reviews are more time and cost effective than full systematic reviews. Scoping review methodology is growing in popularity in occupational therapy (50) and has been used to examine interventions for chronic diseases (51), immigration and its impact on daily occupations (52), occupational and self identity after a brain injury (53), occupational engagement of older adults with low vision (54), and ecological sustainability (55).

Arksey and O' Malley (48) published the first methodological framework for conducting scoping reviews. They outlined five steps to guide researchers through the process: identifying the research question, identifying relevant studies, study selection,

data charting and finally, collating, summarizing and reporting the results. Levac, Colquoun, and O' Brien (49) noted some challenges and limitations with Arksey and O' Malley's framework. They argued that the purpose of scoping studies can lack clarity, that the study selection process is iterative rather than linear and that the analytical method of charting data is poorly defined. Furthermore they acknowledged the ongoing debate regarding the need or otherwise for quality assessment of included studies particularly given the large number of studies often included in scoping reviews. Importantly they highlighted how the breadth and comprehensiveness of the scoping process needed to be balanced with feasibility. Arksey and O' Malley's (48) five steps are outlined below.

Identifying the research question(s)

This review seeks to address the following two questions:

1. What is the extent and nature of time use research in occupational therapy and occupational science? Specifically research trends, gaps in evidence, and methodological issues are examined.
2. To what extent do the identified studies examine the relationship between time use and health? Specifically the review examines whether the studies empirically explored the relationship between time use and health using psychometrically tested instruments.

Identifying relevant studies

The following databases were searched: CINAHL, EMBASE, PsycINFO, Medline, Proquest, OTDBase, PubMed, with the keywords: Activity pattern, time, diary, time use, time budget, yesterday diary, time studies, time utilization, daily activities, time allocation and MeSH terms: time factors, time perceptions, time, occupational therapy, time and motion studies, time management. Boolean operators and truncation were used.

Study selection

The review period was from when the first occupational science publication emerged in 1990 to June 2011 in the first instance. The review was then updated to March 2014. Studies were selected using the inclusion and exclusion criteria detailed in Table II.

[Insert Table II about here]

Data charting

The data charting form captured information relating to the author(s) and year of publication; geographical location of the study; study participants; sample size; if data was collected across 24 hours of the day; whether the study employed primary or secondary data analysis; the data collection method and analysis system used; the extent to which the studies addressed the varied methodological issues associated with time use research and whether the study empirically explored the relationship between time use and health using psychometrically tested instruments.

Collating, summarizing and reporting the results

Numerical analyses of the extent, nature, and distribution of the studies included in the review were conducted (48) and the results were mapped in tables and charts. Non-numeric findings (e.g., the methodological issues associated with time use research) were synthesised and these results are presented in narrative form.

Results

Sixty-one studies published between 1990 and 2014 met the inclusion criteria for this review. Figure I illustrates the number of publications in each year of the review period.

[Insert Figure I about here]

The number of studies has generally increased with a peak of seven studies in 2010. Of the regions represented in the review, Scandinavian authors contributed the most studies (n=16, 26%) followed by USA, Canada, and Australia (Table III). The most frequently studied population was people with enduring mental illness followed by other clinical groups, defined population sub-groups, and finally 'well' populations across the lifespan (Table IV). The vast majority of studies (n=50, 82%) were small/medium scale primary research projects with sample sizes ranging from one to 731. An additional seven (11%) studies related their findings (empirically or descriptively) with population-level time use datasets. Secondary analysis of representative population-level time use datasets was employed in 5 (7%) studies. Almost half of the studies (n=30, 49%) used time diaries as data collection instruments. In 10 of these cases the time diary was a modified version of that used in the respective national time use surveys in Australia, Canada, Ireland, Japan, and Sweden. Table V presents the data collection methods used in the included studies.

[Insert Table III, IV and V about here]

Forty-eight studies (79%) captured data across the 24 hours of the day, with three of these studies only reporting selected activities in the featured publication. Six studies (9%) captured data from early morning to late at night. These studies generally used the original Occupational Questionnaire (38) which records time use from 5am – 12midnight. Five studies (8%) employed daytime momentary observations while the remaining two studies focused on time use during a school day and working day respectively. The studies captured data from various combinations of single weekdays; a weekday and a weekend day; 'typical' days; and full weeks; or single days recorded at intervals of a few weeks or pre and post an intervention.

A range of data coding approaches was noted. In the majority of studies the researcher(s) coded the activities recorded by the respondents. Coding schemes were derived from discipline specific sources such as the American Occupational Therapy Association (AOTA) *Uniform Terminology* (113), the AOTA (114) *Practice Framework* and the Canadian Association of Occupational Therapists *Guidelines for Client Centred Practice* (115). One study referred to the terminology of the World Health Organisation (116) *International Classification of Functioning, Disability and Health*. Twenty studies (33%) used modified versions of coding schemes developed for use in national time use surveys in Australia, Canada, Ireland, the UK, and the USA as well as harmonised European coding systems (117). A small proportion of studies used a pre-coded diary where respondents recorded what they were doing by picking one of a number of listed activities largely representative of the diary day. The Occupational Questionnaire requires respondents to record their activities in their own words and also assign one of four codes to each listed activity. Additionally several authors used previous research to guide their data coding. Instrument specific coding systems and analysis software were used where applicable e.g., the Daily Life software (118) used by time-geographers. Although some of the coding schemes and software have up to 600 individual activity codes, the number of codes reported across all studies ranged from three to 79 and in some cases included the use of sub-categories. Finally some researchers combined their time use data with interview transcripts and used qualitative methods in their analyses.

Ten studies (16%) included empirical examinations of the relationship between time use and health using generic instruments with established reliability and validity. The measures used were the Short Form 36 (in full or part) (119), the Swedish version

of the Manchester Short Assessment of Quality of Life (120), the Göteborg Quality of Life Scale (121), the Life Satisfaction Index-Z (122), the Self-esteem scale (123), the Sense of Coherence scale (124), the Mastery instrument (125), the Life satisfaction measure (126), overall perceived health (127) and the Satisfaction with Life Scale (128).

The majority of studies (n=46, 75%) included some consideration of the methodological issues present in time use research. These included using quality measures such as explicit training and procedures to maximise accuracy and consistency in data collection and coding; having a defined cut-off for the amount of 'missing time' in a diary day; and the examination of extreme values/outliers. The psychometric properties of instruments were generally reported when applicable. Furthermore many studies assessed the validity of their data by asking respondents to rate how well the diary day represented an average day. In some cases supplemental interviews were used to enhance diary quality. A smaller number of studies addressed one or more specific time use research issues, such as seasonal variation in time use, the potentially high level of variability in time use across days of the week undermining the idea of a 'typical day', the potential underreporting of simultaneous and short duration activities, the challenge of classifying activities, the time lapse between the designated diary day and diary completion, the error associated with retrospective recall of activities, and the possible social desirability bias when doing so.

Discussion

This is the first scoping review of time use research in occupational therapy and occupational science. Evidently time use is of enduring interest to occupational therapists and occupational scientists. The number of publications has generally grown in the time period. Indeed the decision to focus only on discipline specific occupational therapy and occupational science journals means that the increasing numbers of occupational time use researchers who are publishing to a wider audience in a broad range of interdisciplinary journals was not captured (129-133). Taken together there is evidence to suggest that occupational therapists and occupational scientists are making an important contribution to the field of time use research.

The geographical distribution of the included studies may reflect the parameters of the scoping review which included studies written in English only. It may also reflect the Western perspective that dominates the occupational therapy and occupational science literature (134). This is an important consideration in time use research when

there are such variations in the perception and meaning of time across cultures (135, 136). There is some evidence of culturally sensitive explorations of unique time perceptions for Maori (137) and Aboriginal (138) peoples by occupational therapists and occupational scientists. The findings of this scoping review suggest that further time use research is required 'to gain a better understanding of occupational engagement for individuals from diverse communities, cultures and in varying geographical locations' [(139), p. 440).

This study provides evidence in support of Wilcock's [(44), p. 3] claim that there is a 'propensity for studies that are small scale, individually based, and have significance or relevance to the practice of current day occupational therapy such as disability, care-giving and ageing'. Over half of the included studies involved clinical populations with modest sample sizes. Approximately 20% (n=12) of the studies examined the time use of 'well' populations, with eight of the 12 focusing on the time use of older people. Without doubt the focus on older people is warranted as the World Health Organisation (140) projects the number of people aged 65 or older will grow from an estimated 524 million in 2010 to nearly 1.5 billion in 2050, with most of the increase in developing countries. As a result they call for coordinated research to discover the most cost-effective ways to maintain healthy lifestyles and everyday functioning in countries at different stages of economic development and with varying resources. However given that there is also growing international recognition of the need for targeted, holistic, age-appropriate preventive and clinical services for all young people, not just those who are at risk or experiencing difficulties (141-143), occupational researchers are encouraged to advance this agenda and prioritise studies on the lives of well children and young people as Hunt et al. (105) and Lynch (107) have done.

Secondary analysis of representative population-level time use datasets was employed in only five (7%) of the studies in this review. Evidently occupational researchers have yet to fully realize the potential of large population-level datasets, some of which now include data on time use and well-being (24). Pierce (144) called for large pattern predictive research on population differences in occupation and occupational patterns across 24-hour cycles, requiring methods and instruments that are better fit to the study of large samples. Indeed there are increasing calls for the strengthening of population and public health perspectives in occupational therapy and occupational science research, policy, and practice (139, 145-149). Wilcock (8, 150-153)

and Hocking (4) have been key proponents in this regard. Hocking [(4), p. 34] argued that ‘occupational therapists need to look beyond providing good quality intervention for individuals who have already acquired a health condition’ and extend their thinking to ‘practice that influences groups, organisations, communities – the whole of society’ (p. 37). Moll, Gewurtz, Krupa, and Law (148) believed that the benefits associated with occupation should be promoted in the realm of public health, as well as how occupation can be a risk factor for ill-health. Similarly in her editorial in the recent edition of the *Journal of Occupational Science*, devoted in its entirety to occupation for population health, Wicks [(154), p. 2] encouraged occupational scientists’ ‘quest to understand how occupation has positive and negative implications for health at the personal, local, and global levels’.

Ten studies (16%) were indentified that included an empirical examination of the relationship between time use and subjective well-being. Some studies did collect health and well-being data but did not examine their relationship with time use (108) while others examined related concepts such as occupational balance and health related variables (57). Arguably then Yerxa’s (6, 155) question of how daily occupations including their patterns in time contribute to human happiness, life satisfaction, quality of life, and health requires further empirical attention. Law, Steinwender, and Leclair (156) found little empirical evidence in the occupational therapy literature to support the belief that there is a relationship between occupation, health, and well-being. More recently Pierce [(144), p. 302] claimed that the lack of research on the relationship of occupation to health and quality of life is a ‘critical gap’ in occupational science research. Wilcock [(44), p. 3-4] has called for further exploration of ‘the apparent health or illness outcomes of contemporary lifestyles from an occupational perspective’. Such explorations need to include quantitative and qualitative studies to grasp actual relationships between occupation and health at the population level (157). Crucially longitudinal research is required that may identify causal pathways in the relationship between time use and health (156).

A significant number of the included studies used discipline specific coding schemes to guide their analyses. Wilcock (8) suggested recently that the use of discipline specific terminology by all those who seek to ‘describe or study particular aspects of all that people do across the wake-sleep continuum from birth to death’ has restricted knowledge development. For example, the term occupation is ‘not currently in the lexicon of public health’ [(148), p. 115]. Clark [(158), p. 176] advocated the careful use of language that ‘travels well in interdisciplinary contexts to describe the

relationship of occupation to health'. Farnworth (28) argued that activity is a more appropriate concept to use in population-level time use research rather than occupation which relates to time use at the individual level. Occupational researchers may wish to consider using generic activity coding schemes such as that contained in the recently released United Nations (159) *Guidelines for Harmonising Time Use Surveys*. In this way time use research can contribute important and valid information on the 'form' or 'observable aspects' [(160), p. 80] of occupation at a population level. Alternative approaches to categorising occupation have also been used developed that reflect 'the complexity of human occupation from a time and doing perspective [(15), p.16] by exploring main, hidden and unexpected occupations, as well as sleep, which is considered a building block in the patterns of daily occupation.

According to Pentland and Harvey [(135), p. 264], 'in order that time use research be maximally useful across disciplines, investigators have a responsibility to consider and consult various theoretical and methodological aspects'. While it was reassuring to find that the majority of the studies in this review were sensitive to issues of reliability, validity, and trustworthiness, specific time use research methodological considerations received less attention. Many excellent resources are available to assist occupational researchers in conducting high quality time use research (27, 159).

Finally, as Michelson [(161), p. 103] stated, 'the whole is greater than the sum of its parts' particularly given the zero-sum nature of time 'in which there is only a fixed amount of time to be distributed and traded off among necessary and desired activities' (p. 18). The reporting of aggregate-level statistics and major time allocation estimates does not allow for the full richness of time use data to be utilized (135). Unique patterns that are not represented by the aggregate-level average may be identified by person-centred rather than more traditional variable-centred approaches (162). While such methods are increasingly popular in contemporary research on lifestyles and health behaviours (163-167), none of the studies in our review used these empirical cluster or latent class analytic strategies. [An interesting study by Andersson, Eklund, Sundh, Thundal, and Spak (168) did employ cluster analytic techniques in the analysis of women's patterns of everyday occupations and alcohol consumption but did not meet the inclusion criteria for this review.] Seven studies (11%) in this review used person-centred time-geographic methods (39), capturing activity patterns as a multidimensional unit with outputs in the form of graphs that illustrate the complexity of 'everyday patterns of doing' [(15), p. 16)].

Limitations

As with all research this study has a number of limitations. The review was limited to studies of time use to the exclusion of studies of tempo and temporality of which there are many. Indeed these topics could be the focus of future scoping reviews. While many of the included studies reported affective states or states of mind associated with time use and perceived competence, value, and enjoyment in relation to time use, only those studies that examined time use and health using generic instruments with established psychometric properties were considered. While the two authors consulted throughout this scoping review process resource limitations prohibited the independent review of each of the full articles. As is the norm in scoping reviews (48) the findings from these studies were not synthesised. Therefore a review focusing exclusively on these studies would be an important contribution to the knowledge base. In addition the present review excluded studies that explored the meaning of time use. However as Pierce [(169), p.144) stated 'occupational therapists require sophisticated understandings of both the cultural repertoire of typical activities for persons of different ages and backgrounds and the complex nature of the personally constructed and fully contexted occupational experiences', thus necessitating both quantitative and qualitative approaches as advocated by Frank (157).

Conclusion

This scoping review extends the existing literature by mapping for the first time the extent and nature of time use research in occupational therapy and occupational science journals and the extent to which studies have explored the relationship between time use and health. Sixty-one studies were identified. Evidently time use is of enduring interest to occupational therapists and occupational scientists. Studies from Scandinavia, North America, and Australia predominate. While time use diaries were used most frequently occupational therapists and occupational scientists have developed a range of time use data collection instruments. Forty-nine studies (80%) focused on time use in clinical or defined population sub-groups. A detailed evaluation and synthesis of the evidence emanating from the small number of studies (n=10, 16%) that empirically examined time use and health is warranted. Moreover occupational therapists and occupational scientists should consider more large-scale, quantitative research into the time use and health of well populations across the life span at local and global levels. In so doing they will be able to further strengthen the core business of occupational therapy of creating health in everyday patterns of doing (15) and answer Yerxa's (6, 155) central

question of how work, rest, play, and the quotidian occupations including their patterns in time contribute to human happiness, health, and quality of life.

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Table I. Selected outputs that illustrate the central and enduring importance of time use in occupational therapy and occupational science

Selected Output	
Conceptual models relating to time use	Temporal Adaptation [3] Value and Meaning in Occupations (ValMO) Model [10) Synthesis of Child, Occupational Performance and Environment in Time (SCOPE-IT) Model [11]
Selected keynote lectures on time use and everyday occupations	Law [12] Farnworth [9] Christiansen [13] Zemke [14] Erlandsson [15]
Literature reviews on aspects of time use	Desha & Ziviani [16] Eklund, Leufstadius, & Bejerholm [17] Barclay et al. [18] Pemberton & Cox [19]
Overviews of time use methodologies	Farnworth et al. [20] Holsti & Barr [21] Ziviani et al. [23] Daunhauer & Bundy-Fazioli [23] Hunt & McKay [24]
Journal of Occupational Science Dialogue on Terminology	Farnworth & Fossey [25]
Online international discussion 'Occupational Patterns in Time and Space'	International Society for Occupational Science [26]
Selected books and book chapters	Pentland, Harvey, Lawton, & McColl [27] Farnworth [28] Ziviani, Desha, & Rodger [29] Harvey & Singleton [30] Harvey & Pentland [31]
Instruments	Activity Configuration [32] Activity in Context and Time [33] Caregiver's Activity and Recording of Events Inventory [34] Profiles of Occupational Engagement in Schizophrenia [35] Modified Occupational Questionnaire [36] Mother's Time Use Questionnaire [37] Occupational Questionnaire [38] Time geography [39] Time and Space Use Inventory [40]
Time use interventions	Action Over Inertia Programme [41] Redesigning Daily Occupations (ReDO) Programme [42] Lighter Living (LiLi) Programme [43]

Table II. Scoping review study inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
1990 – 2014	Not tempo or temporality
Data collected on a broad range of daily activities, not discrete activities in isolation	Not studies of meaning of time use
Human time use	Not time use relating to service delivery, student supervison or the development of assessment tools
English	Not theoretical or methodological papers
Published in peer reviewed occupational therapy and occupational science journals	Not book chapters / theses

Table III. Geographical location of studies

Geographical Location	Study Reference Number	n (%)
Scandinavia	[43, 56-70]	16 (26)
United States of America (USA)	[40, 71-80]	11 (18)
Canada	[41, 81-90]	11 (18)
Australia	[91-100]	10 (16)
United Kingdom (UK)	[101-104]	4 (6)
Ireland	[105-107]	3 (5)
Middle East	[37, 108, 109]	3 (5)
Asia	[110-112]	3 (5)

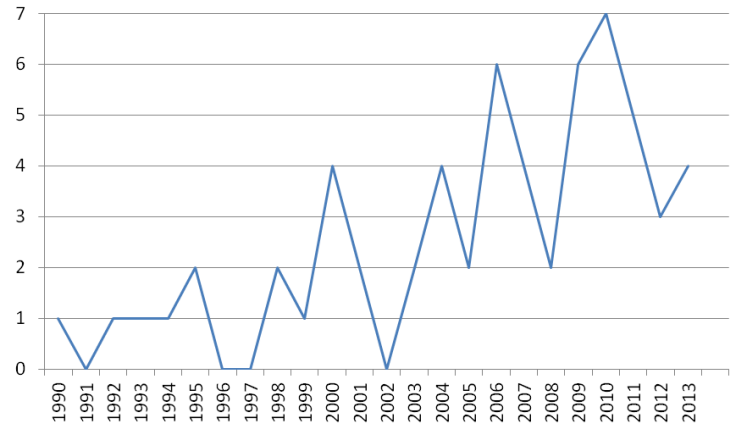
Table IV. Study Populations

			n (%)
Clinical Population	Clinical Diagnosis – Enduring Mental Illness	e.g., schizophrenia	17 (28)
	Clinical Diagnosis - Other	e.g., rheumatoid arthritis, cancer, CVA, traumatic brain injury, spinal cord injury, pain, HIV, binge eating disorder, diabetes, cerebral palsy, obesity, Alzheimer's Disease, environmental sensitivity, low vision, obese children	16 (26)
Defined population sub-groups	Adults	e.g., unemployed people, survivors of terrorist attacks, survivors of domestic abuse, mothers of children with/without disabilities, older adults attending community OT, parents of obese children, working married mothers, employed adults, OT/PT students	11 (18)
	Children / Adolescents	e.g., gifted students, young offenders, children in orphanages, teen mothers, children at risk of conduct problems,	5 (8)
Well Population	'Well' older adults		8 (13)
	'Well' general adult population		2 (3)
	'Well' adolescents		1 (2)
	'Well' typically developing children		1 (2)

Table V. Data collection instruments

Instrument	n (%)
Time diaries	30 (49%)
Activity Configuration/Occupational Questionnaire/Modified Occupational Questionnaire	11 (18)
Time geographic method	7 (11)
Experience Sampling Method	3 (5)
Mother's Time Use Questionnaire	2 (3)
Caregiver's Activity and Recording of Events Inventory	2 (3)
Spot observations/Behavioural mapping	2 (3)
Profile of Occupational Engagement in People with Schizophrenia [POES]	2 (3)
Time and Space Use Inventory	1 (2)
Activity in Context and Time [ACT]	1 (2)

Figure I. Number of publications in the review period 1990 – 2013.



Note. 2014 is not included in this chart as the review period extended only to the first three months of the year.

A Person-centred Analysis of the Time Use, Daily Activities and Health-related Quality of Life of Irish School-going Late Adolescents

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Abstract

Purpose: The health, well-being and quality of life of the world's 1.2 billion adolescents are global priorities. A focus on their patterns or profiles of time-use and how these relate to health-related quality of life (HRQoL) may help to enhance their well-being and address the increasing burden of non-communicable diseases in adulthood. This study sought to establish whether distinct profiles of adolescent 24-hour time-use exist and to examine the relationship of any identified profiles to self-reported HRQoL. *Method:* This cross-sectional study gathered data from a random sample of 731 adolescents (response rate 52%) from 28 schools (response rate 76%) across Cork city and county. A person-centred approach, latent profile analysis (LPA), was used to examine adolescent 24-hour time-use and relate the identified profiles to HRQoL. *Results:* Three male profiles emerged, namely *productive, high leisure* and *all-rounder*. Two female profiles, *higher study/lower leisure* and *moderate study/higher leisure*, were identified. The quantitative and qualitative differences in male and female profiles support the gendered nature of adolescent time-use. No unifying trends emerged in the analysis of probable responses in the HRQoL domains across profiles. Females in the *moderate study/higher leisure* group were twice as likely to have above average global HRQoL. *Conclusion:* Distinct time-use profiles can be identified among adolescents but their relationship with HRQoL is complex. Rich mixed-method research is required to illuminate our understanding of how quantities and qualities of time-use shape lifestyle patterns and how these can enhance the HRQoL of adolescents in the 21st century.

Key words: *time diary, finite mixture models, young people, well-being, health*

Background

There are now 1.2 billion adolescents (aged 10 - 19 years) in the world [1]. While the last 50 years has seen significant improvements in child health, the same gains have not been recorded for adolescents [2]. Consequently, their health and well-being is now a global priority [1, 3]. Recent policies call for increased attention to non-communicable causes of disease burden and lifestyle risk factors in adolescence [4], not least because important determinants of health and well-being are imbedded in young people's daily behavior, as reflected in their time-use [5, 6]. Indeed, how one lives out one's daily life is closely connected with health and quality of life [7-9]. Given that, time-use studies make an ideal contribution to the evaluation of well-being and quality of life [10-13].

To date, most studies of young people's lifestyles and time-use have tended to focus on a small number of discrete activities in isolation [14, 15]. However, it cannot be assumed that healthy levels of one activity are indicative of an overall healthy lifestyle [16]. Indeed, the finite nature of time requires trade-offs or substitutions among necessary and desired activities [17-19]. For example, although it is hypothesised that screen time displaces physical activity [20, 21], high levels of physical activity and sedentary behaviour can coexist [16, 22]. Therefore, macroscopic views are increasingly favoured in research on lifestyles and health with social scientists focusing more on overall patterns of daily activities [23, 24]. Such *person-centred* views are growing in popularity in research on adolescent lifestyles too [16, 25-33]. The person-centred approach seeks to understand the person as a functioning or organised whole rather than a summation of variables [34]. In fact, with this approach, the variable values are of no importance in themselves. Rather, they are meaningful only as parts of a configuration [34]. Importantly, person-centred analyses of adolescent time-use can more effectively capture the interconnectedness of activity choices and portray the complexity of activity participation typical of many young people's lives [35], and the impact on their health, well-being and quality of life [36].

Capturing the complexity of adolescent activity requires not just person-centred analytical methods but also the collection of data on all the activities performed by an individual in a 24-hour cycle, as these are the building blocks that create an overall lifestyle or pattern of time-use [37]. As a result, those concerned with adolescents' health have been urged to pay attention to these "...overall patterns of daily life, including sleep, eating habits, mass media consumption, extra-curricular activities, and

relationships with parents and peers". [5, p. 413]. However, there is a lack of such person-centred studies of adolescent 24-hour time-use [22], with a few exceptions [38-40].

The inclusion of positive outcome variables has recently been identified as one of the important requirements of quantitative developmental research [41]. One such variable is health-related quality of life (HRQoL). Indeed, there is growing consensus that the creation of a complete picture of young people's health and well-being requires an assessment of HRQoL outcomes [42]. No doubt reflecting this and contemporary perspectives that endorse an ecological view of the determinants of adolescent health and well-being [1, 43], and that honour young people's subjective perspectives of their own well-being and quality of life [44, 45], studies examining the relationship between HRQoL and discrete time-use behaviours in adolescents are increasing. More time in physical activity and longer sleeping hours have been found to be associated with better HRQoL, while high levels of recreational screen time are associated with poorer HRQoL [46-52]. However, these variable-centred studies do not take the previously described time-use trade-offs or displacements into account. In fact, the relationship between adolescent overall time-use patterns and HRQoL has not been examined to date (Hunt & McKay, 2014, under review).

With that in mind, we aimed to establish whether distinct patterns, or profiles, of adolescent 24-hour time-use exist in a cross-sectional sample of Irish late adolescents and to examine the relationship of any identified profiles to self-reported HRQoL.

Methods

Sample and Participant Selection

In 2007, we recruited a cross-sectional, random sample of adolescents aged 15 - 19 years in full-time education who were living at home (consistent with previous international studies [53]) in County Cork, Ireland. Second-level schools were randomly selected, from the governmental schools' register, with probability of selection proportionate to enrolment. School principals were asked to provide consent and 28 of 37 selected schools (76%) agreed to participate. Each school then identified one class

group from the two designated years[1] resulting in 1413 students being invited to participate. The first author provided written and verbal information for students and written information for parents. Students and parents were required to complete the consent/assent form. Consent/assent was obtained for 731 students (52%) who were subsequently enrolled in the study.

Measures

Time-use

Time-use was measured using a pre-coded 24-hour diary with six main activity categories comprising 31 individual activities. The time diary is the most frequently used data collection method in child and adolescent time-use research [14, 19]. Although there is an acknowledged lack of information about the quality of time-use data captured by the different methods [54], the time diary method is considered to have acceptable reliability and validity [55, 56] and is the method recommended by the United Nations Economic Commission for Europe (UNECE) Task Force on Time-use Surveys [11].

The diary in the present study was adapted from that used by the Irish Economic and Social Research Institute (ESRI) in their 2005 survey of Irish adults' time-use [57]. The activity categories were in keeping with those used in adolescent time-use surveys internationally [53]. Participants were asked to record their main (primary) activity for each block of 15 minutes of the designated day. Participants completed one diary for a weekday and one diary for a weekend day. The focus of this study was the time-use of participants measured during the school year.

The six main activity categories were Personal Care, School/Study, Paid Work, Housework, Voluntary/Religious Activity, and Leisure. Personal Care was disaggregated into Sleep and Self-Care, as the association between sleep and HRQoL has been the focus of increased attention in recent years [52]. School/Study was also disaggregated into two distinct categories given the significance of homework and study in the lives of adolescents [58, 59]. Similar to previous studies [51, 60, 61] we

[1] The Irish second-level school system comprises a 3-year junior cycle and a 3-year senior cycle. The first year of senior cycle is typically referred to as Transition Year, while the second year of senior cycle is referred to as Fifth Year. Sixth (final) year students were not included as informal consultation with school principals had indicated that accessing this cohort in their final State examination year would be problematic.

computed weekly time in these eight activity categories by multiplying weekday time by 5 and adding to weekend time-use totals that were multiplied by 2.

Health-related quality of life

HRQoL was measured using the 52-item KIDSCREEN questionnaire [62]. This instrument was developed across Europe as a self-report measure applicable for healthy and chronically ill children and adolescents (aged from 8 - 18 years) and assesses 10 domains of HRQoL, namely "physical well-being", "psychological well-being", "moods and emotions", "self-perception", "autonomy", "parent relations and home life", "social support and peers", "school environment", "social acceptance" and "financial resources". Psychometric testing has shown the KIDSCREEN to be a reliable, valid, and sensitive measure [63]. A global HRQoL score (the KIDSCREEN-10 Index) was also generated from 10 items of the KIDSCREEN-52 [64]. The KIDSCREEN-10 Index has also demonstrated good psychometric properties [65]. Cronbach's alphas for the present study were .95 (KIDSCREEN-52) and .86 (KIDSCREEN-10 Index). The KIDSCREEN instruments have been validated for children and adolescents in Ireland and Irish norm reference data are available [66]. Using the KIDSCREEN Group Europe's [67] scoring guidelines and software, Rasch scores were computed for each of the 10 KIDSCREEN-52 domains and the KIDSCREEN-10 Index. These were transformed into T-values with a mean of 50 and a standard deviation of 10; with higher scores indicating better HRQoL [68]. The HRQoL data were not normally distributed. Therefore, as recommended [67], scores within a range of plus / minus half a standard deviation of the mean were categorised as average. Scores below or above those thresholds were categorised as below average or above average, respectively.

Procedures

The first author met the participants to provide instructions for completion of the survey instrument. They completed a sample diary and could ask any questions arising. Thereafter, the class was assigned a weekday and weekend day to complete their diaries. Diary days were designated by the first author with the aim of being as close as possible in time to the day of initial diary distribution, in order to maximise accurate recall of activities. Participants were provided with special stickers to use as memory aides and were also encouraged to put reminders in their mobile phones and school journals. When the designated diary days had passed, a liaison teacher prompted

participants to check their diaries for accuracy and completeness. Diaries were then sealed in individual envelopes by participants to ensure privacy prior to collection by the liaison teacher.

Statistical Analysis

We aimed to identify holistic patterns, or profiles, of time spent across eight activity categories measured by the time-use diaries, and then relate any identified profiles to HRQoL. To identify time-use profiles, we used finite mixture models to model the observed multivariate distribution of weekly time-use in the eight activity categories as a function of a single, multinomial latent profile variable. Clustering of individuals was accomplished through the assumption that the time-use variables were independent, conditional on profile membership. These models thus maximise within profile homogeneity and between profile heterogeneity in the observed indicators [69] and are often referred to as latent class or latent profile models, depending on whether the indicator variables are measured categorically or continuously.

The eight observed weekly time-use variables were all continous in nature. However, four of the variables were strongly skewed and/or had a preponderance of zeros. Consequently, to simplify model estimation, we categorised each of these variables (i.e., Study, Paid Work, Housework, and Voluntary/Religious Activity) into zero/some/more time by splitting the non-zero time at the median. Weekly minutes in the remaining four time-use categories (i.e., Sleep, Self-Care, School, and Leisure) were entered as continuous variables. To aid model estimation, the continuous scores were rescaled by dividing by 100. The multivariate probability distribution for the eight variables is thus represented by 16 parameters: two thresholds for each of the 3-level categorical variables and a mean and variance for each continuous variable.

We investigated the plausibility of models specifying one to six latent profiles, thus comparing a single profile solution to a series of more complex models. For each model all 16 parameters were freely estimated within each specified profile (one to six). Separate analyses were conducted for males and females given the significant gender differences in time-use found in this sample [70] and others [71].

Relative fit indices (Akaike Information Criterion [AIC], the Bayesian Information Criterion [BIC] and the sample size-adjusted Bayesian Information Criterion [aBIC] and statistical tests were examined to determine optimal model fit. The Lo-Mendell-Rubin adjusted likelihood ratio test (LMRT) and the parametric bootstrapped likelihood ratio test (BLRT) were examined as statistical indicators of the number of profiles that best fitted the data. Finally the entropy criterion was considered. Entropy is an index that determines the accuracy of classifying people into their respective profiles, with higher values (i.e., closer to 1.0) indicating better discrimination between profiles. No one method for comparing models with differing numbers of latent profiles is widely accepted as best [72]. Indeed, in practice it is likely that there will be more than one "best" model identified across the different indices [72]. Taking precedence from Herman et al. [73] and Arbeit et al. [74] we examined all these indices but gave special weight to the BIC and BLRT as these have been found to be most accurate in determining the appropriate number of profiles [75].

Profile membership is probabilistic rather than deterministic [76]. Recent advances in statistical methods take this into account and allow for improved estimation of the relationship between latent profiles and auxiliary variables (covariates or distal outcomes) while all the time maintaining the uncertainty in profile membership [77]. Using these latest statistical methods [78, 79] the relationship between 24-hour time-use and HRQoL was examined. As the age range of the sample was well specified as the developmental stage of late adolescence [2] we did not stratify or otherwise adjust the model for age. In our previous analyses we adjusted for the unequal distribution of weekdays across the sample. However, we found that HRQoL did not differ by day of the week therefore we did not adjust for day of the week in the model. For the same reason we did not add social class as a covariate to the model.

Because of the large number of tests, a Bonferroni corrected *p*-value of .005 was applied when determining the statistical significance of the scores from the 10 domains of the KIDSCREEN-52 [80]. A *p*-value of .05 was used in the case of the KIDSCREEN-10 Index. All analyses were conducted using Mplus version 7.11 [81].

Results

Twenty weekday diaries and 20 weekend diaries were excluded as there was more than four hours time with no recorded activities. This was the quality measure used by McGinnity et al. [57] in their time-use study with Irish adults. Consistent with previous

studies [53], a further 13 weekday diaries were removed as there was less than 60 minutes recorded at school on the designated diary day. Thus the included diaries were of high quality with less than 0.005% of unspecified time recorded. Twenty-five KIDSCREEN questionnaires were incomplete. There was some overlap in the low quality diaries and incomplete KIDSCREEN questionnaires. In total, 64 questionnaires (9%) were excluded from the analyses. Therefore the LPA was performed on a sample of 311 males and 356 females. Mean age for males was 16.13 years and mean age for females was 15.91 years. Participants are profiled in Table 1.

A 3-profile solution was chosen for the males and a 2-profile solution for the females, based on lower BIC values, a BLRT with $p < 0.05$, and the interpretability of the solutions. Figures 1a and 1b show the fit indices for one to six solutions. Results of an LPA include two sets of parameters: probabilities of latent profile membership and the within-profile parameters for indicator variables. Interpretation of the latent profiles is based on these indicator parameter estimates [69]. Table 2 provides the model-estimated, profile-specific item response probabilities for categorical indicator variables by gender. Table 3a provides the estimated mean weekly minutes and standard deviations of the continuous variables for all males, all females and for each gender-specific profile, while Table 3b presents this data as daily time (hours:minutes) to aid interpretation.

The three male profiles separated into two larger groups and one smaller group. Profile one, which we labelled the *productive* group, accounted for 40% of males. They were more likely to spend more time in Study (58%), some/more time in Paid Work (53%), some/more time in Housework (47%), and less time in Leisure (3hr:26min). We labelled profile two (14%) as the *high leisure* group who had a higher probability of spending no time in Study (61%), Paid Work (94%) or Housework (75%); below average time in Sleep (7hr:55min), Self-Care (1hr:12min), School (4hr:56min); and higher than average time in Leisure (7hr:17min). The third profile (46%), which we labelled as *all-rounder*, was characterised by near average time in Sleep (8hr:37min), Self-Care (1hr:38min), School (5hr:15min), and slightly above average Leisure (5hr:38min). This group was likely to spend some time in Study (53%) and some/more time in Housework (47%).

The two female profiles had broadly similar time-use in Self-Care, School, Paid Work and Voluntary/Religious activity. The profiles separated around Sleep, Study, Leisure,

and to a lesser extent Housework. Profile one (74%) was characterised by marginally more time in Sleep (8hr:42min) and a greater likelihood of time in Housework (63%), considerably more chance of time in Study (85%) and less time in Leisure (3hr:44min), thus we labelled this group *higher study/lower leisure*. The second profile (26%), labelled *moderate study/higher leisure*, had less time in Sleep (7hr:44min), a moderate chance of spending time in Study (61%) and higher than average time in Leisure (5hr:22min). These profiles are presented in Table 4.

While taking into account the uncertainty in profile membership [77], we examined the relationship between latent profiles and HRQoL as a distal outcome using equality tests of probabilities across profiles (Table 5). Although three significant differences emerged across the male profiles, namely in the "financial resources" domain (p = .02), "social support and peers" domain (p = .02) and "school environment" domain (p = .04), these did not remain significant post Bonferroni-correction. For the females, there were three statistically significant differences in probabilities across classes, in "physical well-being" (p = .05), "autonomy" (p = .005), and global HRQoL (p = .02), with the latter two remaining significant post correction.

We then examined the likelihood of above average HRQoL across each of the profiles (Table 6). For the males, relative to the *all-rounder* group, those in the *high leisure* group had a higher chance of above average scores in "financial resources" (p = .05) while those in the *productive* group a higher chance of above average scores in "social support and peers" (p = .04). For the females, relative to the *moderate study/higher leisure profile*, the *higher study/lower leisure* group were significantly less likely to score above average in "physical well-being" (p = .05), "autonomy" (p = .01) and global HRQoL (p = .006) and more likely to score above average for "financial resources" (p = .03). Only the female global HRQoL score remained significant post Bonferroni-correction.

Discussion

We used a model-based, person-centred approach to examine adolescent 24-hour time-use and related the identified profiles to HRQoL. We successfully identified distinct male and female profiles based on the amount of time spent in eight categories of activity. We named the male profiles *productive* (40%), *high leisure* (14%) and *all-rounder* (46%) and the female profiles *higher study/lower leisure* (74%) and *moderate study/higher leisure* (26%) (Table 4).

The three male profiles identified through the LPA are similar to three of the six/seven classes identified by Shanahan and Flaherty [40] in their study of American adolescents. They found that the majority of their participants fell into the *active workers* or *active non-workers* clusters, with the latter similar in description to the *all-rounder* profile of the present study. A smaller *high leisure* cluster also emerged from Shanahan and Flaherty's [40] analysis, in which males were over-represented, in the two younger adolescent age cohorts at least. Ferrar et al. [22] questioned whether the commonalities they observed in adolescent time-use clusters, found despite substantial between-study differences, may reflect globalisation across the developed world; characteristic adolescent behaviour patterns that exist independent of geography or culture; or may be an artefact of the instruments used that measure similar behaviours.

In their systematic review Ferrar et al. [22] found that, of the six studies that conducted gender-specific clustering, different cluster patterns amongst males and females were noted in five cases. Our findings are in keeping with this trend. While there were few dramatic differences between males and females (for example the very high proportion of males in 2/3 profiles not engaged in paid work), there was no profile clearly shared by the sexes. This result further evidences the gendered nature of adolescent time-use [5, 70] and the need for gender-specific interventions to support the health and well-being of young people [82, 83].

Few statistically significant associations between time-use profiles and HRQoL emerged. The equality tests of probabilities across profiles (Table 5) clearly convey the complex relationship between time-use profiles and HRQoL for this group of young people. No unifying trends emerged. To illustrate with one of many possible examples, those in the male *high leisure* group had the highest probability for below average scores in "physical well-being" (41%), "psychological well-being" (42%), "parent relations and home life" (47%), "social support and peers" (54%), "school environment" (48%), "social acceptance" (44%) but the highest probability of the highest scores in "autonomy" (35%), "financial resources" (42%). Females in the *moderate study/lower leisure* profile had significantly higher "autonomy" scores. Looking more closely at the likelihood of above average HRQoL across profiles (Table 6), females in the *moderate study/higher leisure* group were more than twice as likely to have the above average global HRQoL compared to the *higher study/lower leisure* profile, a highly significant difference. Although not statistically significant, across the three male profiles, those in the *all-rounder* group had the highest probability of above

average global HRQoL. Our results point to the complexities of creating health in everyday patterns of doing [9]. We are inclined to interpret our findings with caution given the number of potential associations examined, the cross-sectional nature of the data and the challenge of endogeneity or residual confounding in research on adolescent development [84]. Nonetheless, those associations that were statistically significant provide some tentative support to the association, for females, between overall HRQoL and a more balanced lifestyle, defined by Matuska and Christianen [85, p. 11] as "a satisfying pattern of daily activity that is healthful, meaningful, and sustainable to an individual within the context of his or her current life circumstances". Håkansson, Dahlin-Ivanoff, and Sonn [86] posited that well-being is the outcome of balance in everyday life with such balance derived from respecting one's own values, needs, and resources; employing strategies to manage everyday life; and having a harmonious repertoire of personally meaningful daily activities. Perhaps, as Zuzanek [87, p. 220] suggested, the "middle ground" does indeed present "the most rewarding and helpful way to a life of ease and pleasure".

We recognise several limitations in the present study. Due to the cross-sectional nature of these data, the causal relationship between profile membership and HRQoL is uncertain. A response rate of 52% was achieved with no subsequent weighting for non-response, introducing the possibility of non-response bias. However, relevant studies in this areas show little evidence of bias due to non-response [55]. We have no information about those who chose not to participate in this study. We examined the HRQoL of the 64 excluded questionnaires and found only one difference between the two groups across the 11 HRQoL domains that remained significant after adjustment for multiple testing ("school environment", $p = .003$). Accounting for all 24 hours of a day is believed to reduce the potential for social desirability bias and recall errors associated with self-report data [88].

As Patnode et al. [89] noted, a different method of categorizing time-use could have resulted in a somewhat different latent profile structure. As they reported "while dichotomizing variables is an approach that is commonly applied in latent class methods and may help in the communication and application of findings there may be some loss of sensitivity that results from categorizing the data in this way" (p. 465). Furthermore, the extent of prior aggregation of time-use indicator variables influences the resultant

profiles. Although Ferrar et al.'s [22] review demonstrated that up to 18 cluster inputs had been used successfully, we encountered difficulties with model non-identification with 19 indicator variables. This potentially resulted in the lack of identification of some frequently observed time-use profiles, particularly those characterised by time spent in physical activity or screen time. Finally, an issue acknowledged in the methodological literature [90] but notably absent in empirical studies is the compositional nature of time-use data (i.e., the total time spent in activities across the day is constrained at 24-hours) [91]. While the use of log-ratio transformations [92] can be helpful, this is less so with time-use data given the preponderance of zeros. De Leeuw et al. [90] presented a latent time-budget model but this was based on data gathered from random spot observations rather than diaries and does not appear to have been utilised greatly since its publication nearly 25 years ago.

Notwithstanding these limitations, the present study reflects contemporary perspectives in adolescent health policy and research that favour strengths-based and population health approaches in understanding the lives of young people and that prioritise their self-report of health and well-being [45, 93-95]. We successfully identified distinct profiles of adolescent time-use and found some differences in HRQoL across profiles. This study thus extended the literature in a number of ways. In line with current best practice [2, 96], we focused on the defined quinary age band of late adolescence (15 - 19 years). We adopted a person-centred rather than a variable-centred approach to analysing time-use. Finite mixture models, such as LPA, use statistical probability-based models to detect latent categorical subgroups [72]. Model selection in mixture models is therefore less subjective than with algorithmic approaches as both relative fit indices and statistical tests are provided to determine which model solution fits the data better [72]. Furthermore, when using person-centred analyses, it is important to remember that individuals are not statically assigned to profiles for once and for all. Rather, as Magnusson [97, p. 17] stated, "the boundaries of many clusters are fuzzy and permeable" and a person may move from one profile to another over time. With that in mind latent profile analysis was chosen as it retains the probabilistic feature of person-centred analysis more explicitly. This more accurately reflects the complex and ever-changing lifestyles of adolescents [98]. Data were collected on adolescents' overall time-use using diary data as recommended by the UNECE [11]. Finally we used the latest statistical methods to examine the relationship between 24-hour time-use and HRQoL [77].

Our findings provide further evidence of the complexity of relationships between time-use profiles and HRQoL in adolescence. This is not surprising as the evaluation of adolescents' time allocation is recognised as only "one small piece of a much more complex inquiry" [99, p. 163]. Furthermore, it has been said that youth development is "not readily reducible to variables" [41, p. 1014]. Our results point to the need for a mix of variable-centred, person-centred and qualitative research [31, 82, 100, 101], to create a more complete picture of the many systems that comprise the complex "disorderly world" [98, p. 317] of today's adolescents. In addition, the quantitative and qualitative differences in male and female profiles support the gendered nature of adolescent time-use. Our data thus reinforce the need for health promotion and disease prevention strategies to be tailored differently for males and females [70, 82, 83]. Finally, adolescent health policies increasingly call for cross-sectoral and multi-modal interventions that address multiple risk and positive health behaviours [1, 3]. Altering overall behaviour patterns rather than behaviours in isolation may lead to greater intervention success [16, 29, 102-105]. Identifying different time-use patterns amongst adolescents, and their determinants and outcomes, may thus enable the development of tailored interventions [22, 39]. Adolescents need to be educated and supported to engage in a daily round of activities that enhance their health, meet their needs, and enable them to balance the demands of a 21st century lifestyle.

Conclusion

The health, well-being, and quality of life of the world's 1.2 billion adolescents are global priorities. A focus on their profiles of time-use and how these relate to HRQoL is necessary to enhance their well-being and address the increasing burden of non-communicable diseases. We used a model-based, person-centred approach to examine adolescent 24-hour time-use and related the identified profiles to HRQoL. We successfully identified distinct male and female profiles based on the amount of time spent in eight categories of activity. The quantitative and qualitative differences in male and female profiles support the gendered nature of adolescent time-use. No unifying trends emerged in the analysis of HRQoL domains across profiles, reinforcing the complex nature of HRQoL for this group of young people. Rich mixed-method research is required to illuminate our understanding of how quantities and qualities of time-use shape lifestyle patterns and how these can enhance the HRQoL of adolescents in the 21st century.

Ethical Standards

Ethical approval was granted by the University College Cork Research Ethics Committee of the Cork Teaching Hospitals. Therefore this study has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All participants provided written consent/assent.

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Table 1

Demographic Characteristics of Sample (N = 667)

		Male n (%)	Female n (%)
		311 (47)	356 (53)
Age (years)		16.13	15.91
School Year	Transition Year	119 (38)	169 (48)
	Fifth Year	192 (62)	187 (52)
School Location	City	63 (20)	110 (31)
	County	248 (80)	246 (69)
Family Context	Two Parents	273 (88)	309 (87)
	One Parent	32 (10)	38 (11)
	Guardian/Not completed	6 (2)	9 (2)
Social Class	Higher Social Class	179 (58)	166 (47)
	Middle Social Class	90 (29)	122 (34)
	Lower Social Class	22 (7)	43 (12)
	Unknown/Not completed	20 (6)	25 (7)
Nationality	Irish	293 (94)	329 (92)
	Other	18 (6)	27 (8)

Table 2

Model-Estimated, Profile-Specific Item Response Probabilities (%) for Categorical Indicator Variables by Gender (N = 667)

Activity Category	Time	Males (n=311)			Females (n=356)	
		Productive (40%)	High Leisure (14%)	All-Rounder (46%)	Higher Study /Lower Leisure (74%)	Moderate Study / Higher Leisure (26%)
Study	No time	15	61	13	15	39
	Some time	27	33	53	35	52
	More time	58	07	34	50	09
Paid Work	No time	47	94	96	69	76
	Some time	25	03	04	16	10
	More time	28	03	00	15	14
Housework	No time	53	75	53	37	46
	Some time	26	05	28	33	22
	More time	21	20	20	30	33
Voluntary & Religious Activity	No time	77	87	70	73	87
	Some time	12	10	17	11	04
	More time	11	04	14	16	09

Note. Probabilities may not equal 100% due to rounding. Activities categorised into zero/some/more time by splitting the non-zero time at the median.

Table 3a

Estimated Mean (Standard Deviation) Weekly Minutes for Continous Indicator Variables by Latent Profile by Gender (N = 667)

Activity Category	Males (n=311)				Females (n=356)		
	All Males	**Productive (40%)**	**High Leisure (14%)**	**All-Rounder (46%)**	**All Females**	**Higher Study /Lower Leisure (74%)**	**Moderate Study / Higher Leisure (26%)**
Sleep	**3585 (475)**	3636 (438)	3324 (605)	3618 (434)	**3551 (493)**	3656 (374)	3251 (641)
Self Care	**668 (265)**	702 (303)	505 (204)	688 (224)	**789 (264)**	795 (268)	772 (250)
School	**2216 (293)**	2278 (252)	2069 (551)	2206 (176)	**2225 (289)**	2198 (316)	2301 (168)
Leisure	**2090 (775)**	1440 (427)	3062 (866)	2364 (440)	**1745 (670)**	1566 (504)	2254 (805)

Note. Weekly time in activity categories calculated by multiplying weekday time by 5 and adding to weekend time-use totals that were multiplied by 2.

Table 3b

Estimated Mean Daily Time (Hours:Minutes) for Continous Indicator Variables by Latent Profile by Gender (N = 667)

Activity Category	Males (n=311)				Females (n=356)		
	All Males	**Productive (40%)**	**High Leisure (14%)**	**All-Rounder (46%)**	**All Females**	**Higher Study /Lower Leisure (74%)**	**Moderate Study / Higher Leisure (26%)**
Sleep	**8:32**	8:39	7:55	8:37	**8:27**	8:42	7:44
Self Care	**1:35**	1:40	1:12	1:38	**1:53**	1:54	1:50
School	**5:17**	5:25	4:56	5:15	**5:18**	5:14	5:29
Leisure	**4:59**	3:26	7:17	5:38	**4:09**	3:44	5:22

Table 4

Descriptions of Male and Female Time Use Profiles (N = 667)

Gender	Time Use Profile (%)	Description
Male (n=311)	Productive (40%)	More likely to spend more time in Study (58%), some/more time in Paid Work (53%), some/more time in Housework (47%), and less time in Leisure (3hr:26min).
	High Leisure (14%)	Higher probability of spending no time in Study (61%), Paid Work (94%) or Housework (75%); below average time in Sleep (7hr:55min), Self-Care (1hr:12min), School (4hr:56min); and higher than average time in Leisure (7hr:17min).
	All-Rounder (46%)	Near average time in Sleep (8hr:37min), Self-Care (1hr:38min), School (5hr:15min), and slightly above average Leisure (5hr:38min). Likely to spend some time in Study (53%) and some/more time in Housework (47%).
Female (n=356)	Higher Study / Lower Leisure (74%)	Marginally more time in Sleep (8hr:42min) and a greater likelihood of time in Housework (63%), considerably more chance of time in Study (85%) and less time in Leisure (3hr:44min),
	Moderate Study / Higher Leisure (26%)	Less time in Sleep (7hr:44min), a moderate chance of spending time in Study (61%) and higher than average time in Leisure (5hr:22min).

Table 5

Distribution of Conditional Probabilities (%) and Equality Tests of Probabilities Across Profiles for the KIDCREEN-52 and KIDSCREEN-10 by Gender (N = 667)

		Male (n=311)				Female (n=356)		
		Productive (40%)	High Leisure (14%)	All-Rounder (46%)	*p*	Higher Study/ Lower Leisure (74%)	Moderate Study/ Lower Leisure (26%)	*p*
KIDSCREEN-52 Domains	**Physical Well-being**				.56			**.05**
	Below Average	31	41	25		36	16	
	Average	49	35	49		45	48	
	Above Average	20	25	26		20	36	
	Psychological Well-being				.63			.08
	Below Average	32	42	26		37	20	
	Average	36	29	40		28	43	
	Above Average	32	29	34		35	37	
	Moods & Emotions				.65			.37
	Below Average	31	36	23		31	22	
	Average	45	38	45		48	45	
	Above Average	24	26	32		20	33	
	Self Perception				.98			.83
	Below Average	35	37	36		24	35	
	Average	45	38	43		46	40	
	Above Average	21	24	21		30	25	
	Autonomy				.09			**.005***
	Below Average	42	31	18		34	16	
	Average	33	34	50		48	46	
	Above Average	25	35	32		18	39	
	Parent Relations & Home Life				.24			.55
	Below Average	30	47	28		35	38	
	Average	54	33	55		39	29	
	Above Average	15	20	18		26	33	
	Financial Resources				**.02**			.07
	Below Average	22	37	32		30	39	
	Average	39	21	45		33	47	
	Above Average	39	42	23		37	14	
	Social Support & Peers				**.02**			.37
	Below Average	26	54	22		37	32	
	Average	45	35	55		29	43	
	Above Average	29	10	29		34	25	
	School Environment				**.04**			.12
	Below Average	28	48	12		34	34	
	Average	51	34	55		42	27	
	Above Average	21	18	33		24	39	
	Social Acceptance				.68			.57
	Below Average	40	44	33		29	36	
	Average	23	29	32		21	29	
	Above Average	37	27	35		50	35	
KIDSCREEN-10 Index	**Global HRQoL**				.28			**.02***
	Below Average	34	45	25		38	24	
	Average	39	38	40		44	37	
	Above Average	27	17	34		18	39	

Note. Probabilities may not equal 100% due to rounding. * Remains significant after adjusting for multiple testing.

Table 6

Item-Response Probabilities (%) for Above Average HRQoL and Tests of Equality of Probabilities Across the Profiles (N = 667)

		Male (n=311)					Female (n=356)		
		Productive (40%)	**High Leisure (14%)**	**All-Rounder (46%)** [reference]	**Overall Level of Significance** (*p*-value)	**Individual Level of Significance** *(p-value)*	**Higher Study/ Lower Leisure (74%)**	**Moderate Study/ Higher Leisure (26%)** [reference]	**Overall Level of Significance** (*p*-value)
KIDSCREEN-52 Domains	Physical Well-being	20	25	26	.79		20	36	**.05**
	Psychological Well-being	32	29	34	.90		35	37	.90
	Moods & Emotions	24	26	32	.53		20	33	.20
	Self Perception	21	25	21	.91		29	27	.84
	Autonomy	24	34	33	.59		18	40	**.01**
	Parent Relations & Home Life	15	21	18	.80		26	33	.45
	Financial Resources	39	43	23	**.05**	Productive vs. All-Rounder p = .03	37	14	**.03**
	Social Support & Peers	29	10	23	**.04**	Productive vs. High Leisure p = .01	34	24	.42
	School Environment	21	19	32	.19		24	39	.09
	Social Acceptance	27	27	35	.65		50	35	.32
KIDSCREEN-10 Index	Global HRQoL	27	17	34	.15		18	40	**.006***

Note. * Remains significant after adjusting for multiple testing.

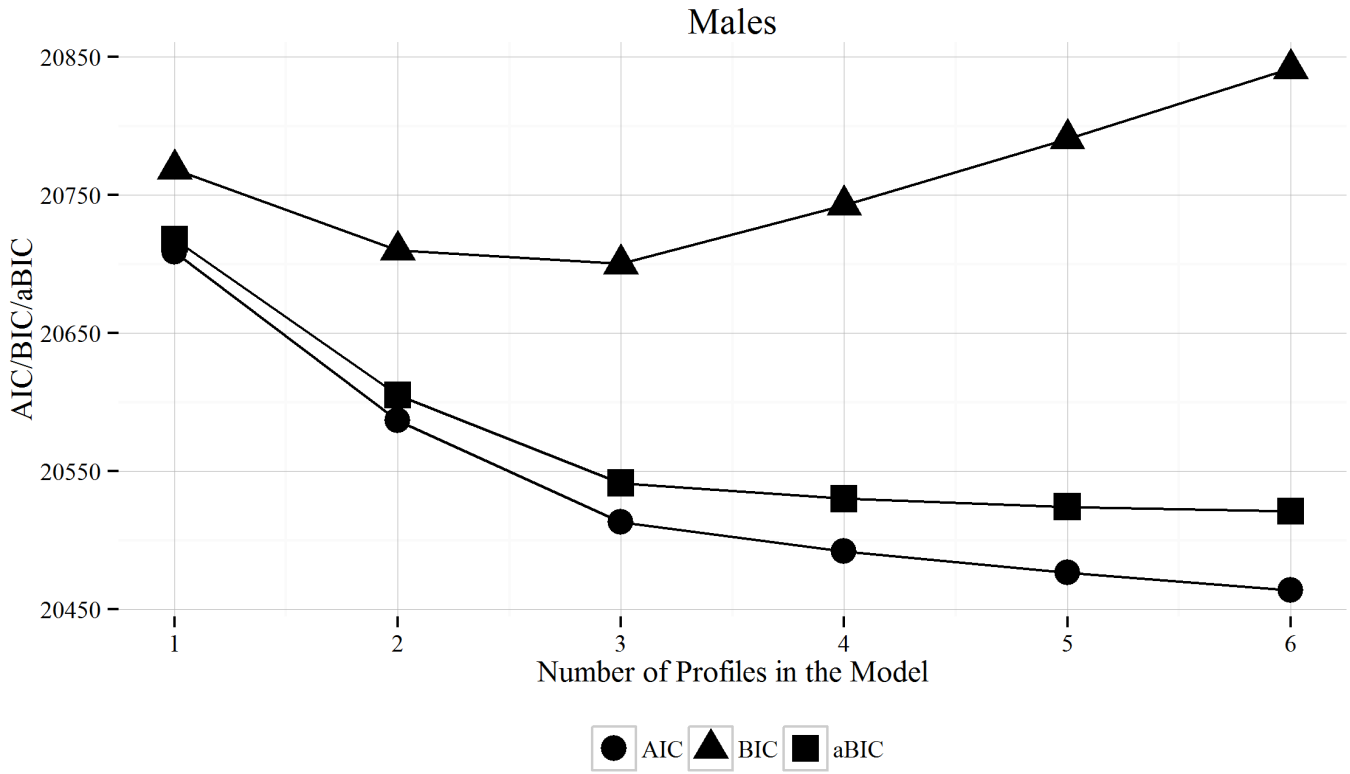


Figure 1a. Model fit indices for 1 to 6 profiles (Males)

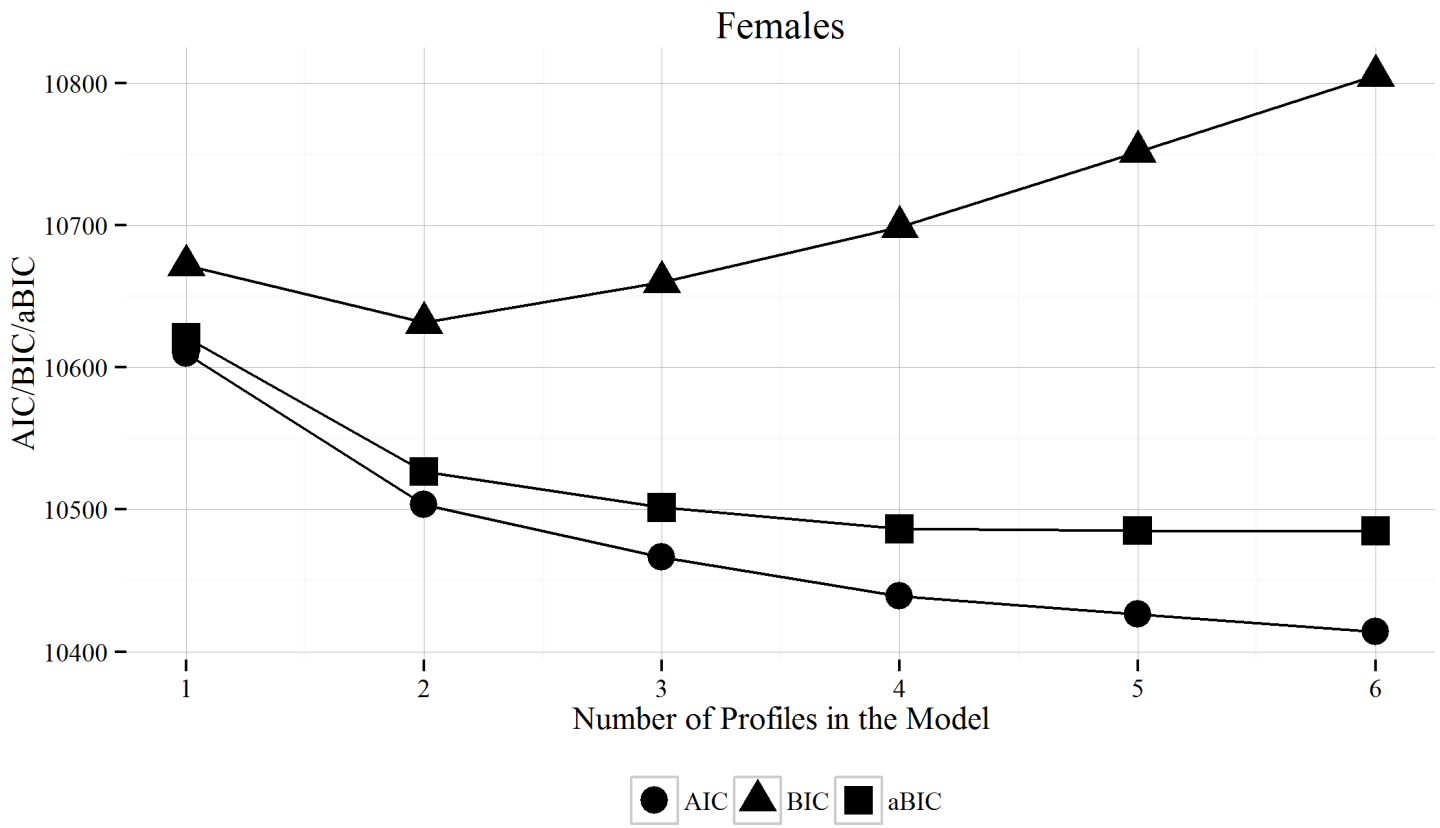


Figure 1b. Model fit indices for 1-6 profiles (Females)

What Can Be Learned from Adolescent Time Diary Research

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Abstract

Purpose: Time-use is increasingly being recognised as a determinant and indicator of adolescent well-being internationally. Three existing literature reviews of time-use research with children and adolescents have identified time-use diaries as the preferred data collection method. Furthermore, they have encouraged researchers to examine multidimensional patterns of overall time-use in large sample whole child populations in order to better understand the health, well-being, and quality of life of children and young people. However, these three existing reviews differ in the time frames covered; the age ranges targeted; the categories of time-use examined; and the time-use data collection and analysis methods used. This study aimed to map the extent and nature of time diary studies with well adolescents (aged 10 – 19 years) and the use of person-centred data analysis of overall time-use as a multidimensional unit. Finally it explores whether and how the included studies analysed the relationship between time-use and health, well-being, and quality of life.

Method: A scoping review method was employed using Arksey and O'Malley's (2005) 5-step framework.

Results: Thirty-three studies met the inclusion criteria. The majority of studies were secondary analyses of cross-sectional population-level time-use or lifestyle survey data. One third of studies (n=11) captured data representing 24 hours of the day. Two studies (6%) used person-centred analyses while six studies (18%) empirically examined time-use in relation to health and well-being. No studies examined adolescent 24-hour time-use and quality of life. ***Conclusion:*** Adolescent time-use researchers are encouraged to be explicit in identifying the stage of adolescence to which their studies relate; capture 24-hour time-use data; analyse overall activity patterns as multidimensional units using person-centred methods; and use robust reliable, valid, sensitive, and age-appropriate instruments to empirically examine time-use and health, well-being, and quality of life. Through this, healthy patterns of everyday activity for adolescents can be illuminated.

Key words: *literature review, time-use, young people, teenager*

Introduction

Around 1 in 6 persons in the world (approximately 1.2 billion people) is an adolescent aged 10 to 19 years [1]. In the last 50 years, their health has improved to a lesser extent than that of younger children [2]. In the United States (US) too, adolescent health has seen little improvement [3]. In fact, worsening mental health outcomes have been noted in the US [4] and internationally [5-7]. Consequently, the health and well-being of adolescents is now a global priority [1, 8]. There is growing international recognition of the need for targeted, holistic, multi-modal, age-appropriate preventive and clinical services for all young people, not just those who are at risk or experiencing difficulties [6, 9, 10]. There is now an emphasis on wellness rather than the prevention of poor health [11] and on "lives not just risk factors" [12, p. S126]. The promotion of healthy lifestyles amongst adolescents is particularly important [13, 14] to prevent the accelerating burden of non-communicable diseases in adulthood [15].

Time-use methodology can provide an important window onto lifestyles [16]. Recognised methods of measuring time-use include direct observation, stylized estimates (i.e., survey questions that ask people to estimate the total time they spend undertaking various activities in a specified time period), experience sampling method (ESM), time stamped/spot observations, and time diaries [17]. Basic time diaries show how people allocate their time in sequences of activities across a designated time period, usually 24 hours. Additionally, data can be collected on simultaneous activities, location, co-presence (i.e., who respondents are with) and affective states such as enjoyment, stress or boredom [18], thus enabling researchers to examine the complex, reciprocal relationships between quantities and qualities of time use, activity contexts, and health outcomes.

The time diary method is deemed best as the resultant data are more accurate and detailed than the alternatives [19, 20]. For example, although Csizszentmihalyi and Larson [21] pioneered ESM with adolescents, this method lacks detail on the total time spent over a day and the nature of activity sequences therein [19]. Furthermore, accounting for all 24 hours of a day is believed to enhance data quality by reducing the potential for reporting errors and social desirability bias among young people [22].
Detailed guidelines for the design, implementation, and analysis of time diary surveys are available [19, 23-25]. Time-use data can be collected retrospectively using a self-completed or interview-administered 'yesterday diary' (i.e., a recall diary that records the previous day's activities) or prospectively with a 'tomorrow diary' (i.e., a diary that

is left with respondents to complete over the course of a designated day in the near future) [25]. Some reports suggest that 'tomorrow diary' data are of marginally higher quality than data from 'yesterday diaries', but the difference is relatively small and may not warrant the significant difference in cost [25]. While the use of 24-hour self-complete 'tomorrow diaries' is considered best practice, given the reasonably similar estimates produced by 'yesterday' and 'tomorrow diaries', it is expected that researchers and national statistical agencies choose an approach that best meets their needs [19]. So-called 'light' diaries use pre-classified lists of activities from which respondents select the activities they were doing. Full-scale diaries require respondents to describe what they were doing in their own words [25]. These responses are then coded *post-hoc* with reference to detailed classification systems (e.g., US Bureau of Labor Statistics [26] American Time-use Survey coding scheme). With both diary formats, classification systems can be flat (i.e., a simple list of activities) or hierarchical with individual activities aggregated into broader activity categories [19]. While there is no single approved international standard classification of activities for time-use surveys [19], adolescent time-use researchers commonly use six aggregate time-use categories, namely personal needs (including sleep), school-related time, work for pay, domestic work, voluntary and religious activities, and free time [27].

Most developing and developed countries now collect time-use data as part of national statistical accounting activities [28]. Since 1990, 69 countries worldwide have conducted a time-use survey [19]. The Multinational Time-use Study at the University of Oxford in the United Kingdom (UK) [29] now includes 18 time-use datasets with diaries from young people, ranging in age from 3 - 17 years, from Europe, the US, and Israel. Additionally, countries such as Australia [30], the US [31], and Ireland [32] collect longitudinal time diary data from young people. In 2015 the UK Millennium Cohort Study [33] will collect time diary data from British 14-year-olds.

Adolescent health professionals have used time diary data to examine diverse aspects of adolescent lifestyles, for example, participation in out-of school activities [34]; sports participation [35]; part-time employment [36]; sleep [37] and electronic media use [38]. Furthermore, studies of adolescent time-use and positive indicators of health and quality of life are emerging [38-40], no doubt reflecting contemporary perspectives that endorse an ecological view of the determinants of adolescent health and well-being [1, 41] and that honour young people's subjective perspectives of their own well-being and quality of life [42, 43]. Indeed, Wallander et al. [44, p. 583] suggested that quality of life could

represent the “ultimate standard” against which to judge the impact of the varied conditions children encounter in their daily lives and society’s efforts to nurture their development. How one lives out one’s daily life is closely connected with quality of life [45]. Given that, time-use studies make an ideal contribution to the evaluation of quality of life [46].

Most studies of young people’s time-use tend to focus on a small number of discrete activities in isolation [47, 48]. However, we need to see how adolescents fill the rest of their days to contextualise these results [49], calling attention to their “...overall patterns of daily life, including sleep, eating habits, mass media consumption, extra-curricular activities, and relationships with parents and peers” [50, p. 413]. Thus *all* the activities performed by an individual in a 24-hour cycle are seen as the building blocks that create an overall pattern of time-use [51]. Moreover, the finite nature of time requires trade-offs among necessary and desired activities [52]. These tradeoffs are referred to as isotemporal substitutions [53] or activity displacements [54]. For example, it is hypothesised that screen time displaces physical activity [55, 56]. However, high levels of physical activity can coexist with high levels of sedentary behaviour [57, 58]. Therefore, unique patterns that are not represented by the aggregate-level average may be identified by person-centred rather than more traditional variable-centred approaches [59, 60]. The person-centred approach seeks to understand the person as a functioning or organised whole rather than a summation of variables [61]. Person-centred methods are growing in popularity in research on adolescent lifestyles [58, 62-65]. Importantly, person-centred analyses of adolescent time-use can more effectively portray the complexity of activity participation typical of many young people’s lives [35] and the impact on their health, well-being and quality of life [66].

To date, how young people fill their days has been the focus of three literature reviews in the last 25 years. Developmental psychologists Larson and Verma [54] conducted a widely cited review of studies of the time-use of children and adolescents aged 5 - 18 years from around the world. They examined studies that employed a variety of data collection methods to explore time spent in four aggregate categories of daily activity namely, school, paid work, housework, and leisure. Personal care, including sleep, was not included as the authors argued that these activities varied comparatively little across populations. Fifty-eight studies published between 1973 and 1999 were included in the review. The most frequently used data collection method was found to be the 24-hour time diary. The authors gave more credibility to findings of time diary studies (along

with ESM and spot observations) over stylised time-use estimates because of their high degree of accuracy.

Three years later, social workers Ben-Arieh and Ofir [47] published their review of the time-use of young people aged 0 - 18 years. Studies published between 1980 and 1999 that examined a range of activities across the day rather than discrete activities in isolation (e.g., television viewing) were included. Twenty-two studies met the inclusion criteria. Concluding their review, Ben-Arieh and Ofir [47] recommended that 24-hour diaries be used in time-use research with children and adolescents; that the focus should be on overall patterns of activity across the day; and that such studies should target the "whole child population" [p. 238] rather than smaller scale studies involving specific populations.

The third review focused exclusively on adolescent overall time-use patterns. Ferrar, Chang, Li, and Olds [57] identified 19 studies published in the last 10 years that used person-centred cluster analytic techniques to empirically describe adolescent time-use patterns, measured by a variety of methods including study specific stylised time-use estimates or established tools such as the *Self-Administered Physical Activity Checklist* [67]. Only one study used a 24-hour activity recall, the computer administered *Multimedia Activity Recall for Children and Adolescents* (MARCA) [68]. The included studies related to young people between the ages of 9 and 18 years and had a minimum of two time-use variables as cluster analysis inputs.

Clearly, the three reviews differ in the time frames covered; the age ranges targeted; the aggregate categories of time-use examined and the time-use data collection and analysis methods used. Furthermore, neither of the first two reviews sought to quantify whether or how the included studies explicitly addressed time-use and health, well-being, and quality of life. While not a primary focus of their review Ferrar, Chang, Li and Olds [57] did note that, with the exception of weight status, few health-related variables were included as correlates in the adolescent time-use cluster studies they reviewed.

The present scoping review thus extends the literature in a number of ways. It focuses on time-use studies with well adolescents aged 10 - 19 years rather than studies involving both children and adolescents. Given that time diaries are considered the most robust method of time-use data collection [19], only studies that employed time diaries to capture data across multiple aggregate categories of daily activity are included. Furthermore, it examines the extent to which such overall patterns of activity were

analysed as a multidimensional unit using person-centred analytic strategies. Finally, this review explores whether and how the included studies analysed the relationship between time-use and health, well-being, and quality of life. Both objective measures of health, such as weight status and physical fitness, and subjective positive indicators of well-being and quality of life [42, 69] are considered.

Method

A scoping review method was used to map the relevant literature. Scoping reviews are recognised as a useful way to explore the breadth of research available at a point in time in the development of evidence within a particular area; to illuminate the most common research approaches employed in the area of interest; to identify gaps in the literature; and to determine if a full systematic review is warranted [70-72]. Scoping reviews do not examine the evidence for a specific intervention [73]. Furthermore, unlike traditional systematic reviews, scoping studies do not seek to assess the quality of evidence, synthesise evidence or aggregate findings from different studies. However, scoping reviews are particularly useful when the field of interest is complex and spread across multiple disciplines; when many different study designs are employed; and when the lack of randomized controlled trials makes it difficult to undertake systematic reviews [70, 73]; as is the case in adolescent time diary research presently. In addition, scoping reviews are more time and cost effective than full systematic reviews [72]. For these reasons, a scoping review method was chosen over the more traditional systematic review method. Examples of recent scoping reviews in the field of adolescent health are presented in Table 1.

Arksey and O'Malley [70] published the original 5-step methodological framework for conducting scoping reviews. These steps are outlined below as they relate to the present scoping review.

Step one: Identifying the research question(s)

Specifically, this review sought to address the following three questions:

1. What is the extent and nature of time diary studies with well adolescents?
2. To what extent are person-centred analyses used?
3. Whether and how the identified studies examined the relationship between time-use and health, well-being and quality of life?

Step two: Identifying relevant studies

Nine databases were searched: CINAHL, EMBASE, PsycINFO, Medline, Proquest, OTDBase, PubMed, SCOPUS and Science Direct. The following keywords (singly and in combination) and phrases were used: adolescent time-use, time-use, time, time diary, time budget, daily activities, daily time-use, young people, young person, diary, time-use, time budget, yesterday diary, time studies, time utilization, daily activities, and time allocation. Truncation (i.e., the retrieval of all words with the same stem but with variant endings) was employed as follows: lifestyle*, child*, youth*, teen*, teenage*, adolescen*, as were the MeSH terms: time factors, time perceptions, time, time and motion studies, and time management. Boolean operators were used and the reference lists of key articles were reviewed.

Step three: Study selection

The review period was from 1990 to June 2011 in the first instance. The review was then updated to March 2014. Studies were selected using the inclusion and exclusion criteria detailed in Table 2.

Step four: Data charting

The data charting form captured information relating to the author(s) and year of publication; study design; the geographical location of the study; study population; sample size; the diary administration method; the number of aggregate activity categories[1] and individual activities recorded; whether the study used variable-centred or person-centred analyses; and whether the study explored the relationship between time-use and objective indicators of health or subjective health, well-being, and quality of life.

Step five: Collating, summarizing and reporting the results

Numerical analyses of the extent and nature of the studies included in the review were conducted [70] and the results are mapped in tables and figures or reported in the text. Non-numeric findings were synthesised and are presented in narrative form.

Results

Thirty-three studies published between 1990 and 2014 met the inclusion criteria for this review (These are listed alphabetically by year of publication in the Appendix). Twenty-

[1] Based on the classification traditionally used in time diary surveys and that used by Zuzanek and Mannell [27] in the CATUS project, daily activities were considered broadly representative of a 24-hour day if six aggregate time-use categories were addressed, namely personal needs (including sleep), school-related time, work for pay, domestic work, voluntary and religious activities, and free time.

nine were cross-sectional studies and four were analyses of longitudinal data. Table 3 shows the geographical distribution of the included studies. The USA and mainland Europe ranked the highest with seven studies each. In the latter case, six of the seven studies were part of a multinational adolescent time-use research project, the Comparative Study of Adolescent Time-use (CATUS) [27].

The majority of studies (n=29, 88%) were secondary analyses of existing datasets, such as national time-use datasets (n=17, 52%) or other national lifestyle datasets (n=12, 36%) that afforded large representative samples. The remaining four (12%) were smaller studies that gathered new data from small to medium size samples. Diary data collection methods included self-report paper diaries (n=17, 52%), the MARCA (n=6, 18%) and telephone or face-to-face interview administered diaries (n=10, 30%).

As evidenced in the data charting form (Appendix A) the age periods to which the studies related varied significantly. For example, some studies focused on 5 - 18 year olds while others examined time-use among 9 - 16 year olds. Those studies that were part of the CATUS project [27] primarily focused on 15 - 19 year olds.

Eleven studies (33%) captured data across six aggregate activity categories while twelve studies (36%) did so across five aggregate activity categories. Five studies each presented data across four and three aggregate activity categories. The number of individual activity codes that were used in the studies ranged from eight to 365.

Thirty-one (94%) of the studies involved variable-centred analyses of time-use. Gender differences in time-use were the focus of enquiry in six of these studies (19%). The second most common focus was changes in time-use over time (n=4, 13%). Other topics included social inequalities in time-use; daily activities and stress; time-use and travel; time-use and maternal employment; cross-national differences in time-use; and the transition to adulthood.

Two studies (6%) used person-centred analytic techniques. Ferrar, Olds, and Maher [82] used cluster analysis in their examination of Australian adolescents' (n=1,853, 9 - 16 years) multi-dimensional time-use as captured by the MARCA. Distinct sex specific time-use clusters emerged, namely *social tasker*, *techno-active,* and *techno-studious* for males and *social screenie, quiet active,* and *techno-studious* for females. Cluster associations with socio-demographic, anthropometric, health, and dietary variables were analysed. Ferrar, Olds, Maher, and Maddison [83] also used cluster analysis in their

examination of New Zealand adolescents' (n=679, 10 - 16 years) multi-dimensional time-use. Different activity patterns characterised the three female clusters (*social sporty, screenie tasker* and *super studious*) and three male clusters (*techno-active, quiet movers* and *social studious*). Weight status, diet, and ethnicity were examined as cluster correlates.

Nine studies (27%) examined time-use and objective indicators of health (Table 4). In some cases multiple indicators were used in a single study. The most frequently used indicator was weight status or body mass index (BMI). Six studies (18%) used non-standardised questions relating to subjective experiences of time pressure, boredom, happiness, satisfaction with time-use, physical fitness, and well-being. However, only two of these studies empirically examined time-use in relation to these subjective states. No studies examined adolescent 24-hour time-use and quality of life.

Discussion

The purpose of this scoping review was to map the extent and nature of time diary studies with well adolescents; to determine the extent to which person-centred analyses were used; and to explore whether and how the identified studies examined the relationship between time-use and health, well-being, and quality of life.

Extent and nature of adolescent time diary studies

Thirty-three studies met the inclusion criteria for this scoping review. The majority of studies were cross-sectional in design, thus no causal inferences can be drawn. However, there are some examples of time-use studies using longitudinal data. Copperman and Bhat [84] and Forshee, Anderson, and Storey [85] analysed time-use data from the Child Development Supplement of the longitudinal American Panel Study of Income Dynamics [31]. Longitudinal time-use studies in particular offer exciting opportunities to understand the lives and worlds of young people and unpack some of the complexities of causation and endogeneity [86] characteristic of studies of adolescent development [87]. As advocated by Larson and Verma [54] repeated studies of adolescent time-use would allow for an assessment of macro-level changes on young people's lifestyles.

The studies identified in this review are diverse in their focus of enquiry, geographical locations, and target populations. The majority of studies involved secondary analyses of existing population-level datasets. This is positive as large-scale samples of the well "whole child population" are examined [47, p. 238]. The extent of diversity in target age

ranges is a less positive finding of this review. The significant differences in age ranges make it very difficult to make comparisons across studies. Moreover, wide age bands in studies of young people may hide rich information specific to narrower developmental stages [13] and compound research and development in knowledge and service delivery in adolescent health [2, 3]. Researchers are encouraged to explicitly describe the developmental stage within adolescence to which their studies relate [2, 3, 6] by using quinary or five-year age bands, namely early adolescence (10 - 14 years), late adolescence (15 - 19 years), and young adulthood (20 - 24 years). The World Health Organisation (WHO) [88] has also recognised the need for age-specific data on young people and has made age disaggregation a standard feature of its data analysis.

The studies in this review date from 1990 to 2014, with computer administered modes of data collection naturally more evident in the last ten years. Advances in technology offer exciting opportunities to collect rich objective data on 24-hour time-use and health behaviours including physical activity and sleep [89, 90]. Given that accelerometry apps and global positioning systems (GPS) are generally available on mobile phones nowadays, future time-use surveys should capitalise on these technologies to enhance the depth and breadth of activity and location data. Indeed, such tools are more likely to appeal to current generations of young people who are more proficient users of technology and media [91], thus potentially yielding higher response rates and more accurate data. The considerable financial burden of data coding would also be largely eliminated. Naturally, the privacy issues associated with this use of technology require sensitive consideration [92].

Web-based or computer administered time-use surveys also enable faster data analysis and dissemination of findings, thus enabling contemporaneous interpretation of findings [93]. As data collection in Hunt, McKay, Fitzgerald, and Perry's study [93] took place in late 2007, the data do not reflect the widespread penetration of mobile technologies in the lives of today's adolescents [91]. Furthermore the diary instrument did not distinguish between Computer/Internet use for gaming or social networking. In 2007, the global phenomenon of social networking did not exist in the mainstream society or youth culture whereas, between March 2012 and March 2013 alone, Facebook® [94] reported an increase of 26%, or 665 million daily users, clear evidence of the challenging nature of conducting research in a "constantly changing virtual world" [95, p. 417]. This is a particularly important issue given that the daily lived experience of young people internationally confronts them with "more complex worlds, with more

contractions and challenges" than before [96, p. 1013]. The impact of technology on adolescent health requires further study [41].

Mirroring the findings of Ben-Arieh and Ofir [47] and Hagell et al. [48], a minority of studies (33%) captured data across six aggregate activity categories, broadly representing 24 hours of the day. As a result, knowledge of children's lives, activities, and time-use is incomplete [47].

Variable-centred or person-centred analyses

In addition to these calls for data collection from across the whole day, there is growing recognition of the need to analyse activity patterns as multidimensional units, that is, the overall activity pattern rather than discrete activities in isolation [48, 57, 97, 98]. This is not surprising given that "time devoted to one domain of activity takes on full meaning only when viewed in terms of its functional relation to time spent in other domains" [99, p. 386]. The relationship between lifestyles (which are largely defined by daily activities) and health and well-being is now being considered from a more macroscopic viewpoint with interest in overall patterns of daily activities [100-102]. While person-centred methods are becoming increasingly popular in research on adolescent lifestyles, these studies tend to examine discrete behaviours (e.g., physical activity, sedentary behaviour) rather than 24-hour time-use and are often based on stylised estimates of time-use rather than diary data. For example, in Ferrar, Chang, et al.'s study [57], only one of the 19 studies used data from across the 24 hours of the day as cluster inputs. The current scoping review identified only two studies (6%) that used person-centred analyses of 24-hour time-use data. Given that "the whole picture has information beyond what is contained in the separate parts" [103, p. 11], this is a significant gap in the knowledge base.

Studies of time-use and health, well-being and quality of life

Nine studies (27%) examined time-use and objective indicators of health, most frequently weight status or BMI. This is not surprising given the widespread concerns about overweight and obesity amongst children and adolescents [1, 104, 105]. The WHO [106] and governments internationally [107-110] have targeted the unhealthy physical activity behaviours of children and adolescents as a key priority to address the increasing prevalence and burden of overweight, obesity, and other non-communicable diseases. Taking a different approach to exploring time-use and objective indicators of health, by drawing where possible on national guidelines such as those from the US

National Sleep Foundation and the American Academy of Pediatricians (relating to screen time), Wight, Price, Bianchi, and Hunt [111] constructed objective measures of time-use relevant to adolescents (n=2,033, 15 - 17 year olds) well-being, such as sleep, eating, schoolwork, and television viewing, using data from the nationally representative 2003 - 2005 American Time-use Survey. Six studies examined time-use and subjective health and well-being. Non-standardised questions relating to subjective experiences of time pressure, boredom, happiness, satisfaction with time-use, physical fitness, and well-being have been used [49, 112-114], although time-use was not examined in relation to these subjective states. Although two studies attempted such analyses, using Dutch [115] and Belgian [116] time-use data, these showed only weak results and were limited by the fact that the time-use and well-being data were drawn from separate datasets [115] and used a single health indicator [116]. Moreover, residual confounding [117] may have lead to biased associations.

Thus, this review highlights the limited empirical research that has examined time-use in relation to health, well-being, and quality of life. This echoes the finding of Ferrar, Chang, Li and Olds [57] who noted that health-related variables were largely unexplored as cluster correlates with the notable exception of weight status associations which were reported in six of the 19 studies. Furthermore, these findings support Glorieux et al.'s belief [116, p. 505] that "the questionnaires accompanying time-diaries are not well suited to link activity patterns of adolescents with more sophisticated indicators of health and well-being". This review identified no evidence of the use of standardised, generic, cross-cultural instruments for the subjective measurement of positive health and well-being. This is at odds with current perspectives in adolescent health that favour strengths-based approaches to understanding the lives of young people and that prioritise their self-report of health and well-being [43, 69, 118-122]. Although quality of life is recognised as an important component in the measurement of well-being [123] no studies were identified that examined adolescent 24-hour time-use and quality of life. Reliable, valid, sensitive, and age-appropriate instruments need to be used to robustly examine time-use and health, well-being, and quality of life amongst adolescents. The inclusion of modules on self-reported well-being generally [124] and child positive well-being and quality of life indicators particularly [125] in large time-use surveys will illuminate our understanding of the bidirectional and interactive processes that occur within and between nested environmental spheres [86] and inform adolescent policy development and service provision targeting increased positive behaviours, relationships, and competencies. Therefore, the inclusion of time-use

components within larger scale representative surveys allows adolescent health researchers conduct detailed studies of the diverse influences on time-use at points in time, and in the case of longitudinal studies, across lifetimes and generations of individuals and families [28]. Research is needed on how 'the quantities and qualities of experiences in different activities act in combination' to affect adolescent development, health, well-being and quality of life [126, p. 163].

Arksey and O'Malley's [70] framework is not without its limitations, most notably the potential for lack of rigor in data charting and the absence of quality assessment of included studies [73]. However, it is generally accepted that the breadth and comprehensiveness of the scoping process needs to be balanced with feasibility [73]. Although the two authors did consult each other throughout the scoping review process, resource limitations prohibited the independent review of each of the articles. Therefore, it is possible that some bias may have been introduced. However, the rigorous application of the study inclusion and exclusion criteria minimised this risk.

Summary and Implications

This scoping review mapped the extent and nature of time diary studies with well adolescents. Thirty-three studies met the inclusion criteria. The majority of studies were secondary analyses of cross-sectional population-level time-use or lifestyle survey data. One-third of studies (n=11) captured data representing 24 hours of the day. Two studies (6%) used person-centred analyses while six studies (18%) examined time-use and health and well-being. None of the reviewed studies examined adolescent 24-hour time-use and quality of life. Individually and collectively, adolescents need to be educated and supported to create health through their everyday patterns of doing [127]. By engaging in a daily round of activities that enhances their health, well-being, and quality of life adolescents can flourish and fulfil their potential for a life of quality in the 21st century. To that end, adolescent health researchers are encouraged to consider the secondary analysis of population-level time-use datasets, in particular those that include modules on well-being [28, 124]. Furthermore, adolescent time-use researchers are encouraged to identify the stage of adolescence to which their studies relate; capture 24-hour time-use data; analyse overall activity patterns as multidimensional units using person-centred methods; and use robust, reliable, valid, sensitive, and age-appropriate instruments to empirically examine time-use in relation to health, well-being, and quality of life.

Implications and Contribution (Summary Statement)

Analysing adolescent 24-hour time diaries and standardised health, well-being, and quality of life data using person-centred methods can illuminate healthy patterns of everyday activity. By engaging in such patterns of daily activities, adolescents can enhance their health and well-being, flourish and fulfil their potential for a life of quality.

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Table 1

Recent Examples of Scoping Reviews in the Field of Adolescent Health

Topic	Author [Reference Number]
Models of transitional care for young people with complex health needs	Watson, Parr, Joyce, et al. [74]
The effect of the environment on participation of young people with disabilities	Anaby, Hand, Bradley, et al. [75]
Life quality and health in adolescents with epilepsy	Thomson, Fayed, Sedarous, Ronen [76]
Behavioural treatment recommendations in clinical practice guidelines for children with attention-deficit/hyperactivity disorder	Vallerand, Kalenchuk, McLennan [77]
Anthropometric measurements in Canadian children	Patton, McPherson [78]
Conceptual frameworks and core clinical practices around working with adolescents	Sawyer, Ambresin, Bennett, Patton [79]
Neurogenerative change following traumatic brain injury	Keightley, Sinopoli, Davis [80]
Obesity and overweight in Bangladeshi children and adolescents	Rahman, Islam, Alam [81]

Table 2

Scoping Review Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1990 – 2014	Not primarily focused on children (e.g., 0-13 years)
Empirical data on a broad range of daily activities / multiple activity domains (3 or more aggregate activity categories)	Not clinical populations (e.g., teenagers with cerebral palsy)
Adolescent age range: 10-19 years	Not discrete activities in isolation (e.g., watching television)
Well adolescents	Not theoretical or methodological papers or literature reviews
Time diaries as data collection instrument	Not book chapters / theses / grey literature
Findings reported as actual time spent in activities	Not time use converted into metabolic equivalents (METS) or energy expenditure
Human time use	
Published in English in peer-reviewed journals	

Table 3

Geographical Distribution of Included Studies

Region	n (%)
USA	7 (21)
Mainland Europe	7 (21)
Australia	6 (18)
UK	3 (9)
Multi-region	3 (9)
Canada	2 (6)
New Zealand	1 (3)
Taiwan	1 (3)
Indonesia	1 (3)
South Africa	1 (3)
Ireland	1 (3)

Note. Percentages do not total to 100 due to rounding.

Table 4

Objective Indicators of Health in Adolescent Time Diary Studies

Objective Indicator	n (%)
Weight status or body mass index (BMI)	5 (15)
Accelerometry / pedometry	2 (6)
Physical activity intensity levels and metabolic equivalents (METS)	2 (6)
Diet	2 (6)
Health Index (presence of health conditions)	1 (3)
Salivary cortisol	1 (3)

Appendix

Scoping Review of Adolescent Time Diary Research Data Charting (N=33)

Author & Reference Number	Study Design	Study Location	Study Population	Sample Size	Secondary Dataset (if applicable)	Time Use Diary Administration Method	Primary Focus of the Study	Number of Activity Categories	Number of Activities	Relationship with objective health indicators health examined empirically	Relationship between time use and self-rated health & wellbeing examined empirically	Variable centred (VC) or person centred (PC) analyses
Hunt, McKay, Fitzgerald & Perry [93]	Cross-sectional	Ireland	15-19 years	731	n/a	Self report paper diary	Gender and social class differences in time use	6	31	No	No	VC
Ferrar, Olds, & Maher [82]	Secondary analysis of cross-sectional national survey data	Australia	9-16 years	1853	National Children's Nutrition and Physical Activity Survey	Multimedia Activity Recall for Children and Adolescents (MARCA)	Time use clusters and correlate-cluster profiles	5	17	Weight status Pedometer steps Diet Health Index (presence or absence of medical conditions)	No	PC (cluster analysis)
Ferrar, Olds, Maher, & Maddison [83]	Secondary analysis of cross-sectional national survey data	New Zealand	10-16 years	679	National Survey of Children and Young People's Physical Activity and Dietary Behaviours	MARCA	Time use clusters and associations with weight status, diet and ethnicity	5	17	Weight status Diet Accelerometry	No	PC (cluster analysis)
Roydhouse, Allman-Farinelli, McGeechan, & Olds [128]	Secondary analysis of cross-sectional national survey data	Australia	12-16 years	1532	National Children's Nutrition and Physical Activity Survey	MARCA	Active and low energy behaviour	3	39	MET	No	VC (principal component analysis)
Ferrar, Olds, Maher, & Gomersall [129]	Secondary analysis of cross-sectional national survey data	Australia	9-16 years	2071	National Children's Nutrition and Physical Activity Survey	MARCA	Social inequalities in health-related use of time	3	39	No	No	VC

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Ferrar, Olds, & Walters [130]	Secondary analysis of cross-sectional national survey data	Australia	9-12; 13-16	2200	National Children's Nutrition and Physical Activity Survey	MARCA	Gender differences	3	39	No	No	VC
McHale, Blocklin, Walter, Davis, Almeida, & Klein [131]	Cross-sectional	USA	10-18 years	28	n/a	Telephone administered interview diary, Daily Inventory of Stressful Events – Youth Version	Daily activities and stress	4	9	Salivary cortisol	No	VC
Olds, Ferrar, Gomersall, Maher, & Walters [132]	Secondary analysis of cross-sectional national survey data	Australia	9-16 year olds		National Children's Nutrition and Physical Activity Survey	MARCA	Time use trade-offs	3	39	Weight status	No	VC
Zick [133]	Secondary analysis of two cross-sectional datasets	USA	15-17 years	1977-1978: 471 2003-2005: 562	Family Time Use Survey American Time Use Survey	Computer Administered Telephone Interview (CATI)	Changes in time use over time	5	19-400 activity codes	No	No	VC
Forshee, Anderson, & Storey [85]	Secondary analysis of longitudinal national survey data	USA	5-18 years	1459	Child Development Supplement (2003) of the US Panel Study of Income Dynamics	CATI	Family characteristics, time use and BMI	5	8 activities	BMI	No	VC
Mullan [134]	Secondary analysis of cross-sectional national survey data	UK	8-13 years 14-18 years	2104	UK Time Use Survey 2000-2001	Self report paper diary	Time use and maternal employment	4	Not reported	No	No	VC

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Österbacka & Zick [135]	Secondary analysis of cross-sectional national survey data	Finland USA (multiregion)	15-19 years	1712	Finnish Time Use Survey 2000 American Time Use Survey 2003	CATI	Transition to adulthood in two countries	5	12	No	No	VC
Wight, Price, Bianchi, & Hunt [111]	Secondary analysis of cross-sectional national survey data	USA	15-17 years	2033	American Time Use Survey 2003	CATI	Time use with a focus on activities that may affect well-being	5	22	Sleep duration and TV viewing analysed with reference to national health guidelines.	No	VC
Hilbrecht, Zuzanek, & Mannell [114]	Cross-sectional	Canada	12-14 years 15-19 years	2154	Ontario Adolescent Time Use Study 2001-2003	Self report paper diary	Time use, time pressure and gendered behaviour	6	20	No	Feelings of time pressure measured but not examined in relation to time use.	VC
Lloyd, Grant, & Ritchie [136]	Cross-sectional	Pakistan Nicaragua Kenya India South Africa (multiregion)	12-14 years 15-16 years 17-19 years 20-21 years	Not reported	National time use datasets	Face-to-face interview administered diary	Gender differences in time use in 5 countries and implications of school enrolment	4	Not reported	No	No	VC
Copperman & Bhat [84]	Secondary analysis of longitudinal national survey data	USA	5-18 years	1970	Child Development Supplement of the US Panel Study of Income Dynamics	CATI	Activity travel patterns	5	365 activity codes	No	No	VC
Hsin [137]	Secondary analysis of longitudinal survey	Central Java, Indonesia	8-18	2928	Worker and Iron Status Evaluation	Face-to-face interview administered diary	Gender differences	4	16	No	No	VC
Sleap, Elliott, Paisi, & Reed [138]	Cross-sectional	UK	9-15 years		n/a	Self report paper diary	Lifestyles of affluent young people, physical activity	3	21	Self reported intensity levels of physical activity.	No	VC

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Blanke & Cornelißen [139]	Secondary analysis of cross-sectional national survey data	Germany	15-19 years	1986	German Time Use Surveys 1991/1992 and 2001/2002	Self report paper diary	Gender differences	5	200+ activities	No	No	VC
Chenu & Lesnard [140]	Secondary analysis of cross-sectional national survey data	France	15-19 years	1757	French Time Use Surveys 1986 and 1998	Self report paper diary	Changes in time use over time	6	19	No	No	VC
Glorieux, Stevens & Vandeweyer [116]	Secondary analysis of cross-sectional national survey data	Belgium	12-15 years 16-19 years	750	Belgian Time Use Survey 1999	Self report paper diary	Time use and well-being	6	22	No	Yes One question on self assessed health Time use of those who rated their health as 'very good' was compared with those who rated their health as 'good' to 'very poor'	VC
Hilbrecht & Zuzanek [112]	Cross-sectional	Canada	12-19 years	2113	Ontario Adolescent Time Use Study 2001-2003	Self report paper diary	Time use, eating habits and obesity	6	Not reported	BMI	Self-rated health and physically fitness Perceived future health prospects Emotional well-being Time pressure But none of the above analysed in relation to time use	VC
Huysmans , Zeijl & van den Broek [115]	Cross-sectional	The Netherlands	15-18 years	81-250 4705	Dutch Time Use Survey 1980-2000 (5 surveys) Dutch National Survey of Students	Self report paper diary	Leisure and well-being	4	Not reported	No	Social and emotional well-being correlates drawn from a different dataset	VC

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Pääkkönen [141]	Cross-sectional	Finland	10-18 years	Not reported	Finnish Time Use Surveys 1987-1988 and 1999-2000	Self report paper diary	Changes in time use over time	5	20	No	No	VC
Short [49]	Cross-sectional	UK	15-19 years	566	UK Time Use Survey 2000-2001	Self report paper diary	Time use, health and well-being	6	25	No	Time pressure Self rated health (single item) But the above were not analysed in relation to time use	VC
Soupourmas [142]	Cross-sectional	Australia	15-19 years	Not reported	Australian Time Use Surveys 1992 and 1997	Self report paper diary	Work, rest and leisure	6	25	No	No	VC
Vaage [113]	Cross-sectional	Norway	12-15 years 16-19 years	357 (year 2000) 238 in 1990; 160 in 2000	Norwegian Time Use Surveys 1990 and 2000	Self report paper diary	Changes in time use over time	6	23	No	Felt stressed during the day But the above not analysed in relation to time use	VC
Vernon [143]	Cross-sectional	USA	15-19 years	1356	AmericanTime Use Surveys 2003 and 2004	CATI	Contexts of adolescent development	6	24	No	No	VC
Wittenberg [144]	Cross-sectional	South Africa	12-20 years	3923	South African Time Use Survey 2000	Face-to-face interview administered diary	Lives of school-going young people	6	29	No	No	VC
Zuzanek [50]	Cross-sectional	Canada and 9 other developed industrial societies (multiregion)	15-19 years	4019	National time use surveys and Ontario Adolescent Time Use Study 2001-2003	Self report paper diary	Comparisons of time use and well-being amongst 10 countries	6	23	No	No	VC

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Kao & Kellegrew [145]	Cross-sectional	Taiwan	13-14 years	18	7 day time diary	Self report paper diary	Gifted children, time use and self-concept	5	13	No	Multidimensional Self-Concept Scale	VC
Macek [146]	Cross-sectional	Czech Republic	13-18 years	257	Euronet Pilot Study	Self report paper diary	General focus on time use	5	17	No	No	VC
Mauldin & Meeks [147]	Secondary analysis of longitudinal national survey data	USA	3-17 years (grouped into 5 age categories)	492	1981 Time Use Longitudinal Panel Study	Self report paper diary	Gender differences	5	26	No	No	No

Note. *Studies listed in alphabetical order by year of publication. Number in square brackets corresponds to number in reference list.*