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**In Fitness And In Health: Women's Safe Navigation Of
Fitness On Social Media**

Thesis presented by

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for the degree of

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University College Cork

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ABSTRACT

The proliferation of online fitness content in recent years has increased the availability and accessibility of health and fitness information. Emerging research identifies concerns associated with using social media for fitness, including negative impacts on health and mental health, which are reportedly worse for women. Despite these concerns, digital fitness is one of the largest niches on social media and has garnered attention in the field of HCI.

Against this backdrop, this thesis explores women's safe navigation of social media for fitness. This PhD details users' engagement with fitness content across platforms, focusing on their perceived safe navigation. These findings can help us support users' active and critical cross-platform use for fitness on social media.

Across three studies, this work explores women's use of social media for fitness, paying particular attention to their perspectives on online safety. Firstly, this thesis details a systematic review that contributes to our understanding of women's use of social media for fitness by identifying their multifaceted and cross-platform engagement. Then, through in-depth interviews and surveys, this work describes competent and caring users and identifies their capability to navigate digital fitness safely and their expressed concern for younger users. Finally, through a series of exploratory workshops, this thesis investigates the development of this capability and, in response to their concerns, attempts to translate it into a game-based intervention.

Findings indicate the contextual and relational nature of navigating digital fitness. This implies that safe use requires an understanding of the fitness space, for example, that content is highly curated by creators, and a knowledge of the intricacies of nutrition and exercise. The relational nature of navigation describes

how participants make sense of content and others online, relying heavily on other members of their communities, friends, and family. By drawing on their lived experience, education and relationships, users have learned to safely navigate fitness on social media over time. Users also report making and learning from mistakes, as they recognise the potential harms associated with fitness content and empathise with users who may be susceptible to these harms. This thesis explores how these learned competencies may be developed into an intervention. Focusing on the community learning users describe, the findings are translated into a cooperative game-based intervention for improving fitness-related digital literacies to promote the relational aspect of learning.

This thesis contributes to the field of HCI by accounting for women's safe use of digital fitness. It provides further evidence of the context-specific nature of digital literacy and sheds light on the potential for context-specific digital literacy interventions to promote online safety. Therefore, this thesis helps those researching and designing for safe social media use to make informed decisions towards safer, more empowered social media use.

In conclusion, this PhD contributes to our evolving understanding of the complexities of fitness digital literacies. It underscores the importance of supporting situated learning and facilitating interpersonal learning for complex topics. It also positions games as a suitable intervention for this learning by encouraging collaboration, which is key to relational sensemaking. Moving forward, this research calls for the recognition of, and design for, the relational and context-dependent nature of digital literacy to promote safe and agentic online fitness experiences.

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DECLARATION

This dissertation results from research and design carried out in the School of Applied Psychology (at UCC) and the School of Design (at UL) from September 2021 to November 2024. This declaration is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism and intellectual property.

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December 2025

PUBLICATIONS FROM THIS THESIS

Doireann Peelo Dennehy, Stephanie Murphy, Sarah Foley, John McCarthy and Kellie Morrissey. "Keeping Fit & Staying Safe: A Systematic Review of Women's Use of Social Media for Fitness." *International Journal of Human-Computer Studies* (2024): 103361. <https://doi.org/10.1016/j.ijhcs.2024.103361>

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PUBLICATIONS FROM THIS THESIS

The peer-reviewed publications above are presented as chapters to form this thesis. I am the first author on these publications, and as such, I carried out the study design, data collection, analysis and led the writing and publication processes. My co-authors made the following contributions:

Stephanie Murphy: Stephanie assisted in screening papers for the first study and provided feedback on the papers.

Dr Sarah Foley, Prof. John McCarthy, and Dr Kellie Morrissey: As the PhD supervisors, they contributed to the work through discussions, developing ideas, and providing feedback on papers. Dr Kellie Morrissey was the primary supervisor and additionally provided guidance through the publication and writing processes.

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CHAPTER 1: INTRODUCING IN FITNESS AND IN HEALTH

In an increasingly digitally mediated society, women's fitness-seeking and sharing often takes place online due to the accessibility and individualisation of content and experiences. This PhD explores women's negotiations and understandings of safe social media use in the context of digital fitness. Particularly as (1) literature cites the benefits and challenges of using social media for fitness, (2) young women are the largest user group [388], and (3) their safety and privacy practices are underexplored [216], there is a need to examine women's experiences on these platforms. This thesis qualitatively analyses existing literature and data collected through interviews, surveys, and workshops with over 100 young women to understand their experiences of using social media for fitness, paying particular attention to their attitudes towards online safety and privacy.

Historically, societal norms and expectations have mediated women's engagement with fitness. For instance, in the early 19th century, gendered expectations that women should be graceful and feminine influenced the exercises they were permitted to engage in, limiting them to walking and dancing [335]. Other social perceptions viewed vigorous exercise and intellectual work as stealing from reproductive organs, which could lead to infertility [344]. In the 19th century, many doctors held a 'vitalist' perspective towards physiology, viewing the body as having a limited energy supply [409]. In turn, this meant that menstruation (not to mention exercise) could weaken women because it used up blood from the brain and organs [344].

The rise of aerobics was the first opportunity for women to enter gym spaces that had historically excluded them [48]. As women gained more access to exercise, the expectations placed on their bodies shifted accordingly. Rather than being confined to dancing and walking to maintain their grace and femininity [335], women could practice aerobics and calisthenics, which meant that they were increasingly expected to be thin and toned [47]. Many women internalise the idealised thin and toned body portrayed in media and advertising, which can lead to poor body image, exercise compulsion, dieting and disordered eating practices for some of these women [44, 277]. The idea that women should look a certain way, engage in particular exercises and eat specific foods aligns with a consumer-driven socio-economic system [48]. Therefore, in some cases, society, exercise, fitness, nutrition and body image are inextricably linked for many women. These pressures are exacerbated by the influx of social media content, which provides instant access to fitness information and perpetuates fitness norms.

Using social media platforms as spaces for fitness-related learning and sharing is a rapidly growing phenomenon, with over half a million fitness influencers producing and distributing content [378]. This surge in fitness-related content presents well-established challenges for Human-Computer Interaction (HCI) and Computer-Supported Cooperative Work (CSCW) researchers, particularly around safeguarding and user wellbeing. For example, a substantial body of literature that explores social media use for fitness cites negative impacts associated with its use, reporting that exposure to fitness content can lead to body dissatisfaction [40, 129, 131], negative mood [130, 176], and disordered eating [40, 256]. These harms are reportedly worse for women [106].

HCI and CSCW research has begun to explore how social media shapes fitness practices, highlighting that social media can promote behaviour change [133, 139],

influence how users seek advice [188, 209] and learn about fitness [185]. However, women's experiences in these digital fitness spaces – especially their safety, privacy and navigation strategies – remain underexplored [45, 216].

Given the limited research, this thesis addresses the gap by investigating how young women engage with fitness on social media, the risks they encounter, and the strategies they use to mitigate the negative impacts of these platforms. This work builds on a body of literature that examines the adverse effects of engaging with fitness. However, this thesis does not dwell on the potential harms of using social media for fitness. Instead, it emphasises a competent user who safely navigates fitness content with *“a pinch of salt”*. As a result, this PhD offers an alternative narrative to the existing literature, which positions users as naïve, and instead depicts a competent and caring user. This PhD draws on users' competencies for safely navigating online fitness, as well as their concerns about younger users, in a final study that explores a game-based digital fitness literacy concept for girls aged 10-13 as they begin to form digital habits [114].

In this first chapter, I outline a brief background and motivation for this work. This includes a short introduction to women's use of social media for fitness and game-based interventions within HCI for digital literacy.

1 USING SOCIAL MEDIA FOR FITNESS: THE GOOD, THE BAD AND THE UGLY

Social media has been changing how we search for and learn about fitness, garnering the attention of HCI researchers [191]. In this thesis, I use fitness as a term that refers to physical performance, exercise, training, and related aesthetics. Therefore, using social media for fitness refers to the use of online platforms or forums to learn about, share, or view fitness-related content. HCI research has

begun to capture the use of social media to promote fitness-related behaviour change [133, 139] and explore how users seek advice [188, 209] and learn about fitness [185].

This thesis focuses on young women's experiences, predominantly those under 30 as they are the largest users of social media for fitness [388]. Young women are most vulnerable to the negative effects of social media and face unique privacy and safety concerns, including harassment [392, 410] and body image concerns [106, 425]. Furthermore, online fitness provides a connection for many young women to the positive health benefits of physical activity [57]. Considering that women are less likely to engage in [152] and more likely to report barriers to exercise than men [274], fitness content may provide an accessible way to reduce some of these barriers. Young women's disproportionate exposure to both the harms and benefits of using social media for fitness makes them a critical group for this research.

Although online fitness continues to grow [378], there remains a lack of engagement from the HCI community surrounding the gendered use of social media for fitness [45], and a gap in our understanding of this user group's attitudes towards safety and privacy.

According to the International Encyclopedia of Media Literacy, De Kimpe *et al.* define online safety as *“a set of issues that are, either directly or indirectly, related to the physical and psychological well-being of Internet users”* [97]. I adopt this interpretation throughout this thesis. As such, this chapter introduces many of these issues, paying particular attention to those that influence psychological well-being and can often manifest physically.

Women are the largest user group that uses social media for fitness [388], and they report that their usage improves their access to fitness information and provides tailored exercise regimes [299]. In the context of this thesis, the fitness

content that users engage with varies, but it includes workouts, nutrition, recipes, lifestyle content, and sports-specific information. Their access to fitness content and tailored exercise advice is often provided by fitness influencers, and women increasingly rely on them for information about health, fitness, and nutrition [209]. Fitness content has been found to play a crucial role in maintaining a healthy lifestyle, particularly for young women, as it is associated with increased physical activity and the consumption of fruits and vegetables [116]. The fitness content that users engage with in this thesis varies, including workouts, nutrition, recipes, lifestyle content, and sports-specific information. Some fitness content intended to be motivational, promoting maintaining or improving fitness, is often referred to as ‘fitspiration’ in literature [131].

In their search for fitness information, users seek authentic influencers who are relatable and credible, which makes these creators trustworthy [295]. Users also look to qualified influencers; however, influencers’ qualifications do not ensure the quality of the content they produce, as research finds that education does not prevent influencers from sharing low-quality information about exercise and health [232]. The sharing of low-quality fitness-related information, or misinformation (which is false or misleading information that is generally shared unintentionally [8]), can make it more difficult for women to navigate health and fitness online [232].

Misinformation spans many domains, yet fitness, nutrition and physical activity are notably susceptible. In this context, adhering to misinformation can have harmful health implications. For instance, if misinformation is incorrectly identified and applied, it can have negative implications, including injury [234], poor nutritional practices [256] and even worsened medical conditions [370]. Furthermore, content can be misleading in its dishonesty, as users share posts that

are altered without disclosing that it is edited, or if they are not clear about the work involved in achieving their physique, for instance, not disclosing that they have undergone plastic surgery. Much of the fitness content online is highly curated, which can exacerbate digitally mediated representations of fitness that are often unattainable. The unattainable bodily standards set by online fitness can have a negative impact on women's well-being [106].

A significant portion of the literature reports negative impacts that consuming fitness content may have on women and girls [106], including disordered eating [40, 256], body image concerns [40, 129, 131], and reduced self-perceived sexual attractiveness [106]. For instance, a study examining 269 participants found that engagement with fitness and clean eating material was linked with thin-ideal internalisation and disordered eating symptomatology [425]. Further work into the impact of fitspiration (content serving as motivation to maintain or improve health or fitness) on self-perceived sexual attractiveness found that viewing fitspiration was more likely to lower self-perceived sexual attractiveness among women than travel images, which the control group viewed [131]. Therefore, observing fitness content can result in negative self-comparison [40, 129, 131] due to digitally mediated representations of fitness that emphasise thinness and muscularity [47], as well as women's desire to reflect this particular beauty standard. Interestingly, research with 122 women spanning 28 days finds that taking a break from observing fitspiration content can increase users' mood and body satisfaction [130]. This further supports the negative impact that observing fitness can have on users' body image, but highlights that ceasing engagement can reverse the negative effects. However, given the benefits of using social media for fitness, such as connecting with the community [149, 285], tailored fitness programs [299], increased physical activity, and improved nutrition [116], it is unlikely that ceasing

engagement is a viable option. Therefore, women's use of social media for fitness must be understood so that we can support safer use while allowing women to continue enjoying the benefits of their engagement.

Body image concerns are well-reported, but for women engaging with fitness content, digital safety risks extend to gender-based harassment [392, 410] and image-based sexual abuse [75, 242]. Unfortunately, these experiences are consistently reported within online fitness communities [26, 64, 311, 373, 392] and among young women [64]. This body of research highlights a growing concern for women's safety online [339, 406, 410]. The digital safety risks described above highlight the potential impact of digital fitness on women's physical and psychological well-being. These physical and psychological risks make it essential to engage with the digital fitness context. This is particularly concerning given the popularity of social media as a primary source of fitness information, which is often unregulated. By understanding how women experience and navigate these risks, HCI can support users' psychological safety and facilitate healthier, more informed engagement in digital fitness.

1.1 Data Surveillance, Privacy Paradox and Digital Literacy

Women use a variety of social media platforms for fitness (Instagram, TikTok, YouTube and Forums), and this cross-platform engagement poses many of the more general, well-established HCI concerns around user safety and privacy in the digital age [78]. These concerns relate to regulation, surveillance capitalism, privacy paradox and digital literacy. (The concept of 'surveillance capitalism' describes how extracted behavioural data can be turned into intelligence that can map users' actions and predict their future actions [436]. The privacy paradox refers to the discrepancy between users reportedly valuing their privacy and their

actions that do not adequately protect their personal data [24]). These three concerns are intertwined, and when viewed together, can provide insight into how autonomy and agency are shaped or distorted online.

As platforms rapidly develop, research and regulations regarding user safety struggle to respond to emerging concerns, which is often referred to as the ‘pacing problem’ [229]. Privacy regulations, such as the General Data Protection Regulation [440] (GDPR), are designed to protect users; however, making informed decisions about privacy and security is challenging because many users may not fully understand the privacy and security vulnerabilities they are exposed to [1].

However, Solove [357] argues that the concept of privacy paradox is built on flawed logic; users’ privacy attitudes are broad and general, while users’ behaviours are context-specific. For example, users’ attitudes may consider data usage by news outlets inappropriate; however, to gain access to personalised fitness, data usage may be deemed appropriate [96]. Additionally, privacy management is an overwhelming task, complicated by the varied platform policies and the complex language used in these policies [87]. Furthermore, research finds that privacy literacy levels or technical knowledge do not prevent ‘privacy paradoxical’ behaviour [25]. Therefore, the privacy paradox extends beyond individual users’ management, particularly as platform privacy management tools often lack personalised, accurate or flexible protection [206].

Whether considered the ‘privacy paradox’ or not, there is still a gap in users’ understanding surrounding the use and processing of health and fitness data [429]. The processing of health and fitness data can be problematic, as the data collected are intimate and related to the body, and can be exploited for insurance profiling or employment monitoring [233]. For instance, insurance companies can offer benefits to their customers who share data about healthy lifestyle choices, such as

discounts on premiums. This raises concerns regarding discrimination and transparency, as Martani, Shaw and Elger [233] question whether favouring users who share their behavioural data is ethical and whether the purposes and extent of data processing are not fully disclosed.

A lack of transparency from platforms can exacerbate the knowledge gap surrounding data processing, leading to ‘online apathy’ or a loss of agency over user data [156]. Conversely, other research finds that rather than apathy, users experience a sense of powerlessness [282], believing there is insufficient education or support for managing social media data, and therefore, must accept the way it is. Despite being aware of the potential data sharing that can occur online, many users continue to engage with social media for its perceived benefits [282], such as access to personalised health and fitness information [299]. While most users understand that their data are being shared with social media and third-party companies for product and service improvement [241] (because they have to disclose this in their terms of service [440]), Zuboff [436] posits that it is the extent of the data usage they do not understand. As Zuboff [436] describes, ‘surveillance capitalism’ turns behavioural data into intelligence that maps and predicts users’ actions. However, these personalised predictions enhance the perceived benefit of the platforms they use.

Considering that engaging with fitness content can be both beneficial and harmful, and the number of women using social media for fitness purposes is increasing rapidly, this thesis examines how they use social media for fitness in a safe manner.

Research to date reports users’ critical engagement with fitness content, finding that users can ‘detach’ themselves from harmful content [420]. Tiller [390] advises that social media users seeking fitness advice should be critical in their engagement

and judge advice on its merit. Yet it can be challenging to identify how this critical engagement or agency develops. It may be the result of digital literacy skills, which are required to navigate dynamic digital contexts [123] and involve critical thinking to filter, evaluate and support accurate information [123]. Some work exploring digital literacy argues that it requires critical ignoring, which encompasses deciding what to ignore and what to engage with [198]. This critical engagement is relational as users rely heavily on others to determine information sensibility [158]. For example, women report using comment sections and their personal experience to navigate health and fitness information [226]. Without this critical engagement, some users fear that young girls may be more vulnerable to the adverse effects of digital fitness [420]. However, this critical use has previously been noted by Goodyear *et al.* [144] among young people aged 13-18 in the UK. These young people (aged 13-18) and even younger users must be considered in digital literacy interventions to support online safety. Many HCI interventions that support safety and privacy integrate some aspect of digital literacy [98], and research supports the idea that digital literacy skills can help users navigate online safety [282]. Despite the abundance of digital literacy research in HCI [98], there is a lack of focus on developing digital literacy in specific contexts [334], such as the online fitness space for particular groups, like girls.

2 MOTIVATION FOR RESEARCH

Taken together, these concepts underscore the complexity of digital fitness, online safety, privacy, agency, and the perceived benefits of using social media for fitness.

Given that young women use social media despite its reported negative implications, and in light of the many privacy and safety concerns, it is crucial to better understand their use to prioritise their safety.

I take a qualitative approach to understanding women's use of social media for fitness, with particular concern towards their privacy and safety attitudes. In this thesis, I address a gap in the literature around fitness-specific safety concerns in the context of cross-platform social media use and begin to explore their sensibility and digital literacy, as well as how HCI and related disciplines might facilitate safer, more empowered digital fitness use for young women and girls.

3 WHY DESIGN INTERVENTION?

This thesis employs an interdisciplinary approach that draws on literature from psychology, HCI, CSCW, cyber safety, and digital media. Additionally, I deploy methods from qualitative research and design. This combination plays a significant role in this thesis and corresponds to essential aspects of my positionality as a researcher. I am a designer by training, holding a primary degree in Product Design (Marketing, and Innovation) and this degree taught me that design has application in real-life problems. A second degree in design (an MSc) brought me into the world of designing for women's health and well-being. This background informed my approach across this thesis.

This research project began as a proposal to develop a design intervention that facilitates women's safe use of social media for fitness. This builds on existing work in HCI on interventions for online safety, which are plentiful and are often developed to encourage safer online behaviours and enhance digital literacy. A large selection of HCI research focuses on educational interventions to improve

online safety related to cybersecurity, data usage and privacy [35, 79, 163, 178, 228, 336, 387, 430, 430]. Often interventions provide real-time feedback and support users to make more informed choices when using online platforms [1]. For example, *Strike at the Root* is designed to nudge teens (ages 13-17) when they encounter suspicious or harmful content, helping them make safer decisions in real-time [5]. The teens are prompted to consider how to act in the moment rather than relying on parental moderation.

HCI interventions frequently utilise serious games, which are characterised by the combination of video games and another function, like training, to target a market other than entertainment [9]. Many of the serious games within the field of HCI are cybersecurity interventions. For example, *Cyber Air-Strike* supports users in learning the basic elements of cybersecurity through cyber-attack and defence scenarios, increasing users' awareness of digital threats. Similarly, "*A Day in the Life of Jos*" by Maqsood and Chiasoon [228] educates users about the complexity of social media and the consequences of their choices for both their personal and digital lives [228].

Beyond cybersecurity, initiatives like the DQ institute and LEGO's suite of interactive tools highlight ways that play can foster critical digital citizenship skills in children (and adults) [113]. In partnership with the DQ Institute, LEGO have developed a game and supporting educational materials that work through skills required to be a good digital citizen [382].

Games are also used to promote healthy behaviours; for instance, playing Quest to Lava Mountain, an avatar adventure game where the character needs to source food for energy and knowledge, has been shown to decrease sugar consumption and increase attitudes towards nutrition and physical activity [2]. There are many promising interventions for enhancing digital literacy and online safety. This thesis

builds on those to support safety, agency and digital well-being in response to some of the challenges related to engaging with digital fitness.

This thesis is positioned at the intersection of HCI, design and applied psychology. Underpinned by qualitative methods, this PhD addresses well-established concerns in HCI related to online safety and women in the context of fitness. This work addresses longstanding challenges and introduces a new perspective on women's use of social media for fitness in the domain of HCI. A perspective that views young women as competent in safe navigation, and concerned for younger users of social media for fitness. I discuss these concepts throughout the thesis and contribute conceptual, methodological, empirical and design findings to the field of HCI.

4 THESIS AIMS AND RESEARCH QUESTIONS

The rapid growth of online fitness and the pressing concerns associated with its use make this a priority concern, and the lack of research regarding women's use of platforms in this way, particularly in terms of privacy, exposes a gap to be explored.

Therefore, this work is motivated by the following aims:

(1) Establish a comprehensive understanding of the ways that women use social media for fitness.

The first aim of this work is to gain in-depth insights into how women engage with digital fitness. I met this aim by conducting a systematic review with a multidisciplinary research base. Compiling existing research contributes to a deeper understanding of women's engagement, which is crucial for supporting research and design across these fields to facilitate safer and more informed social

media use. “How is social media used as a site for women to share information and experiences about fitness?”

(2) Advance the understanding of their attitudes towards privacy and online safety.

The second aim of the work is to explore young women’s attitudes towards privacy and safety, which is essential for informing research and design efforts for creating safer and more transparent social media experiences. I met this aim through a qualitative study that explored: *“How do women engage with fitness content across platforms, and what are their attitudes towards privacy and safety?”*

(3) Delineate challenges and opportunities of their use and, in response, design an online safety intervention.

The final aim is to examine the advantages and disadvantages associated with women’s use of social media for fitness. Then, in response, propose design interventions to support safer online fitness experiences. I met this aim through qualitative studies. Exploring users’ perceptions of the advantages and disadvantages of using social media for fitness provides a basis for making user-informed interventions. The studies were guided by these research questions: *“What skills do women use to navigate fitness online safely, and how are they developed?”* and *“How might we begin to design responses to facilitate the safe use of social media for fitness?”*

5 CONTRIBUTIONS OF THIS THESIS

This thesis presents a series of contributions that advance research across several fields, including HCI, CSCW, and digital media, and the contributions extend existing understandings of how women use social media for fitness.

Wobbrock & Kientz [419] define seven types of contributions to the field of HCI, and according to them, this PhD makes conceptual, empirical and design contributions. The contributions are fourfold: (1) A framework capturing users' modes of engagement provides a conceptual contribution that offers a structured approach for identifying and analysing how users interact with and navigate platforms. (2) The qualitative research makes an empirical contribution, offering new insights into women's lived experiences in the context of digital fitness, particularly regarding their safety practices, privacy concerns and their informal learning of safe navigation strategies. (3) This thesis advances conceptual understandings of safe space by expanding the definition concerning digital fitness. (4) Finally, this thesis contributes to the field by detailing the design and evaluation of an educational game-based concept for children called '*Bad Actor Battle*.'

Firstly, the conceptual contribution of this work is highlighted in Chapter 2, which presents the '*Modes of Engagement*' framework. The modes of engagement framework provides a practical guide for researchers in the field to explore how women use social media for fitness. It aids in the identification and categorisation of their practices to guide future work in the area.

Secondly, the qualitative work presented extends our understanding of women's experiences using social media for fitness, their safe navigation practices and opinions on online safety and privacy. Users' perspectives regarding privacy and safety practices within this context are not addressed within HCI or more broadly within social media and fitness literature [216]. Therefore, this qualitative work develops our understanding of privacy in this context and prompts thought and design around safer online experiences for these users. This work extends our understanding of users' safety practices by depicting them as competent and caring

when navigating social media. Additionally, the PhD identifies participants' concerns for the safety of younger users and broader community members in digital fitness spheres. In turn, I leverage their capacity to enact care for community members, as I translate their skills into an educational concept to support digital fitness literacy skills.

Thirdly, Chapter 5 makes another conceptual contribution by extending the understanding of safe space into a two-fold definition that incorporates making social media a safe place and distancing oneself from harm to create a safe distance.

Fourthly, Chapter 5 makes a design contribution to the field through the design and preliminary evaluation of an online safety game-based concept. This game, '*Bad Actor Battle*,' aims to teach safe navigation skills associated with using social media for fitness in a careful and considered manner.

6 THE STRUCTURE OF THIS THESIS

This thesis is presented as a series of publications written for HCI journals and CSCW conference proceedings. Across six chapters, these research papers are presented in Chapters 2, 5, and 6. They are presented in the order they were carried out, as each study informed the next. The following is an introduction to the concept and contribution of each chapter.

In *Chapter 2*, I present the first publication: '*Keeping Fit and Staying Safe: A Systematic Review of Women's Use of Social Media for Fitness*.' This paper is published in the International Journal of Human-Computer Studies (IJHCS). This paper aims to address research questions by reviewing and critically evaluating existing literature. The chapter presents a 'modes of engagement' framework for identifying how women engage with social media for fitness. The framework provides an understanding of the four primary modes of engagement: *producing*,

observing, interacting, and managing. Within this, it offers theories and methods that can be used to further explore these modes. The analysis also illustrates tensions within the online fitness community, including the pressure to share content publicly while navigating personal desires for privacy. Additionally, the paper identifies a tension between sharing perfect and aesthetic content and the need to share real, honest depictions of their bodies and lives. Finally, the paper a need for further research to investigate how this population experiences privacy and safety within online fitness.

Chapter 3 is a methodology chapter. It is included to supplement the shorter methods sections in each paper, as they are not comprehensive enough to support this thesis. Additionally, this chapter outlines the methodology underpinning this thesis, including the qualitative research and theories employed throughout the thesis. In Chapter 3, I expand on the data collection and analysis methods used as well as the ethical considerations and reflexivity involved in the research process. I include a reflexive piece, '*out of my depth & learning to swim*', which details my experience learning about reflexivity and how my understanding evolved throughout the PhD.

Chapter 4 presents a paper published in the Computer Supported Cooperative Work (CSCW) 2025 proceedings. This paper: '*Take Everything With a Pinch of Salt: Learning to Navigate Fitness On Social Media*' details a qualitative study with 114 participants consisting of surveys, interviews and a process of shared looking. The paper delineates three themes that explain users' experiences of navigating fitness content online and presents design considerations to improve women's experience of using social media for fitness. Notably, it highlights a concern expressed by these participants for younger or newer social media users. Finally,

the paper calls for design to support the development of social media literacy and safe navigation skills.

In *Chapter 5* I include a paper describing the development and preliminary evaluation of a design intervention concept - *Playing it Safe: Carefully Designing a Serious Game to Teach Safe Navigation of Fitness Content to Girls Aged 10-13*, under review at TOCHI26' (Transactions on Computer Human Interaction). The paper explores how the safe navigation described in Chapter 4 is developed and how this competency can be applied to a design intervention for younger users. It details workshops with young women, highlighting the roles of education and lived experience in developing digital literacy skills, before documenting the design process of a game-based concept aimed at teaching these skills to younger users. Finally, it describes workshops with girls aged 10-13 to evaluate the concept, concluding that game-based approaches may be suitable digital literacy interventions.

Finally, *Chapter 6* presents the broader findings of this PhD and their implications in HCI and beyond. Through a recap of the aims of this work, the chapter details how women use social media for fitness as depicted in this thesis and reflects on existing work. The chapter also indicates users' attitudes toward privacy and safety within this work as it relates to the literature. I then discuss the challenges and opportunities of women's engagement with digital fitness that prompted the conceptual design described in Chapter 5. In a reflexive manner, the chapter concludes with if and then style statements that detail the implications of this thesis for the field of HCI.

I do not seek to draw attention to the negative impacts of using social media for fitness, but rather to highlight how it can be used safely for users to benefit from it. I stress that although platforms are constantly evolving and fitness trends are

changing, legislative changes remain slow, and so do safety interventions as a reaction to situations and trends. This thesis provides an understanding of the relational and contextual nature of digital fitness and online safety, which can facilitate safe navigation and the development of skills that evolve with the platforms and adapt to changing trends.

In summary, this PhD contributes a perspective on women's use of social media for fitness that highlights their agency and competency in navigating the fitness sphere safely. Through a systematic review, interviews, surveys and workshops, I qualitatively explore their use of social media for fitness. I argue that they are capable of navigating fitness safely, which they have learned through lived experiences, relationships and education. In particular, I highlight that this active engagement with social media raises concerns for younger users, whose engagement is still largely passive. In response to this concern, I design and preliminarily evaluate a game-based concept to promote active engagement both online and offline. I draw attention to the contextual and relational nature of online safety and digital literacy to offer a foundation for researchers and designers seeking to understand, design and support safer and more empowered online fitness experiences.

CHAPTER 2: KEEPING FIT & STAYING SAFE: A SYSTEMATIC REVIEW OF WOMEN'S USE OF SOCIAL MEDIA FOR FITNESS.

Motivation for this Paper within the Thesis

This paper systematically analyses existing literature relevant to this thesis. It was conducted to provide a comprehensive synthesis and appraisal of qualitative research on women's use of social media for fitness to establish a foundation for the PhD. The paper sought to answer the following questions: (1) *How is social media used as a site for women to share information and experiences about fitness?* (2) *In what ways do women engage with fitness content on social media?* And finally, (3) *How do women use platforms to engage with fitness content on social media?*

Contribution of this Paper to the Thesis

This chapter synthesises existing literature to provide an evidence-based foundation for the thesis. This chapter highlights a knowledge gap surrounding women's attitudes towards online safety and privacy when using social media for fitness, presenting an opportunity for further inquiry. This paper also contributes (1) a descriptive overview of the current understanding of how women use social media for fitness, (2) a series of tensions that complicate the digital fitness space and considerations for researchers, and (3) a framework for identifying and making sense of women's engagement with fitness online. The framework suggests several theories that may be useful for the sensemaking of women's use of social media for fitness, and is drawn upon in Chapters 3 and 5.

Publication Details and Authorship

This chapter was published in the International Journal of Human-Computer Studies in December 2024. The full reference is: Doireann Peelo Dennehy,

Stephanie Murphy, Sarah Foley, John McCarthy and Kellie Morrissey. 2024.

Keeping Fit & Staying Safe: A Systematic Review of Women's Use of Social Media for Fitness. *International Journal of Human-Computer Studies* (2024), 103361.

I am the primary author for this paper, and I completed the study design, conceptualisation, data collection, formal analysis, original draft writing, review, editing and visualisation. I was supported by my co-authors, Stephanie Murphy (screening and reviewing), Sarah Foley (reviewing and supervision), John McCarthy (reviewing and supervision), and Kellie Morrissey (conceptualisation, reviewing, and supervision).

1 INTRODUCTION

For the past two decades, social media has been constantly reshaping how we search for, learn about, and share health and fitness information and has become a topic of interest amongst HCI researchers [191]. However, to date, there has been a lack of engagement from the HCI community regarding gendered interactions in the context of health and fitness content on social media [45]. For HCI to engage meaningfully with women's fitness on social media, we must first examine the existing literature. In this article, we conduct a systematic review and qualitative systematic synthesis to understand how women use social media for fitness.

Female users comprise the majority of influencers and consumers of fitness, health, and nutritional content online [388]. With the growth of image and video-based social media platforms, health and fitness information is becoming increasingly accessible, and users are turning to online resources, such as YouTube videos and influencer content, for health, fitness, and nutritional information [209]. Interacting with fitness influencers' content may play a significant role in maintaining a healthy lifestyle, particularly for young women, as it is associated with increased consumption of fruits and vegetables as well as increased physical activity [116].

With the continuing growth of online fitness [378], HCI research has examined the use of data tracking and sharing in everyday fitness activities, including tracking personal health and fitness informatics [128, 207, 328, 429] and engaging with digital fitness communities [149, 285]. For instance, Gui *et al.* [149] found that large supportive groups emerged when users shared their running data with communities of pre-existing contacts, which motivated users to continue tracking. Additionally, research shows that online platforms are suitable sites for support, community and knowledge acquisition [404]. Support is considered vital for

women's engagement in physical activity, as they are less likely to engage in exercise than men [152] and more likely to report barriers to engagement [340]. Women find support through engagement with fitness influencers [116], whereas men are more likely to view athletes' content rather than that of fitness influencers [239]. All of these users are connected to fitness influencers and new fitness content via algorithms [245]. The rate and volume of fitness content available to and consumed by users can make it challenging to identify misinformation [71, 376]. To combat this, users often follow *authentic* creators who present themselves as *regular* people [405] and trust these users to share genuine information with them.

While engaging with fitness online has several benefits, there are some adverse effects [389]. For example, research to date highlights that platforms, including Instagram, can endorse exercise compulsion, dissatisfaction and objectification [73, 131, 202, 319, 425]. Furthermore, female adolescents are more vulnerable than males to the harmful effects of fitness content [106], and male norms tend to relate to health (i.e., training for health, rather than appearance) [150]. In addition to these damaging effects for women, fitness content often focuses on working hard to achieve the "*ideal body*", which impacts users physically as they alter their nutrition and exercise regimes [43]; this hard work has been referred to as "*aesthetic labour*" [121]. Furthermore, fitness consumers are subject to data surveillance when accessing social media sites [174]. Users often "allow" third parties access when using apps and websites, yet they are unsure of the level of access they are granting [436]. Surveillance capitalism turns user experiences into behavioural data, and these data aid in personalised predictions [436].

Concerns regarding misinformation, surveillance capitalism and the potential for harmful psychological effects can make sharing and learning about fitness online

challenging to navigate. These concerns are explored in literature across various disciplines, including media studies, sport, education, and health. To better understand these concerns and their implications in HCI, we complete a qualitative systematic synthesis of existing interdisciplinary work regarding fitness. We report our process for conducting this review by following the PRISMA guidelines, and we conducted a thematic synthesis for analysis [322]. For this review, we explore fitness as a subset of health [377] that extends to exercise, nutrition, and sport. This work builds upon the work by Hoffman and Novak (2012), which characterises social media usage under four headings: creating, consuming, connecting and controlling [167].

The review sought to answer the following research questions:

1. How is social media used as a site for women to share information and experiences about fitness?
2. In what ways do women engage with fitness content on social media?
3. How do women use platforms to engage with fitness content on social media?

Our qualitative synthesis addresses these questions by outlining how the current literature has explored women's experiences of sharing fitness information online. This review highlights the importance of qualitative research for understanding participants' motivations regarding social media as a site for learning about and engaging with fitness. This work contributes:

A descriptive overview of the current understanding of how women use social media for fitness: We provide an understanding of the varied ways users engage with fitness across social media. This forms a cohesive reference point for HCI researchers who wish to continue to examine the ways women use social media for fitness.

Considerations for researchers and practitioners: We characterise a series of tensions that complicate the future of this space and provide suggestions for researchers and practitioners.

Framework for Identification and Sensemaking: We provide a framework for identifying and making sense of women's interactions with fitness content. This framework may extend beyond fitness interactions to provide an understanding of the various topics women interact with online.

2 BACKGROUND

2.1 Sharing about Fitness Online

Providing guidance and receiving social support are positive aspects of online sharing about health more generally [208], and both passive and active engagement in these communities can aid the development of effective coping strategies and improve health literacy [317]. A systematic review examining online communities highlighted these two engagement styles: users who actively engage and '*lurkers*' [224], or those who observe. While learning about specific illnesses is suited to both types of engagement on forums and platforms, users are increasingly turning to online bloggers and influencers to learn about their bodies and fitness [320].

In a 2021 paper, Rodney describes "*blogsperts*" as influencers who share bodily knowledge gathered from anecdotal evidence [320]. Increasingly, users are turning to these *blogsperts* or influencers on online platforms such as YouTube for health, fitness and nutritional information [209]. Influencers who produce fitness content often have their content deemed "*Fitspiration*", describing an online trend of motivational posts for fitness [71]. Studies across social media platforms highlight some adverse effects of fitspiration, as it can impact users' self-perceived sexual attractiveness [131], body satisfaction [73] and relationships with food [425]. Research by Hendry, Hartung and Welch [161] highlights further concerns

regarding fitspiration misinformation. The authors highlight how influencer content can lack rigour relating to evidence [161]. This can impact users, as creators share potentially harmful information [88], including promoting products that are harmful [263]. Women are at risk of this harm as they are the majority consumers of fitness and nutritional content [388]. Furthermore, due to stigma surrounding women's health, they are more reliant on information from online sources and, therefore, are at greater risk of the negative impacts of misinformation [342].

As users navigate misinformation, they want to consume “*credible*” information, requiring those who produce fitness content to “*construct a credible voice*” to be considered reliable and relatable [345]. For creators to be credible, Woods [422] finds that influencers must be authentic. The author describes authenticity as the ability to remain true to one's personality, self, and values despite external pressures. Influencer authenticity affects consumers' attitudes towards creators and brands [259] and can be characterised by the increased “availability” and “accessibility” of an influencer through sharing more of their private selves [307]. An honest depiction of one's private life involves sharing both negative and positive experiences, which may come at a personal cost to influencers [153]. The desire for influencers to share their authentic selves, teamed with the possibility of personal backlash, has been called the “*online authenticity paradox*.” Dekavalla [99] describes how creators portray their trustworthiness on YouTube, denoting authenticity and transparency about sponsorships, as well as a proclaimed distance from the “*industry*” as essential factors for building trust. Building on these ideas of credibility and authenticity, we now explore misinformation, online safety, and privacy issues to further situate our review.

2.2 Safety, Security and Privacy when Consuming Online Content

The increasing number of online data breaches and subsequent media attention have spotlighted online safety and privacy in the public interest [25]. Data breaches and cyberattacks can damage users' trust in social media and, in some cases, impact the well-being of those involved [27, 368]. Women are among those most likely to be victims of data breaches [360] and are more likely to be subjected to day-to-day harassment on social media [186]. Content creators are subject to similar harassment yet receive less public sympathy [220], as they are often blamed for choosing a line of work that requires them to be public-facing and, therefore, harassment is considered a natural consequence. Previous research indicates users manage online harassment through social media platform affordances, for instance, by unfriending, muting and filtering perpetrators [273]. The platform affordances aid the management of harassment; however, how they afford privacy or safety is relative to the users engaging with the platform [95] and, therefore, are not equally accessible to all users.

In a qualitative study analysing terms of service, Pater *et al.* [289] found that social media platforms do not define what constitutes harassment. The lack of definition makes harassment difficult to deal with and report. It is not just harassment policies that are troublesome; most privacy policies, in general, are inaccessible and unsuitable for reading by those with lower literacy levels (i.e., a 12th-grade reading level) [87]. Additionally, the privacy management on these platforms lacks “*adequate personalised, accurate and flexible privacy protection*” [206].

While most users know their data are being shared with social media and third-party companies [241] for product and service improvement (because

companies must disclose such information in their terms and conditions) [440], they do not know the extent of this data usage. Third-party companies turn extracted behavioural data into intelligence that can predict users' future actions [436]. Users with high privacy literacy levels understand data usage and are less likely to trust companies with their data [155]. However, regardless of privacy literacy levels, users often trade personal data for small rewards (website access, etc.) [69]. This contradiction between concern and action is known as the "*Privacy Paradox*" [196]. When observing the behaviour of "*technically savvy*" participants engaging with an app, Barth *et al.* [25] found that technical knowledge does not prevent privacy paradoxical behaviour. For HCI researchers to make informed contributions in this context, we systematically synthesise existing interdisciplinary literature on women's experiences engaging with fitness content online. In the next section, we present our process for conducting a systematic review and qualitative synthesis of the existing research.

3 METHODOLOGY

We conduct a qualitative systematic review, to provide a rigorous foundation for future work. Systematic reviews originate from clinical trials and condense large bodies of data, which lends itself well to the interdisciplinary nature of HCI [305]. We employed a four-step data collection process and a thematic synthesis for data analysis, an underutilised approach in the HCI community [322]; this approach allowed us to remain "*close*" to the study data and to synthesise them in a transparent way [385]. As with prior HCI systematic reviews [191, 246, 303], we followed the PRISMA guidelines [86] and we registered the protocol for our review on PROSPERO prior to the data collection [293].

3.1 Data Collection

We report our four-step data collection process: search, screening, quality and eligibility checks, and corpus data extraction.

3.1.1 Search

We searched four databases: ACM Digital Library, SCOPUS, PubMed and PsychInfo. Following a scoping search of the ACM Library, which determined a lack of literature pertaining to fitness, social media, and women [45], we included non-HCI databases in our searches. Including non-HCI databases provided more fitness-related articles and qualitative research. An iterative search string was developed and tested using “*AND/OR*” as well as variations and abbreviations of words associated with fitness, women, and online spaces. The search string is available in Table 1.

Table 1: Search Terms

Search Terms	Data Base Searched
"women" AND "fitness" AND "social media" (OR "Instagram" OR "Twitter" OR "TikTok" OR "Pinterest" OR "Facebook" OR "forum")	ACM Digital Library, SCOPUS, PubMed, Psych Info

This string examined full text, titles, abstracts and keywords. We sought peer-reviewed English articles published between January 2010 and August 2023 to ensure relevant and up-to-date literature was included. This returned 667 results, and we scanned each result prior to screening to determine papers that did not meet our criteria (Table 2). The remaining (57) papers were downloaded. Following our search and initial pre-screening removal of texts, we carried out Google Scholar searches to find articles that may have been missed. To do this, we used the keywords from the search string developed, and based on a browsing method [59],

we examined the returned results for articles with relevant titles. The titles that contained our keywords or similar terms were flagged using the star ‘save’ feature of Google Scholar. Once all the results pages had been examined, we returned to our saved list for screening, discussed below in 3.1.2. Additionally, we completed forward and backwards citation searching among papers that had rich insights into women’s experiences with fitness online. We completed forward citation by identifying papers that we deemed as having rich insights in line with our inclusion criteria (papers included in this article), then we searched for articles that cited those papers on Google Scholar. Similarly, our backwards citation searching examined the same articles and reviewed their reference lists for relevant papers. This then snowballed into an iterative process, as we repeated the forward and backwards searching with the new relevant articles. Papers identified in this process were also saved on Google Scholar. Both actions provided us with a further 86 relevant texts.

Table 2: Inclusion and Exclusion Criteria

Inclusion	Exclusion
Exploring women’s use of social media for fitness	Using social media for recruitment alone
Exploring usage of social media platforms for fitness	Exploring health-tracking apps.
Including women’s experiences	Focusing on male experiences
Qualitative Studies	Quantitative Studies
Separating male and female experiences in analysis	Not specifying male or female experience in analysis

3.1.2 Screening

To begin the screening process, we scanned the titles and abstracts of the 73 saved papers on Google Scholar and the 13 papers identified through citation searching. We did this by going through the titles and abstracts of each saved paper, looking for papers that met our inclusion criteria. We downloaded the 38 papers that met our inclusion criteria and stored them in EndNote. Additionally, we downloaded the 57 papers from our database searches for screening.

Quantitative papers that were not concerned with both fitness and social media or were concerned with male experiences of fitness on social media were not included.

We removed duplicates and uploaded 95 papers into Rayyan, a web app for screening titles and abstracts [280]. We then compared the remaining texts to the exclusion criteria: studies that used social media only for recruitment purposes, quantitative studies, studies involving health-tracking apps and those that focused on male experiences or failed to segregate male and female data.

Two authors reviewed paper titles and abstracts on Rayyan and assigned each paper as “include”, “exclude”, or “maybe” based on the exclusion criteria (seen above in Table 2). Following this, 68 papers remained for full-text review (*fig.1*).

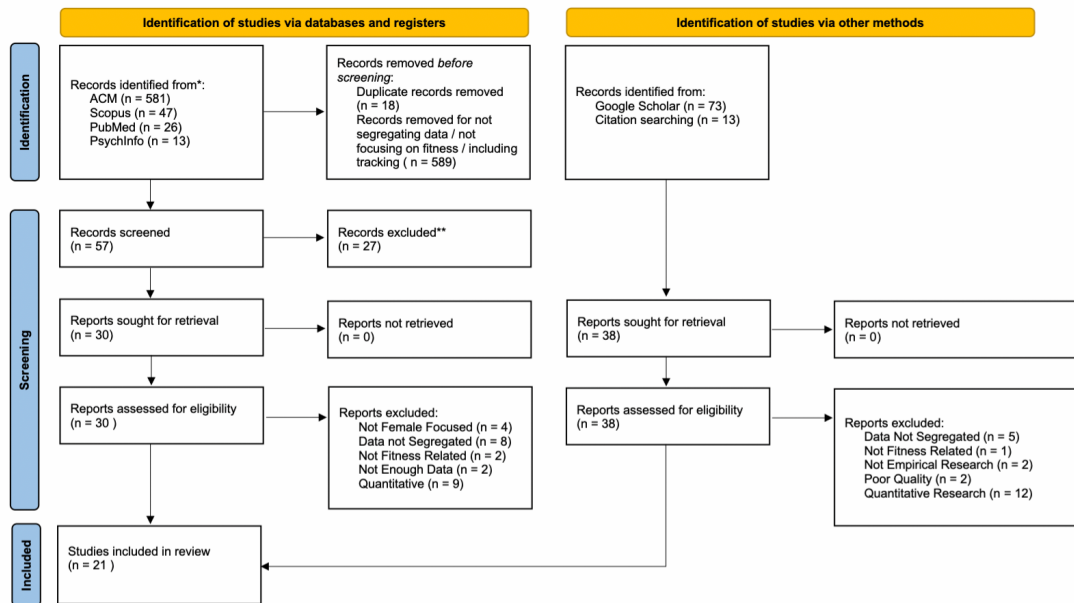


Figure 1. PRISMA Flow Chart

3.1.3 Quality Checks

The remaining 68 papers were assessed for eligibility; for this, both the first and second authors completed a full-text review of each paper and categorised papers as “include”, “exclude”, or “maybe”. As we reviewed papers in full for the first time, this review process involved ensuring they met the inclusion criteria and that there was sufficient qualitative data for extraction. The authors met to discuss excluded papers and, as a result, excluded 46 articles. This discussion resulted in papers being excluded for not discussing fitness, failing to segregate data, and lacking sufficient data.

Now familiar with the remaining 21 papers, the first two authors discussed the appraisal of the papers for quality. We used the CASP qualitative studies checklist to ensure the quality of the remaining papers, however, we did not need to exclude papers based on our appraisal. For example, we used this tool to determine whether the results were valid, by examining the aims, methodology used, research design, recruitment, data collection, and the relationship between the researcher and

participants. In our case, it highlighted some weaknesses within the papers, as a few detailed their reflexivity (except for [26, 49, 166, 216, 420]). These assessments did not raise any other issues, and we did not deem the lack of reflexivity grounds for exclusion, so the remaining 21 papers were analysed. The framework also provided guidance for conducting a “thick and thin” analysis, allowing for both a decontextualised and contextualised interpretative analysis [291].

3.1.4 Data Extraction

We extracted descriptive and qualitative data from the papers, including 1) the spread of papers by year, venue, author and location; 2) the social media or platform being examined; 3) participant information, age, education, class, race; 4) methodology used; 5) the study findings; and 6) the discussion.

3.2 Data Analysis

3.2.1 Thematic Synthesis

Thematic synthesis is conducted by completing line-by-line inductive coding of relevant sections from the papers. A thematic synthesis is an adapted version of thematic analysis, specifically designed for the analysis and integration of findings from multiple qualitative studies [392], aiming to generate new insights and understandings. Thematic synthesis is similar to Braun and Clarke’s reflexive thematic analysis [52] in that codes develop as researchers become familiar with data. We form them from meaning-based patterns and do not emerge from the data.

To conduct the qualitative analysis, the first author familiarised herself with the data by reading through it multiple times and discussing its content with the second author. Once initially familiar with the data, she inductively developed codes at a semantic and latent level. The first author’s perceptions were guided by a social constructivist epistemology during this development. To address this, we

reflect on our positionality in the next section. Two rounds of coding took place in Microsoft Word. Codes were formed from abstracts, findings, and discussions of papers, as these sections contained relevant information regarding engagement with fitness content. Following these coding sessions, two authors met to discuss the developed codes. The data were then uploaded into NVivo for a final round of coding, where codes began to be grouped by themes [385].

Two authors reconvened for a discussion of codes and their meanings. Codes were then uploaded to Miro, a web application, to undergo a process of affinity diagramming, which helped create meaningful patterns in a visual manner [56]. We moved beyond reviewed papers to develop conceptual links between codes and descriptive themes to create four analytical themes.

3.3 Reflexivity

Practising reflexivity is recommended for qualitative research [237, 375], and we felt it was necessary to reflect on our assumptions while completing this review. Firstly, we did not collect this data - it has been collected, interpreted, and analysed by other researchers. Therefore, we had no part to play in the initial representation of the data. However, our familiarity with social media may have affected our analysis. For example, three of the five authors are everyday social media users. However, we do not feel that this is negative, but rather may provide insights into the workings and varied nature of social media sites. The first author regularly consumes fitness content on social media sites and is likely to empathise with data about struggling with body image or aesthetic labour, as it is something she has experienced. We discussed our views towards social media, accessibility and privacy throughout this research during group meetings. Our reflexivity practice

was ongoing [66], and these group meetings allowed us to reflect on our assumptions surrounding the content being discussed.

4 FINDINGS

Four themes were constructed from the data to report how women experience fitness on social media. These four themes are centred on the activities of Producing, Observing, Interacting and Managing. The spread of these themes across the included papers can be seen in *Table 3 below*. The themes and respective sub-themes are detailed below. Further details regarding the included papers and their findings, including information about the aim, participants and methods used, can be found in Appendix A.

Table 3: The Instances of Themes in the Papers

Theme	Number of Papers
Producing	11
Observing	19
Interacting	9
Managing	5

4.1 Producing

The papers convey the idea that producing content allows women to be observed and feel part of a community, even important members of the community. Women in the examined papers practised this production by sharing themselves, their bodies and fitness content as they edited imagery and carefully curated their online persona.

Table 4: Platforms in the Studied Papers

Platform	Number of Papers
Instagram	15
Twitter	1
Facebook	4
YouTube	2
Pinterest	1
Snapchat	1
WordPress	1
Blogs	1
Forums	3
Google	1

4.1.1 Mandatory Sharing

Many papers feature Instagram as their users' leading social networking site (52%), as seen above in Table 4 [26, 62, 63, 166, 311, 315, 391, 392, 420]. Instagram is primarily an image and video-based platform, and for some participants, this insinuated that they needed to share their bodies to be successful on Instagram. In her autoethnography, Basabain [26], who uses social media to promote her Personal Training (PT) business, stated: *"If I post my appearance, I believe that I will perform at a higher standard than I am now in terms of the number of followers, sponsors, and income."* She seeks to gain materially from her social media account and believes that this success can be achieved by sharing herself and her body. She is not currently doing so due to her cultural and religious norms. She is torn between conforming to online norms of sharing her body for success and conforming to religious and cultural norms by not sharing her body for modesty.

Summarising their analysis of a number of images shared with them by participants, Toll and Norman [393] note: *"showcasing the body is central to how*

the participants use and experience Instagram". Using compositional interpretation in their review of participants' images, they found that every photo shared with them showcased users' bodies. This may suggest that sharing images of one's body leads to greater success and user engagement on online platforms, indicating the value placed on sharing the body. Some participants recognised the pressure they felt to share in the past, but now they act against it as Camacho-Miñano & Gray [64] quote a young participant who is not an influencer: *"I used to upload what the public was interested in [...] I really like to show my body, [...] because guys like to see a girl's body, but I don't do it with that intention."* Here, the user highlights the gendered nature of sharing the body and how *"guys"* like to see it. Users who conform to these gendered norms benefit from the visibility a conventionally attractive body provides by gaining followers, likes and sponsorships.

Other studies explore a similar sense of empowerment [393], as users can post what they want while conforming to feminine ideals. Toll and Norman [393], describe that: *"participants stated that they could 'post what [they] want[ed]'; however, 'these 'choices' were embedded within power relations to conform to dominant feminine body ideals and were, thereby, never 'totally free choice.'*" The freedom of choice for sharing is overshadowed by what users feel they should be posting.

Some users feel a need to share experiences due to a lack of gendered health information. For example, Sverkersson *et al.* [373] find information regarding doping is oriented towards male users and find women are sharing their experiences as a result: *"If I'm open about my course and my perceived side-effects, maybe it can help someone else"*. This participant is sharing her experience due to a lack of fitness information about doping that is specific to women. She feels the need to share about her body and her experiences, not for success as with the

image-based networking sites, but to increase the amount of female-specific fitness information available. The studied papers highlight two types of sharing mandates: one that necessitates sharing because nobody is, and one that necessitates sharing because everybody is. This mandated sharing is often adjusted so that content appears a certain way. The following section discusses the processes by which users alter and manufacture content.

4.1.2 *Manufacturing Moments*

Another practice identified within the reviewed papers is “manufacturing moments”. This involves influencers creating content and identities that are aesthetically appealing to their consumers and presented as natural moments in their lives. Manufacturing moments is a creative process requiring foresight and planning. The planning may negate users’ enjoyment of these moments (going on a walk specifically to take photos) or impact their followers’ self-esteem (through unattainable social comparison) [393].

In these papers, the experience of content creation is mainly seen as the purposeful selection of images to manufacture an online presence [166, 180, 311, 391, 393]. In a paper by Toll and Norman [393], a participant whose account was not monetised described the process of taking photos for Instagram as taking *“millions of pictures in the exact same place just doing a bunch of different poses.”* This highlights the intricacies required for creating images for Instagram; Toll and Norman [393] find that such images are often staged, calling Instagram a *“performative digital space.”* Other studies found this *“performative space”* was an opportunity to share the best version of themselves, as they shared images of themselves which were edited, filtered and posed [118, 180, 311]. In some cases, posing is extreme and involves taking photos when the body is aesthetic; in interviews with Rajan [311], an influencer shared that she takes images of herself

when she is at a low body fat percentage, and drip-feeds these as posts on her Instagram over time: *“I usually take most of my fitness selfies on Instagram at a time when I’m at an extremely low body fat percentage. I, then, slowly release these over the period of a month or two”* [311]. This posting is highly curated; creators alter their appearance temporarily to portray a representation of themselves, which is unhealthy to replicate. The low body fat percentages reported in this study result from diet and exercise changes but are unhealthy to maintain over time. This may negatively affect viewers as they strive for unattainable body ideals.

Participants in these studies endure aesthetic labour in the process of image manufacture, which can impact their sense of self as they portray a false version of themselves, as with Rajan’s [311] participant above. This self is different from their real, everyday selves, which may impact them negatively if they compare themselves to their images. Similarly, their imagery may negatively impact viewers’ self-esteem as they compare themselves to creators [73]. As well as such content potentially hurting their self-esteem and body image, Rajan [311], reported users physically hurting themselves to create content: *“I was pushing my body to do certain postures just so that I could post a social media image. It has injured my body quite a few times”*.

Content creation in the studied papers involves significant manufacturing in search of ‘perfection’, and sharing in this way is mandatory. However, users also share their imperfections. We detail this practice in the next sub-theme.

4.1.3 Editing and Imperfect Relatability

Many studied papers also share an idea of the *“imperfect body”*, a version of bodies that display their ‘flaws’, including stretch marks and blemishes. Papers concerned with image-based platforms often described users doing so through

photographing an authentic body and the absence of editing. Toffoletti and Thorpe [391] highlight that fitness images found under hashtags from a popular fitness community are not glamorous or sexualised because the photos show women sweating and wearing gym gear. These natural images of women working out and sweating suggest the creator's desire to be authentic [391]. One of Reade's [315] non-influencer participants felt that editing photos skewed real-life perceptions: *"Raw to me is leaving it as it is . . . not edited [...] don't fake your posts and your pictures, cause that's more showing that you aren't real"*. This user feels that editing photos is inauthentic and creates a barrier between the online and offline versions of the creators they follow. Another user in the same paper highlights issues with self-perception that editing images may cause: *"work for [your body], and not just change the way it looks in a picture but change it in reality [by working on it] because you may like how the picture looks, but you might not be happy with the way you look if you are just editing"* [315].

Many participants in these studies felt that images pertaining to fitness must be relatable or attainable, and that editing is an adverse action that may suggest low self-esteem on the part of the poster. In turn, users often take the opportunity to highlight their imperfections in image posts to appear relatable. Two imperfections surfaced in the studied literature: imperfect bodies and imperfect experiences. Examples of both are shared with followers to increase relatability and make creators seem authentic.

Reade [315] finds in her studied imagery that: *"imperfections have not been edited out of view, such as cellulite, stretch marks and blemishes"*. She argues that including imperfections works to create raw imagery, which in turn increases relatability. Toffoletti and Thorpe [391] find that fitspiration media shares imperfections as users are: *"enthusiastically showing off their 'real' bodies. Stretch*

marks, scars, loose skin and cellulite are not obscured but feature in women's self-portrayals on Instagram."

Indeed, several papers we reviewed indicated that sharing imperfections served to increase relatability. Some creators are open about editing and the fact that they are not as perfect as they appear online. In the papers we studied, relatability increases influencers' authenticity; sharing imperfections helps build relationships with followers. For instance, a participant of Andreasson and Johansson [13] describes an imperfect experience of someone vomiting in the gym: *"Blowing chunks, technicolour yawn, talking to Ralph on the great white phone, whatever you want to call it, nausea and vomiting during a workout are no fun."* In work by Sverkersson *et al.* [373], women share honest, imperfect experiences with doping side-effects: *"hair on my legs and underarms grew faster [...] more acne, [...] a few pimples in the face. Got a little vocal hoarseness—not a man's voice; more like sexy voice—and, not to forget, a more sensitive clit."* Here, the sharing of such imperfect yet honest and *real* experiences on these forum-based platforms increases relatability and provides a safe space for users to share their authentic experiences. While the posts on the forums in these papers do not suggest that users are looking for or sharing *real* images, they do highlight the real experiences that users seek and share in their text-based posts. Sharing these experiences offers support to other platform users who value these honest depictions of doping as a woman [12, 162, 373].

These experiences are intimate and imperfect, and as users strive for openness and relatability, they share them with other women online in an effort to be perceived as authentic. This highlights a tension between mandatory sharing of "bodies" and "ideal bodies" and the desire for representation of "real bodies" as well as real experiences. The need to share both ideal and real bodies is driven by user

engagement and influencer perception and is sponsored by market demands and trending ideas.

4.2 Observing

Observing content is an aspect of the online experience which describes how users engage with the content produced by others. In our reviewed papers, users primarily consume content by searching for and learning about fitness topics [26, 49, 64, 72, 118, 162, 373, 392]. They are particularly interested in learning physical exercises [63, 180], and often want to learn from lived experiences [216], such as postpartum experiences [315] or doping experiences [12, 162, 373].

4.2.1 Learning about the body

In the studied literature, participants talked about learning through interactions on social media sites. Toffoletti *et al.* [392] find that Instagram can be a site of community, support, and learning, with one participant sharing that: *“I feel that I, through Instagram, [...] I learn a lot of things from them, and it’s a source of inspiration for me.”* Wood and Watson [420] also found that their participants made conscious decisions to view content as inspirational and to view it critically. For instance, one participant talks about viewing content as aspirational rather than negatively comparing herself as she describes some users do: *“like ‘ah why can’t I look like that?’ [...] but for me I try to make it more aspirational [...] ‘okay I’m aspiring to be better’”*.

Participants benefit from the interactions afforded by social media, and their learning often stems from interpersonal relationships formed online. Other participants benefit from social media users as they learn about food and exercise - for example, Camacho-Miñano *et al.* [63] describe how many participants learn exercises by observing Instagram influencers. Similarly, Jong and Drummond [180] share a participant who describes learning from influencers' exercise and diet

regimes: “*She was doing some donkey kick thing. I tried to do it, and it’s so hard! I tried to copy some healthy recipes*”. Raggat *et al.* [180] find that being part of the ‘fitspiration’ trend increases access to recipes and exercises, and improves users’ knowledge of fitness and nutrition. Such information is now very accessible through everyday technology: “*You [...] look at your phone and something is going to be up there about a workout idea, [...] jump onto any social media and get a whole list of anything you can do*”.

Users find easy access to a large variety of online fitness information beneficial. However, the information they seek often focuses on “*problematic female areas*”, such as “*squats, abs, planks*”, and “*things to work the bottom*” [62]. It could be posited that such searching (and finding) this type of content may harm users who transition from exercising for health benefits and enjoyment to exercising to achieve a certain appearance. As in the previous section, in some studies, participants staged walks to take photos, similarly moving from exercising for health benefits and enjoyment to, in that case, ‘exercising’ for content. For Camacho-Miñano and Gray [64], participants highlight this alternative purpose of learning and doing exercises: “*To be hot, so to speak. [...] To have a good body and be able to show off well. Or that people see you and say, ‘fuck, how hot is she?’*” The mental and physical benefits of exercise are sometimes minimised as users speak about exercise as having an overwhelming purpose of ‘being hot’. When users do not have this “good body” that is worth showing off, it can negatively affect them as they compare their body to those in posts: “*If you’re of a bigger size, it can make you feel horrendous, it can make you feel completely alien and that you shouldn’t look like that.*” [118].

As noted above, users appreciate authenticity [315] when they feel that influencers are being genuine and not promoting false narratives. However, when

an influencer's authentic self aligns with the societal standard of attractiveness, it is often seen as unrelatable and negatively impacts the follower's self-esteem and self-perceived attractiveness [131]. Users may expect representation of various body types, including their own; however, often, the reinforced body norm is one they do not meet. This lack of representation is captured by Toffoletti and Thorpe [391], who note that the images they studied did not feature *“many older (50+), larger (size 14+) or ethnically diverse women,”* nor did they find any pictures that depicted disability. This lack of representation in the studied imagery may reduce self-esteem as women compare themselves to influencers, and exercise becomes a means of achieving an ideal body type rather than a form of enjoyment or self-care. Social media sites are ideal platforms for knowledge acquisition; however, the negative impact of comparison and lack of representation reduces many users' enjoyment of fitness content [64, 118, 393].

4.2.2 Learning through experiences

Our review clarifies that online spaces facilitate participants' learning from others' personal experiences. A participant of Reade's [315] shares she has learned about the postpartum experience from a creator, which resonated with her: *“Her images of post-pregnancy are excellent, like not trying to get that [pre]baby body back.”* Reade [315] finds that participants who consume post-pregnancy content feel a rapport with creators and identify with their posts. This is unsurprising, as there is media-borne pressure for women to “bounce back” after pregnancy [269], and having someone post their honest experiences helps these women validate their own experiences. Similarly, Henning and Andreasson [162] find that women learn about doping by reading accounts of other women's experiences. One participant states: *“I have benefited tremendously from reading other women's logs.”* In turn, women may choose to share their experiences from which others

may learn; another of their participants shared: *“I learned so much from reading about other girls’ [steroid experiences] [...] it would only be fair to share my own experience.”*

In our reviewed papers, users found value in women sharing their lived experiences, as it legitimised their experiences and provided comfort and support. In turn, users repay the community by sharing their own experiences. The women sharing their experiences exist in personal (following friends), community-based (posting on forums) and virtual relationships (following influencers). These relationships are beneficial when the consumer trusts the person posting. In the next section, we explore the trustworthiness of information and its sources.

4.2.3 Trustworthiness

Users discuss the trustworthiness of information consumed across several papers in our sample [12, 62, 118, 180, 310]. While some participants thought many creators were: *“uneducated and underqualified to give the advice they do”*, many continued to trust creators – particularly if they had larger followings: *“You can [...] be a specialist in sport [...] have 50 followers and maybe I do not take it seriously [...] one that has millions of followers, and they may be lying to me, and maybe I’m hurting my muscles I do believe it”* [62].

Camacho-Miñano *et al.* [62] find the key to trustworthiness is the number of others who ‘buy into’ the content rather than the professional background of the creator. In contrast, Lupton [216] finds that users tend to believe information when it comes from relational connections. She states that the relational connection is strong because family members have *“intimate knowledge”* of their health and can, therefore, offer *“more personalised and effective”* advice.

In turn, many users are aware of the curated nature of content, recognising that what they see is intentionally constructed. This knowledge affects both the

believability of posts and creators. For example, some users are aware that creators post certain products due to brand sponsorships, which undermines their trustworthiness. Wood and Watson [420] describe participants' frustrations when they are being sold something rather than being given advice. Their participants note that influencers are “*on a pedestal as good sources of information, and they're not good sources of information, but they'll sell you a skinny tea because it's going to make them some money.*”

Some participants find it difficult to distinguish between posts that cleverly advertise products and those that do not, hindering their ability to trust the content of the posts. Easton *et al.*'s [118] participants were also frustrated by influencers who had had plastic surgery misrepresenting their augmented bodies as ‘natural’, acknowledging that followers may idolise influencers, but their bodies are unattainable with exercise alone: “*They've all had surgery, so people will be working towards a goal that's not achievable*”.

Cynical or misleading representations of products and bodies can make online consumers more aware of what they view and prompt them to make informed judgments regarding their trustworthiness.

4.3 Interacting

Interacting is a crucial aspect of how women use social media, incorporating the social aspect of social media. Interacting allows them to connect with others; women in the studied literature interacted with and supported one another by using the affordance platforms offered for connection. This section also explores negative connections that occur on social media, specifically harassment.

4.3.1 Affording Connection

Some users have found that the Instagram algorithms connect them with content they want to see [62, 63], such as workout videos or healthy recipes. Camacho-

Miñano *et al.*'s [63] participants feel Instagram knows what content they want to see: "*Instagram has got the drift of the [workout] routines that I like.*" Their participants enjoy how Instagram uses their behavioural data to predict what they want to see. They appreciate the convenience and access to new material provided by algorithms.

Another way Instagram affords connection is through the Stories feature [311, 315] (images or videos that disappear after twenty-four hours). This feature is praised in our sampled literature for its temporary nature and lack of impact on the carefully manufactured Instagram profile. It works for sharing: "*boring-but-also-funny stuff*" that users don't want to be shown as "*part of your feed for the rest of your Instagram future*" [315]. Participants do not worry as much about the content of these stories or how they are perceived within, as they disappear, and users assume people will forget about them.

Participants use Instagram's Direct Messaging (DM) feature for more personal connections [315, 392]. Users connect through DMs when they don't want others to see the content of the discussion or when they are sharing personal questions and advice. For example, Toffoletti *et al.* [392] found followers used DMs to connect with creators and engage in personal, private conversations "*without the risk of public disclosure,*" for instance, commenting. Reade [315] details an example where a participant is filming a YouTube video about an eating disorder and, in doing so, offers her audience the chance to submit suggestions for topics of discussion, either in public comments or in private DMs: "*I'll be filming a [YouTube] Vlog touching on my history with binge eating . . . If there is anything in particular you'd like me to talk about, comment below or DM me!*"

DMs intimate and private nature can facilitate a personal relationship on Instagram. As the DM feature and other features allow for personal connection,

they also provide opportunities for harassment. In the following section, we discuss instances of harassment in our studied literature afforded by platform features and how users overcome it.

4.3.2 Harassment

Many women who took part in these studies experienced harassment online [26, 63, 64, 373]. Women in Toffoletti *et al.*'s work [392] experienced harassment ranging from persistent messaging (*"I'm in love, I want to marry you"*) to sexual harassment (*"lots of dick pics"*). Users stated that male users typically initiated this unwanted interaction. This harassment is received negatively, but senders often perceive it as flattery [227]. Harassment often took the form of body shaming: some of Camacho *et al.*'s [63] users describe comments they received: *"I do not like that you have so much muscle"*. These types of harassment have a negative impact, including loss of dignity, privacy and sexual autonomy [242]. Sexual harassment was frequently addressed in the studied literature [26, 311, 392]. Basabain *et al.* [26] find that through sharing their lifestyle or *"attractive appearance"*, users are aware of the likelihood of receiving sexualised comments. Rajan [311] finds that participants with many male followers experience sexualisation in their comments and DMs. Camacho-Miñano and Gray's [64] young participants observe this to be a gendered issue, saying that only women receive this harassment and *"boys don't suffer this censure."*

Harassment also manifests itself offline, impacting how women conduct themselves both on and offline. For instance, Basabain *et al.*'s [26] auto-ethnography describes her experience as a new mother receiving negative comments online relating to her postpartum body and subsequently changing her appearance offline in the days following: *"I received a negative comment on how pregnancy had changed my body [...] the next day I put on a three-layer outfit*

consisting of joggers, a t-shirt and an Abaya with a scarf.” Similarly, interviews conducted by Toffoletti *et al.* [392] find that women who post running fitness content do not share their running locations online, nor do they stick to the same routes for fear of offline harassment. Women who engage with fitness content are subject to the online rules discussed earlier regarding sharing and manufacturing, and they must also monitor their offline experience.

The level and frequency of gendered harassment experienced in these papers reiterates a growing concern for women’s safety online [339, 406, 410], highlighting its intensity. As these experiences intensify, users are forced to control and monitor this harassment.

4.4 Managing

Participants in these papers exercised control by taking advantage of available platform affordances to manage their privacy and with whom they interact. Managing is an important aspect of how women use social media, allowing them to stay and feel safe online.

4.4.1 Who is watching?

Users in the studied literature were mindful of who they followed and who followed them. For instance, in Toffoletti *et al.* [392], a participant shares that she does not: *“follow anyone that’s on there to look good. I know the effect it can have, [...] I used to look at people and go “oh shit, I don’t look anything like that; therefore something’s wrong with me.”* This follower restricts who she follows so that she can enjoy content without feeling bad due to what she sees. Similarly, women avoid accounts that share unattainable standards of healthy eating as they might result in engaging in unhealthy practices: *“If I followed their food account where they tell me to eat healthily and I couldn’t, I’d probably end up with an eating disorder”* [118]. These women are highly aware of the content they

consume and take active measures to avoid content that could have a negative impact on them. Using the platform's affordances as a method of self-care, they actively control their interactions with and consumption of content focused on perfect bodies and healthy eating.

Participants also controlled what they shared with others, with some being mindful of those following them. Toffoletti *et al.* [392] document how a hashtag (*#littleeyesarewatching*) reminds a user that she is not only posting for herself or her peers, but also for younger users who may be influenced by her words and actions. Others are mindful that their families are observing their content, aiming to restrict what their families see and posting accordingly: *"I do not strip down completely to my inner-wear in selfies. I have family on Instagram, and they will not be okay with that"* [311]. This participant's family are Muslim, and additional cultural and religious customs apply to her situation. In her case, she feels a need for female bodies to be covered and is cautious not to offend her family with inappropriate posts. Similarly, in work by Basabain *et al.* [26], a woman shares how she controls what she posts to please her family: *"I began to post exercises with mostly modest clothing [...] to prevent bothering conservative followers and family members."* Both users similarly manage their appearance and posting in line with their own and their family's cultural values.

Other women control who can contact them, particularly if they have experienced harassment: *"You block, you report, and you move on"* [391]. Participants tend to be proactive in managing negative experiences; some are not upset by harassment but still, exert control over interactions with harassers through using platform affordances: *"I've never felt traumatized [...] you just report to Instagram and Instagram closed the account"* [392].

The participants in these papers were mindful of the content they viewed, making conscious choices to manage who they followed and who could contact them, in order to protect their mental health. Women additionally make choices about the content they share to protect younger users [392] and their families [26]. The following subsection describes the privacy features users in these studies engage with to manage their online experiences and attitudes towards privacy and safety.

4.4.2 Awareness of Privacy

Privacy surfaced in the studied literature in two ways: 1) authors highlighted privacy features participants chose to use, and 2) authors noted participants' notions of data privacy and security.

Some participants adapt privacy features to manage their online presence by using separate private and public profiles [26, 311, 392, 393]. Complicating this is the fact that several participants voice the need to have public profiles to gain an audience or have sponsors. Toffoletti *et al.* [392] highlight a participant who shares that she *“had to make my profile public”* to engage with a sponsor who required it as part of a contract. Resonating with our earlier concept of mandatory sharing, here, a user must offer up their privacy to have their profile perform well online and meet requirements for sponsorship. Other papers [26, 311, 393] note the loss of privacy as participants create public accounts for their businesses (built around their private life) to gain an audience: *“I created a business account [...] This account is public and focused on [...] building a clientele base and building my brand with an awareness of cultural limits”* [26]

Profiles that anyone can view are considered more suitable for monetisation, making public profiles often mandatory for sponsorship and business growth. However, as users switch their accounts to public, they must be more mindful of

who can view their content. Several papers note this complexity within the health and fitness realm, as some users grapple with cultural and religious expectations [26, 311, 393]. Users want to share their experiences, including images of their bodies, but are limited by having public-facing profiles that can also be seen by family members, who have their own expectations [26, 311, 393]. Toll and Norman [393] share insights into how such participants manage expectations to share themselves and creatively circumvent ethnocultural expectations. As they share, they choose to wear modest dress while engaging in fitness poses. In ways like this, participants are seen to sacrifice the control that comes with private accounts to increase their visibility, gain sponsorship and followers, and find ways to manage their desire to share and be safe, without restricting themselves in what they post.

A relatively small number of papers explicitly discuss users' use of privacy settings [26, 311, 392, 393], and only one paper discusses data privacy [216]. Lupton [216] reports a lack of concern for privacy and security issues; the author notes that: *"participants did not spontaneously refer to privacy or security issues."* Probing this further, she found that participants were aware of data privacy and that companies used their data, but seemed unconcerned about the implications for their own data. As one participant from this study shares: *"There's a lot of people using the internet, and I don't think they'll have very much interest in my information"* [216]. This participant is aware that social media and data companies may use her data, but it is unclear whether she understands how this is carried out, as she believes her data would not be of interest to third parties. In the same study, another participant is more aware of the ways third parties use her data for marketing purposes: *"If I look up fitness, they'll say, 'Oh, look at this fitness gear; why don't you buy it? [...] I think it's just society today – I can't really stop it."* This

user perceives themselves as powerless against the algorithms that structure much of their online experience. The regularity of third-party usage of her data and her familiarity with its use make it seem like a common practice and something systemic that would be difficult to change. In our sample, Lupton's [216] paper was the only one to explicitly discuss data privacy, perhaps suggesting that privacy is a complex issue and the extent of its complexity is not fully understood by women interacting with fitness in online spaces. It may also reflect a lack of engagement with the topic in previous literature. This thematic synthesis of the existing literature has identified four overarching themes that explore how women engage with fitness content on social media. We detail how papers collectively describe participants producing and curating content for others to enjoy, observing content, interacting with one another, and managing their privacy.

5 DISCUSSION

This systematic review and thematic synthesis explored existing literature on women's engagement with fitness content on social media. Our findings detail how participants control their privacy and their experience of posting and consuming both relatable and 'perfect' content. Our findings reflect and extend previous literature [73, 100, 202, 389, 404, 425], highlighting the use of social media for health and fitness information dissemination and exposing a gap in privacy knowledge [216]. Here, we connect these findings more broadly as they pertain to existing debates in HCI; we also outline a series of tensions which we foresee as complicating sharing about health and fitness online in the future. Furthermore, we offer a *'Modes of Engagement'* framework for the sensemaking of sharing practices online, with a specific focus on women's sharing of fitness-related information.

5.1 Not seeing who's watching

In our review, users seemed generally unconcerned about their data safety and privacy [216]. Users presumed their data was not worthwhile or exciting (*"I don't think they'll have very much interest in my information"*) [216]. It could be posited that a lack of concern may stem from a lack of understanding of the extent to which their data are being used or a perception that the benefits outweigh the drawbacks. This can be observed in other studies examining corporate data usage, where users tend to focus on the benefits of algorithms and data usage rather than the potential harms (e.g., saving time or identifying content that users will enjoy [125, 356]). As mentioned earlier, third parties can translate human experience into behavioural data, which aids personalised predictions [436], and these personalised predictions add to the perceived benefit of algorithms.

Additionally, some users may believe their data is *"not interesting enough,"* but many companies disagree [83]. It could be that users do not recognise the interest of other actors in their data and how it is used. The impact and level of data usage have not even begun to be mapped, let alone explained to users [181]. Regarding health and fitness data, the risk of data gathering and selling is greater than that of targeted ads interrupting social media usage[181]. For example, in the recent Roe Vs Wade overturn in the US, many women were concerned their reproductive data was being sold to the US government or that their identifying, now potentially criminalising, health data could be subpoenaed and used against them in court [138]. Insufficient data transparency on these online platforms, combined with users' lack of concern about safety and privacy, creates tension for the future of the space.

In this way, HCI research can address the broader impact that surveillance capitalism has on users and aid in communicating potential privacy

concerns to users. We suggest studying existing knowledge levels of users in the fitness community regarding surveillance and creating a basis for policy and educational program development to improve overall transparency. We also encourage continued research into the degree of surveillance capitalism to highlight the stakes of data usage on users.

Our findings also indicated gendered harassment experienced by users [26, 63, 64, 373]. Toffoletti *et al.* [392] write about users experiencing image-based sexual harassment online, while other papers in this review reported their participants receiving sexual messages [26, 64]. This corresponds with wider cultural issues relating to online misogyny and sexual harassment of women [297]. Image-based sexual harassment is often seen in the sending of unsolicited images, often “dick pics” [159], as well as the leaking of intimate images. A content analysis of unsolicited images detailed that even as women ignored these perpetrators, they still received image-based sexual harassment [339]. McGlynn and Rackley [242] highlight mental and physical harms resulting from users losing a sense of dignity, privacy and sexual autonomy [242]. They define the concept of “image-based sexual abuse” (IBSA) and explain the role of the law in response, which would see *“civil and criminal law provide redress for victim-survivors and [...] encourage cultural change”* [242]. It is key to highlight the legality surrounding such abuse, as some expect that online abuse is inevitable, and those who experience it can be victimized, and their online behaviour warrants the abuse [220]. The idea that victims of harassment should be responsible for managing their harassment and abuse themselves constitutes victim blaming, which sees the victim of a crime wrongfully held at fault for the harm they experienced [381]. Victim blaming also appears as toxic responses on social media platforms [372]. Top-down intervention from platforms here would benefit the victims of such abuse and harassment, as

well as provide them with sufficient affordances to manage their safety and privacy, building on traditional private accounts, blocking and reporting features. IBSA is not easy to deal with by criminal law, as it encompasses a wide range of behaviours, and pre-existing laws struggle to capture the behaviours involved [75]. Many countries, including Australia and Ireland (more recently), have criminalised IBSA, and penalties for breaking these laws include fines and imprisonment [75, 85].

Users' desire to monetise their public-facing accounts and fears of harassment and judgment complicate future design in this space [26, 311, 391]. Our review highlights users' attempts to negotiate between public and private spheres by maintaining separate accounts for business, family, and friends [26, 311, 391]. Many users find Instagram restrictive, as they want to share authentic versions of themselves with some followers and an alternative version of themselves with others [104]. In some cases, individuals with this perception create workarounds [104], such as "Finstas" [426] or "fake Instagram" accounts that users repurpose to connect more openly with close friends [426]. These accounts are often humorous, unfiltered representations of users' lives, and users share these with friends without a broader and more scrutinising public. Such accounts are deemed (by the same users) unsuitable for wider Instagram audiences [104]. While none of the reviewed papers explicitly mention Finsta accounts [426], they discuss creating separate public and private accounts to portray themselves differently [26, 311, 391]. This desire for users to be themselves privately and the earlier discussion of the need to share publicly for sponsorships and followers leads us to another tension.

We highlight potential tension between the desire for public accounts and the need for privacy. This is further complicated by the monetisation of public

accounts and the desire for authenticity, which can be harmed by monetisation [99]. HCI may intervene by promoting transparency in advertisements, companies, creators, and platforms through research and communication of the findings.

5.2 The Body Online

In our analysis, the authors of the papers detailed their participants' desires to share content online. Creators often monetised this sharing for material and social gains [26, 64, 392, 393]. Users in the papers who sought to gain materially felt the need to share themselves and images of their perfect bodies to get sponsorships and followers [26, 64, 392, 393]. Existing research supports this, noting that social media enables creators to earn money and gain exposure by publicly sharing themselves and their lives [65]. This public sharing usually requires presenting the best version of oneself or the manufacturing process discussed previously [166, 180, 311, 391, 393]. Our analysis captured the highly curated portrayal of fitness in some online spaces [63, 118, 310]. For example, one of Rajan's [311] participants' drip-fed images of herself with an "*extremely low body fat percentage*" onto her Instagram feed over a month-long period, creating a false representation of a perfect body that her followers may try to achieve, even though having very low body fat over a long time can be harmful for women. Here, the body being shared is curated to display thinness. In contrast, research exploring the male body on Instagram reveals that the male ideal is characterised by muscularity and leanness, and social media posts that adhere to this ideal receive more responses [150]. The over-saturation of these types of perfect bodies can impact women's self-esteem [131]. However, in comparison, some work suggests that the majority of male participants do not feel their self-esteem is impacted by observing this kind of

content [108]. Additionally, the oversaturation of these ‘perfect bodies’ can lead to the experience of exercising: “*to be hot [...] to have a good body*” as with one participant in work by Camacho-Miñano and Gray [64]. Research finds that in comparison, for males, the norms and outcomes related to health, or training to be healthy, are more common than appearance constructs like training “to be hot” [150]. Research supports that weight-inclusive imagery is more likely to inspire exercise intention and motivation for some women [421]. Relatedly, female participants in the studied papers praised creators who shared their “*imperfections*”, including stretch marks and cellulite. This type of sharing can be linked to the body positivity movement, which has resurged since 2012 due to the rise of Instagram [93]. The movement supports diversity, acceptance and respect while rebelling against societal norms [330]. It has been indicated that engagement with body-positivity content may improve users’ body image [84, 367].

Toffoletti and Thorpe [391] acknowledge the lack of representation of larger body sizes in their content analysis of the image-based site Instagram and highlight a lack of ethnically diverse women. Our review included two papers that highlighted cultural and religious differences experienced by Muslim women as they use social media for fitness. As women in these papers tried to succeed in a social media industry dominated by Western ideals, these users often adjusted their online sharing to account for their own or their family's religious beliefs [26]. These women struggled to conform to the requirements for online success, including sharing their bodies due to their religious and cultural beliefs. Research by Mustafa *et al.* [266] highlights that Islamic beliefs are central to how Islamic women view female intimate and reproductive health, often negatively impacting how they view their bodies. This negative impact of how they view their bodies

may be reinforced if they are not as successful in the fitness space as others due to religious and cultural restrictions on sharing their bodies.

It is essential to note that the majority of the papers in this review primarily examine Instagram as the main social media platform (as shown in Table 4 and discussed in Section 4.1.1). Therefore, the desire for visual representation of perfect and relatable bodies likely hinges on the video and image-sharing nature of the site. A similar desire for this representation will likely be seen on other image or video sharing platforms, like TikTok, YouTube and Pinterest. We note that when the format of the platform changes, for instance, to forum-based platforms, the users still seek and share authentic, real, and relatable experiences in a written format. For example, the participant in Andreasson and Johansson [13] who shares an honest experience of vomiting in the gym: *“Blowing chunks [...] whatever you want to call it [...] vomiting during a workout [is] no fun”*. In this case, they desire honest and relatable experiences to be shared by other forum users, for example, to share genuine depictions of the side effects of some doping substances. There is less of a desire for representation of *real bodies* in imagery, as it does not translate to the needs of the platform users (who want to learn and share about the effects of doping on female bodies); however, the desire is still there for *real experiences*.

The monetisation of online fitness here hinges on perfect bodies that are relatable. These perfect bodies are (perhaps unconsciously) based on what a wider public, including HCI researchers in health and wellbeing, construes as healthy and fit [363]. This norm is then reified, represented and reproduced within the artefacts we create [363], for example, in tracking devices where the ideal body *“serves as an unattainable reference point”* to keep the tracker and use of the tracker ongoing (p.3). Therefore, we should consider different body types when researching and designing in this area. **The desire for the representation of ‘real bodies’ in social**

media content (and HCI artefacts) competes with the earlier idea of ‘ideal bodies’, which creators are expected to share (and consumers strive to emulate). This tension may be addressed by further exploring how women are represented in online spaces and extending the understanding to include trans, disabled and non-Western perspectives [190].

5.3 Framework for understanding engagement with fitness content on social media

Following these tensions, we offer one of the main contributions, an analytic framework that we hope will help researchers, policymakers, developers, and designers make sense of users’ engagement with fitness content on social media. We foresee it being particularly beneficial in user research, qualitative analysis, online ethnographies, and policymaking. This framework builds upon our analysis and work by Hoffman and Novak [167], which explores social media usage in relation to users’ behaviours and well-being in terms of their fundamental needs. We update it, extend it, and apply it to HCI to understand how social media is used for engaging with fitness.

To generate this framework, we first brainstormed key variables derived from these findings (Fig. 2). The questions used to generate these variables included: Who is implicated? What behaviour is being explained? How do practices impact each other? How might we study practices, and what research could aid our understanding? We examined how the practices described in our findings may interact with one another. Following this, we began to explore who would be

implicated by the framework, and those who may benefit from the framework are featured in *Figure 3*.

	PRODUCING	OBSERVING	INTERACTING	MANAGING
PRODUCING		Users share content similar to what they see as they engage with trends.	Creators interact with their audience through sharing carefully considered content and responding to messages and comments.	Users manage who they share with/for by using privacy to block users, or have their profile on private.
OBSERVING	Users take inspiration from content they see to produce their own content.		Users interact with new content through algorithms and interact with creators through liking, commenting and messaging them.	What users observe is managed by following certain people and staying on their feed, as well as not following content that makes them feel bad.
INTERACTING	Creators connect with their audience through carefully considered posting, captions and replying to comments under their posts.	Users find new content via the algorithm, and comment on content and even directly message the users.		Users interact with others in a controlled manner by only following according to their preference and using the privacy features.
MANAGING	Users restrict who can see or interact with their posts.	Users manage what they see, sticking to their feed seeing posts by people they follow or they don't engage with content bad for their mental health.	Users negotiate who and what they interact with by managing who follows them and can speak with them through privacy features.	

Figure 2: Matrix of Variables

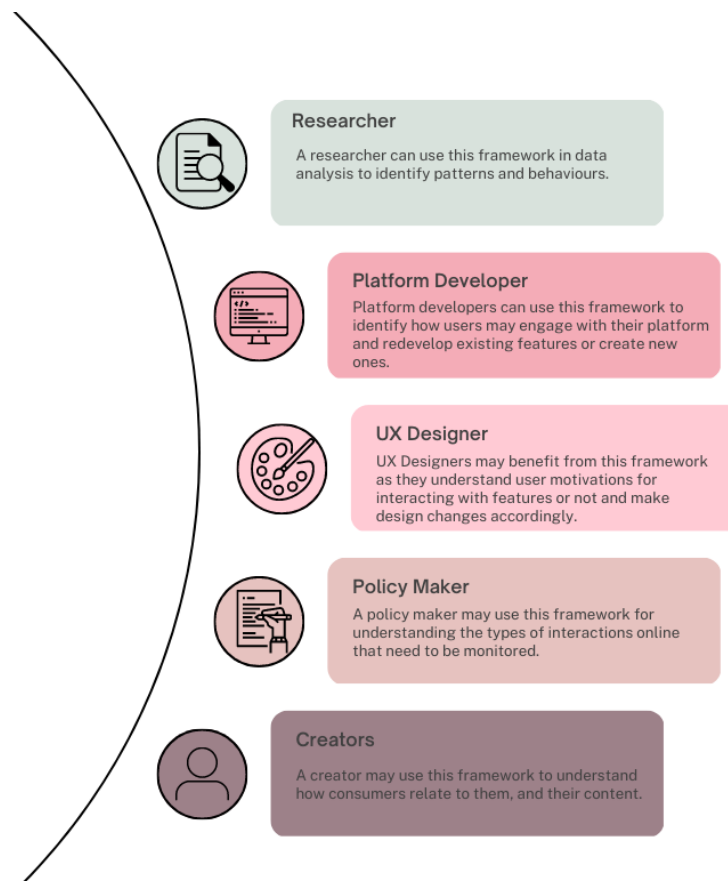


Figure 3: Stakeholders

The ‘*modes of engagement*’ framework (Fig. 4) is built around four types of engagement: producing, observing, interacting, and managing. Below, we define the concepts, describe methods for examining them, outline research questions that may stem from them, and discuss theories that could be used to further understand the area. Multiple theories and methodologies can be employed to understand interactions, which are communicated through a gradient. It is worth noting that most, if not all, social media research can be studied using any of the methods outlined below. However, in our framework, we have selected (and in supporting text, highlight) those methods that we feel may be particularly useful in HCI research, especially given the contested nature of the space, as detailed in our tensions above.

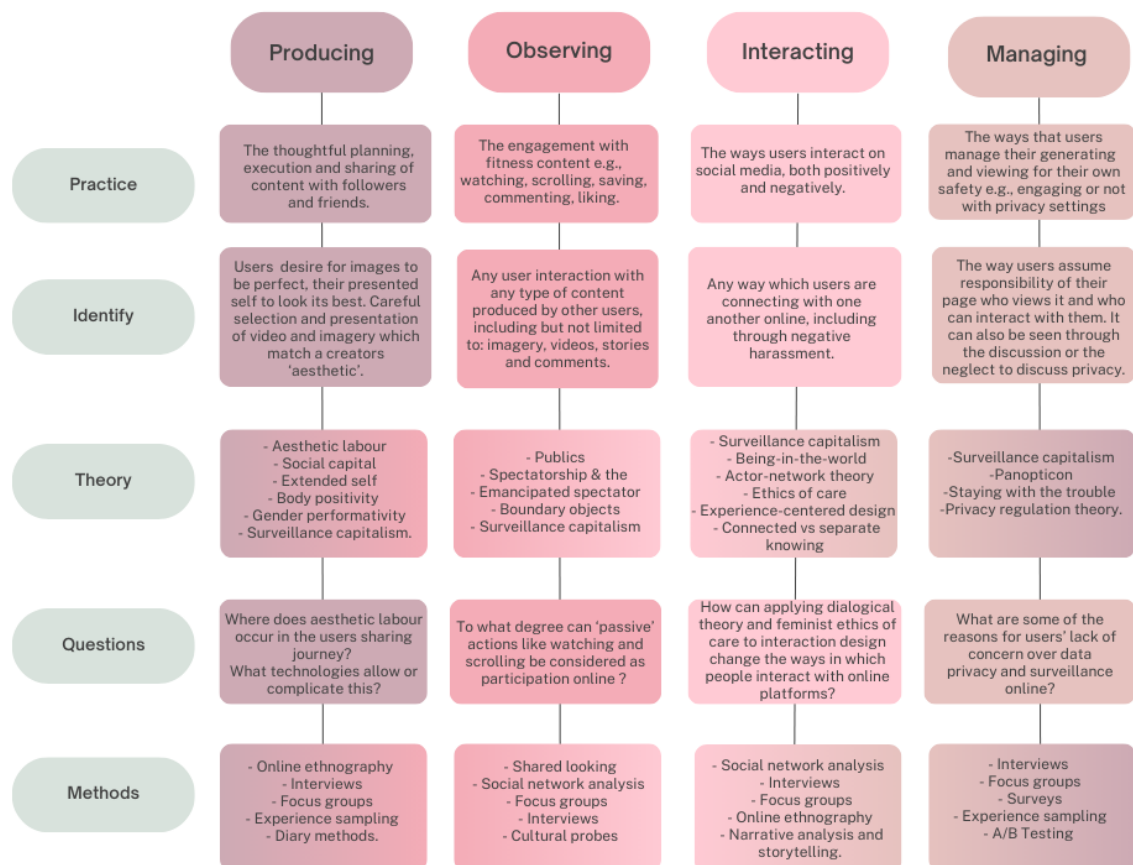


Figure 4: Modes of Engagement Framework

1. **Producing.** This can be described as the thoughtful planning, execution and sharing of content with followers and friends. It does not explicitly relate to influencers: anyone who puts thought into their content before sharing is deemed to be producing. It can be characterised by the need or mandate to share, the thoughtful planning behind sharing and the editing of imagery. It also covers the desire to share relatable content.

We may identify ‘producing’ as users discussing the desire for images to be perfect, for their presented self to look its best, and the need to share for their followers or sponsorships. It may also exist as the careful selection and presentation of video and imagery which match a creator’s ‘aesthetic’.

Many theories, concepts and ideas offer interesting perspectives around production on social media with specific reference to fitness. As mentioned earlier, aesthetic labour [121] refers to the hard work users engage in to present acceptable bodies; body positivity is a movement that aims to normalise ‘imperfect’ bodies or those outside the mainstream [367].

However, theories such as the extended self [30] (that selfhood is also comprised of digital and physical possessions) and gender performativity [126] may also help us understand creation practices in more nuanced ways. To study this, we suggest open qualitative methods such as ethnographies and interviews and UX research methods such as diary studies and experience sampling.

2. **Observing.** This describes the watching, scrolling, saving, commenting, liking and sharing of fitness content. It is characterised by users’ looking at and learning from bodies and experiences, and is often mediated by the trustworthiness of the creator or the platform in question. For instance, users wish to learn about their body but are mindful of the source of the

information; they may trust health sites, influencers with certifications, or those with many followers. Observing can be identified as any interaction with content which does not involve originally posting it. Here, we suggest that theories and concepts that hinge on participation, engagement and audiences can help us understand how such users can be considered active rather than passive observers. Among others, McCarthy & Wright [240] speak about ‘publics’, as well as Rancière’s [312] emancipated spectator, to help us understand these technologically mediated cultural contexts in terms not only of what is said but what actions are carried out. Research methods that may be generative here include those that allow greater insight into these small actions, such as social media analysis, shared looking and cultural probes.

3. **Interacting.** Interacting describes how users interact with each other on social media, both positively and negatively. Interaction entails users’ interactions with the platform to engage with others (e.g., following, liking, sharing, DMing or commenting). Each method of communication serves its own purpose. Interaction is also described by the harassment and unwanted engagements experienced online, which may include unsolicited messaging, persistent messaging, threats, and more. Interaction can be identified by the ways users interact with one another online. Sociocultural philosophy concepts such as being-in-the-world [437] and feminist ethics of care [271] may here offer us insights into how users take care and show concern for one another, as well as how they relate to one another. Sociotechnical theories like experience-centred design [240] and actor-network theory [204] might, in turn, help us understand how the design of online platforms can affect this experience of connecting. Research methods that may be

generative here include qualitative methods (focus groups, interviews) and narrative methods such as storytelling.

4. **Managing.** This pertains to the ways users work to monitor sharing and consuming for their own safety. This can be seen as either engaging with or choosing not to engage in privacy settings. It is also evident in the ways users block viewers from engaging with their content, as they manage their online presence and determine who can see and interact with their content. It can be identified through discussion or the neglect to discuss privacy. Many theories intersect in the area of privacy, security and control; however, in the context of our framework, we believe that surveillance capitalism [436] (detailed elsewhere in the paper) and the notion of the panopticon [314] can both offer critical lenses through which to understand users' and their concerns (and lack thereof). Haraway's [154] concept of 'staying with the trouble' might help us engage with potentially discomfoting notions of privacy, attention and concealment, while both qualitative and quantitative methods could intersect here to understand users' perceptions of design features that offer privacy and expression.

Our framework highlights four types of engagement and provides insight into understanding and conducting future research in online spaces related to fitness. It also aids understanding for those outlined in Figure 2 and beyond. Future studies might use this framework to investigate social media usage for fitness in specific contexts. For instance, work exploring the idea of producing may build from theory around aesthetic labour and extended self to gain a deeper understanding of how creators view their bodies and their fitness as commodities (or not) and their online

presence as a possession (or not) while engaging with concerns they may have about privacy and harassment. Additionally, work may develop the idea of *managing* to understand users' attitudes towards data safety and surveillance when they engage with fitness content on social media. Engaging with Panopticon may enable us to understand users' concerns and provide an opportunity to enhance transparency between these technologies and their users.

5.4 Limitations & Future Recommendations

The nature of this systematic review necessitates acknowledging the limitations of the evidence and review process [281]. As with similar systematic reviews, the evidence has been gathered by other researchers, making it challenging to identify biases or inconsistencies that may have influenced the data collection and analysis in the primary studies. The selection of data presented in the publication is a snapshot of analysed data from the studies, and we cannot be sure which data were omitted. Additionally, our exclusion of papers not published in English ignores a large body of work from other countries. Our corpus, therefore, represents a largely Westernised experience of social media and fitness (of the 21 publications, 13 are from Westernised countries: Australia, the UK, Canada, Germany, and Spain; only one represents Saudi Arabia). Highlighting the overrepresentation of Western cultures here should influence future research to explore and intentionally publish women's experiences in other areas.

HCI research should continue to explore populations frequently excluded from representation and share insights with stakeholders and platform policymakers. We urge researchers to move beyond educational interventions alone, which place the responsibility of safety on the user, and instead apply pressure and aid in the policy and legal development of regulations to help keep

users safe. Finally, we provide a framework that aids the identification and sensemaking of women's engagement with fitness content on social media. Future research may benefit from exploring additional applications of this framework, including those within online health practices.

6 CONCLUSION

Social media usage for fitness is growing, and the industry is expanding; however, there are risks when engaging with fitness content online. Specifically, issues regarding body image, exposure to misinformation and the privacy risks associated with being online.

This study reported our process for a systematic review and thematic synthesis, as we compiled and analysed existing literature exploring women's social media usage for fitness. We found that women engage with fitness in four main ways: producing, observing, interacting, and managing. This review highlights the gap in fitness literature regarding attitudes towards privacy. These themes depict users' online fitness usage as multifaceted, and we share tensions that we believe will complicate the future of this space. These tensions include the need for public accounts for monetary success and the need for private accounts, the desire to share ideal bodies and real bodies, and the fast-paced movement of technology and trends versus the slower legal processes which govern them. Following these tensions, we present our *modes of engagement* framework for categorising, understanding, and sensemaking of their fitness-related online activities, which has the potential to make an important contribution in future analyses and responsible design in this field.

CHAPTER 3: METHODS AND METHODOLOGIES

Motivation for this Chapter within the Thesis

The previous Chapter synthesised existing literature to provide an evidence-based foundation for the thesis. Building upon this evidence base as a background, this chapter outlines the methodological framework and research design that shaped this PhD. The methods employed were selected to explore women's experiences navigating fitness content on social media and to inform a game-based intervention. I present this work as a series of HCI papers, which limits the depth of discussion regarding the methodological approaches implemented. Each chapter employs specific methods detailed in its respective methods section, however these sections are condensed to align with the publication format. Therefore, this chapter further elaborates on the methodological approaches taken throughout this project, including those of the previous chapter. This chapter also details the participant engagement, ethical considerations, data collection, analysis and design that informed this research and its outcomes. This transparency demonstrates the rigour of this PhD in its contribution to expanding knowledge on digital fitness literacies and the 'safety work' women undertake to ensure their safety when using social media for fitness.

1 INTRODUCTION TO THE CHAPTER

This thesis adopts qualitative research methodologies to frame, study and answer the following research questions: (1) How is social media used as a site for women to share information and experiences about fitness? → (2) How do women engage with fitness content across platforms and what are their attitudes towards privacy and safety? → (3) What skills do women use to navigate fitness online safely, and how are they developed? → (4) How might we begin to design responses to facilitate the safe use of social media for fitness?

As outlined in Chapter 1, this project was conducted in three phases: (1) a systematic review to analyse existing literature to form a basis for further enquiry regarding women's use of social media for fitness. (2) Interviews and qualitative surveys to identify their attitudes towards privacy and safety when engaging with fitness online, and (3) a series of workshops to explore women's development of digital health literacy and safe navigation skills for online fitness and how they might be translated into a game-based intervention. I now introduce several theories that underpin this thesis and situate them within the work.

This work is repetitive in parts due to the paper format, particularly in the background sections of Chapters 4 and 5, as I lay out the rationale for studying women who use social media for fitness. In response, a prologue section precedes these empirical chapters, outlining the relevance of each chapter within the context of the thesis. This ensures that the argument for this thesis remains at the forefront of this work, irrespective of the repetitive chapter structure.

2 METHODOLOGY

2.1 Qualitative Research

At its core, qualitative research seeks to capture participants' experiences, perceptions, and behaviours. Qualitative research within HCI is used to understand how technologies are integrated into people's lives, how they perceive and feel about them, and how they think about them [3]. In this thesis, I draw on qualitative research to centre women's understandings and experiences of using social media for fitness, particularly regarding their safety and digital literacies. To gain insight into the safe use of social media for fitness and the relevant digital literacies required, I aim to focus on the lived experiences and processes of meaning-making among women who use social media for fitness. I combine multiple data collection methods to gain insight into these lived experiences.

In using semi-structured interviews, surveys, shared looking accounts and workshops, I align with many other HCI researchers who seek to qualitatively explore social media [343].

For example, HCI research employs qualitative methods, including interviews and focus groups, to investigate women's experiences with wearable technologies and digital health tools, and reports emotional responses such as guilt and shame, as well as privacy-related concerns [217]. These emotional and meaning-making dimensions of the findings are unlikely to be accessed through quantitative surveys. Further qualitative HCI work by Karusala *et al.* [186] explores cultural roles, gender roles and expectations and how they shape social media usage and boundary negotiations. In their research, the qualitative nature of the work allows them to capture lived and culturally situated experiences, which are of particular interest as online fitness and safety behaviours are digitally and socially mediated [186]. Women's use of social media for fitness is deeply influenced by social norms,

gender expectations and digitally mediated representations of fitness, as I have detailed in the previous chapter. Qualitative methods allow me to explore these complexities in a way that accesses users' experiences and understandings.

As this area is underexplored in HCI, it can be challenging to identify the HCI issue before conducting research, making it difficult to determine the variables required to conduct quantitative research [3]. My qualitative approach, guided by a constructivist epistemology, allows me to co-construct meaning with participants to generate new knowledge about women's use of social media for fitness. I chose to employ qualitative methods because safety, privacy, and digital literacy in online fitness are complex, and I needed to explore them in relation to women's experiences.

Although the 'H' in HCI is for 'human', as Crabtree [89] points out in the title of his paper, there is a growing realisation that qualitative research is not always given adequate respect within HCI. The insights derived from qualitative work are often overlooked during review processes in HCI due to issues related to extraneous criteria, including metrics and measurements, interrater reliability scores, and sample sizes [354]. This denies HCI of insights regarding society and technology; disregarding the very H (human) that Is (interacts) with Cs (computers) [89]. Despite the difficulties faced by qualitative researchers in HCI peer review processes, qualitative research remains well-suited to gather the in-depth, lived, experiential insights I seek in order to answer the research questions of this thesis. Like many HCI researchers, I have experienced reviewer comments that were methodologically incongruent [103]. Yet I remain committed to upholding the rigour of my qualitative research, through carefully designing and conducting research, as well as practising reflexivity [210] and being transparent about my process. In maintaining the methodological rigour, I contribute

meaningful insights into how women use social media for fitness [210]. In line with this, my reflexivity (a reflection on my thoughts and preconceived ideas throughout the research process [50]) is captured in a section titled ‘Learning to swim’ later in this chapter, which draws attention to my reflexive process undertaken throughout this PhD.

Furthermore, I aligned with the research paradigm and theories that inform my interpretation of the data. For this work, I employ a constructivist paradigm informed by two recurring ideas: Care Ethics and The Emancipated Spectator.

As with much of the qualitative research in HCI on social media [343], my approach is grounded in a constructivist paradigm, meaning that the participants and I co-constructed meaning through our interactions [302]. This paradigm influences data collection and interpretation, as it underpins the qualitative research assumption that reality is subjective and shaped by individual experiences. With this belief in mind, the methods I employed in data collection (interviews, qualitative surveys and workshops) encourage the sharing of experiences and provide insight into how meaning is constructed (and co-constructed). My research leverages constructivism to support an exploration of *how* women use social media for fitness that values their experiences and opinions.

Qualitative research is resource-intensive [210]. Methods such as semi-structured interviews and workshops can be time-consuming and require substantial resources. For example, I conducted in-depth interviews and multiple workshops with numerous participants to comprehensively explore women's use of social media for fitness purposes. Rigorous data collection is a time-consuming process, and the relatively short timeframe for conducting multiple studies during the PhD meant that the studies were not exhaustive in terms of participant demographics.

Drawing on a qualitative methodology to respond to the research questions and facilitate an inductive approach to creating meaning allows for a deep, nuanced understanding of women's engagement with digital fitness. This approach is appropriate due to the relational and culturally situated nature of users' engagement. The qualitative data collection and analysis described in Sections 5 and 6 ensure space for participants' voices and the subtleties of how safety and care are enacted on and offline.

2.2 Theoretical Background

As previously noted, qualitative research needs to remain aligned with the research paradigms and theories that inform my understanding. As stated for this thesis, it is a constructivist paradigm informed by theories and concepts, including Care Ethics and the Emancipated Spectator. The nature of the 'thesis by publication' format has not provided ample space for the discussion of these guiding perspectives within the chapters, and as such, I elaborate upon them here.

Chapter 2, the systematic review introduced a framework, which identified several theories (and methods) that may be beneficial for the sensemaking of how women engage with fitness on social media. Two of the recommended ideas recur throughout the thesis: Care Ethics and Emancipated Spectator, while others implicitly underpin the studies. This section outlines the phenomenology employed implicitly and explicitly in this thesis, including Noddings [270] Care Ethics and Rancière's [312] concept of the Emancipated Spectator. First, I will briefly introduce the constructivist paradigm grounding the qualitative approach.

2.2.1 Constructivist Paradigm

A constructivist paradigm views knowledge as socially constructed and subjective, emphasising users' understandings, experiences and perspectives. My

research aligns with the constructivist paradigm as meaning is co-created, context-specific and shaped by participants' perspectives throughout the thesis.

Constructivism is a learning theory that, in the context of this PhD, draws on the work of Dewey [332] and posits that learning is an active, context-dependent, socially mediated, and experiential process. Its specific relevance here is to the inquiry into women's use of social media for fitness and their development of safe social media practices in this context. Leveraging constructivism, I highlight users' ability to make sense of their interactions with objects and people in environments [332], specifically social media platforms, algorithms, digital fitness content, and culture.

Constructivism suggests that 'learners' actively build their understanding and knowledge [105]. It positions users as active in knowledge construction, and it considers the context of the user's worldview. As my intention is to explore women's engagement with social media for fitness and possible interventions, the constructivist approach values their experiences in the process. Hence, I decided to conduct a qualitative exploration of their experiences through interviews, surveys, and workshops.

Constructivism is influential in understanding 'learners' as active meaning makers, and this has implications throughout this PhD, particularly in extending the understanding of users as capable of navigating social media safely. I leverage Dewey's [105] view that learning is part of living and that *"every individual has grown up, and always must grow up, in a social medium"* (p.1803), to highlight the influence of relationships, culture, values and community on learning to navigate fitness on social media. It is a combination of social interactions, lived experiences and values that help an individual to *"acquire a mind of his [sic] own"* (p.1804) [105]. Drawing on this perspective, in the following chapters, I position users as

competent in navigating social media in a way that is safe for them, having learned to do so through their lived experiences, education, interactions with others and the digitally mediated values of online fitness.

The fact that users leverage their lived experiences to navigate fitness on social media means they are actively creating knowledge, which aligns with a constructivist view. Similarly, in his essay ‘The Emancipated Spectator’, Rancière [312] positions viewers of art as active in its interpretation. Rancière [312] argues that viewers possess the intellectual capacity to interpret art, and in doing so, he challenges the notion of their passive consumption. A prioritisation of this user agency and the value of situated and relational knowledge is linked to Feminist HCI and care ethics, too, as it pushes back against top-down systems. These theories share a similar emphasis on active participation and contextual understanding, rather than passivity.

HCI work by Suchman [371] argues that interaction with technology is constructed through context, social dynamics and situated actions, which aligns with a constructivist lens. Her work reflects feminist epistemologies, recognising that knowledge and action are embodied, relational, and contextual.

Other Feminist HCI work by Bardzell and Bardzell (2011) emphasises reflexivity, co-construction and the inclusion of marginalised voices in knowledge creation, and this emphasis is inherently constructivist. Drawing on Bardzell and Bardzell’s (2011) emphasis on co-construction, I engage with users during data collection (and evaluation in Chapter 5) to co-create an understanding of safe social media use and the development of digital literacy.

A constructivist paradigm recognises this co-construction of meaning and knowledge [302]. In this work, the paradigm views me (the researcher) as inseparable from the research process and views this connection as positively

influencing the work. As we cannot be separated [302], I must address this influence on the work to ensure the research process is rigorous. To do so, I include a reflexivity section [50]. Later in this chapter, the reflexivity section aims to provide a snapshot of the ongoing reflexivity process, shaped by my experiences throughout the PhD. Additionally, there are reflexivity sections in Chapters 4, 5, and 6.

Finally, a constructivist perspective shifts my understanding of digital literacy towards a contextual act of self-care and safety rather than a skill. My work positions women as ‘savvy’ users of social media for fitness. Yet their digital literacy extends beyond the ability to utilise the affordances of social media platforms. It is shaped by context, education, and social influences, and contributes to their active use of social media for fitness. Constructivism emphasises that knowledge emerges through interactions, and now I turn to Care Ethics to draw attention to the relational responsibilities involved in those interactions.

2.2.2 Care Ethics

Care ethics was introduced in Gilligan’s [142] work *In a Different Voice*, which emphasised the importance of care, context and relationships in moral development. She writes that “*The moral imperative is to act in such a way that relationships are maintained, not just that rules are followed.*” Her understanding of care ethics moves away from a rule-based moral reasoning. Rather than the view that “*everyone should be treated the same – an ethic of care rests on the premise of nonviolence – that no one should be hurt*” (p.174) [142]. This perspective shift is from abstract fairness towards relational responsibility. Noddings [270] is also credited with articulating Care Ethics in her work *Caring*, where she identifies care as a feminine ethic and applies it to moral education. Noddings’ [272] idea of care is more relational and responsive in real-world contexts. She holds the view that

caring “*involves stepping out of one’s own personal frame of reference into the other’s*”. In her work, she identifies two stages of caring, *caring-for* and *caring-about*. These stages refer to the physical act of caring and the state of being where somebody has caring ideas, respectively. For example, the ‘physical act of caring’ described in *caring-for* typically refers to a proximal and active type of care, such as feeding or washing. In comparison, *caring-about* is more distal and affective, like advocating for policy changes. There is an emotional investment required for both stages of care, but *caring-for* additionally requires physical presence. Tronto [398] expanded upon these stages of caring at the intersection of care ethics, feminist theory and political science. She expands the phases of care to include *caring about* (identifying a need), *taking care of* (taking responsibility for care), *care giving* (meeting the need), and *care receiving* (making sure the need is met). Care, as Tronto discusses, is material and embodied, and is composed of actions, not just thoughts and presence.

Kittay [194] emphasises that caregiving often requires invisible work, accentuating its interdependency and systemic inequalities. She highlights that it is not just an action but a relational network. Caring acts are contextual and based on social and emotional situations and are often unbalanced. For example, care can sometimes be one-sided, as in a mother-baby relationship, which is underpinned by power structures and emotions. In this work, care ethics is employed to understand the relational nature of digital fitness and to highlight that users’ online experiences are informed by their relationships.

While care is typically positive, excessive care can be harmful and often reflects power imbalances in relationships [160, 187] and research [33, 134, 365]. For example, Spiel [365] discusses power within design research and how the conceptualisation of design as addressing problems and finding solutions often

leads to more issues that manifest discrimination [31] and exclusion [364]. This indicates that design privileges particular perspectives and designers make assumptions about the use of their artefacts. She highlights that this is even more problematic when we consider technological systems [365]. She provides a provocation of viewing design not as something to find solutions but rather, a practice towards responsibility and embracing the messiness of the process [365]. Embracing this messiness echoes Haraway's [154] concept of 'staying with the trouble,' which suggests that rather than solving or avoiding problems, we live within them. Haraway calls for our mindful engagement with complicated challenges as we seek ways to cohabitate, as she describes our purpose: *"is to make trouble [...] as well as to settle troubled waters"* (p.1) [154]. We must ask hard questions, push back against norms and disrupt systems that perpetuate injustice, but we cannot solve all problems neatly; instead, we must stay present and practice care and responsibility.

In the final chapters of this thesis, I discuss the design of a conceptual intervention; while the design is not the central focus of the work, it is vital to reflect on the process and the power dynamics inherent in designing such interventions. Care ethics emphasises my responsibility and position of power in the process, and as such, I delve deeper into this reflection in the reflexivity section.

Care ethics is well established in HCI research, with feminist HCI researchers using care ethics to foreground the caring and relational nature of online communities [394]. HCI work is increasingly adopting care ethics to promote collaborative and community-oriented engagement. For instance, work by Henriques *et al.* (2025) presented a feminist care ethics toolkit to foster ethical engagement in community-based research, encouraging ethical reflection,

relational sensitivity and meaningful involvement in community-academic collaborations.

Care ethics centres human relationships and emotions, emphasising human experiences, and I use it to put the H in HCI. This is crucial when exploring topics such as fitness in the field of HCI. Particularly as the meaning-making processes between users, their relationships, fitness and social media are relational and context-specific. Care Ethics is a recurring theme throughout the chapters of this thesis.

In Chapter 1, I position Care Ethics as a suitable theory for exploring how women interact with fitness on social media, as the chapter identifies the relational and situated nature of digital fitness use. I capture the situatedness of ‘success’ in the digital fitness space, which is demarcated by follower counts, likes and sponsorships. Additionally, I note the relational nature of digital fitness, as users rely on relatability and likability when determining trustworthy influencers.

Chapter 4 identifies an ethic of care demonstrated by participants towards younger users, as they recognise a need to care for individuals who may not yet understand the potential risks associated with using social media for fitness. This need for care is further explored in Chapter 5, as users describe a collective sense of caring for one another in the online fitness space. As Tronoto [398] expanded care ethics into political science, she drew attention to the fact that care is not just private but fundamental to a just society. She writes that: “*Caring is both a practice and a disposition*” (p.104) [399], she positions care as a concern of living. She emphasises that care is a responsibility shared by society; this concern or care is a responsibility shared by members of the online fitness community. The care I describe in Chapters 4 and 5 is ingrained within this online fitness community, as they *care about*, *take care of*, and *care give* to less ‘active’, younger users.

Participants identify a responsibility towards younger users and the desire to help them avoid harm (Chapters 4 and 5). Additionally, they describe an active community caring in Chapter 5, where they work to *care for* younger users.

Care ethics is explicitly and implicitly embedded within this work. I draw from it to highlight the importance of relationships and responsibility towards and within the fitness community. It foregrounds the relational nature of the digital fitness experience, highlighting that people exist in a web of their relationships (and their digital communities). In contrast to individualistic paradigms, Care Ethics underscores the significance of attentiveness and care in shaping experiences and knowledge practices.

Within this work, Care Ethics offers a valuable lens for examining how women navigate fitness on social media, both as individuals and as group members influenced by the broader fitness community and its trends. It facilitates a deeper understanding of users' engagement with fitness online, as they seek support and advice while navigating digitally mediated representations of fitness. I draw upon Care Ethics in addressing how safe navigation may be taught to younger users through its emphasis on relational learning. By leveraging Care Ethics, this research examines how social media use for fitness involves acts of care and safety to maintain the well-being of users and others in online fitness communities. Next, I briefly turn to another recurring idea, the Emancipated Spectator, a concept that has shaped my thinking regarding what those acts of safety involve in online fitness communities.

2.2.3 *The Emancipated Spectator*

Rancière's [312] concept of the emancipated spectator employs a theatre-based analogy to posit that spectators are not passive observers of meaning but rather, they are active interpreters of meaning. He writes that "*Spectatorship is not the*

passivity that has to be turned into activity. It is our normal situation. We learn and teach, we act and know as spectators who all the time link what we see with what we have seen and said, done and dreamed"(p.17) [312]. Here, he implies that audiences bring their knowledge, experiences and imagination into their spectating. This applies to users navigating content in online fitness spaces, too. In the later chapters, I describe participants drawing on their experiences to help them navigate social media safely.

In Chapters 4 and 5, participants actively interpret content they see by drawing on their education and past mistakes to navigate potentially harmful material. I depict active participants who are competent and capable of negotiating their safety in digital fitness spaces. Similar to the concept of the emancipated spectator, I portray participants as proactive and engaged in ensuring their own safety, rather than as ignorant or powerless users.

Participants in this study actively engage with fitness and they express concern for younger users who may not be able to critically engage with content. I draw on Rancière's concept in Chapter 5 to understand that users require a contextual basis for social media and fitness-related information to engage in responsible and safe spectating. For instance, to move from passive users to active users, users must recognise that social media is highly curated and often presents socially mediated representations of what is considered fit and healthy. Users must also acknowledge that self-comparison to these representations may cause them harm. Furthermore, they also need to recognise that fitness is multifaceted, combining health, wellbeing, exercise, rest, and nutrition, to safely navigate fitness on social media. This contextual understanding enables users to be active spectators of online fitness, and as I detail in Chapter 5, this activity allows them to create a safe space or mental distance from the content they view. These recurring concepts (Care

Ethics and Emancipated Spectator) help identify the ways in which active social media users can support more vulnerable users in engaging responsibly with digital fitness.

3 PARTICIPANTS & SETTING

I employed various methods of data collection across several different participant groups throughout this thesis. The participant demographics and research strategy are detailed in the study chapters, but in all cases, the participants were female. A female population was studied as women are the largest users of social media for fitness, and they face unique privacy and safety concerns, including harassment [392, 410] and body image concerns [106, 425]. Additionally, as this research project progressed, it became apparent that this user group has specific mechanisms for safely navigating fitness content that incorporates female body and health and societal norms of what is considered healthy and fit.

I now provide an overview of the participants and explain why each group was relevant to include, based on the research aims.

3.1 ‘Women Who Use Social Media for Fitness’.

3.1.1 *Women in Fitness, Historically.*

Women’s engagement in fitness has historically been mediated by societal norms and expectations that even in the 18th century viewed exercise as ‘necessary’ but cited that the constitution of women is adapted only to moderate exercise. Some understandings in the 19th century viewed vigorous exercise and intellectual work as *stealing* resources from reproductive organs and leading to infertility [344]. These kinds of views restricted women’s exercise to that which would enhance their grace and allow them to maintain their femininity, such as walking and dancing [335].

In the 1970s, the rise of aerobics provided an entry point for women into gym spaces that had historically excluded them [48]. Over time, as women began to exercise, the societal expectations for women shifted from graceful and feminine to thin and toned [47]. In 1998, Campion wrote that exercise was a socially acceptable form of purging that garners support from family and friends [344], for instance: ‘You look great, have you lost weight?’ Her view is heavily criticised, but there is an understanding that the pursuit of fitness is one step behind the pursuit of thinness [48]. Dieting is an assumed behaviour for women, and people are not surprised to learn that 80% of women in Western cultures are dieting at any given time [277]. In her work positioning fitness as a feminist issue, Brabazon [48] highlights that disordered eating is embedded in the disordered nature of the political economy and hyper-consumerism. She believes that obesity and anorexia should be acknowledged as social and political issues.

Fitness itself, along with its complications related to body image, social norms, and disordered eating, is embedded in social contexts. For instance, literature reports that white and Asian college women internalise a thin ideal [231], while studies reporting on Black and Latina women find they reject this ideal and instead internalise a curvaceous body [58, 68]. These culturally specific body ideals are then amplified by the media, and in particular by social media. Fitness, society, and culture are inextricably intertwined, and this is reflected in women’s use of social media for fitness and in the representation of women’s sports in the media.

For instance, the fitness industry polices the range of acceptable femininity. In 2004, the FIFA president, Blatter, suggested they could attract more sponsorship and viewership for women’s soccer with “*more feminine uniforms [...] tighter shorts, for example*” because of the ‘pretty women’ playing football. These remarks were understandably met with criticism, but across the sporting world, women are

sexualised and their sporting uniforms are made to be ‘more feminine’. For instance, prior to the introduction of women’s boxing in the 2012 Olympics, female boxers were asked to wear skirts, apparently to help viewers distinguish between male and female boxers [329](?). The Norwegian beach handball team received fines and backlash for wearing ‘improper clothing’ as they decided to wear shorts instead of bikini bottoms in European competition [12]. Western media and social media both perpetuate social norms for women and fitness, one that determines what they should wear and positions a ‘perfect body’ as thin and toned. There is an expectation that women should strive for this ideal body, and if they feel excluded from gym spaces and sporting arenas, it is no wonder that they are the primary users of social media for fitness [388]. Given its accessibility, availability, and individualisation, digital fitness provides autonomy and instantaneous advice regarding fitness, health, and nutrition. In addition to these concerns, there is a dearth of research engaging with women’s fitness in HCI [45]. This thesis begins to fill this deficit by providing a gendered perspective on the safe use of social media for fitness.

For this thesis, I was interested in exploring women's experiences using social media for fitness. I recruited women due to a lack of engagement in the field of HCI with women’s fitness [45] and because women are the main users of social media for fitness [388]. Although research identifies some positive impacts of engaging with fitness content for maintaining a healthy lifestyle, including its association with increased exercise [116], much research highlights the negative impacts of using social media for fitness. These negative impacts include body dissatisfaction [129, 130], poor nutritional habits [147, 238], and injury [234]; these negative impacts are reportedly worse for women [106]. Despite these adverse effects, users continue to rely on social media and fitness influencers as sources of

fitness and nutritional information and remain avid consumers of fitness content. A key reason they provide for this is that social media and influencers provide accessible and individualised information [299]. They perceive that they safely navigate digital fitness content through relational and situated learnings of social media, fitness and women's bodies.

With these considerations in mind, the complex nature of women's fitness is deeply embedded in social norms and gender roles and my qualitative approach facilitates an exploration of these intricacies in a way that centres women's lived experiences and understandings.

3.1.2 Participants and Recruitment

For both empirical studies, I recruited women (18+) who (1) follow one or more fitness influencers or (2) engage with fitness content by liking, commenting, sharing media, following advice given, or have done so in the past. They engaged in qualitative surveys, semi-structured interviews, shared looking and workshops across Chapters 4 and 5.

I recruited the participants by advertising posts shared on social media through local sports teams and gym accounts. I used social media because it is time and cost-efficient [39], and it facilitated snowball sampling [288]. Although much research supports incentivising participation, it is against both the School of Applied Psychology's guidelines and those of the University of Limerick to do so. Incentive-based advertisements can result in representative samples. However, not doing so does not significantly impact the quality of the responses [268]. For both studies, I recruited female participants who were currently or had previously engaged with fitness content on social media, were Irish or living in Ireland, were able to consent, and were over 18.

3.2 Game Testers

The evaluation stage of Chapter 5 involved participants aged 10-13 to help assess a game developed to improve social media literacy. The reasoning for recruiting children is twofold: first, as the studies progressed, users expressed concern for the less 'active' users of social media, who may be more susceptible to its harms, and they viewed these users as younger than themselves. Secondly, in order to create a game-based intervention for a 'younger user', the younger user should be included in the process [313].

By determining the potential end user of the intervention aged 10-13 I access an age where children are beginning to actively engage with digital media and devices [114]. This is, therefore, a crucial age to intervene, as they start forming digital habits that may impact their sense of self, future behaviours, and relationships [114]. Additionally, this age group are able to provide their own responses to the surveys and offer feedback on the game.

3.2.1 Participants and Recruitment

The participants were young girls (aged 10-13) who used social media for fitness or played sports, as they might do so in the future.

I recruited participants through sports clubs. I contacted the club's chairperson, who, acting as a gatekeeper, recruited participants through communication channels with their parents, specifically via player-parent WhatsApp group messages. Snowball sampling was conducted here, too, as some participants were referred by their family members.

3.2.2 Child Safety

Later in this chapter, I describe the ethical process and the measures taken to ensure the safety of the children. As these participants were under 18, this work followed the guidance of the National Strategy for Research and Data on Children's

Lives 2011-2016 [101], Ethical Review and Children's Research in Ireland [127] and the related guidance documentation for developing ethical research projects involving children [4].

The children who participated in the test workshop shared valuable insights and funny stories. They were honest and open in their feedback, and I gained invaluable insight into what is considered cool among girls aged 10-13 (it was *not* boys, or school).

4 ETHICS & DATA MANAGEMENT

This project was conducted across the University of Limerick (UL) and University College Cork (UCC). Therefore, while ethics and data management were controlled by two governing bodies across the two empirical studies, I upheld the ethical standards throughout my PhD. As there were two governing bodies ethical approval was sought and obtained from both universities for their respective studies. Following the term at UL, all relevant data were transferred to a new UCC-managed Microsoft OneDrive and then deleted by UL.

4.1 Ethics

I initially sought ethical approval from the University of Limerick for the first empirical study (later in Chapter 4). The Science and Engineering Ethics Committee approved the study in January 2022. Following this, ethical approval was obtained for the second empirical study (Chapter 5) from the Social Research Ethics Committee at University College Cork in May 2024.

In this subsection, I outline some of the ethical considerations I took into account during this work, including negotiating sensitivities and the special considerations required for engaging with young participants.

4.1.1 Negotiating Sensitivities

During the development of the research plan for this work and in obtaining ethical approval, I was firm in the belief that it would be unlikely that users would discuss any sensitive topics. The plans and proposals detailed my intention to discuss users' practices around social media use, their favourite platforms and influencers, as well as how they negotiated online safety. I was under the assumption that the topics would be discussed and that the conversations would not be much broader than those outlined in the guide.

However, in reality, the intended topics were discussed, but during data collection for Chapter 4, participants also shared stories about being followed home after nights out, the impact of media coverage on femicide on influencing their decisions on when and where to run, and prior unhealthy behaviours. As they shared their responses, I listened attentively to their stories and gently guided the conversation back to the topics listed in the interview guide.

Additionally, in the adult workshops described in Chapter 5, some participants shared stories that highlighted negative experiences with social media, as well as their past struggles with body image and eating habits. I did not foresee these topics surfacing, and although the participants' discussions were humorous and retrospective, I was surprised by the direction of the conversations. As such, similarly to the data collection in Chapter 4, I listened to their stories and made connections between their stories and the workshop tasks. The participants were not visibly distressed as they recounted their stories; however, in the event that participants had become distressed, they were aware of their ability to withdraw at any time, and I would have reminded them. Additionally, the information sheet that participants received included contact numbers for support services in case they required any additional resources.

As I transcribed the data and began the analysis, I was cautious about capturing the context of users' statements and stories. I added notes to the transcripts as I analysed them to remind myself of the context of the responses during the workshops and interviews. This included making note of their laughter, joking responses and shock, to ensure I did not misrepresent them or their quotes in my analysis.

4.1.2 Special Considerations

As this work engaged participants under 18 in Chapter 5, I adhered to stringent child protection protocols. As such, I designed and conducted the workshop in line with the UCC Child Safeguarding Statement. This statement outlines procedures for ethical engagement with minors in the context of research. First, I obtained informed consent from parents/guardians before the workshop, as well as the child's assent, to highlight their voluntary participation. I also completed the Child First e-learning program provided by the HSE and received vetting by An Garda Síochána (the Irish police) through both UCC and the Camogie Association (the governing body of the sport they played), in line with requirements. During the workshops, I attempted to facilitate the active involvement of the young participants in my study through play, ensuring that they felt comfortable sharing their thoughts and feelings [215]. As with the adult participants, I aimed to capture the context surrounding participants' remarks and noted sarcasm, laughter and jokes in the transcript notes and during the coding process. This ensured I could capture the essence of the workshop and participant responses in my analysis.

4.2 Data Management

My data management strategy for this PhD included a detailed plan that outlined the processes for collecting, storing, and sharing data to ensure accurate and

responsible data management. Principles of confidentiality and care guided my data management practices.

Data were (and are) stored in the UCC OneDrive cloud, and in line with UCC's code of research conduct policy, will be retained for at least 10 years. As I was the primary researcher on the projects, only I had access to the data. To facilitate collaboration in the analysis process, I removed participants' names and assigned them pseudonyms. Additionally, only quotes, pseudonyms, codes and themes were shared with the research team.

I wanted to return to participants to ensure they felt as though they were represented correctly in the papers; however, the recruitment and anonymisation processes did not allow for it. I did, however, allow participants to choose their own pseudonyms, and since they did not correspond with their actual names or those of other participants, that was the pseudonym I used. It is my hope that if the participants read any of the publications resulting from their data, they might recognise themselves in the analysis.

5 DATA COLLECTION

Throughout this thesis, data collection transitioned from systematically reviewing existing qualitative studies to empirical collection methods, including surveys, interviews, shared looking, and workshops. These methods were chosen due to the rich qualitative insights they can provide into women's social media usage for fitness.

5.1 Systematic Review

In Chapter 2, I conducted a systematic review to provide an evidence base for the rest of this thesis. I aimed to collate all existing data that fit my eligibility criteria to answer the question 'how do women use social media for fitness' [203]. I

employed systematic methods to ensure that Chapter 2 would present a transparent and reproducible collation of the evidence available across the literature. I leveraged systematic review as a method to condense bodies of data across fields, as there was a lack of HCI literature exploring social media use for fitness [45]. This lends itself well to the interdisciplinary nature of HCI [305]. I followed a four-step data collection process, and, as with prior HCI systematic reviews [191, 246, 303], I reported my process using the PRISMA guidelines [86]. This included a four-step data collection process: search, screening, quality and eligibility checks and corpus data extraction.

During the review process, I was primarily concerned with qualitative data and literature that involved qualitative research. This aligns with my constructivist epistemology, as it allowed me to identify rich contextualised insights from a selection of studies. In this sense, a constructivist approach to the review allowed me to focus on the ways participants constructed meaning from their experiences while maintaining the context of the studies.

Additionally, rather than solely reporting what the existing literature was saying, I was able to explore the patterns and complexity of meaning within the works. This was particularly well-suited to my research questions, which sought to understand how women use social media for fitness, and provided space to evaluate their experiences within the context of the studies.

I conducted a systematic review, rather than a literature review, to answer the research question I set out in a rigorous format, rather than exploring existing research more broadly. This review was the basis for the thesis and the studies in the chapters that follow and therefore required a rigorous basis from which to build my arguments and understandings of women's use of social media for fitness.

Little work has been carried out exploring social media use for fitness in HCI, and therefore, a systematic review contributes a synthesis of high-quality evidence to paint a picture of ‘how women use social media for fitness’. As Webster and Watson [416] indicate, these types of reviews can help one build a foundation from which to extend knowledge. By reviewing and organising the data in Chapter 2, I have provided a suitable foundation for the following chapters and created a basis for extending digital fitness research to capture women’s experiences of privacy and safety, a gap lacking in the reviewed dataset.

5.2 Qualitative Surveys

Qualitative surveys are ideal for obtaining rich qualitative insights due to their openness and flexibility when addressing various questions [53]. I employed qualitative surveys as a starting point for my research to capture rich insights [52, 54] from a large number of perspectives and experiences [54]. HCI research by Liu *et al.* [212] details the development of Q-Survey, a chatbot-style qualitative survey tool designed to automate open-ended responses in a conversational format. The survey tool allows researchers to collect nuanced and subjective participant responses at scale; however, I employed a regular open-ended survey created and distributed using Microsoft Forms. I chose this method to gather nuanced insights about user experiences and to build an understanding of the platforms users engaged with, the influencers they liked, and their safety attitudes, behaviours, and habits, to inform the interview guide for my semi-structured interviews. The qualitative survey enabled participants to describe their experiences in their own words, providing a basis for developing the interview guide.

5.3 Semi-Structured Interviews

For Chapter 4, I conducted semi-structured, exploratory interviews that followed an interview guide. Their semi-structured nature allows for discovery, and they are shaped as the interview progresses [222]. Semi-structured interviews are often used within HCI to explore the contextual use of technology [41], giving space for users to describe their personal experiences. The flexibility provided by semi-structured interviewing allowed me to explore user experiences, motivations and behaviours. Additionally, it provides us (the participant and I) with space to discuss topics that emerge during the interview. The ability for us to discuss topics not outlined in the guide as they arise aligns with the constructivist approach to this work, in that we are co-constructing meaning throughout the interview.

Semi-structured interviews are leveraged within HCI to explore users' lived experiences with technologies [81]. The conversational format allows participants to share rich personal stories about their experiences with technologies in specific contexts. In responding to the research questions and aims of the PhD (to explore women's use and lived experience of online fitness), semi-structured interviews provide the opportunity for in-depth exploration of their experiences, motivations and behaviours.

I conducted seventeen semi-structured interviews remotely via Microsoft Teams between January and March 2022, resulting in over 12 hours of interview data. The interview guide consisted of questions that asked participants about their motivations for using social media, the types of content they consumed, their preferred platform affordances, data privacy habits, and opinions on data usage.

5.4 Shared Looking

Shared looking is a method for observing participants interacting with social media platforms in real time [392]. The 10 participants, using laptops, completed

‘shared looking’ during the semi-structured interviews. Participants used their phones to access their preferred social media site, scrolling through content and interacting with the site as usual, speaking aloud to describe their actions. I used this process to explore how users typically engage with platforms, what content they watch, and their thoughts on platform features. It also acted as a prompt to encourage further discussion during the interviews. Toffoletti *et al.* [392] report that shared looking allows users to highlight content and contextualise information for the researchers. In this work, the contextualisation was drawn upon to understand how users apply their knowledge to navigate fitness in real life. This allowed me to observe nuanced behaviours and decision-making that would likely be omitted from a user’s discussion of their social media use.

5.5 Workshops

Workshops capture the experiences and perspectives of participants through facilitated discussion. Workshops are utilised in HCI for both exploratory and evaluative purposes, particularly in the context of game design. For instance, work by Benito-Santos *et al.* [32] conducted a series of workshops, first to identify requirements and then to build and test a prototype for a game to promote good dietary behaviours among young girls [32]. Similarly, Chapter 5 combines two stages of workshops, one exploratory and one evaluative, first to identify recommendations and then test a prototype that develops from the recommendations.

The first stage involved a series of exploratory workshops with women aged 18-35, aimed at identifying how participants learn to navigate fitness content, misinformation, and online safety. Additionally, these workshops aimed to determine how safe navigation skills could be taught. Based on the findings from

Chapter 4, I deemed the participants as capable agents who actively engaged with and reflected on their social media use with autonomy, which enabled them to contribute to the development of a knowledge base on how these safe navigation skills were established. The second stage was an evaluation workshop. A game-based design intervention was developed from the first set of workshops and tested by participants aged 10-13 in a series of evaluation workshops. The two separate workshops are differentiated in the following sections: Stage 1: Scoping Workshop and Stage 2: Evaluation Workshop.

5.5.1 Stage 1: Scoping Workshop

This workshop aimed to understand how users develop a sensibility around using social media for fitness [296]. This workshop was exploratory, in line with other HCI work that aims to understand, ideate, and identify topics, as seen in ‘Playing Design’, a case study by Benito-Santos *et al.* [32].

Benito-Santos *et al.* [32] leverage exploratory workshops to discover girls’ associations with food, discuss game concepts and identify their preferences in terms of game mechanics. Engaging with users early in the process helps researchers decide where to start their game design process. Similarly, I used workshops to explore users’ lived experiences and identify users’ perceptions of the key processes in learning how to use social media safely and developing digital fitness literacy. From this workshop, I created a series of design recommendations aimed at fostering the development of the digital literacies required in this context.

The use of workshops links to my qualitative methodology and constructivist perspective as it facilitated discussions of how users combined their lived experiences and embodied understanding of fitness to navigate safely. This method provided space for their voices and their perspectives on how they developed their

technical savviness. Additionally, it supported the relational aspect of digital fitness through the group setting.

As I sought to explore users' experiences using social media for fitness safely, I began by providing an opportunity for a general discussion on their use of social media for fitness and whether it had changed over time.

Additionally, I developed findings from Chapter 4 to create a series of scenarios, which were used as prompts or discussion points surrounding misinformation, trust and privacy and safety practices (Appendix D). The final stage of the workshop involved sharing advice with their younger selves, based on how they had learned to safely navigate social media in the context of fitness.

5.5.2 Stage 2: Evaluation Workshop

This workshop aimed to test and refine the game design concept and understand the value of the game for participants. As with other HCI workshops aimed at evaluating game-based interventions, users played the game and then reported their experience through a survey [168]. The format of FemQuest evaluation workshops, detailed by Holly *et al.* [168], utilises hands-on gameplay sessions and in-game collaboration. Similarly, the evaluation workshop detailed in Chapter 5 employed a hands-on gameplay technique, where participants played a series of rounds of the game to assess its effectiveness.

In conducting the evaluative workshop, I sought to determine how younger users would perceive the game-based concept and whether they could understand and enjoy the game. The workshop format allowed me to observe a collaborative sense-making of both the game and the concepts being discussed within the game. This provided a contextual insight into how users would interact with each other and the game.

Following gameplay, I conducted a follow-up survey to capture participants' responses to the game. The combination of the workshop and the survey allowed me to gauge the participants' experiences as reported by them, rather than solely observing them. Additionally, I sought to capture the self-reported understandings that users may have obtained from playing the game. The qualitative survey, with open-ended responses, provided an opportunity for them to self-report their experience. I paid particular attention to avoid asking leading questions and welcomed participants' positive and negative experiences.

These qualitative methods provided an opportunity to collect rich insights into the lived experiences of users and their navigation of privacy and safety on social media, specifically in the context of online fitness. It also allowed me to explore the suitability of a design intervention among young girls, focusing on their perspectives and understandings.

6 DATA ANALYSIS

I employ thematic synthesis, reflexive thematic analysis, and draw on narrative inquiry in this work. These analytic methods are particularly well-suited to qualitative inquiry because they emphasise identifying and interpreting meaning. In line with the constructivist paradigm, the analysis throughout this thesis has been an interpretive process in which I created meaning from participants' responses.

This thesis aimed to understand the nuanced complexities of women's use of social media for fitness and their constructions of online safety. To meet this aim, my analytic methods are flexible and rigorous. Taken together, flexibility and rigour can appear contradictory. However, my flexible approach allowed me to adapt my analysis based on the context and data; rather than just using thematic

analysis, I draw from thematic synthesis in Chapter 2, as it is best suited to the secondary data collected. This flexibility allows me to recognise the complexity of participants' responses. In embracing this flexibility, I can navigate the various data without being confined to one analytic method. My rigorous approach, on the other hand, ensured that the chosen method was employed with integrity and precision. Here, I describe the use of thematic synthesis and reflexive thematic analysis as the primary methods of data interpretation in this PhD.

6.1 Thematic Synthesis

The data from the systematic review were analysed by thematic synthesis. Thematic synthesis is an underutilised approach in the HCI community [322], and this approach allowed me to remain “close” to the study data and to synthesise them transparently [385]. It is similar to Braun and Clarke's reflexive thematic analysis in that data are coded as the author becomes familiar with the data; however, it is adjusted to best suit secondary data [385]. The process I followed is the same as the one I describe in detail in the following section for reflexive thematic analysis. Below are snippets of the coding process where I coded data from the papers and uploaded codes into Miro, a web-based app (Fig. 5). Once the codes were uploaded I organised them into tentative categories (Fig. 6) and then into themes (Fig. 7).

The thematic synthesis in this work builds on multiple sources to generate high-level insights and create new understandings of how women utilise social media for fitness that are grounded in the original data. I employed thematic synthesis to identify patterns across qualitative studies examining women's use of social media for fitness. In line with my epistemological approach and the qualitative nature of

Braun and Clarke view qualitative analysis as an adventure that is messy and organic, and offer a guidebook for exploring qualitative research and Reflexive Thematic Analysis (TA) rather than a travel itinerary [55]. I use reflexive TA here to develop, analyse, and interpret patterns within and across my qualitative dataset. It aligns well with my constructivist approach to this work because it offers a flexible and rigorous way to identify patterns of meaning within the datasets.

The reflexive TA facilitates a deep exploration of participants' construction of meaning surrounding digital fitness and their negotiations of safety and privacy, rather than being concerned with an objective truth. This is appropriate as I intended to explore participants' understandings and experiences of using social media for fitness. TA builds on a systematic data coding process to develop themes and has grown in popularity in recent years within the HCI community [46]. The studies in this thesis follow guidelines by Braun and Clarke [52] to conduct a rigorous reflexive analysis [52]. In conducting a reflexive thematic analysis, I recognise the value of my subjective and situated position as the researcher doing the TA [51]. Reflexivity involves critical reflection on my role as a researcher and my research process; as such, I discuss my reflexivity in Section 6.

While methods such as grounded theory would have been suitable here, I was interested in conveying patterns and meaning across participants and workshops without relying on a strict coding framework. The reflexive thematic analysis allowed me to navigate multiple datasets, including interview transcripts, surveys and workshops. It also allowed me to engage with participants' nuanced perspectives in my analysis and writing of the chapters. Figures 8 and 9 below show screenshots of the analysis for Chapter 4, on Miro, the web-based app I used for affinity diagramming and visually organising my codes into themes.



Figure 8: Inserting codes from the data analysis in Chapter 4 into Miro and displaying them on sticky notes. Pink notes are the codes.

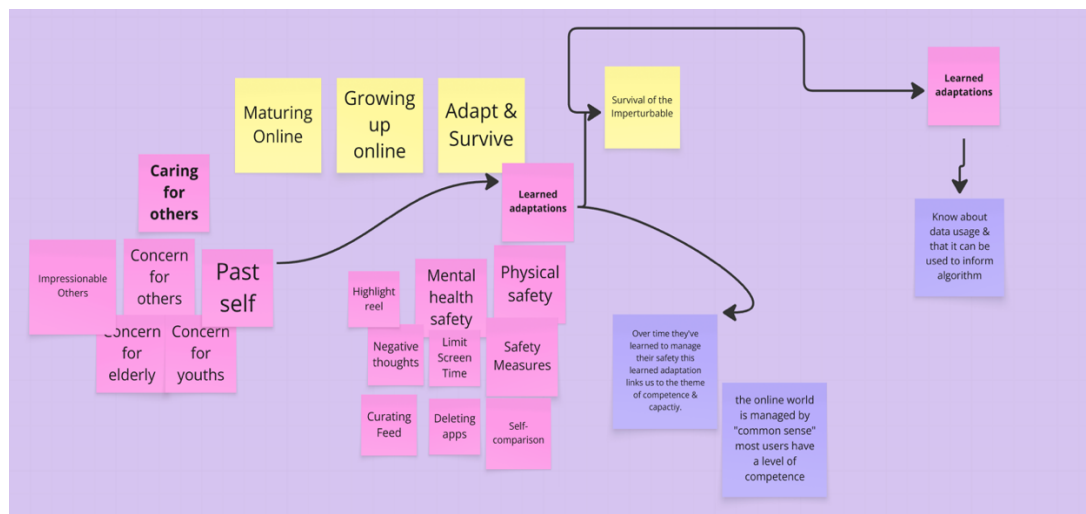


Figure 9: Pink Codes are grouped and organised under tentative categories (yellow notes). Purple notes provide context and explanations.

Figure 10 below depicts an early iteration of the ‘Community Led Curation’ theme detailed in section 4.2.3 of Chapter 5. The theme is represented below by a green note, and the purple notes provide explanations. Codes are organised into groups with related codes as a visual aid for the writing process.

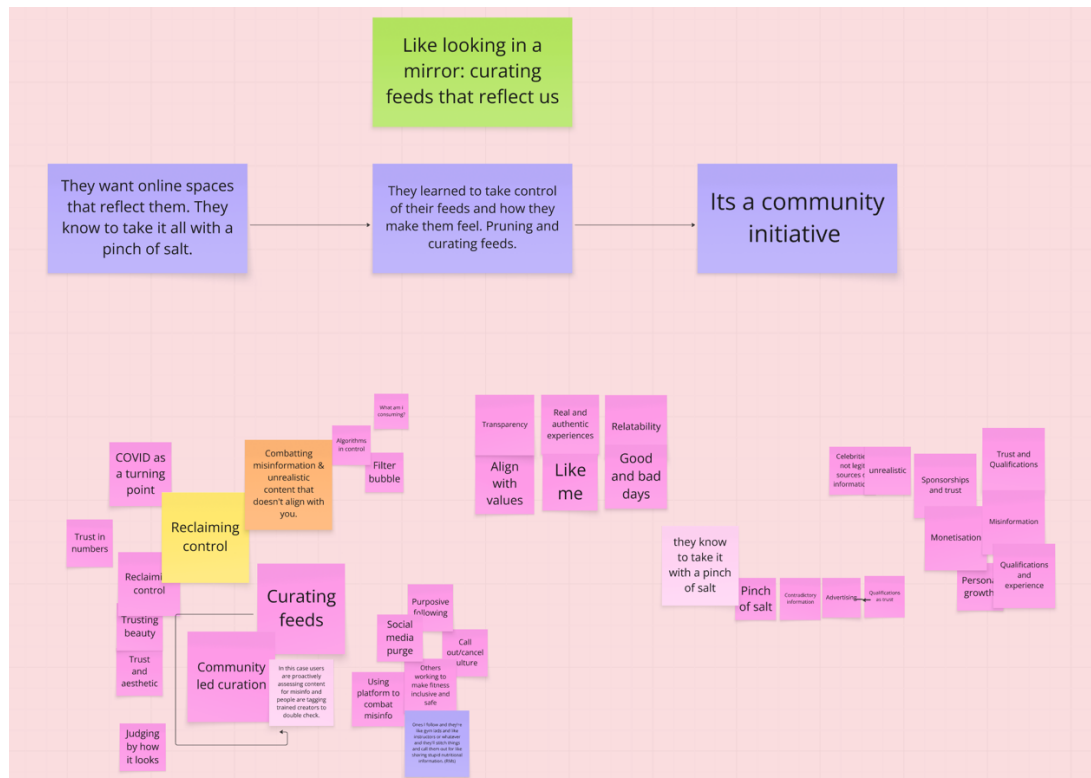


Figure 10: A theme from Chapter 5 on a green sticky note, with purple notes providing explanations.

6.3 Narrative Inquiry

For the data analysis of the final evaluation workshop data, I pivoted to a qualitative analysis that drew from narrative inquiry. The workshop data explored participants' experiences in response to the gameplay. Therefore, it was essential to capture the sequence of events in the workshop to understand how players made sense of the challenges in the game and how they interacted with one another during play. To capture this, I employed elements of narrative analysis that focused on the temporal and relational aspects of the gameplay. This allowed me to represent participant contributions and interactions in a manner that reflected the workshop's context [353].

The workshops focused on exploring how participants interacted with the game, and it was unlikely that the children would describe their actions as they played. I did not want them to describe their actions as I sought to identify whether they

could play the game, whether they enjoyed it and if it was beneficial to them.

Narrative analytic methods are well-suited to my constructivist approach as they are utilised to explore meaning and experiences. I compiled the workshop transcript with my notes and the survey data together to help me provide a description of the user's behaviours during the workshop.

Golsteijn and Wright [143] suggest that narrative inquiry is well-suited for HCI in maintaining users' voices; in this sense, the narrative inquiry is inherently constructivist and appropriate for use in this thesis. Additionally, it has been successfully used to understand children's perceptions of reality and unreality regarding technology [267], and as such, I believe it is a suitable method for exploring children's perceptions of the game-based intervention. Some HCI work, such as that by Bhatti *et al.* [36], utilises narrative inquiry to form 'intimate narratives' to gain insight into the use of technologies by foreign student mothers, adding to the knowledge base without decontextualising it. I use narrative inquiry to tell the story of the evaluative workshop and gameplay, to maintain the context of the game. I do not commit to the situated context required for creating the narrative data [143], a classroom setting, but I do consider users playing together, as they would in context.

My analysis combined aspects of thematic analysis and narrative inquiry. First, I familiarised myself with the transcripts by reading and taking notes. Secondly, I coded the workshop data as I had with the previous workshop. In between coding and sorting tentative themes, I realised that the codes and themes were not telling the story of the workshop. The nuance and flow of the gameplay were lost in the creation of tentative categories and themes. Participants in the workshop were not describing their actions, but rather narrating their experience, including their interactions and the frustrations of the game. The data was situated and sequential,

therefore requiring the shift towards narrative inquiry. Narrative inquiry allowed the participants' voices to remain central to the analysis, maintaining a focus on their sense-making of the game through their own language and jokes. I returned to the data and took notes on relevant aspects of the workshop, including the setting, participants, and outcome. I wrote short character-based stories to maintain the user's voice. I then returned to the research questions, and because I was interested in the gameplay, I focused on the participants' experiences while playing the game. I took quotes that helped paint the picture of what was happening and wrote the analysis to capture the workshop in a sequential format.

7 DESIGN

I engage in design throughout this thesis; later in the work, I suggest design recommendations and implications, create potential design solutions, and design a game-based concept. My design process is guided by design thinking, particularly as I draw on its principles of user-centredness, ideation and iterative prototyping [408], to explore how women engage with fitness content on social media and to envision ways to support safer digital environments. Design thinking is a methodology for creative problem-solving [441], and provides a set of principles, methods and tools to practice design [408]. Due to the human-centric nature of HCI, it is an approach to problem-solving that is human-centred and well-suited to HCI research. Tim Brown [60] describes design thinking as *“not only human-centred; it is deeply human in and of itself”* (p.15). I draw on Design Thinking for two main reasons. The first is that it is the set of tools, methods and principles I first trained with in my primary degrees in Design, and therefore subconsciously framed my thought processes in designing and conducting the research studies, as well as ideating responses to the findings, detailed in this thesis. The second is its

emphasis on empathy, user-centredness, and effective communication within cross-functional teams. This suits HCI because of the multidisciplinary nature of the field and its focus on how people interact with computer technology, particularly in understanding their needs and designing and improving the usability and accessibility of technology [173]. When combined with care ethics, it offers an opportunity to enact care and supports a relational mode of inquiry, as well as tools for responding to research findings.

In addition to the design thinking process, the game-based design concept I detail in Chapter 5 is guided by principles of the MDA game design framework: mechanics, dynamics and aesthetics (MDA) [171]. The MDA framework is a model for designing and analysing games, breaking down the game into rules and systems (mechanics), users' interactions with the rules and systems (dynamics) and emotional responses (aesthetics).

I, like many HCI practitioners [395], seek to design game-based interventions, leveraging the MDA framework during the design of the *Bad Actors* to ensure that the game is player-centred [247]. The framework has been criticised for neglecting some game design aspects and focusing too much on game mechanics [411]. I pair the MDA framework with the iterative stages of design thinking, seeking to ideate, prototype and test the game concepts. In doing so, I attempt to design a game concept that is user-centred and can foster digital literacy learning and engagement by aligning the gameplay with the desired outcome (fun and greater understanding of digital fitness literacy skills).

Although Design Thinking has been adopted in HCI and across various disciplines, it has been subject to many critiques. One such criticism is of its contingent nature. Another critique of Design Thinking lies in its limitations in addressing larger societal issues, stemming from its focus on users (or 'userism')

and its problem-solving approach (sometimes referred to as ‘solutionism’). Modern challenges faced by society are systemic and require reimagining futures rather than problem-solving from the past [408]. Design has also been criticised for its claim to be user-centred, when the theories upon which it is built often centre the designer as the main agent [193]. Furthermore, concerns about how problems are created arise when considering the designers’ (or researchers’) perspective of reality and whether it is positivist or constructivist, as the positivist view is that the problems exist and can be understood and identified with the proper tools. In comparison, the constructivist view (informing this thesis) is that the problems are socially constructed, therefore, solidifying the criticism that the designer is the main agent.

In response to the concern that the designer is the main agent, this thesis highlights the ways design recommendations are embedded in the data and provides space for users’ perceptions through feedback during the evaluation of the game. Yet, it does not refute the fact that I was the main agent during the design of the proposed solutions in Chapter 4 and the game-based intervention in Chapter 5. As such, I recount my reflexivity during the design process in the following section.

8 REFLEXIVITY & STUDY CONTEXT

In line with good practice in qualitative research and the constructivist perspective underpinning this work, this section expands on my reflexivity throughout this PhD [52, 76]. The reflexivity throughout this PhD was not linear; it was non-existent at the beginning of the PhD, sparse in the middle and messy at the end. I ‘discovered’ reflexivity towards the end of my first study in Chapter 2 and began to critically engage with it towards the end of my second study in

Chapter 4. As I explore my reflexive process in this section, my use of language and tone is more personal and therefore less formal.

My understanding of reflexivity has evolved throughout this series of studies, and while I become more confident about reflexive engagement over time, my ability to write about my reflexivity is anxiously restricted by word counts and the norms of the journals and venues I write for. Here, I will recount my journey through and ‘discovery’ of reflexivity, from being out of my depth, to learning to swim.

Reflexivity aligns well with qualitative methodologies, and there is a growing demand for qualitative work to incorporate reflexivity or positionality. However, it remains difficult to report reflexive practices or researcher positionalities in HCI due to tight word counts and a disconnect about what might be important to reflect upon. Nonetheless, I conducted the research comprising this thesis. My experiences have inextricably shaped this work, from the research design through data collection, analysis, and exploratory design. Although my methods are rigorous and my reporting is transparent, I was still the one who made sense of the data. As with places I go, leaving fingerprints and footprints, my work has my prints all over it. How I make sense of the work is important, and my experiences are important to understand within the context of my work.

8.1 Out of my Depth

As I began to read around reflexivity and decided it was something I should care about, I was coming to the writing-up phase of my first study. It was fitting that there would be a reflexivity section in my study, as it was qualitative and all my experiences had informed my analysis, as they should (knowledge is subjective and contextual) [50]. That’s a strength of qualitative analysis methods like reflexive

thematic analysis and thematic synthesis. Here, my reflexivity or positionality made up a shopping list description of the research team and me. I knew it was something I should include, so I did. However, I was unsure of what it really meant. I was told that information like class and gender was relevant here. My experiences would be different because I am an educated middle-class woman, even though I had never considered whether I was middle class, I just was, and it isn't easy to describe class systems in Ireland.

8.2 Study Context

This PhD was conducted in Ireland, and the participants are all Irish and living in Ireland. The particular context of Ireland as a setting for this work is important to explain for three main reasons, 1) Ireland is an EU country, and this is likely to influence perceptions of data safety, online safety and privacy due to stringent and well advertised regulations like GDPR [440] 2) In some cases, the participants are recruited through GAA (Gaelic Athletic Association). clubs, as members of Camogie (kah-mo-gee) and Gaelic (gay-lick) football teams and likely heavily influenced by the culture of the GAA 3) Ireland has both private and public healthcare systems, but with a past where church and state (and therefore healthcare) are messily intertwined.

In this work, as I view the users' understandings as entangled in their environments, cultures and lives, it is important to consider the role the above factors may play in their meaning-making processes.

For instance, Ireland is under the jurisdiction of GDPR, which has been noted to impact how users with high objective knowledge of GDPR within the EU view their vulnerability towards data breaches and privacy concerns. Some research suggests that users do not feel vulnerable to security and privacy breaches because

they believe governments and organisations ensure their privacy [230]. This may have influenced the apathetic approach to privacy by the participants. Perhaps conversely, one user remains concerned that her data would be used outside the EU in the US to harm other women. Feeling less protected by the GDPR restrictions in the face of vulnerabilities of choice and agency in the US at the time [109].

Additionally, local GAA clubs and teams facilitated some of the workshops I detail in Chapter 5. GAA is steeped in history and pride. This may influence the meaning-making as groups of women over 16 can play on the same teams and learn from their teammates. The sport facilitates relational learning that may not be as easily accessible in individual sports or sports that have strict age groups for competition.

The healthcare system in Ireland and its occasional historical oversight of women have impacted users' trust in the health system. For example, previous well-documented cases include the Magdalene laundries (girls and women were imprisoned and forced into unpaid labour and were subjected to severe physical and mental maltreatment [278]. Those in the laundries were unmarried mothers, daughters of unmarried mothers, women who were sexually abused or had grown up in the care of the Church and State [278]) and the Cervical Smear scandal (women received false negative test results, were not told, and the women involved passed away as a result of their Cervical Cancer [117]). These cases have influenced the level of trust that some women have in the healthcare system [294] and may have influenced users in this study. This could, perhaps, contribute to some of the reliance on social media and influencers for health and fitness information seen in this thesis.

These contextual factors are key for understanding how the women in the following chapters create meaning, learn to use social media for fitness, and negotiate risks on and offline.

8.3 Learning To Swim

I began to learn about and think more critically about reflexivity as my research progressed. Conversations I had with colleagues developed and deepened my understanding of reflexivity. I started to understand its importance and relevance within my work. This swim lesson came too late for my second study. A study in which my reflexivity (as a positionality statement) was extended included a reflection on my familiarity with social media for fitness. I started to incorporate elements of reflexivity throughout my analysis yet removed them to fit the condensed nature of the HCI papers I was writing. It was clearer to me at this stage, where I showed up in my work. As I met with colleagues to discuss findings, I would brush past the ‘boring’ bits - things that seemed obvious to me as I was familiar with using social media for fitness. The group shared their interest in some of the findings, which I thought were mundane. I felt that I needed to capture my reflexivity throughout the process for my final study, so I kept a journal. This journal contained my thoughts as I was planning the research and the workshops, and my thoughts throughout the data analysis and design process. For example, during the workshops, I found myself classifying participant responses as good or even brilliant quotes, particularly if they appeared to answer my research questions: *“I felt happy when there were good responses, like they were answering my research questions cleverly and giving me great quotes to use in my work.”* This continued into the analysis, and I often highlighted the quotes I liked during the familiarisation as I read over the transcripts, almost a reminder that they were

good and should make the cut. They rarely made it into my final write-up, but I found it interesting that I was drawn to some quotes in the workshop and again in the familiarisation stage of analysis. In comparison, sometimes during workshops, I would be disappointed by responses when they spoke about more abstract ideas. For example, when participants spoke about making mistakes, the research questions seemed more difficult to answer.

At times during workshops, I found myself slightly uncomfortable as participants cracked jokes about them or their friends having eating disorders when they were younger or losing their periods: *“Even though it was said as a joke, it’s still kind of frightening, and everyone laughed and agreed.”* This happened several times in response to different topics, including how (to paraphrase) ‘nobody knows anything about women’s bodies’. It was challenging to sit with during the workshops; they were always said as jokes, and it was nice to have created a safe space where people could share in this way. I felt it had to be addressed, though, and that the intended humour needed to be communicated through the transcription and write-up of the analysis, to capture the true essence of the participants and the context of their statements. It wasn't as easy as they were intended to be humorous within the context of the workshop, but it was unlikely that it would be communicated that way in an academic paper.

As briefly explored above, the reflexivity journal was a place for me to discuss any feelings that arose about the work. As the project developed, I used the space to reflect on my workshops and to write about problems I had during the ideation and evaluation of the intervention. For instance, as I began ideating and prototyping, I was more comfortable than I had been for some of the other stages of this research project. I wrote: *“I’m enjoying this process, it’s fun to be back where I’m comfortable,”* and it was. I thoroughly enjoyed the ideation and the

prototyping. Although I have a background in design, I do not view myself as a designer and I *do not* think I am a good designer. So, despite my comfort in designing, I was unimpressed by my skills and designs.

Furthermore, now I was unimpressed with design more generally. I struggled when designing to be inclusive, questioning the ability of the design to be inclusive if it was designing it and trying to think of ways it might exclude users. I made the colour scheme for the game colourblind friendly and non-digital in an attempt to make it more accessible. Even though there are a whole host of users, it is still inaccessible to, for instance, users whose first language is not English.

In designing, I selected relevant ‘skills’ for the design concept, although they stemmed from my work, I privileged the opinions and understandings of those in this study. These skills are general and do not begin to consider marginalised users or even those with disordered eating or exercise compulsion. Furthermore, I may have misrepresented the participants in the design and given them ‘skills’ they did not feel they possessed. I have failed to account for this in my work as I did not evaluate the concept with the users who inspired it, but rather those for whom the concept was intended.

I feel guilty as I reflect here that my reflection is only in-depth concerning my final study, and that I should have kept a journal the whole time. I wonder, if I had kept a reflexivity journal throughout the PhD, what would I have written about those stages where I felt uncomfortable, or how the discomfort shifted throughout the research?

9 SUMMARY

In this chapter, I have outlined the qualitative methodologies that underpin the research, as well as the role of constructivism in study design and the

interpretation of data. The chapter also detailed the ethical considerations, data collection methods, and analytical approaches that shaped this PhD. I combine a systematic review, qualitative surveys, semi-structured interviews, shared looking and workshops to build a layered understanding of how women engage with social media for fitness, navigate its risks and how this knowledge might be shared with younger users. Using thematic synthesis and reflexive thematic analysis ensures that participant voices remain central to interpretation, while my reflexivity has supported transparency and critical awareness throughout the project. The following chapters present the findings of the empirical studies and detail how this process unfolded. Chapters 4 and 5 are publications presented in the ACM format. They detail the literature and methods relevant to the studies and present individual findings, contributions, and implications, which I tie together in the closing Discussion Chapter.

CHAPTER 4: ‘TAKE EVERYTHING WITH A PINCH OF SALT’: YOUNG WOMEN LEARNING TO NAVIGATE FITNESS ON SOCIAL MEDIA

Motivation for this Paper within the Thesis

This paper was conducted to further explore the gap in knowledge indicated in Chapter 2, surrounding women’s attitudes towards online safety and privacy in digital fitness. This paper sought to extend HCI understandings of social media use for fitness by exploring the modes of engagement described in Chapter 2: producing, observing, interacting and managing.

Contribution of the Paper to the Thesis

This chapter provides further evidence to support Livingstone’s idea that the social media user is not as ‘gullible’ as others have previously thought [213]; they are competent and capable of safely navigating fitness online. This is a different perspective from that typically reported in literature regarding social media use for fitness and affords the scope to further explore this capacity. This paper also highlights that in addition to a competency and capacity to remain safe online, participants also depict a level of care and concern for younger digital fitness users. This work contributes (1) descriptions of fitness users’ cross-platform engagement, (2) an inquiry into women’s experiences of online safety and privacy, and (3) design considerations for safe navigation of fitness on social media.

Publication Details and Authorship

This chapter is a conference paper published in the proceedings of the ACM, Computer Supported Cooperative Work 2025. CSCW is a subfield of HCI that focuses on collaborative technologies facilitating social interactions. This venue’s interdisciplinary nature provides a suitable home for this work as it engages with the technical and social dimensions of using social media for fitness. The full

reference is: Doireann Peelo Dennehy, Stephanie Murphy, Sarah Foley, John McCarthy and Kellie Morrissey. 2025. “Take Everything With a Pinch of Salt”: Learning to Navigate Fitness on Social Media. *Proc. ACM Hum.-Comput. Interact.* 9, 2 (May 2025) <https://doi.org/10.1145/3711080>.

I am the primary author for this paper, and I completed the study design, conceptualisation, data collection, formal analysis, design, original draft writing, review, editing and visualisation. I was supported by my co-authors Stephanie Murphy (reviewing), Sarah Foley (reviewing and supervision), John McCarthy (reviewing and supervision) and Kellie Morrissey (reviewing and supervision).

1 INTRODUCTION

We know that many people use social media to learn about and discuss their health [7, 165, 279, 345, 432], and in particular, they connect with and learn from social media influencers [116]. There has been an increase in engagement from CSCW and HCI with women's health [200], including thoughtful work on menopause [19], breastfeeding [107] and menstruating bodies [19, 67, 294, 359, 423]. Additionally, feminist HCI agendas have supported and enriched the epistemological contributions of these studies [20, 21]. However, this increased engagement does not yet extend to women's fitness [45], even though fitness is a subset of health [377]. More specifically, research engaging with young women's online fitness practices across other domains often fails to discuss women's attitudes towards privacy [216, 295]. Women may face unique privacy and safety concerns when engaging with fitness on social media, including harassment [392, 410] and body image-related concerns [106, 425].

Physical activity is widely documented to have positive health benefits [57]; yet, women are less likely to engage in it [152] and more likely to report barriers to exercise than men [274]. As the online fitness community grows (with over half a million fitness influencers across Instagram and YouTube) [378], fitness is receiving increasing attention within the fields of CSCW and HCI. Work to date highlights that connecting with friends who have similar fitness goals can improve motivation to exercise [6] and that sharing fitness activities and goals online can improve health behaviours [261]. Using social media sites for fitness enables users to collaborate with one another as they learn and share fitness information on platforms [286], for example, engaging in collective fitness activities on Zoom [151] or making recommendations to others [188, 209]. Some research highlights positive

impacts of using social media for behaviour change [139]. For instance, research shows that interacting with content produced by authentic [422] fitness influencers may play an important role in maintaining a healthy lifestyle, particularly for young women, as it is associated with the consumption of fruit and vegetables and physical activity [116]. This growing area of fitness research requires investigation, as it is underexplored [45], and cross-platform interactions with fitness content should be explored, given that many users engage with multiple social media platforms.

Although there may be benefits to engaging with fitness content on social media for women, this engagement is impacted by the actions of algorithms and recommender systems [341]. Recent work suggests that users are aware of how algorithms on social media sites become more personalised [213]. Many users can recognise algorithmic action on their feeds, however, they are often unaware of how they operate due to their 'black box' nature [429], meaning we can see some of the inputs, but we cannot trace algorithmic decision-making. Users' growing awareness of algorithms, coupled with a lack of understanding of how they operate, has resulted in a loss of agency over their data. Hargittai and Marwick [156] have coined this as 'online apathy'. This online apathy may be concerning, given the sensitive nature of some users' health data. The perceived sensitivity of data increases if the data relate to a stigmatised condition or if it might adversely impact the user [352]. Therefore, users may have increased anxiety surrounding their sensitive health data if they feel as though they have no control over its usage.

Research reports negative implications of engaging with fitness content, which are reportedly worse for women [106], including issues with body dissatisfaction [425] and negative impacts on users' self-perceived sexual attractiveness [131].

These users must also navigate health and fitness misinformation [232], which poses issues such as purchasing and consuming non-regulated supplements [263] or falling victim to scams from online personal trainers (PTs) [88]. Privacy is underexplored within this user group [216], and more generally, privacy is challenging for many users to navigate, as platform policies are often difficult to access and understand [87].

This paper aims to explore our female participants' cross-platform interactions with fitness content and fitness communities, as well as their attitudes towards data usage, online safety, and privacy, to examine how technological interventions may make these interactions safer. We chose to examine women's experiences due to a growing interest in women's health, yet a lack of engagement from HCI and CSCW with fitness and women's physical activity online. We explore younger users, as it is essential that young women establish healthy fitness routines and relationships with fitness. Without these, exposure to idealised fitness content can make young users more susceptible to negative body image and unhealthy food choices [326].

We do so through a reflexive thematic analysis of surveys, semi-structured interviews, and shared looking accounts with a total of 97 participants. It is vital for CSCW to engage in this context, as understanding how users interact with social media sites and fitness communities can enable cross-functional teams of researchers and designers to develop digital interventions that support these users' learning, interaction, and safety.

The following research questions guided this study:

- 1) How do young women engage with fitness content on social media?

2) What concerns, if any, does this user group have regarding fitness, privacy and the algorithms governing social media platforms, and how might we begin to address them?

Our research highlights users' experiences with online safety, privacy [18], and algorithms. The findings suggest that these users believe they have developed the skills to navigate fitness content on social media safely. They do so through methods of determining trust and by working with algorithms to co-create spaces filled with content they want to see. This work contributes 1) an extension of existing work on fitness in CSCW and HCI by exploring these fitness users cross-platform engagement and their attitudes towards algorithms 2) an elaboration of existing research in this area by highlighting fitness content consumers' experiences of online safety and privacy, something lacking from previous literature [18], and 3) design considerations for the safe navigation of fitness content on social media.

2 RELATED WORK

This study builds upon cross-disciplinary research exploring the use of social media for fitness and user attitudes towards privacy and online safety. To further situate this work, we discuss current conversations about trust and authenticity in CSCW, HCI and social media literature.

2.1 Authentic and Trustworthy Digital Fitness on Social Media

Social media sites offer opportunities for social support [82, 308]; in recent years, these sites have become increasingly popular for learning about fitness and providing recommendations to others [188, 209, 316]. Research also suggests that sharing information about fitness activities can motivate continued fitness tracking [149]. In the context of health, Sillence [348] reports that users like to learn from

and trust others who share similar experiences: similarly, Lupton [216] finds users learn from anecdotal evidence and stories. In the specific context of fitness, many users rely on fitness influencers to learn about fitness [88]. Trust is key to the success of these influencers, as the basis of their influence is built on the trust of their followers [396]. Trust has had little engagement from CSCW; however, it has been described as ‘highly dynamic’ and relevant to activities at ‘*appropriate* levels’ [383]. For instance, users may trust a fitness influencer who lifts weights to inform them about form and lifting techniques, but not for advice on swimming. Users build trust by following fitness influencers or seeing them regularly on their social media feeds; for some users, trust can be determined by having a large number of followers [62]. These online relationships are expected to comply with societal norms, including *benevolence*, *reciprocity*, and *transparency* [362]. Sousa *et al.* [362] posit that this expectation allows users to trust and be influenced by others online.

Relatedly, authenticity is an essential factor for the trustworthiness of these influencers [422] and is leveraged by influencers for their benefit [170]. Authenticity can be characterised as the ‘*availability*’ and ‘*accessibility*’ of a creator [307] and is often achieved through sharing honest depictions of their private lives. Authenticity also impacts users' attitudes toward creators and the brands and products they endorse [259]. For instance, users find influencers with many corporate sponsorships are less trustworthy and authentic. Comparatively, work in social media marketing suggests that the more an influencer engages with paid promotions, the less authentic their content appears, and brands take this into consideration when selecting influencers [170]. This finding complements research that shows users are less inclined to trust sites with many advertisements [348].

Many users must also navigate misinformation and identify trustworthy content when engaging with fitness online. Misinformation is a contextual problem rather than a general issue [119], and within fitness communities, it can cause specific harms for users related to exercise and nutrition, such as illness resulting from the consumption of unregulated health supplements [263]. Similarly, Hendry *et al.* [161] note that users are concerned about the accuracy of influencer content and that it is challenging to determine whether the information they share is truthful and trustworthy [249]. Sillence *et al.* [346] list credibility and impartiality as crucial factors for deciding whether health-related information is reliable. Users must be motivated and able to evaluate content and information [248]. Hassoun *et al.* [158] identify users' methods of determining content credibility and note that users have a degree of information sensibility. For instance, users '*crowdsourcing credibility*' by assessing comments on posts to define group thinking; as a result, they may adopt it as their own.

Additionally, research regarding trusting online news sources highlights likes and comments as signals from this collective that help users make decisions about the news content [413]. However, this group thinking is likely to mirror homophily [321], in that we also surround ourselves with like-minded people in online communities. Therefore, the group thinking might reflect the user's confirmation biases [415].

From the above, it is clear that CSCW, HCI and other disciplines have engaged with the topics of digital health for social media, along with a focus on influencers and misinformation. Despite this, there is a lack of work on fitness (as differentiated from health) outside of tracking, and despite a growing interest in CSCW and HCI in women's health, little is known about the particularities of women's engagement with fitness content [45]. In the next section, we unpack

these and related issues to discuss the complexities of sharing health and fitness online, as well as user advancements, including agency, as users engage with algorithms to situate our work further.

2.2 Complexities of Sharing Online

While online spaces serve as outlets for learning and sharing about fitness, the datafication and surveillance capitalism on these sites pose harm to users who may be disadvantaged by the algorithms underpinning them [67]. It is challenging to navigate these algorithms due to their 'black box' nature that prevents users from gaining an accurate understanding of how they work [68]. Research that uses visualisations to aid users' understanding of algorithms found that although they improved algorithmic understanding, the mental models users created for Twitter (now X) and the tweets they saw varied greatly from user to user [69]. When users interact with new systems, they form ideas and assumptions about how they believe the systems work, and these models can impact how they use and understand the systems [68]. CSCW practitioners can help users build accurate mental models of algorithms, online privacy, and data-sharing systems, thereby better supporting safe fitness interactions on social media. CSCW practitioners may offer an understanding of both users and technology that could be used to encourage responsible and considered design of systems and technologies. For instance, CSCW work by Ehsan *et al.* [2024] introduces the idea of *Seamful Explainable AI* by pairing seamful design, which explores gaps and uncertainties in technology to reveal them and support user agency. They develop and evaluate a design process for identifying and using seams to enhance AI explainability and user agency [70].

Privacy and security decisions are complex due to the constant evolution of associated policies, making it difficult to determine what security and privacy vulnerabilities users may expose themselves to [1]. A study of fitness trackers and user experiences found that user privacy is impacted by a lack of understanding about how devices sense and process data [429]. This lack of transparency is suggested to result in ‘online apathy’, as described in our introduction [156]. However, following a 12-month study with groups of young people to encourage a ‘critical’ understanding of their data, Pangrazio & Selwyn [282] found that users feel a sense of powerlessness rather than apathy. They believe that there is little support and education for managing and controlling social media data, and as a result, they can do little but accept the way it is [282].

Many users engage with social media, despite potential data sharing concerns, due to the perceived benefits of social media, such as communicating with friends [282]. In a literature review, Kokolakis [196] highlighted this *privacy paradox* between user knowledge and concern surrounding data usage and user actions. For instance, users' understanding of data usage does not prevent them from sharing their data to access websites or social media sites. Research shows that, among technically savvy users, technical knowledge has little to no impact on privacy paradoxical behaviour [25]. Similarly, Lupton and Michael [218] suggest that although users are aware that companies collect their data, they do not understand how these data are algorithmically processed and deployed beyond advertising.

These users value algorithmic processing because the algorithms reflect their self-concepts, such as their sexual orientations and interests, and they appreciate algorithms' ability to change over time and adapt [205]. For example, on TikTok, the user's feed or *For You Page* becomes personalised as active users engage with the app [42]. However, research finds that the For You Page can show harmful

content, and some users may become lost in recommender systems that show them content they feel they cannot escape [251]. However, a critical piece by Livingstone [213] suggests that prior audience research often portrays users as heedless and alike, and she comments that users “*are not as gullible as popularly feared*”. It has also been noted that users who are active across multiple platforms tend to have a better understanding of algorithms than those who use only one [374]. Kapsch's [185] work highlights users' algorithmic literacy as they work with the algorithms and ‘co-shape’ how the algorithm filters and organises content for them. Although experience with algorithms increases algorithmic literacy, it does not necessarily provide users with the vocabulary to communicate their understanding [374].

Social media offers numerous opportunities for learning and sharing fitness information, but it also presents several challenges in navigating online content and platforms. Our study builds upon a growing body of research in CSCW and HCI to provide an understanding of women's experiences using social media for fitness, as well as their attitudes towards privacy. This study builds on these notions of trust, connection, and privacy to explore how technology might mediate some of the aforementioned challenges while continuing to encourage learning and sharing in these spaces. In the next section, we detail our approach to this research study.

3 METHODS

This paper follows a three-step data collection process, including qualitative surveys, semi-structured interviews, and shared looking, followed by a thematic analysis. These methods were chosen to gain insight into the experiences of women who engage with fitness content on social media, and their potential concerns surrounding fitness, privacy, and algorithms on social media. The

qualitative survey provided an opportunity for rich insights from a large number of participants [52, 54]. The responses from the survey supported the development of the semi-structured interview guide by identifying users' favourite platforms, creators, and their attitudes towards privacy. Semi-structured interviews are well-suited to gaining insight into participants' lived experiences. Additionally, we completed some shared-looking accounts, which we explain below in 3.1.2, to understand how participants engaged with their favourite platforms and how they interacted with content. The data were analysed using reflexive thematic analysis. Thematic analysis has gained popularity within the HCI community in recent years, particularly since 2019, and continues to grow [46]. We follow Braun and Clarke's [52] guidelines to complete a rigorous and reflexive analysis.

3.1.Procedure

3.1.1 Sampling

Ethics approval for this study was granted by the Faculty of Science and Engineering Ethics Committee at the University of Limerick. Following approval, we employed a purposive sampling method to gather user responses quickly. Participants were recruited via social media posts shared on Instagram and Twitter via student social media channels. In total, we collected 80 complete survey responses and conducted 17 semi-structured interviews. During ten of these interviews, we completed shared-looking accounts (explained below). In our analysis, we refer to our interview participants by pseudonyms, and when we refer to survey participant data, we notate them as P1, P50, etc. The interview participant demographics are presented in Table 5, and the survey participant demographics are provided in Table 6 and Figure 11. We have included participants' age and education level as they spoke about how their educational backgrounds and ages impacted their social media usage and navigation.

Table 5: Interview Participant Demographics. This includes the 17 interview participants' pseudonyms, age, education level and whether they completed the shared looking process during their interview. This shows the interview participants as a young and highly educated cohort.

Name	Age	Education level	Shared looking
Sarah	26	BSc	N
Niamh	23	BSC	Y
Leah	24	MSc	Y
Shona	24	BSc	Y
Jenny	30	BSc	N
Katie	18	1 st Year College	Y
Bernie	24	MSc	Y
Shauna	25	MSc/PhD	Y
Geraldine	21	PT Course	N
Grace	23	BSc / PhD	Y
Sophie	18	1 st Year College	N
Lucy	25	BSc	Y
Ruth	24	MSc	Y
Aoife	28	BSc	Y
Eva	25	BSc	N
Anna	21	2 nd Year College	N
Laura	28	BSc	N

Table 6: Survey Participant Education Levels. This includes descriptive educational levels, including post-primary school, apprenticeship, college, and professional training. This shows the survey participants as a highly educated sample.

Education Level	Number of Participants
Post Primary School	3
Apprenticeship	1

Post Leaving Cert Course	1
In College	13
Bachelor's Degree	36
Master's Degree	19
PhD	4
Professional Training	3

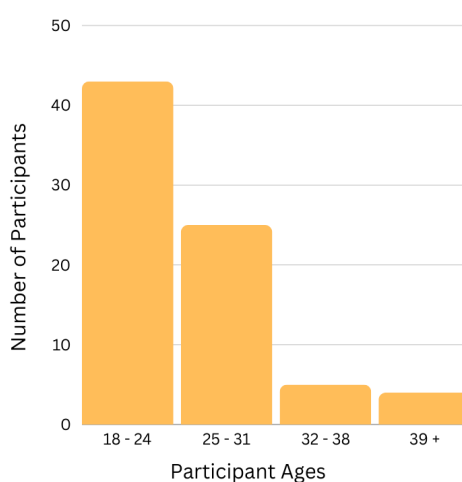


Figure 11: Survey Participant Ages. This shows the survey participants ranged between 18-60. However, most participants are under 31, making this a young sample.

3.1.2 Surveys, Interviews and Shared Looking

This study comprised a qualitative survey, semi-structured interviews, and shared-looking accounts. Qualitative surveys are ideal for obtaining rich qualitative insights due to their openness and flexibility when addressing a range of questions [53]. It also allowed us to capture a wide range of diverse perspectives and experiences [54]. The survey was deployed among women who use social media for fitness. The survey aimed to answer the research questions by determining users' preferences for social media sites, fitness content, and fitness influencers, as well as their attitudes towards privacy when using social media for fitness. The data collected in the surveys informed the interviews, as it clarified the user

group's most used platforms, favourite fitness influencers and their thoughts and practices around online safety and privacy.

We conducted 17 semi-structured interviews with women who engage with social media for fitness to understand their experiences using social media in this way, along with their opinions and habits surrounding online safety and data privacy. These interviews were conducted remotely via Microsoft Teams between December 2022 and February 2023, resulting in over 12 hours of interview data. Questions included motivations for social media usage, the type of content consumed, preferred platform affordances, data privacy habits, and opinions about data usage. A selection of these survey questions and the interview guide can be found in Appendix C.

During these interviews, the 10 participants using a laptop completed 'shared looking' [392]. For this, the participant used their phone and opened their preferred social media site; they scrolled through content and interacted with the site as usual while speaking aloud to describe what they were doing. This process allowed us to see how users typically engage with platforms, what content they watch (what they skip), and their thoughts on platform features. It also acted as a prompt to encourage further discussion during the interviews. Some of the prompts used during the shared-looking accounts to encourage conversation, including "*Why didn't you watch that video?*" can be found in Appendix C.

3.1.3 Data Analysis

Reflexive TA regards the researcher's subjectivity as a key resource for analysis [146], and as such, our reflexivity is evident in 3.1.2 and throughout the analysis. The interviews and shared-looking accounts were transcribed to form the initial dataset. We extracted the survey data from the responses and added it to the initial

dataset. We treated the data as one cohesive dataset to avoid reductive analysis [53].

The first author carried out the analysis, including familiarisation, code generation and written analysis. The reflexive TA process does not recommend multiple coders for ‘accuracy’ because the researcher’s subjectivity is key to the analysis (p.99) [50]. The wider research group met in between stages to discuss progress, code development and theme creation. To carry out the thematic analysis, the first author (1) familiarised herself with the data through transcription, reading through the dataset, taking notes, and discussing its content with the second author. Once initially familiar with the data, she (2) inductively and deductively generated codes at both a semantic and latent level from what users were saying and the deeper meaning of their words. These codes were created deductively based on prior theory (i.e., privacy paradox) and inductively without a theorised basis. Two rounds of coding were conducted in Microsoft Word, as codes were generated from the cohesive dataset. Each of the interview transcripts and survey responses were coded to identify topics, ideas, and patterns within the dataset. The first author tagged segments of text that held meaning and were potentially relevant to our research questions. This meant that she flagged remarks regarding privacy, algorithms, social media platforms or fitness. These topics and ideas included users feeling like their phones listened to them, and participants using social media for workout ideas and recipes. As the coding process is organic, evolving, and subjective, codes were expanded as the authors’ understanding of meaning in relation to the dataset and research questions developed. The data were then uploaded into NVIVO for a final round of coding and the creation of primary tentative themes. Patterns were developed based on data safety, algorithmic interaction, and platform curation, which were recurring.

At this stage, the first author was familiar with the data and the codes within the data. The first author labelled the codes in the software and began to organise the codes using parent and child nodes, as it became apparent that some codes were sub-categories of other codes. This resulted in a number of parent and child codes, including: Algorithm - '*algorithm knows me*' and Privacy - '*privacy trade off*.'

Following the coding sessions, all the authors met to (3) discuss the developed codes, ideas, and explanations. Codes and tentative categories were uploaded into Miro, a web application, to undergo a process of affinity diagramming. This mapping involved organising the codes into their relationships, which allowed for the creation of meaning-based patterns visually, as seen below in Fig. 12. Then, the first author (4) reviewed the tentative themes against the data that had been tagged with the codes that fell into each category, keeping in mind the research questions. Following this, as a wider research group, we (5) refined, defined, and named the themes: Algorithmic Dialogue, Coming of Age Online, Belief and Scepticism, and Care (these are not the final theme names). The final step of the analysis occurred as the first author (6) began to write the analysis and fully flesh out the themes. As writing is embedded in the analytic process of reflexive TA, the analysis was not fully finished until the final drafting of this paper. For this process, the first author took some of the flagged quotes from the themes and developed the narrative around them. Additionally, they rearranged quotes into other themes if they were

better suited and combined themes to reach our final three themes, which we explore in Section 4.

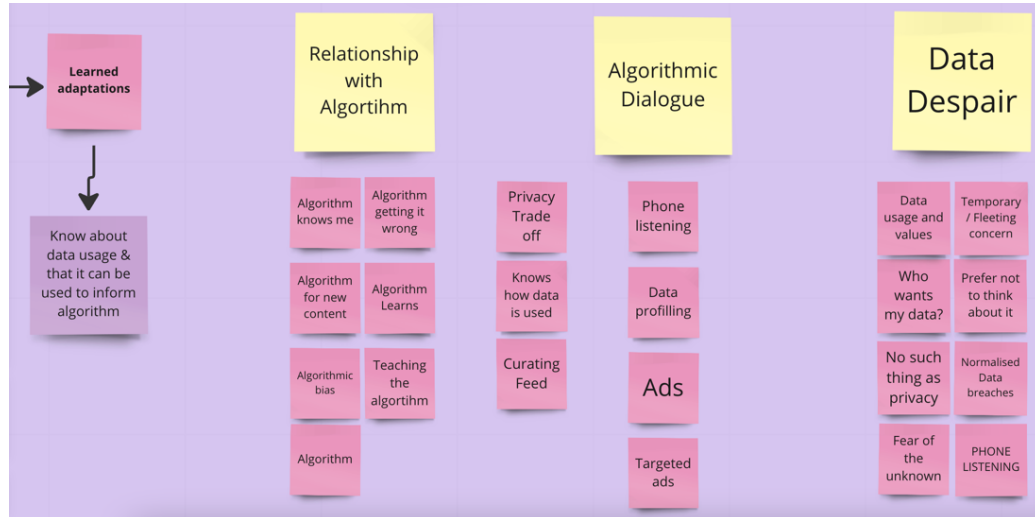


Figure 12: Miro Board Development of Theme 2. The larger, yellow Post-it notes describe tentative categories, smaller pink Post-it notes represent codes, and the purple one on the left contains further descriptions.

3.1.4 Reflexivity

Practising reflexivity is widely recommended for qualitative research [66]. As the analysis was a reflexive TA, it is important to note the researcher's subjectivity within the process. Although biases are not of concern when conducting a reflexive TA, the findings remain situated and subjective; therefore, researcher reflexivity can aid the transparency of the analysis [146]. As such, we reflected on our assumptions about fitness and social media throughout this study and how they may have impacted our analysis and subsequent write-up. We considered how our education, gender (postgraduate, four females, one male) and attitudes towards fitness impact our world views and experiences of fitness and social media.

We highlight that the first author has been consuming fitness-related content on social media for several years and often incorporates information learned online into their daily practice, including stretching and following recipes. This provided her with a familiarity and level of understanding when engaging with some of the

data; it may be that this familiarity added a further depth to her analysis. Three of the four remaining authors are everyday social media users, and this familiarity with social media is likely to have influenced our analysis; however, we do not consider this a negative aspect, but rather a potential source of insight into the workings and varied nature of social media sites. The fifth author does not engage with social media regularly, yet provides a critical outsider perspective to analysis, which is not impacted by his online experiences.

We discussed our views towards social media, accessibility, and privacy throughout this research during group meetings, making our reflexivity practice ongoing [66]. These group meetings allowed us to reflect on our assumptions about topics that arose during the study.

4 FINDINGS

Three overarching themes were constructed from our thematic analysis to report on our participants' experiences of fitness information online. These themes are as follows: (1) Qualities and Characteristics of Trust; (2) Working with the Algorithm; and (3) Competency and Capacity for Control. Our research varies from existing research as it captures the cross-platform experience of users, as seen in Table 7 below. It also extends existing research by highlighting the experiences of fitness content consumers regarding online safety and privacy, a topic previously lacking in the literature [216].

Table 7: Social Media Sites Where Participants Consume Fitness Content

Social Media Site	No. of Participants
Instagram	89
TikTok	65
YouTube	43

Pinterest	8
Facebook	7
Blogs	7
Reddit	5
Twitter	5
Forums	3

4.1 Qualities and Characteristics of Trust

As participants consumed content from influencers to learn about their bodies, exercise, and nutrition, they highlighted factors that contributed to trust. Many participants were aware of the high volume of online creators, the varied nature of their education and qualifications, and their diverse agendas (i.e., whether users or posts are sponsored). For example, Lucy finds that being supported by companies can hinder her trust in both the creator and the product:

“when I see someone sharing something about a product, and then I see another person sharing it, and then there are ten people sharing it, I start to not trust that product because it’s obviously some sort of deal that people have, and obviously, they’re being paid to talk about it.”

Several participants (10 participants in total), including Anna, Shauna, P9 and P62, were also attuned to the content and creators' performative and often sponsorship-oriented nature, noting that they take everything they see with “*a pinch of salt*”. These users are aware that they should be mindful of trusting the content they see online, as creators often portray idealised versions of life, highlighting their successes and often omitting their failures. There are “*two sides*

of Instagram” (Bernie): the idealised perceptions shared and real life, which is not shared; this can hinder the trustworthiness of creators and content.

Similarly, creators' withholding information about surgery and aesthetic treatments also impacted some users' trust. P3 spoke about creators claiming they look a certain way due to exercise and diet when they have undergone surgery: *“Some of them get other work done, saying it's from working out.”* When creators are untruthful about their experiences, some users are less likely to believe the content they share.

Many users have developed an awareness of the curated nature of social media and sponsorships, and some believe that navigating this is easy, requiring only *“common sense”* (P13). However, it is not common sense for all users, as some participants were unsure which information was misleading or trustworthy. Grace believes she may have encountered misinformation online, but cannot determine when she sees it: *“I'm sure I've been exposed to misinformation that I'm not even aware of because it's just like how it is.”*

Other participants, including P46, find it *“hard to determine if they're telling the truth or not.”* However, some users cited their third-level education as equipping them with the ability to determine misleading information:

“I definitely would notice kind of misleading information or incorrect exercises or things I'd only notice them because I've studied it previously myself” (Laura).

Similarly, with additional fitness education, Geraldine discusses how fitness information becomes outdated and turns into misinformation: *“You can never trust anybody, I find when it comes to any kind of social media because information*

changes all the time.” She highlights the quick-changing nature of fitness research and trends: *“Say squats is the best thing ever, ten years’ time it could come out [...] squats is actually the worst thing for your knees.”* She notes that the constant flow of new exercise research and trends can contradict older findings and trends, and that keeping up with such developments is challenging. For these users, their experience in fitness-related further education provides them with the confidence to navigate misinformation and fitness trends. Other participants highlighted the varied nature of trust, and Katie noted: *“It’s like a bit hit or miss; sometimes people are contradicting themselves all the time, and you don’t know who to believe.”* The volume of information and mismatch of opinions makes it difficult to determine which influencers are genuine, as P9 points out:

“So many people are trying to be fitness influencers at the moment, so it’s important to verify that these people actually know what they’re doing and aren’t just jumping on a bandwagon.”

Many participants were aware of the varying credibility of information shared by influencers and, as such, developed criteria for following or trusting influencers.

A number of participants shared qualities and requirements they had for trusting influencers. Some users sought influencers with formal qualifications, and P55 shares: *“I only listen to trained professionals – there is too much information out there to be misconstrued.”* Eva, too, highlights the desire for her influencers to be qualified and preferably known to her personally:

“I like to follow people that I've got to know, and I know like KiKiFit has a degree behind her, so she knows exactly what she's talking about like you will believe them because she has the background.”

Some participants wanted influencers to share evidence-based information and be relatable, positive, and have likeable personalities. For Anna, influencers must be relatable to be trustworthy: *“What makes someone believable is if their lifestyle is similar to mine.”* The ability to connect with the influencer here meant the user could validate her own experiences through the influencer. Personality was significant for others, including Ruth: *“I follow them because I like them, like their personality.”* She highlights her desire for a creator that she could relate to and *“someone who you think you'd go for a pint with”* (P72). Other participants sought positive content that made them feel good: *“I like to follow people I find positive and uplifting”* (P52).

Many users spoke highly about influencers who were educated, similar to them, or had a positive attitude. They trusted creators who were honest and not overly endorsed by brands and products. Below, we discuss the algorithms that connect users with new influencers and content.

4.2 Working with the Algorithm

Many participants in this study felt that the algorithms governing the platforms they use knew them and were learning from them in a two-way relationship. This two-way relationship meant users were co-creating their online spaces with the algorithms - users teach the algorithms what they like, and the algorithms show the users what they want. Therefore, curating these online spaces together as a team.

Some participants reported familiarity with the algorithms central to their online experience. While some users lacked the vocabulary to describe the algorithms they interacted with, they felt their presence. Shona, for instance, recognised a presence which tailored her experience: *“There’s a word for that. Like the way TikTok like alters the videos it shows you based on what you watch.”* However, she did not name-check algorithms. Users praised the algorithms underpinning their online experience and how they easily personalised content: Shauna shares, *“I suppose [it’s handy] because you’re actually seeing content and adverts that are specific to you.”* Laura also enjoys the level of personalisation the algorithm affords her as she tells us: *“It just like knows what I’m thinking”*.

Similarly, several users reported being impressed with how well these algorithms understood them and how they *“learn quickly what you like”* (P66). Several users reported that they teach the algorithm to show them content they want to see. Grace notes: *“If I want to see more of it, I’ll like it to teach the algorithm”*, and later explains that this is how she has *“retrained the algorithm to give me funny stuff.”* One participant, Sarah, actively ignores content she dislikes with the hope of training these algorithms:

“Because of the algorithm, I can see like multiple different fitness influencers or fitness pages, not that I actually want to watch or agree with [...] I just ignore it.”

As in section 4.1, where users highlight the abundance of and difficulty navigating information, Sarah ignores questionable fitness content, scrolling past it to signify to the algorithm not to show her similar content.

Some users, like P20, *“express to the algorithm when there’s content that I don’t want to see”*, thereby actively working with the algorithm, rather than against it, to

benefit from the content they see. Teaching and training the algorithm is effective when users can determine potentially harmful content, but as seen above, identifying misinformation can be difficult.

Many of our participants shared the perspective that personalisation was convenient, and the resulting data exchange was worthwhile. However, not all participants agreed, and P35 shared:

“I believe we are giving away more information than we should, and this bespoke experience means we only view what the algorithm thinks we should.”

Some users, including P35, had an informed understanding of the data profiling that occurs on these platforms. Many users were aware of some of the ways their data were being used to inform algorithms. Many participants believed that their phones listened to them to fuel recommender systems. Katie shares that it:

“always happens to me when I’m on TikTok because I’m thinking of something and then like two minutes later, I’ll see it [...] I’m like oh maybe I should do arms today, and then this arm workout will come up on my For You Page in the next minute.”

She believes algorithms are silent observers, constantly watching online interactions and collecting data. She also highlights the cross-platform usage of her data, in this case, sharing her information with TikTok.

Other participants spoke about their phones, listening to them for advertising purposes. During the shared looking, Ruth was shown an ad for tracking her

period, and we had discussed period tracking apps earlier in the interview. Ruth was surprised at how quickly her data are analysed and sold:

“That’s so bad, they’re just listening to me all the time. I know they listen, but like, I didn’t think they’d listen that quickly.”

She, too, has an understanding of the data profiling and usage that takes place, yet is still surprised at the reality of it. Jenny dismissed this frequent data sharing: *“It’s just so normalised now that you nearly laugh about it”*, and Katie stated that she *“would prefer not to think about it.”* Grace, too, experiences this cross-platform data sharing, but she does not mind its usage across social media platforms for personalisation. Instead, she feared her health data might be *“used to like incriminate something”* as she spoke about a period tracking app: *“compar[ing] my data against another woman”* around the time of the Roe vs. Wade overturn. She worries her data may be used to inform other governments about other women's pregnancies and abortions. This particular concern for others is facilitated by this user's interest in and awareness of current affairs.

These users accept that their data will be used in ways they do not understand, yet they want to know if it aligns with their values. Leah speaks of the harsh reality:

“If you want to be online [...] you just have to accept the fact that your data has to be somewhat available, and there's not really a way of escaping it.”

She believes there is no such thing as online privacy anymore, and to be online is to be sharing. This idea is echoed by Shauna, who suggests a solution:

“Every social media should technically be paid for and that it shouldn't be based off of customer data and marketing.”

These users have developed an appreciation of the algorithms and work with them to co-create a safe space filled with content they want to see. Although these data show many users have a sense of control regarding the content they consume as they curate safe spaces, they view the data usage and profiling that takes place as beyond their control. We discuss this competence and the resulting care for others that accompanies it below, and explore their apathetic approach towards their data usage later in the discussion.

4.3 Competence and Capacity for Control

Many users felt that they could navigate these social media sites to manage their safety and enjoyment online, showing capability for control and a drive to maintain their online safety. Some users also voice concerns for members of these online fitness communities who have not yet learned how to navigate the platforms and content safely.

Many participants displayed many signs that they felt they had adapted to navigating the online experience safely. They spoke of how their online usage has changed over the years as they have become more accustomed to being online and consuming fitness content. One way that users adjusted their engagement with fitness content was through the curation of spaces where they felt safe. For instance, P27 uses platform features to create a space where they feel safe: *“I follow people who will be good for my mental health and not negatively impact me”* (P27).

Similarly, P68 shares that they make calculated decisions about who they follow based on their previous experiences:

“I consider how each person will affect my own life and mind [...] I have fallen into the trap of ‘OMG, I wish I looked like her,’ and it ended up ruining my day.”

Here, we see many users navigating content as the algorithms intrude on their created safe spaces, making them unsafe again. Perhaps it is careful curation in the first place, teamed with this active recognition of potentially harmful content, that can help maintain the safety of these spaces. Participants who have experienced negative impacts of consuming fitness content, including body image issues and disordered eating, have an additional dimension of learning; in turn, they monitor the content they consume and specifically follow creators that positively impact their mental and physical health. Another example of this comes from Niamh, who spoke about learning from her old habits, and now she proactively curates her Instagram: *“I’ve made my Instagram more realistic.”* She knows the impact some of the content has had on her in the past, so she stops viewing it:

“If I’m starting to get a bit like down when I’m watching it, I’ll just turn it off. Whereas, like when I was younger [...], I’d be like, well, that’s your own fault because you don’t look like that, so stop eating.”

For other participants, their curation ensures that those they follow have values aligned with their own:

“I only follow people whose values align with my own. After years of following many different types of accounts, I know what content is unhealthy for me” (P1).

A number of participants, including Bernie, found privacy features helped to *“control who follows you and sees your content”*. However, some users who had private accounts were not always clear on how much protection private accounts provided them:

“I know that probably doesn't mean anything [...] I'm sure that there definitely is people who could like hack me and who can see my profile” (Lucy).

Some participants managed their online safety through: *“regularly updating passwords”* (Sarah), *“not saving passwords”* (P40), and *“keeping my passwords to myself”* (P70). Another participant ensured their online safety using *“a VPN”* (P41) as they browsed. Other users found that their concern for their online safety was fleeting and only came into focus as others were hacked or they were reminded of the dangers of being online. For instance, Ruth shares her temporary concern regarding data safety:

“I guess I think you think about your data safety every so often when someone's Instagram page is hacked, you're like Jesus, that's mad, isn't it?”

Similarly, Sophie spoke of a documentary she watched that raised concern for her regarding data safety, but only temporarily: *“For a while, that kind of scared me”*.

Many users remark that it is difficult to be online, particularly as a female, because *“teenage girls can't win”* as Grace refers to external and internal pressures to conform to gender norms, dealing with objectification and sexualisation. Some participants worried about users who are new to exercise:

“Somebody just starting out sees all these videos of how to lose this fat or this that, and they think that that's what works” (Geraldine).

Geraldine, who's understanding likely comes from her third-level fitness education, shares her concern that newer users will believe this misinformation and get disheartened when they don't experience the same results. Other participants were concerned about the high levels of misinformation circulating in fitness communities, such as *“the dangers of non-professionals giving tips to beginners”* (P68). Many users acknowledge the potentially harmful impact of misinformation for those newer to exercise who are sorting through the abundance of fitness information online.

In reflecting on how they navigated fitness on social media, and their concerns, many participants surprisingly shared concerns about other users. Many of these concerns were rooted in users' prior vulnerabilities regarding fitness content, and as a result, they were now concerned for others. As Niamh shares:

“When models got into, like, showing their exercise routine, but obviously, they were fake too, but I didn't know that at the time.”

Niamh has learned about bodies, exercise, and nutrition in university, and as a result, she recognises that the models' exercise routines alone did not result in their *perfect* bodies and that, often, they had poor nutritional practices. As a result, she is concerned about users who cannot make this distinction. Laura shares similar concerns. She (also having completed exercise and nutrition courses) identifies:

“Things that I would see are definitely incorrect [...] young people, I think especially believe them because they wouldn't know much about the industry.”

Laura has a knowledge of exercise and nutrition, which allows her to spot misinformation, and her experience consuming fitness content online means she is aware of the highlight reel nature of the content and that she should take it with a *pinch of salt*.

This analysis depicts competent, intelligent users of social media for fitness. Most users display a learned competence that helps them to navigate fitness on social media in a safe way. Factors that they see as important in their learning process include their formal college education and learning from their own mistakes. We find that many users' understandings of the performative nature of the industry and its potential impact on them (particularly from their past experiences) unexpectedly led participants to be concerned about other community members. Additionally, a lot of users are worried that other, newer community members may be unaware of the potentially harmful effects of curated fitness content or how to navigate it safely. These users navigate social media to maintain safe and positive experiences through their curation and co-working relationships with the algorithms which govern the platforms.

5 DISCUSSION

This research aimed to understand how women who consume fitness content interact across social media platforms, as well as their attitudes towards online safety. We find that user exposure to fitness content on online platforms, teamed with their offline experiences, makes users well-equipped to maintain their safety and peace of mind online. Many participants reported experiencing harmful social media usage in the past (and some still do) and, as a result, had developed methods to mitigate the harm. These methods included co-creating safe spaces with algorithms, curating their feeds, and only following people whose values align with their own. This study advances current literature by exploring user attitudes towards privacy relating to fitness content. In this discussion, we describe how these findings resonate with existing literature, and building upon it, we present three design considerations to support the fitness-related learning and sharing taking place on social media.

5.1 Trust Me, I'm an Influencer

Our study found that participants were concerned about disingenuous creators, a concern exacerbated by the volume of fitness information available online and the increasing popularity of creating fitness content. Users were grateful for the fitness knowledge creators provided; however, disingenuous creators and misinformation made it difficult to determine which content was trustworthy.

As with existing literature, users in this study sought authenticity from the creators they followed [161, 197, 315, 405, 435]. Users appreciated influencers they felt were like them, which made them relatable and, therefore, more authentic. Participants here struggled to identify what it meant to be authentic beyond being relatable, likeable, similar to themselves and without multiple sponsorships. Some researchers have found it challenging to understand authenticity, creating

guidelines for determining authenticity online [431], and others have identified authenticity as the ability to remain true to their values, self, and personality, regardless of societal pressures [422]. In this study, participants appreciated when influencers remained true to values that were aligned with their own. To be authentic, influencers must share both positive and negative experiences; however, sharing negative experiences may come at a personal cost to influencers, which is known as the *authenticity paradox* [153]. Users in this study want to see authentic influencers but will unfollow creators they find negative to protect their mental health, reinforcing this authenticity paradox.

Participants in this analysis understand that many influencers have monetised their accounts and are cautious of influencers who engage with multiple sponsorship deals or products endorsed by various influencers. Thus, users are less likely to trust creators or products that engage with several sponsorships. Similarly, research by Sillence *et al.* [348] finds that users are less likely to trust information and advice on sites when they contain a lot of advertising [348]. In many ways, advertising may be more challenging to spot; despite requirements for influencers to disclose advertisements, many creators do not [16]. For example, when examining advertisement disclosures and affiliate marketing content on Pinterest and YouTube, Mathur *et al.* [236] found that only about 10% of affiliate marketing contained disclosures. Additionally, an increase in more subtle advertisements, including brand trips, may make it more difficult for uninformed users to identify advertising.

Many of our findings connect with prior work regarding attitudes towards trust, monetisation, and information credibility. For instance, Thimbleby *et al.* [383] describe how dynamic trust is and how it is context-specific at ‘appropriate levels’; here in this study, we note that in the context of fitness, users trust influencers

who have sports or exercise-related degrees and training. The users in this study who had fitness or nutrition-related further education had a more extensive understanding of the area, and they felt they were more attuned to trends and misinformation, and therefore, better equipped to navigate trustworthy content than newer users. Sometimes, users' trust extended to fitness creators with many followers, implying that if enough other users follow them, they must be trustworthy. Work by Sillence *et al.* [347] focused on understanding the factors that influence trust in web-based health advice and identified a phase of trust identification called content evaluation. As with our findings, they note that users bring varying levels of background knowledge and expertise to the evaluation process, and therefore generate different levels of trust. Similarly, some users with additional education in sports and exercise cite themselves as able to identify misinformation.

Other HCI research highlights ways for users to identify and mitigate misinformation or *fake news*, including analysis of textual content, identifying unreliable sources and using social network analyses to determine credibility [337]. These techniques lend themselves well to working through fitness content to distinguish between genuine and disingenuous information, provided that users can analyse the text or identify unreliable sources.

Similarly, research cited earlier by Hassoun *et al.* [158] finds users *crowdsource credibility* – by checking comments or having *surrogate thinkers* who are a select number of users whose values they align with [158]. We see some adoption of surrogate thinkers in our study, as Eva describes trusting one influencer because she knows the creator has studied sports science and nutrition. Many participants preferred that creators have degrees or education related to the topics they were discussing online. However, despite professional and academic qualifications,

Marocolo *et al.* [232] found that numerous social media accounts disseminated fitness misinformation and often shared content beyond the boundaries of their expertise. Therefore, creators' education levels or a degree in exercise science, for example, do not mitigate the risk of them disseminating misinformation. Similarly, although many of these participants are highly educated and they identify their education as helping them navigate fitness misinformation, it likely does not exclude them from believing some misinformation. This may imply that 1) misinformation is highly sophisticated and difficult to identify, or 2) that education is not the only appropriate response to combating misinformation.

5.2 Learned Awareness and Care

Users have learned to navigate social media safely and have a learned awareness of the curated nature of fitness content. Users must critically evaluate and navigate social media and fitness content, and they are concerned about other online fitness community members who have yet to learn this. A combination of experience, social media literacy and positive body image work together to promote the safe navigation of fitness on social media.

Our participants report concern for newer members of the fitness community who have not yet learned to critically evaluate fitness content. These users may believe highly curated content is normal if they are not yet accustomed to the idealistic portrayal of fitness on social media. Participants reported their own behaviour change over time as their familiarity with social media and fitness offline helped them to identify unrealistic content online. We note that for some users, this familiarity with fitness came from their higher education, but for others, they seem to have developed over time through sport and engaging in fitness offline. Research exploring the development of critical evaluation skills finds that

social media usage does not necessarily promote media literacy [306]. These findings, combined with those of our study, imply that rather than social media usage alone, prolonged time spent online, personal experiences and education all contribute to media literacy among users.

In this study, users' understanding of themselves and their familiarity with fitness content on social media helped them establish boundaries when consuming content and following influencers. These boundaries included following creators who made them feel good and ignoring content they didn't want to see. This awareness is called social media literacy and can protect girls and young women from the impact of observed content on their body image [292]. Additionally, an awareness of how some celebrities edit their pictures can be protective against body dissatisfaction [61]. Users in this study possess a high level of social media literacy, and they share their concerns with users who lack this literacy. The high levels of social media literacy seen are likely a combination of their experience of following fitness content for several years, paired with the number of participants with fitness-related education. When viewing content, these participants often question its impact on them, and in the case of negative impacts, they may ignore or unfollow the content or users.

Similarly, existing research finds that users with a positive body image question how realistic observed imagery is in order to combat its adverse effect [124]. Another study found that although users knew images were manipulated, the imagery still negatively affected them [223]; this suggests that social media literacy alone is critical but insufficient for safely navigating fitness; it may also involve self-esteem and positive body image. We observe this in our research, as one participant describes not having issues with her body image and, therefore, not feeling harmed by curated content. In addition, other participants who have

struggled with body image concerns in the past list the impact of some content on how they viewed their own body: *"I have fallen into the trap of 'OMG, I wish I looked like her', and it ended up ruining my day"* (P68). Research concerned with social comparison more generally on social media found that participants in the US and Mexico reported a decrease in social comparison over time [80]. Cheng *et al.* [80] suggest that this might be due to the more individualistic culture of the US and, in this study, Ireland. We need to continue to engage with and support users in developing social media literacy and safe navigation skills by combining online and offline learning experiences. As users in this study were concerned for younger or newer users, perhaps the development of these skills could be supported, for instance, in classroom settings. Similar work by Bekker *et al.* [29] has successfully developed a web-based tool to support primary school teachers in implementing 21st-century education, which includes media and technology literacy. Additionally, Musi, Federico, and Riotta [265] surveyed and classified existing tools that aim to enhance data literacy, offering guidelines for developing gameful tools to promote critical thinking in online environments.

5.3 You Lie Down with Algorithms, You Get Up with Data Breaches

The online experience captured in this study has been co-created between users and algorithms. Similar to the work by Kapsch [185], users in this study work with their social media platform algorithms to create a space they enjoy and feel safe in. Users perceive their algorithms as entities that can be taught; they think the algorithms are listening to them and learning what they like.

Often, users were aware of algorithms; they identified and frequently named algorithms as working for them during their social media experience. However, they did not necessarily understand how they worked. Similarly, research by

Eslami *et al.* [122] demonstrated that users struggle to comprehend the algorithmic presence and influence in social media feeds [122]. While the users in the study by Eslami *et al.* [122] did not understand algorithmic presence, users in our analysis felt they understood some of the ways algorithms work and how they can be interacted with to benefit them, the user. For instance, users would ignore content to signal to the algorithm that they did not like it. Compared to Esami *et al.*'s study in 2015, the increased knowledge and awareness among users here may be attributed to the growing popularity of algorithms and recommender systems on social media sites, such as TikTok.

Participants in this study enjoyed being shown new fitness content that was relevant to them. Conversely, a study by Kwak *et al.* [201] found that their participants felt that suggested content tricked them into liking and engaging with content they thought was posted by their friends, which led to unwanted or forced networking. Users in this study occasionally discussed algorithms and recommender systems at play without using specific terminology to name them; similar to research by Swart [374], familiarity with algorithms does not necessarily require the vocabulary to articulate the technology. Participants frequently suggested their algorithms were informed by their phone listening to them. However, a review of the discourse around mobile eavesdropping finds insufficient evidence to confirm or disprove the suspicion that companies are listening to smartphone users to inform advertisements [199]. While many participants in this study reported that their phones were listening to them, they did not indicate that it was unsettling.

Our data set primarily consisted of users who indicated that they did not mind data tracking for targeted ads and personalisation. Still, a call for transparency surrounding data privacy and usage, in general, would be beneficial, as a lack of

transparency can make it difficult for users to understand how their data are used. There is some CSCW work by Bhargava *et al.* [105] that engages in this area to improve the transparency and explainability of social media sites. Their design intervention, called Gobo, allows users to control and filter content from multiple social media platforms[105]. Their initial testing finds that Gobo provides space to enhance control and transparency in social media.

Users in this study do not fully understand how their data are being used to inform their algorithms, leaving them with privacy concerns, which, as shown above, are often fleeting. Users' fleeting concerns in this dataset reflect existing literature; Hargittai and Marwick [156] note the phenomenon of *online apathy*, as discussed earlier or as Pangrazio & Selwyn [282] view it, a sense of powerlessness. Other participants in this paper discussed privacy as a commodity [136] and lamented that privacy does not and cannot exist on free social media platforms. Participants knew that their data were being shared by third parties and social media sites, supporting some existing research [241]. However, users displayed paradoxical behaviour as they were aware of data sharing on social media sites, yet continued to use them [196, 282]. Users also exhibited paradoxical behaviour, as they maintained private profiles despite their scepticism about the privacy they offered: *"I know that probably doesn't mean anything"* (Lucy). Interestingly, this contrasts with users' active approach to deciding what content they want to see, as they are apathetic in their approach to data sharing. This implies that users are committed to navigating these data practices more critically when given the tools.

Research finds that users want to know which data are being used and with whom their data are being shared, including advertising, tracking and government bodies [182]. Our research similarly finds that users are concerned about the intended use of their data - particularly if it may harm another person. For

example, one participant did not mind their data being used unless they were to be used maliciously. She worried that her period data from a tracking app (in Ireland) might be compared with data from women in the US to convict women who may have had or were planning to have abortions, given recent restrictions around reproductive healthcare in the US. Some period tracking apps have collected sensitive information which may be used to infer whether a user is considering or has had an abortion, and the privacy policies allow them to share their data with third-party authorities [109].

It is important to note that the studied activity of consuming fitness content works across platforms and products. Therefore, users need to understand how they are being tracked across platforms – not just that they are tracked.

5.4 Design Considerations

At the highest level, future CSCW work to support the safe navigation of fitness content needs to consider what stage a user is at in their online fitness journey - whether they are new to fitness or a savvy user. This is because users feel that a combination of both online and offline fitness experiences equips them with the skills to safely navigate fitness content online. The ‘experienced’ users in this study feel as though they are competent in safely navigating social media, yet they are concerned about the newer users who may not be as capable. By considering the stage a user is at in their fitness journey, a design intervention can specifically target either the implementation of new safe navigation skills or the improvement of existing skills. CSCW work should also consider how users currently assess trust and view algorithms and design from the existing knowledge bases. We now offer three design considerations as future direction for CSCW research. These

considerations are further elaborated with design interventions, which are intended as communication aids for these considerations.

Design to foster trust. Users rely on their fitness communities and social networks to determine reliability, credibility, and trust. Participants in this study trusted creators who had specialised training or recognised degrees for their fitness-related information. For instance, Eva references a creator who: *“has a degree behind her, so she knows exactly what she's talking about, like you will believe them because she has the background.”* To leverage this, CSCW work should consider how users assess trustworthiness and offer technology-mediated support. For instance, platforms could support the education of their popular influencers. Social media sites could fund and run educational seminars or courses for their influencers to ensure they share up-to-date information, taking some of the onus off influencers and onto the platforms and social media sites to ensure they are actively combating misinformation (below in Fig. 13).

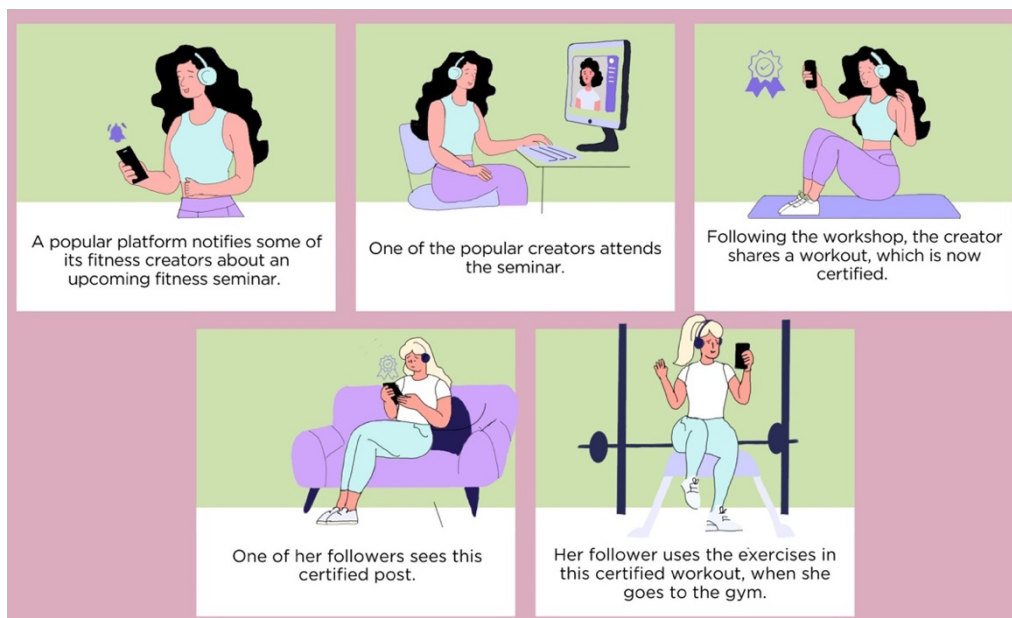


Figure 13: Storyboard displaying an example of how CSCW work might ‘design to foster trust’ by encouraging platforms to offer content-specific certifications and training sessions for creators and influencers

Design to support the development of social media literacy and safe

navigation skills. Users in this study regard themselves as self-sufficient when it comes to safe navigation of fitness content, and they are concerned for younger (or newer) users. As Niamh highlights the abundance of disingenuous content online and how she has learned to recognise it over time: “*obviously, they were fake too, but I didn't know that at the time*”, this is something that participants learned through their social media usage and their education. CSCW work should aim to support the initial and continued development of social media literacy skills. For example, CSCW could support this development through a platform feature that encourages active engagement and uses in-platform prompts to ask users to verify content on their feed (Figure 14 below). These prompts could include debunking popular misinformation myths, evaluating the *authenticity* of posts, and assessing the relatability of creators. This would allow users to consider content as they view it, offering tools for checking fake content and reminders to view content with a *pinch of salt*, which could help users develop social media literacy and the skills for safe navigation.

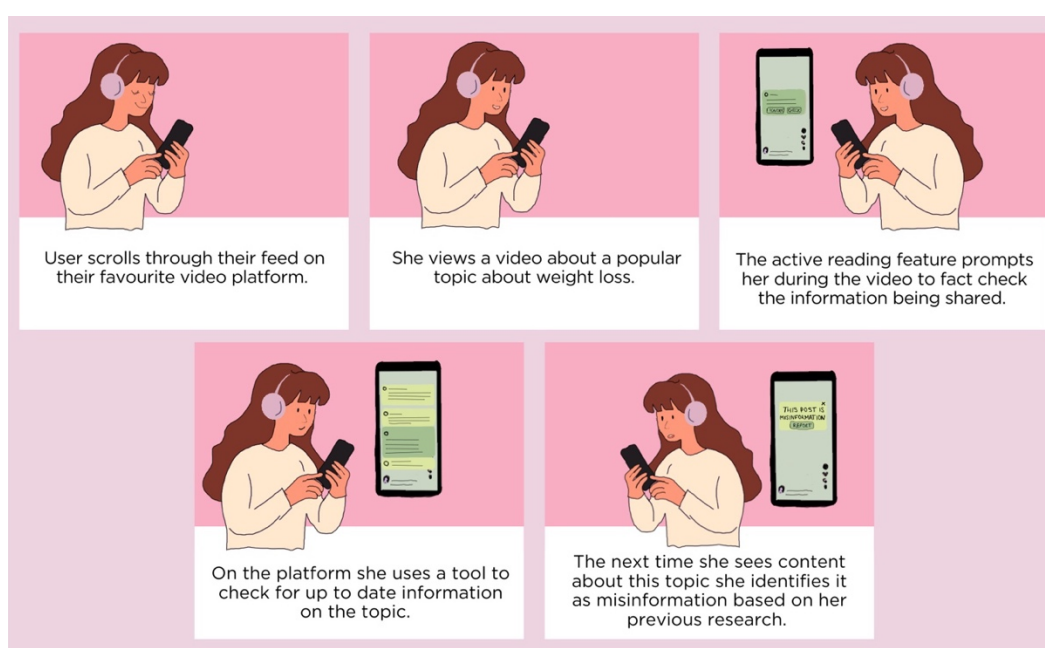


Figure 14: Storyboard showing how CSCW work might ‘design to support the development of social media literacy and safe navigation skills’ by developing an active watching feature that prompts users to fact-check information and view content with a pinch of salt.

Design to increase users’ knowledge of data usage and privacy practices

online. A number of users have some understanding of data usage on platforms and its impact on their social media fitness use. Often, these users are apathetic towards the data usage or feel as though it is out of their control. For instance: *“If you want to be online [...] you just have to accept the fact that your data has to be somewhat available, and there's not really a way of escaping it.” (Leah)*, furthermore, some participants lack the vocabulary or understanding to articulate the extent of the usage. CSCW work can help users develop accurate understandings of how their data are used, enabling them to make responsible and informed decisions about their data and privacy. As a result, users would feel as though they have more control over their data in online spaces. CSCW might apply this in a design intervention that indicates where data are being used and sold, to inform users about the buyers of their data and their usage. Furthermore, as seen below in Figure 15, a tool might facilitate the setting of privacy goals similar to screen time limits – for instance, ‘do not share my data with companies who use my data for anti-abortion work’, in response to Grace’s concerns about her data being used *“against other women”* to incriminate them. The user would receive a notification when a site or a link might prevent them from reaching their goal, thus allowing users to actively learn about the use of their data to help them reclaim control.

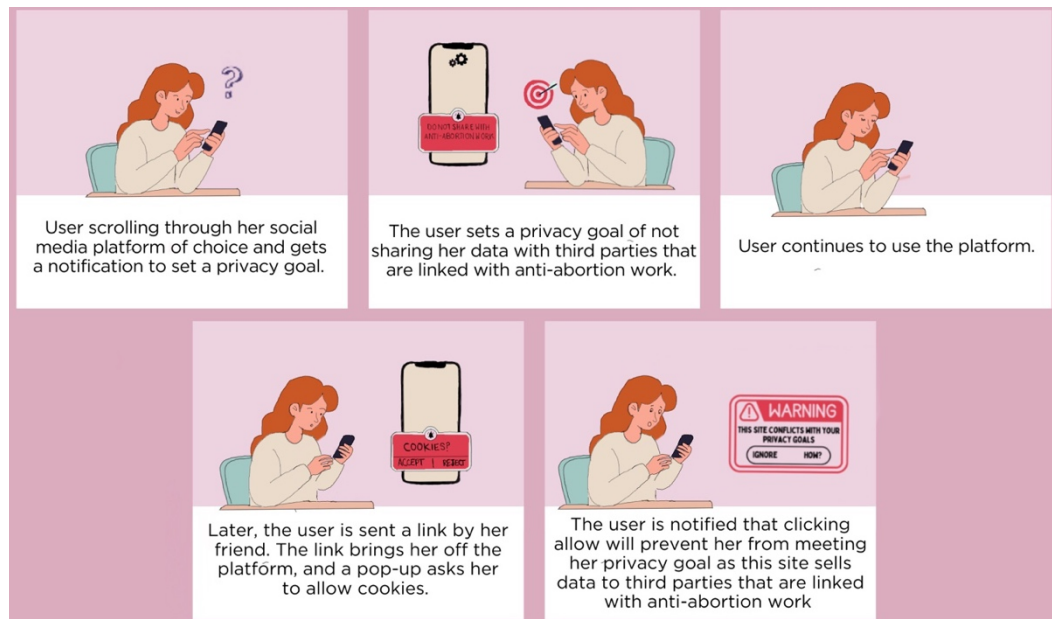


Figure 15: Storyboard with an example of how CSCW work might ‘design to ensure accurate understandings of data usage’ by developing introductory tutorials for new platform users.

5.5 Limitations

The limitations of this study should be taken into consideration. The scope of this research project restricted access to those who consume fitness content, and this research may have benefited from additionally comparing the opinions of those seeking financial gain from using social media for fitness. It is important to note that the participants are all from Western Europe, which is not fully representative of online experiences. European participants (those in this study) are subject to stringent regulations such as GDPR [440], which may impact their understanding of privacy and user rights. Additionally, the participants in this study are highly educated, and many felt their fitness-related digital literacy stems from their third-level education (often fitness and health specific). Therefore, these experiences and calls to aid the development of digital literacy may have further implications for a less educated population. Another limitation is that the preliminary design considerations and suggested ideas were not tested with end users; here, they act as communication aids. Future research should investigate the longitudinal development of users' safe navigation measures and continue

exploring methods for communicating data privacy concerns to general users.

Based on these limitations and the nature of this qualitative work, we refrain from generalising our findings beyond the scope of this study.

6 CONCLUSION

This paper presented findings from qualitative interviews, surveys, and shared-looking accounts to explore how these participants use social media for fitness and their attitudes towards privacy. From the findings, it is evident that these users have developed methods of safely navigating fitness on social media and should be further supported in understanding how these sites process their data. Based on these findings, we offer design considerations to foster trust online, support continued safe navigation, and aid users in developing accurate mental models of these systems.

CHAPTER 5: PLAYING IT SAFE: DEVELOPING AN EDUCATIONAL GAME TO TEACH SAFE NAVIGATION OF FITNESS CONTENT TO GIRLS AGED 10-13.

Motivation for this Paper within the Thesis

This paper sought to elaborate on the competency users displayed in Chapter 4 by investigating their understanding of their capacity and how it is developed. Additionally, this paper expanded the design consideration in Chapter 4, which called for the design to support the development of social media literacy and safe navigation skills. Furthermore, this chapter aimed to capture the development of this sensibility from experienced users and translate it into a game-based concept for the younger users that the participants in Chapter 4 expressed concern for.

Contribution of this Paper to the Thesis

This chapter highlights the relational nature of social media use for fitness and the abilities required for safe navigation. This work contributes (1) insights into participant experiences of learning how to critically engage with fitness online, (2) design recommendations for translating this learning into a game-based concept for younger users, (3) a game-based concept and primary evaluation with the younger users to teach safe navigation of online fitness and (4) a theoretical extension of the practice of creating ‘*safe space*’ in users critical engagement with digital fitness and beyond.

Publication Details and Authorship

This chapter is under review at Transactions on Computer Human Interaction 2026 (TOCHI).

I am the primary author for this paper, and I completed the study design, conceptualisation, data collection, formal analysis, original draft writing, review, editing and visualisation. I was supported by my co-authors, Stephanie Murphy

(reviewing), Sarah Foley (conceptualisation, reviewing, informal analysis, and supervision), John McCarthy (reviewing and supervision), and Kellie Morrissey (reviewing and supervision).

1 INTRODUCTION

The proliferation of digital fitness and health content in recent years has increased the accessibility and availability of personalised fitness information. As a result, users are increasingly turning to social media for fitness and nutritional information [414]. This accessibility provides a level of convenience, and as McKay and Miller [243] identify, convenience (or convenient technologies) can often facilitate harm. For digital fitness users, the perceived convenience of engaging with fitness content, consuming potentially harmful content, or following misleading advice may pose a threat to their online and physical safety. For instance, literature to date in HCI and cyberpsychology has detailed how engagement with fitness content can have negative health implications, posing concerns about injury [234], negative impacts on self-esteem [131, 425], and relationships with food [147, 238]. Other research identifies the highly curated nature of fitness content online [295] and the prevalence of low-quality fitness information [384], which can exacerbate these and other negative impacts. Women make up a significant portion of those engaging with online fitness [70], and as such, these concerns may have a greater impact on them [106, 195].

However, some users are aware of the potential adverse effects of using social media for fitness. Many of these users perceive themselves as critical consumers who ‘detach’ themselves from content to avoid negative self-comparison [420]. This shifts the narrative from users as passive consumers to active meaning makers, similar to Rancière’s [312] theoretical notion of the emancipated spectator, which challenges assumptions about passive audiences. Users active engagement is evident when they proactively choose the content with which to interact (or not) [366], they are not merely passively watching content. Users who critically engage with social media and fitness indicate their concern for younger users who may be

more susceptible to these harms [299] if they do not critically engage with content and platforms. This responsibility can be interpreted within Noddings' [271] Care Ethics framework, which suggests that moral action stems from relational concern and attentiveness. In turn, once users become aware of the potential harms of using social media for fitness, this attentiveness extends into concern for those without the same awareness.

This community concern towards younger users in online spheres has been identified in other HCI work on moderation and community norms [333], child-computer interaction [14] and intergenerational mentorship [11]. In response to these concerns, several interventions have been implemented to enhance digital literacy and promote digital citizenship among young users. These interventions include classroom activities for practising digital literacy skills [260] and curricula developed to cultivate skills and dispositions to help young people navigate online spaces [175].

Children aged 10-13 are a key group for these types of intervention as they are beginning to use social media [114] and forming digital habits that will shape their future behaviours and identities. Digital literacies and digital citizenship-type interventions for this age group have shown positive effects [211]. For example, a day-in-the-life style game was reported to improve digital literacy [228], and digital citizenship education promoted knowledge acquisition, awareness, and behaviour change [211]. Research with this age group in the context of health and fitness found that the game-based intervention, Quest to Lava Mountain, enhanced nutritional knowledge and increased exercise uptake [338].

Given the relational nature of online fitness and the agency (and concern) displayed by some digital fitness users [366, 420], it is worthwhile investigating how users who feel competent to safely navigate digital fitness have learned to do

so. An intervention grounded in this learned proficiency may offer a promising approach to fostering critical engagement and digital literacy among the next generation of online fitness users.

The paper describes an iterative design process comprising three Phases: (1) Scoping, (2) Exploration, and (3) Evaluation. Through a series of workshops, we explored how 39 women developed digital literacy and safe navigation skills in the context of online fitness. Based on these insights, we generated design recommendations and explored design responses in Phase 2 to translate these skills into an intervention for younger users. Finally, in Phase 3, we conducted an evaluation-type workshop to gather feedback from 7 of the intended users of the gamified intervention, aged 10-13, with the aim of supporting safer and more critical engagement with fitness content on social media. The intention of this paper is not to present a finalised design intervention to improve digital literacy in this group, but rather to showcase the qualitative findings and provide an initial concept that supports digital literacy skill development.

This work sought to answer the following research questions:

RQ1. What skills do women use to navigate fitness content on social media safely, and how did they learn these skills? (Phase 1)

RQ2. How might these skills be translated into an intervention for young girls? (Phases 2 and 3)

Our contributions are as follows: (1) We provide insight into how women reflect on their experience of learning to engage critically with social media for fitness. (2) We offer design recommendations for capturing this growth and development in a game for new users of social media for fitness. (3) We present a game concept and a primary evaluation with the intended user group to teach users safe navigation skills for social media. (4) Finally, we identify a key practice of creating ‘*safe space*’

in users' critical engagement with fitness content. We consider it important for future HCI work to understand the sensibilities of social media users.

2 BACKGROUND

This work extends a wider research project aimed at understanding and supporting safe practices for users engaging with social media for fitness (e.g., exercise, sport-related content, nutrition and wellness). The project examines women's cross-platform engagement with sites including YouTube, Instagram, and TikTok. Thus far, a systematic review has highlighted a gap in the literature regarding women's privacy and safety concerns in this area [216]. Empirical work within the project suggests that some women exhibit the capacity to safely navigate fitness content online [296]. In line with other research, the findings detail that many women with this capacity express concern for younger fitness consumers, who may be more susceptible to the harms associated with social media use [403]. To continue this work, we explore digital literacy as well as fitness and health literacy as suitable points of intervention for supporting safer social media use in a fitness context. To achieve this, we conduct empirical research to explore the development of safe navigation capacity among experienced users and translate the findings into design recommendations and a design concept for younger users.

2.1 Digital Literacy and Critical Engagement

Digital literacy is a term that articulates the skills required to navigate a dynamic digital context, and it requires critical thinking to filter, evaluate, and support accurate information [123]. Users must be motivated to evaluate content and misinformation [248]. This evaluation is largely socially informed and influenced by peers, families and online communities. This process occurs in digital

environments that Dourish [110] posits become meaningful *places* through users' interactions, social practices and meanings.

HCI work by Hassoun *et al.* [158] exploring how Gen Zers access information online, found that users 'crowdsource credibility' to align their thinking with others by checking comments and forums. Similarly, Malki, Patel and Singh [226] find that women navigate health and fitness information by drawing on personal experiences and reading comment sections to determine reliable information, thus relying on socially informed sense-making practices. They do so because users perceive health misinformation as ubiquitous and do not trust existing moderation or fact-checking interventions [226]. To practise critical thinking, users must process both the content and additional information. For example, they may observe the content and then read the comment sections to gauge the group's understanding and determine whether something is trustworthy.

Further critical thinking research by Kozyreva, Wineburg and Hertwig [198] argues that digital literacy requires '*critical ignoring*', which they describe as choosing what to ignore and what to give attention to. They find that traditional approaches to practising critical thinking are not as well-suited to navigating content in online spaces where time and attention are commodities. Instead, Kozyreva, Wineburg and Hertwig [198] feel that students should be supported to '*thoughtfully and strategically allocate (...) their attentional resources online.*' Critical ignoring is a form of active engagement with online content. Drawing on Rancière's [312] idea of the emancipated spectator helps to understand that audiences are active because they can think, interpret, and create meaning from what they view. In this way, social media users can actively question what they see and share their own experiences. In the context of digital literacy, this move from passive observers to active ones requires users to analyse information, recognise

biases, and thoughtfully engage with social media. They should be encouraged to participate in this activity, particularly those who engage with fitness content due to many of the well-reported negative effects of using social media for fitness, including disordered eating [40, 256], body image concerns [40, 129, 131], and reduced self-perceived sexual attractiveness [106].

2.2 Fitness-Related Digital Literacies

Fitness and nutritional information are the two most commonly searched health topics online by young people [414], many of whom seek advice shared on social media platforms around diet, exercise and workouts [144]. This content is often highly curated [295], which can negatively impact what users construe as ‘fit’. This construction often equates ‘fit’ with muscular and thin [47], and the internalisation of this can damage one’s mental or physical health [403]. Some work, including a systematic review by Peelo Dennehy *et al.* [295] highlighted the popularisation and monetisation of fitness influencers with ‘perfect bodies’. Many users on social networking sites entrust these influencers as a source of fitness and nutritional advice and information [295, 390].

Relying on influencers for health and fitness advice is widely accepted among young people, fueled by the ease of access to information and the sense that the information can be individualised and specific due to its abundance [299]. In some cases, fitness influencers disseminate poor-quality exercise information, contributing to an increase in misinformation [232]. If fitness misinformation or poor-quality information is acted upon, it can have harmful effects. For instance, much of the information shared online about high-intensity interval training (HIIT), for example, omits its potential link to adverse cardiovascular events, which can contribute to misconceptions about its safety [120]. Additionally, following

online workouts may lead to improper exercise technique and increase the risk of injury [234]. The intersection of fitness and digital literacy has implications for health outcomes and social media safety due to the demands safe navigation (e.g., identifying misinformation or harmful content) and the risks of not addressing these challenges (e.g., injury [234] and poor nutritional practices [256]). This raises questions about how individuals critically engage with fitness content online, necessitating an examination of the role of the user, digital literacy, and the platforms involved in this engagement.

2.3 Understanding and Supporting Digital Literacy Development

Some user groups are critically engaging with fitness content to reduce the associated harms [366, 420], yet it is unclear how this critical engagement is developed.

Tiller [390] advises those who use social media to engage with fitness content to do so critically, by filtering out superficial content, examining influencers' qualifications, avoiding quick fixes, and evaluating advice on its merits. However, it is challenging to comprehend how these skills may be learned or taught. Empirical work exploring women's navigation of fitness content demonstrates users' critical engagement as they exercise agency in deciding what to attend to [366]. Users report 'detaching' themselves from the content to avoid negative self-comparison [420], and they are attuned to the curated nature of fitness online [296]. In these studies, many users express concern for younger users who may not be as adept at navigating digital fitness. This concern is rooted in a sense of relational responsibility and empathy towards other members of online fitness communities, particularly those with less experience. This concern and responsibility can be understood through Noddings' [271] moral theory, Care

Ethics. According to Care Ethics, ethical action results from attentiveness to others and relational concern, emphasising the importance of understanding and responding to the needs of others. As older users gain experience, they identify the harms of using social media for fitness and then express concern for younger or less experienced users. Drawing attention to users' ability for safe navigation and their concern and compassion towards younger users highlights an opportunity to build on their knowledge base to enact care for the younger users. This ability to safely navigate fitness content online is potentially an underutilised knowledge that could serve as a basis for developing interventions for younger users.

It is essential to support users in developing digital literacy and safe navigation skills so they can continue to remain safe as platforms rapidly evolve. Users must be able to adapt and apply their understanding across multiple platforms to various types of content in order to navigate safely and effectively. As suggested by some users, younger users may be more vulnerable to the harms of digital fitness [106]. One way to support these users may be through teaching digital literacy skills [282] and creating environments that attend to their needs and foster their capacity for learning. Game-based interventions that encourage participation, collaboration, and relational learning may operationalise these relational values to contribute to safer, more empowered engagement with digital fitness content [18, 140]. Games, rather than instructional tools, encourage critical thinking, collaboration and strategy to foster deeper engagement than more passive forms of instruction [140]. Additionally, they can simulate complex social dynamics[28], such as those experienced when navigating fitness online. Game-based interventions enable experimentation with digital literacy in abstract scenarios without real-world consequences [228]. Digital literacies must be examined within their social, technological and economic contexts [334]. Considering the contextual nature of

digital literacy and the extensive research on the topic [98], there is a notable lack of focus on developing digital literacy in specific contexts, such as the online fitness community, and for particular groups, including girls.

There is reported success among games that promote healthy behaviours [338], such as games that focus on and successfully increase nutritional knowledge [17]. This success suggests potential for an intervention that might support more informed and responsible consumption of fitness content. Furthermore, considerable HCI work has explored safer social media use through game-based interventions aimed at improving digital literacy and combating misinformation online [192, 250]. For instance, a game that uses inoculation to teach common misinformation techniques helps users identify and resist misinformation [63]. A systematic review of digital literacy games by De La Hera *et al.* [98] finds that most work to date focuses on technological literacies, specifically cybersecurity and fake news aspects of digital literacy. Game-based interventions are effective at inciting behaviour change, improving knowledge and self-efficacy, and, most importantly, they are enjoyable [433].

This section has briefly highlighted some of the benefits of game-based interventions; however, there are also barriers to digital game-based learning in classrooms, such as the lack of available financial resources, up-to-date devices, software, and teacher training [184]. Games that encourage collaboration through mobile phones in the classroom [252] pose concerns for teachers integrating technology into their classrooms, primarily due to a lack of access to technology and funding [361]. This issue, along with the others cited the systematic review by Sousa, Neves and Luz [361] (e.g., low perceived technical knowledge), suggests that while these interventions are suitable, there are concerns about the accessibility and inclusivity of digital games for use in schools. Therefore, a non-digital game

may be more suited to classroom use, particularly in the context of this study, in Ireland, where recent reports indicate that despite access to computer devices and technical support, teachers perceive the technology and support as inadequate [400].

By collaborating with more experienced user groups (adult women), this work aims to bridge the gap in understanding how digital literacies and competencies are developed within online fitness communities. Additionally, the paper aims to develop an idea that can translate these competences into a game-based intervention for new community members. We draw on the success of similar interventions in digital citizenship, privacy, and online safety to present a game-based intervention concept called 'Bad Actors'.

3 THE STUDY

This research aimed to understand the development of safe navigation skills and digital literacy in the context of online fitness. In doing so, we sought to explore the opportunity for a game-based intervention to support this development based on learning methods and skills identified. This research spanned three phases: (1) Scoping Phase: conducting workshops with young adult women to inform design recommendations, (2) Exploration Phase: using the design implications for exploratory design research, and (3) Evaluation Phase: testing and refining the design concept based on insights from the earlier phases.

3.1 Research Context

This study is part of a wider research project concerned with understanding and supporting women's interactions with social media for fitness. Earlier research within this project has indicated that many users have the competency and capacity to safely navigate fitness content online [296, 366, 420]. The project finds

that these users recognise the potential risks of engaging with fitness online in an unsafe manner and express concern for younger users who may lack the confidence or ability to safely navigate content.

Prior work for this project developed a framework for the sensemaking of women's use of social media for fitness; the '*Modes of engagement*' framework offers conceptual tools to explore social media engagement for fitness. This paper draws on the framework's recommendations and leverages Rancière's [312] concept of the emancipated spectator and Noddings' [271] Care Ethics to understand safety and digital literacy in the context of women's online fitness engagement (and beyond).

In doing so, we view women's safe use of digital fitness as active, relational, and embedded in their lived experiences. We employ care ethics to reframe online safety as a shared responsibility between older, more experienced users and younger ones. It recognises the social implications of online interactions and not just the technical skills involved in digital literacy. The emancipated spectator provides a lens through which to view communities as spaces for active-meaning makers to co-create norms, culture and safety. Together, these conceptual perspectives shift our understanding of users from passive individuals to active negotiators of risk, who manage their own safety and help others.

3.2 Participants, Ethics and Recruitment

This work involved 39 adult participants (aged 18-35) and 7 children (aged 10-13). The adult participants were recruited through local gyms, sports clubs and online platforms. The women were Irish, and one-third of them were highly educated. The inclusion criteria required women who were casual users of social media for fitness (i.e., those who followed fitness creators, viewed fitness content

as it appeared on their feed, or specifically searched for fitness-related content when they wanted to learn something, such as a workout routine). None of these participants were fitness creators, and their engagement can be categorised according to Peelo Dennehy *et al.*'s [295] *Modes of Engagement* framework as overlapping between observing, interacting and managing. The participants also felt they had 'advice to share with their younger selves' as detailed in the recruitment flyer (Appendix D). This was to encourage participation from users who recognised that social media required critical engagement.

The younger participants (10-13) were members of local sports teams and were recruited through their Camogie club (Camogie is a traditional Irish stick and ball women's team sport, played by over 100,000 women in Ireland [257]). The children described using social media to follow their sporting heroes and occasionally for exercises related to their sports, and two participants reported having their social media use heavily supervised by their parents (and joked about ways to circumvent the supervision).

Participant demographics, including age, education level and work experience, are captured in the tables below (Tables 8 and 9). This is because participants reported that their age, education, and jobs influenced their development of safe navigation skills. A selection of the adult participants who are quoted in this paper are presented in Table 8, and the children's demographics are provided in Table 9.

For both phases, ethics approval was sought and obtained from University College Cork. Participation in the study was voluntary, and informed consent was a prerequisite for adult participants. Children's involvement required their assent and the consent of their parents or guardians. Due to the fact that participants were under 18, we obtained additional Garda (police) vetting from the university and the Camogie Association, and completed Child Safeguarding training [102].

Table 8: PHASE 1: Scoping Phase; workshop participant demographics. This table includes the pseudonyms and age, education and occupation demographics of the participants directly quoted in this paper.

Pseudonyms	Age	Education Level	Occupation/College Course
Eleanor	30	Masters Degree	Social Care
Colleen	31	Masters Degree	Social Care
Aimee	30	Undergraduate Degree	Nurse
Moya	21	Undergraduate Degree	Business
Molly	26	Undergraduate Degree	Nurse
Aisling	20	In College (Undergrad)	Physiotherapy
Leah	18	In School	Student
Cara	19	Leaving Certificate	Pharmacy Assistant
Cleo	35	Masters Degree	Additional Needs Assistant
Rachel	18	In School	Student
Eimear	23	Undergraduate Degree	Business
Caitlin	22	In College (Undergrad)	Nurse
Holly	22	Leaving Certificate	Waitress
Chloe	28	Masters degree	Teacher
Mikaela	24	Undergraduate Degree	Financial Advisor
Katie	29	Undergraduate Degree	Consultant
Deborah	24	Undergraduate Degree	Teacher
Hayley	33	Undergraduate Degree	Childcare
Orla	22	PT Course	Army Personnel
Sophia	23	Undergraduate Degree	Personal Assistant

Table 9: PHASE 3: Evaluation Phase; workshop participant demographics. This table includes the participants' pseudonyms, age, and educational demographics.

Participant Pseudonym	Age	Education Level
Katie	12	1 st year post-primary school
Robyn	13	1 st year post-primary school
Kayla	10	5 th class primary school
Erin	11	6 th class primary school
Roisin	12	1 st year post-primary school
Shelly	10	6 th class primary school
Layla	11	6 th class primary school

3.3 Data Analysis

The first author conducted a reflexive thematic analysis (TA) in Phase 1, following the six steps recommended by Braun and Clarke [50]. The author (1) familiarised herself with the data. She did so by listening to the audio, transcribing it, reading the transcript, and taking notes. This process also involved active reading and considering observations, as well as the assumptions that may underpin them. Following this, the author began (2) coding units of the dataset based on patterns and meaning. The analysis was primarily inductive; however, familiarity with the framework developed by Peelo Dennehy *et al.* [295] helped identify key patterns in user behaviour, such as modes of engagement (e.g., producing, observing, interacting and managing), and emergent concepts (e.g., aesthetic labour, care ethics and emancipated spectator). The coding was grounded in the data, and the framework served as a guide rather than a strict coding structure. Codes were refined across the dataset throughout the process, moving back and forth between workshop data to add information to new codes. Codes were uploaded into NVivo for a final coding round and data collation. Then, the author (3) generated initial themes by taking each code with its parent and child notes and uploading them into Miro, a web-based app for an affinity mapping process. Each code was assigned a Post-it note, and some quotes and snippets of data were transferred across as explanations. Some codes were clustered together to form candidate themes when they appeared to be connected. The clusters were explored independently, as they related to the research questions and regarding the analysis as a whole. Following this, the author (4) developed and reviewed the themes against all the data under each code and cluster for each tentative theme. (5) The themes were refined, defined and named. Finally, the author began (6) writing, which involved producing the analysis as it was written. Writing is

embedded in this analytic process, and the themes and quotes continued to evolve as the analysis was written.

For data from Phase 3: The evaluation workshop, the first author conducted a narrative inquiry to synthesise participant contributions, interactions and themes into an account that reflected the contextual flow of the session [353]. The data from the evaluation workshops captured participants narrating their experiences, interactions and their frustrations. The data was sequential and needed to be captured as such, as it told a story of participants' gameplay. Therefore, the analysis necessitated a shift to a narrative inquiry.

First, the primary author familiarised herself with the transcripts by reading and taking notes on relevant aspects of the workshop, regarding the setting and participants. Then, the first author created short, anonymised accounts of the participants and gameplay, including direct quotes to maintain their voices in the analysis. The transcript, notes, and survey data were reviewed together to identify a descriptive account of user behaviour, perspectives, gameplay and their meaning-making processes during the workshop.

3.4 Primary Researchers' Position Statement

The participant demographics in this paper, age, education, and job, are included as participants deem them relevant to developing their understanding of digital fitness. I will therefore include some of my demographics that may be relevant to data collection, interpretation and design.

I am a white Irish cisgender woman in my mid-twenties. I have an educational background (BSc and MSc) in Design. I engage with online fitness content in a relaxed and leisurely manner, consuming it when I want exercise and nutrition

information or sport-related advice, rather than following multiple creators and constantly observing their content.

Regarding my safe navigation of fitness, my leisurely consumption affords me some level of protection from its harms, teamed with my education and awareness of social media as a highly curated space. However, I am not immune to its harms and occasionally engage in negative self-comparisons, fitness content's influence on my eating and exercise habits has lessened over time.

In many ways, I am an inside researcher, relating to this user group's struggles and concerns for younger users (Phase 1). In Phase 2, I was an inside designer, developing the concepts, and I was particularly concerned not to cause undue harm as I designed a game concept to teach safe skills. In Phase 3, I shifted to an outside researcher as users evaluated a design concept I had developed, while I navigated concerns about the authenticity of their feedback.

In line with the reflexive TA method, my subjectivity was used as an analytic resource, and I kept a reflexive journal throughout the data collection, analysis and exploration of this work. This allowed me to remain aware of how my experiences shaped this work (see Appendix D for excerpts from the journal).

In the following sections, we describe the data collection and analysis across the three phases, as well as the findings and how they inform the development of the next phase.

4 PHASE 1: SCOPING PHASE

4.1 Phase 1 Scoping Workshops

The workshops in this phase aimed to understand how users develop the ability to critically navigate fitness on social media, and how they might teach younger users to foster this sensibility. Having recruited adult participants who felt they had advice to share with their younger selves about safely using digital fitness, we

felt the participants may be able to provide insight into their own safe use of social media for fitness. Their experiences and insight could serve as a basis for an intervention that promotes safe social media use.

We conducted three workshops, averaging 70 minutes, with 12 participants in the first, 16 in the second, and 11 in the third. The participants were encouraged to engage in a group discussion about using social media for fitness and share information about the influencers they followed, as well as their fitness consumption habits. They were then presented with six scenarios informed by prior research from Chapter 4, which examined misinformation, trust, and privacy practices. Participants were encouraged to discuss their experiences of the subject matter (an example can be found in Appendix D). Finally, participants offered advice to their younger selves, providing guidance for navigating fitness on social media.

4.2 Phase 1 Findings

We constructed three overarching themes from our reflexive TA to report on the findings from the workshop with women. These themes detail participant reflections surrounding issues with using social media for fitness and developing skills for safe navigation. The themes are: (1) What is Fit and Healthy? (2) Creating Distance, Out of Harm's Way and (3) Community-led curation.

4.2.1 What is Fit & Healthy?

Adult users in this phase identify how fitness on social media can influence their understanding of societal and bodily norms. For example, inconsistent and unrealistic beauty standards have influenced what they construe as healthy and fit, making it difficult for individuals, particularly young women, to develop a grounded and embodied understanding of bodily norms.

Sophia believes that social media impacts our idea of what constitutes ‘normal’ for women’s bodies:

“People don’t even realise that people [they follow] stop having their periods. We don’t even know as women like what’s a healthy size to be, there is so much that we don’t know from genuine good sources, [...] you don’t actually know if it’s normal to have a little bit of a belly, or if it’s normal to bloat.”

Sophia identifies that the abundance of contradictory information contributes to confusion around women’s health and fitness norms. She feels that her point is validated later in the workshop by Leah, another participant. In discussion, Leah shares her confusion because of conflicting fitness content. On one hand she highlights that workout routines for women target ‘problem areas’: *“the ones for women, it’s always the lower belly fat.”* On the other hand, Leah is confused by popular narratives that contradict her understandings of women’s bodies:

“But then I saw this thing, but I don’t know if it’s true but something about you have a uterus there and that’s actually why you have that bit of your tummy.”

(This is a common misconception, although the uterus is in the pelvic region it is not usually large enough [179] to protrude in non-pregnant women, and is situated behind the bladder [10]. ‘That bit of your tummy’ is a result of the pattern of fat distribution in women [327].)

This validates Sophia's point about a disconnect between what we see online and our bodies, in that Leah did not know about her uterus, its positioning or this common misconception, and questioned what she saw online. This illustrates a

wider misalignment between women and their bodies. Users' understandings of what is normal or what it means to be healthy and fit are increasingly informed by digitally mediated representations rather than medical or evidence-based ones.

Furthermore, the role of fitness-related content in constructing and circulating normative ideals of health and fitness often privileges aesthetic outcomes. Self-comparison to these normative ideals and aesthetics can have a negative impact on self-esteem and body image [40, 129, 131]. Participants display an underlying assumption that women, in particular, are likely to have body image concerns, as Aimee mentions

“Women will always obsess and never be happy with themselves. You go from the smallest girls here to the biggest girls [...] all of us will have at least one negative thing to say about our body.”

This user acknowledges that the beauty standards informed by health and fitness norms, promoting thinness and aesthetic labour, can contribute to a culture of self-criticism. Caitlin identifies that this predisposition of negative self-comparison makes the online fitness sphere profitable she notes: *“We are socially conditioned to hate ourselves, [...] it’s easier to make money off women that are insecure.”*

In her opinion, the fitness industry can capitalise on this culture of self-criticism, as it creates demand for workout programs, fitness content and even fitness influencers. She suggests that we must accept our body as it is in response: *“nothing rattles people more than a woman that says I’m quite happy with myself, yeah I’ve got a belly – and?”* Eleanor replied: *“I think again that comes with age”*, sharing her idea that for many women, age and experience help them to accept

their bodies and develop a critical awareness of how social media shapes and reinforces often unrealistic body norms. This ability to separate themselves from the information and norms perpetuated online leads to women questioning the normative body ideals and can foster resilience to internalised appearance-based pressures and misinformation.

4.2.2 Creating Distance, Out of Harm's Way

As participants navigate the abundance of fitness-related content that shapes their understanding of bodily norms, some recognise that the idealised norms displayed online, such as 'perfect bodies', are complex and interdependent. They acknowledged that sustainable physical change and well-being require balancing nutrition, movement and rest as well as genetics. For instance, Moya highlights that fitness outcomes and nutrition are inextricably linked.

Moya: "A few years ago, I probably would have believed that [a certain exercise will make you skinny] I'm definitely more aware of like, misinformation, and it doesn't work like that. There's a lot more factors to it; doing a workout is not just how you get that [body], it's diet and nutrition."

This ability to detach oneself from the dominant fitness narratives online is developed through recognition of the carefully constructed messaging online and that the body and fitness are complex. Moya believes this improves with time and experience, as users recognise that personally meaningful fitness outcomes require more than specific workouts; they depend on nutrition, recovery, and an understanding of one's body.

To promote this critical awareness and create space between content and its potential negative impact on users, workshop participants highlight methods of navigating fitness content and information by diversifying learning sources,

practising ‘active’ consumption, and embracing making mistakes as part of that journey. For instance, Eimear speaks about learning active reading in her third-level education and how that plays a role in her safe consumption of fitness content and may help others:

“I remember actually hearing about it in college, you need to be like active reading and [...] paying attention to who’s wrote it, who sponsored it and what was said [...] then you’d be able to look at something and research it [...] if they learn to how to filter that themselves, it’s gonna be a lot more useful than being told this is wrong.”

Eimear explains that empowering younger users through education is valuable for enabling the development of ‘safe space’ between users and potential harm.

Other participants believe that this distance from harm is acquired through trial and error and that mistakes are an inherent part of the learning process. However, less experienced social media users engaging in fitness are caught at an intersection where they shape their identities and understandings of bodies and fitness in tandem with social media and digital representations of societal norms. This intersection of social media engagement, identity formation and fitness requires a thoughtful consideration of the degree to which experimental learning is appropriate, as Chloe explains:

“You need to separate mistakes in level of seriousness [...] skipping meals or eating disorders or not knowing the proper way to do an exercise and doing it

dangerously, [...] that's the kind of mistakes you don't want them to make because they'll have lasting impact."

Although participants feel that experimental learning is a part of learning to engage with fitness and social media, individuals may engage in harmful practices that damage their physical health without reliable sources (or the ability to identify reliable sources). Therefore, differentiating these mistakes or equipping people with skills to identify the most harmful mistakes is important here.

Participants describe learning from their mistakes and noticing how social media impacted them and their self-perception. In response, they begin to distance themselves from the harmful content by curating safe spaces. For instance, Mikaela described her realisation: *"I don't see myself in these people, and like this isn't making me feel good, so I unfollowed a lot of people."* Mikaela reflected on the version of healthy and fit that she was observing online, which was making her feel negatively, and she took action to make her online experience more representative of her and therefore more pleasant. Combining the use of platform features and active reflection to curate safe spaces in an act of self-care. As users question digital representations of 'perfect bodies' and fitness, rather than internalising them, they look for discourses and creators that validate their individual experiences. As a result, they create a safe place filled with content and creators they like. Furthermore, they create a safe distance from the false representation of fitness online, or a safe space between their self-concepts and the (mis)representations of fitness online.

4.2.3 Community Led Curation

Participants describe a level of community-led curation regarding fitness misinformation; not only do they curate their feed, but they also work to create a

safe communal space (i.e., the online fitness community). Throughout the workshops, users described creators with fitness and nutrition qualifications acting almost as moderators on social media sites.

Participants describe a selection of trustworthy and qualified influencers who address and correct misinformation, for example, Orla describes:

“The lies are being shut down straightaway, that someone saying, oh, this is a great nutrition point and then an actual fitness person or someone who's done a degree in it is turning around and saying, ‘that is not true’.”

These influencers act as moderators of fitness content by responding to misinformation, and they are supported by their followers who tag them in potentially misinformative content for them to address:

“There is kind of one way they're doing that online though, the videos where they're stitching and [...] people that [are] following them tag them in the videos they come across, [...] and they're like, okay, I'll respond to this one and go through whatever lies are in it or that” (Eimear).

In a community-led curation or moderation of content, consumers of fitness content are actively assessing content by connecting it with trustworthy sources. By engaging with content they believe may contain misinformation and tagging qualified, trustworthy creators to assess the video, they can determine if it is misinformative. Some users named the creators they rely on for this process, for

instance, Mikaela, discussing the creators you can rely on for calling out misinformation:

“Then you have like the Sean Caseys who say, that’s not true, that can’t be done.” (According to a media article by Moore [255] in 2024, Sean Casey is a Northern Irish fitness coach and business owner with over 7M followers online, and his ‘truthful style is what sets him apart from the majority of fitness gurus). Mikaela knew immediately which influencer she relies on for trustworthy content and fitness myth-busting.

Here, users are actively identifying potential misinformation and taking steps to verify credible content. Users are not passively observing content but rather actively making meaning for themselves, guided by a trustworthy member of their community. Users actively attempt to filter fitness-related information for themselves and their community members, potentially preventing some of the harm that may result from misinformation.

4.3 Recommendations for Game Design

The following are design recommendations for creating game-based interventions to improve digital literacy skills among the next generation of online fitness consumers. These recommendations have been developed from the findings of Phase 1. The findings were surveyed to identify common topics surrounding their sensibility that would be important to include in a game design.

Participants described learning how to navigate fitness on social media through a combination of lived experience, as they made mistakes and received direction and support from their community. Some workshop participants identified the benefit of making and learning from mistakes. However, Chloe noted that some mistakes are more severe and can have more negative, lasting impacts than others.

Therefore, a game-based response needs to allow users to make mistakes in a controlled environment where the consequences of the mistake are not damaging or long-lasting. As such, a game-based response should (1) *focus on real-world experiences*. It should incorporate real-life scenarios where players make decisions about interacting with fitness content online. For example, players are shown posts and should decide whether they're trustworthy.

Participants highlighted the need to learn how to evaluate content online, for example, by using 'active reading' and identifying the importance of diversifying sources. Participants note that an intervention should support the building of long-term digital literacy skills. Therefore, the game-based concept should (2) *encourage critical thinking and misinformation detection*. It might include challenges that encourage players to critically evaluate information and identify misinformation. For example, players need to identify fake fitness advice, misleading ads, or unreliable sources to help them build skills in discerning credible content.

Users in this study discussed the collaborative effort involved in curating safe online spaces and how some users work together to identify potential misinformation and flag it to the attention of a qualified and trustworthy influencer for verification. These influencers actively correct misinformation when prompted by members of the fitness community. In this case, a game-based intervention should (3) *include social and community elements*. This might involve collaboration or teamwork. For instance, players could work in teams or collectively to safely navigate fitness content. In the following section, we build on these recommendations to explore the potential for a design intervention.

5 PHASE 2: EXPLORATION PHASE

5.1 Phase 2 Design Concepts

The design recommendations were leveraged to explore game-based interventions that support safer online experiences. We draw on the MDA framework (Mechanics, Dynamics and Aesthetics) to inform the design of gameplay that fosters learning and engagement by aligning gameplay with the desired cognitive outcomes [171]. The framework is a model for analysing and designing games that highlights how various elements interact to shape the whole gaming experience. We combined the MDA framework with stages of the design thinking process, as the MDA framework alone has been criticised for focusing too much on game mechanics [411]. As such, Phase 2 involved the iterative design and refinement of concepts through brainstorming [418] and prototyping [386]. Each idea was informally evaluated against the design recommendations, scoring them 1-5 based on how well they met the criteria. Ideas were then discussed with the authors, and the highest-scoring ideas were prototyped.

5.1.1 Developing and Evaluating Ideas

Three game concepts were prototyped digitally on Canva in response to the design recommendations. The first game idea, ‘Burst your bubble’, was a cooperative game where players work together to gain insight into whether a scenario is misinformative or not by swapping information on fact cards (Fig. 16). Building on the design recommendations, the game was grounded in ‘real-world scenarios’. However, following a discussion with the authors, we deemed that the topics were inappropriate and might expose these young users to topics concerning eating disorders and body concerns.



Figure 16: A series of cards created for 'Burst your Bubble'. Upper cards are the scenario cards, and the lower cards are fact cards, which are added up to decipher the truth behind the scenario card. Players use their fact cards in a game like Go Fish to swap cards and determine whether the scenario card in the middle is true or false.

The second concept, *'Jumping to Conclusions'* (Fig. 17), focused on misinformation more broadly. It was a cooperative board game where players worked together to solve a problem by collecting advice from animals in the town (Figures 17 and 18). It had social and community elements and focused on misinformation; however, the group decided that it was too childish for our target demographic (10-13).

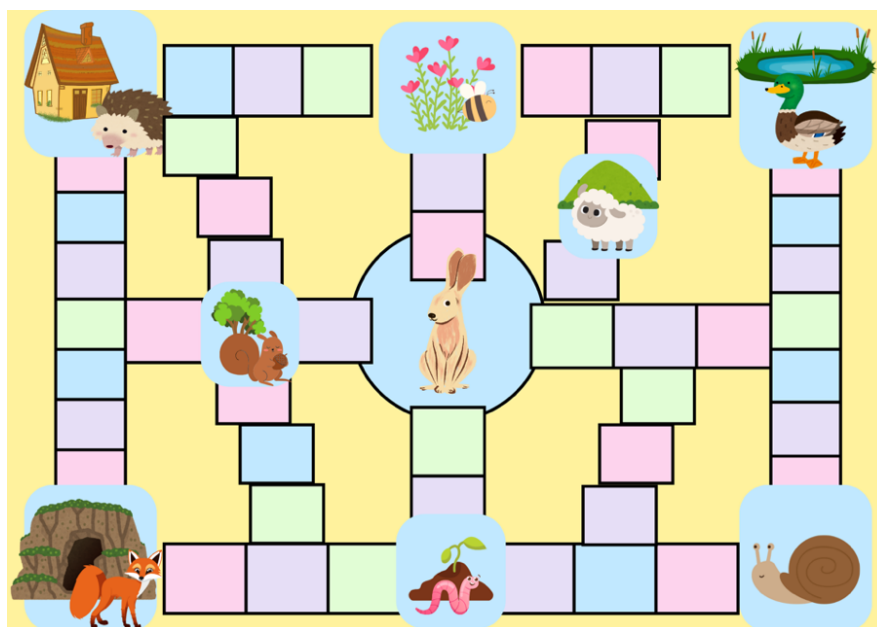


Figure 17: Jumping to conclusions game board. The user starts in the middle and works around the board to the towns' creatures to collect and compare their advice on the game problem, before working their way back to the middle to solve the problem.

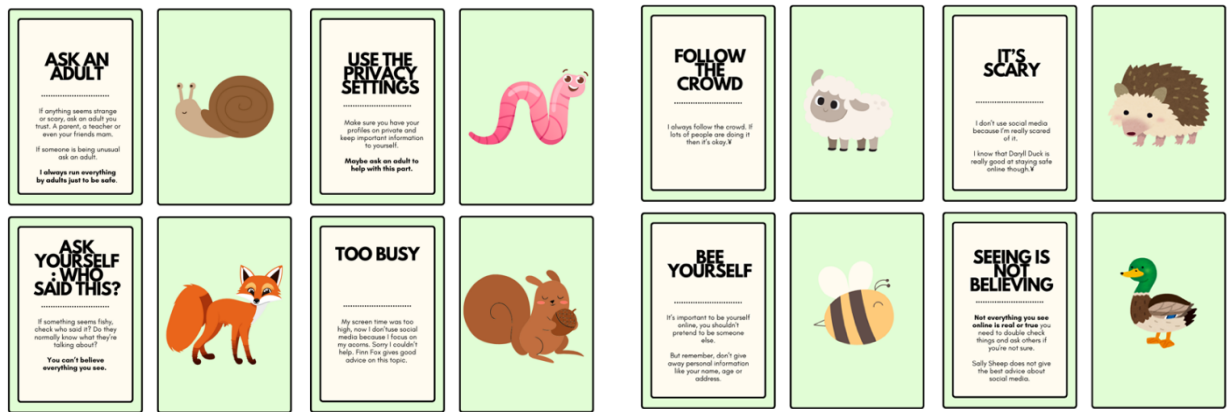


Figure 18: Character cards that depict information about safe navigation to help the players solve the game problem.

Our final concept was ‘*Bad Actor Battle*’, a co-operative game that focused on the skills required to safely navigate fitness and online spaces more generally. This game is used in the evaluation in Phase 3. We discuss the game in further detail below.

5.1.2 *Bad Actor Battle*

‘*Bad Actor Battle*’ is a game that involves matching icons representing skills for safe navigation with ‘bad actor’ cards that display the icons in order to defeat the bad actors. This game builds on several methods participants identified in Phase 1 for navigating fitness content on social media (e.g., Critical Thinking, Understanding and Using Platform Affordances, Diversifying Sources, and Creating a Safe Space), and they are represented as skill cards in the game. These skill cards are: ‘Phone a friend’, ‘Filter’, ‘Critical thinking’, ‘Fact Check’ and ‘Report’. Table 10

below explains the link between the participant insights, the described methods and associated skills.

Table 10: Traceability style table linking the methods of safe navigation, related descriptive quotes from Phase 1 and explanations of the skill cards.

Method of Safe Navigation	Related Quote from Phase 1	Associated Skill Card	Explanation
Critical Thinking	<i>“you need to be like active reading and [...] paying attention to who’s wrote it, who sponsored it and what was said.”</i>	Critical Thinking	Carefully considering content, its source and trustworthiness.
Understanding & Using Platform Affordances	<i>“I don’t see myself in these people, and like this isn’t making me feel good, so I unfollowed a lot of people.”</i>	Not Interested/Filter Report	Engaging with platform affordances to manage privacy and safety.
Diversifying Sources	<i>“you’d be able to look at something and be able to research it.”</i>	Phone a Friend Fact Check	Seeking support from relationships and expert opinions to determine whether something is trustworthy or beneficial.
Creating Safe Space	<i>“definitely more aware of like, misinformation [...]. There’s a lot more factors to it; doing a workout is not just how you get that [body], it’s diet and nutrition.”</i>	Not Interested/Filter Critical Thinking	Understanding that something may be harmful and distancing oneself from that content or narrative – saying ‘I am not interested in this’.

Players set up the game by (i) shuffling the bad actor and glitch cards (Figure 19) and placing them face up in a pile (Figure 20). They continue by (ii) dealing five skill cards to each player (Figure 21). The remaining cards are (iii) set aside in a pile (Figure 22).



Figure 19: Game setup (i) Glitch cards and Bad Actor cards being shuffled.



Figure 20: Game setup (i) Cards shuffled and set into a pile face up.



Figure 21: Game setup (ii) Skill cards dealt to players.



Figure 22: Game setup (iii) Skill cards in a pile.

The rules require players to match the skill cards in their hands with the skills on the bad actor cards from the pile. For instance, ‘a *fitness faker*’ bad actor card could be defeated using skills like fact-checking, critical thinking and reporting (Below in Fig. 23). Once they use a skill card, they pick another from the pile. The goal of the game is to defeat as many bad actors as possible within a five-minute ‘screen time’ limit.

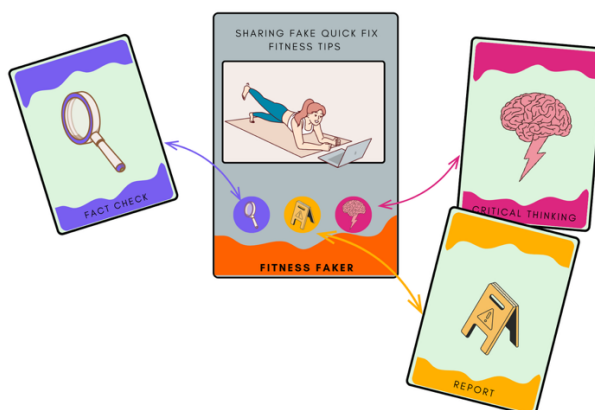


Figure 23: A graphic representation of defeating the fitness faker bad actor, by matching (fact check, critical thinking and report) skill cards to those depicted on the Bad actor's card.

The learning goal for users is to identify some of the 'bad' scenarios and 'bad actors' that exist online and the skills they can use to overcome them. By aligning the mechanics (rules, skills, and bad actors), dynamics (time limit and glitch cards), and aesthetics (teamwork, skill discovery, and fun), this game concept (Fig. 24) ensures its design reinforces the learning goal. Additionally, the concept responds to the design recommendations by focusing on misinformation detection, promoting critical thinking, and applying it to real-world scenarios. Furthermore, the game's cooperative nature satisfies the recommendation to incorporate social and community elements. The traceability of the game, from theme to evidence of learning goal achievement, is presented in Table 11 in the following section.



Figure 24: A mockup of the game concept

6 PHASE 3: EVALUATION PHASE

This phase aimed to preliminarily test and refine the design concept with younger users. Prior to the evaluation workshop, the game was tested by the authors and a game design expert. This informed a refinement of the game where the icons representing the safe navigation skills were removed from the front of

the card (Fig. 23) and placed at the back (Fig.25) to ensure players considered the implications of the bad actors and the safe skills, rather than just matching them.

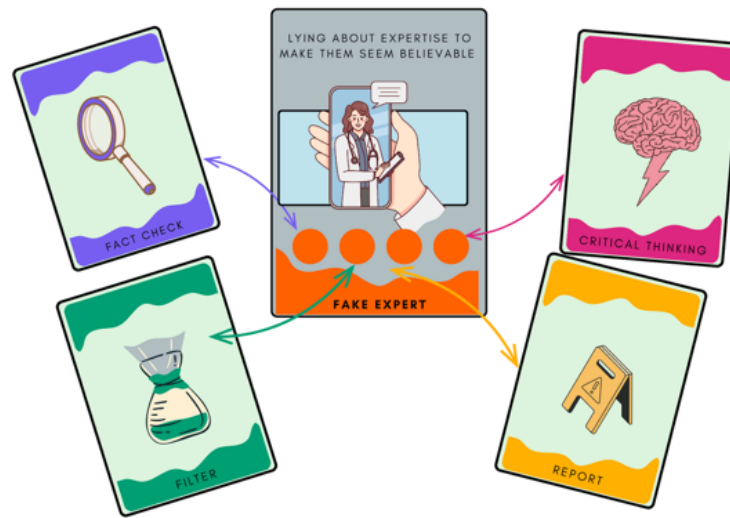


Figure 25: A graphic representation of defeating the fake expert bad actor, with the refined version where the skills are removed from the front of the card.

6.1 PHASE 3: Evaluation Workshops

The young participants completed a qualitative survey that asked them about safe social media use and how they determine whether people are telling the truth online. The workshop was structured in three stages: (1) an icebreaker game of fitness-related charades, (2) gameplay with three rounds of the game, and (3) a follow-up survey with questions about their experiences, gameplay and learning aims. The workshop lasted approximately 80 minutes.

6.2 PHASE 3: Evaluation Findings

Here, we present the findings of the evaluation workshop in the form of a narrative description, integrating the survey results with the gameplay analysis.

6.2.1 Description of Gameplay

It did not take long for these participants to understand and start playing the game. Following the introduction and the explanation of the game, they could play. Immediately, they began working together, discussing what skills might defeat the bad actors and which ones they had:

“Fact check?” (Erin)

“That’s what I was thinking” (Shelly)

“I don’t have one of them” (Kayla)

“For gods sake, I’ve about 10 critical thinking” (Roisin) (Fig. 26 Below)

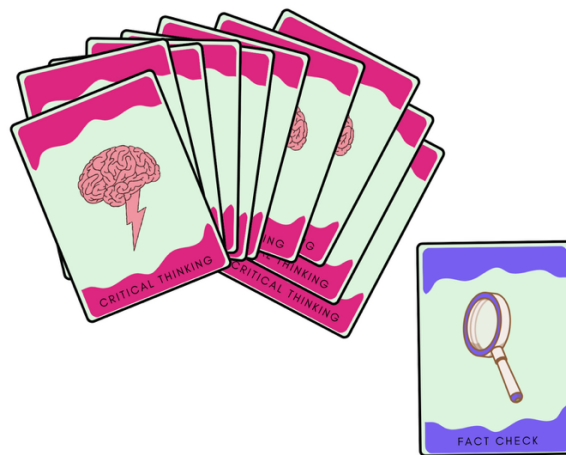


Figure 26: Fact Check (left) and ‘about 10 critical thinking’ (right) cards for reference.

Roisin was frustrated that she had many of the same ‘critical thinking’ cards. Similarly, another user, Kayla, had many filter cards and was frustrated that she could not use them to defeat the bad actors. Following a round that did not require a single filter, Kayla said: *“It was fun, but I think we should just like get rid of the filter cards because I have loads and there hasn’t been a filter yet.”* She then looked down at the pile and recognised the next bad actor would need a filter to be defeated and exclaimed: *“Oh no, wait, there is a filter in the next one!”* They were excited to play another round, as they unexpectedly found the first round fun, *“yay, it was actually fun”* (Roisin). This time, they wanted to beat their first score:

“How long were we the last time?” (Robyn)

“We were 5 minutes, but we didn’t get all the bad guys” (Erin)

“Because we were talking the whole time” (Kayla)

“Yeah, let’s try beat it this time” (Shelly)

They took control of the second round themselves, with one player reading (Roisin) and the other players problem-solving out loud. They worked together to defeat the bad actors: “Someone’s sharing fake news”, Roisin called out the bad actor card, and Shelly shouted for a skill card, *“so we’re going to have to fact check.”* Erin asked, *“Does anyone have a fact check to put down?”* and Robyn replied, *“I do, but I don’t know where it is now,”* and finally, Shelly put hers down: *“Here I have one.”* The participants quickly got into the game’s flow and worked together to defeat the bad actors.

6.2.2 Honest Serious Fun

The participants enjoyed playing the game and having promised to give honest feedback (*“I’m going to let loose”* - Roisin), they reported having a good time: *“I really liked it”* (Robyn), and as Katie puts it: *“I would tell you if I didn’t. I’d be brutally honest, I actually enjoyed it.”* Similar to Roisin in the previous section, the participants were surprised to have enjoyed playing the game. These participants said they would enjoy playing the game in school if their teacher brought it out. For some, this was a positive alternative to work: *“way better than writing”*, Erin claims she would prefer to learn about this topic through gameplay rather than by listening and then having to write a response. Perhaps Erin has a preference for learning tasks that are more self-driven or active. The game here appears to offer a type of learning that feels more dynamic than traditional literacy tasks, such as reading and writing.

All participants agree that *“it would have to be an all-girls game”* (Roisin), *“Yeah, the [boys] just rip the cards”* (Kayla). They joke that the boys their age would not sit down and play this game, that they would ruin it. Perhaps a future iteration of this game could consider making it more suitable for both girls and boys to play together.

Although they enjoyed the game, participants also suggested an improvement by expanding the skill cards to include a ‘not interested’ card, similar to a filter. As Erin described using the not interested feature: *“I always say ‘not interested’. I don’t like report, I always just press not interested”* rather than the report feature. Her response indicates her familiarity with the platform’s features that can help establish safe spaces and how she uses them to distance herself from the content she does not want to see.

In addition to testing gameplay, in a survey we asked participants what they thought the game was trying to teach them. They responded that the game taught them *“how to be smart on social media”* (Shelly). They identified that the game aimed to teach them to engage critically with content online and *“to not believe everything that you see on the internet”* (Kayla). Robyn thought this too and observed that the game taught her: *“Don’t believe everything you see.”* These participants had a correct understanding of what the game was trying to teach them, and they felt that they learned (in the short term) to be smart on social media and not to believe everything they see online.

Table 11: Traceability style matrix linking the theme from Phase 1-> the design recommendation -> the game mechanic (skill/rule) -> dynamic -> learning objective -> evidence collected in Phase 3

Theme from Phase 1	What is fit and healthy?	Creating Distance, Out of Harm's Way	Community-led Curation
Design Recommendation	(2) Encourage Critical Thinking and Misinformation Detection	(1) Focus on real world experiences & (2) Encourage Critical Thinking	(3) Include social and community elements
Game Mechanic	Skill Cards: Fact Check and Critical Thinking	Skill Cards: Not Interested & Report Bad actor cards showed real world instances of harm.	Rule requiring teamwork. Skill card: Phone a friend.
Dynamic	Glitch Cards encourage fact checking with qualified personnel.	Time limit promotes fast decision making and adds tension.	Time limit and limited number of skill cards encourage co-operation.
Aesthetic	Excitement of placing the right card	Frustration when time runs out before defeating all the bad actors. Frustration when using the wrong skill card.	Teamwork playing with each other.
Learning Objective	Recognising you can't believe everything you see and becoming familiar with fact checking	Identifying platform features to use to stay safe online.	Recognising that people can work together to stay safe online.
Evidence (Phase 3)	"someone's sharing fake news" "so we're going to have to fact check" – players recognising the skills they can use and when to use them.	"How long were we the last time?" "we were 5 minutes but we didn't get all the bad guys" – players frustrated that the time ran out before they could defeat the bad actors.	"Does anyone have a fact check to put down" – players working together to defeat the bad actors.

6.3 PHASE 3: Reflections for Future Refinement

Following feedback from end users, we refined some elements of the game.

During the testing, some users complained about the relevance of the filter card

(*"We should get rid of the filter,"* – Kayla and *"I always just press not interested."* –

Erin). In response, we removed the filter card and replaced it with a 'not interested

card' (Fig. 27) as both serve similar purposes and depict an active engagement with

the platform to create space between the user and content they do not want to see.

Additionally, we revised the game's rules to make them more competitive, as suggested by the participants. For instance, we adjusted the rules to have individual winners for the first player to use all their skill cards. If a player incorrectly places a skill card, they must pick up another one.

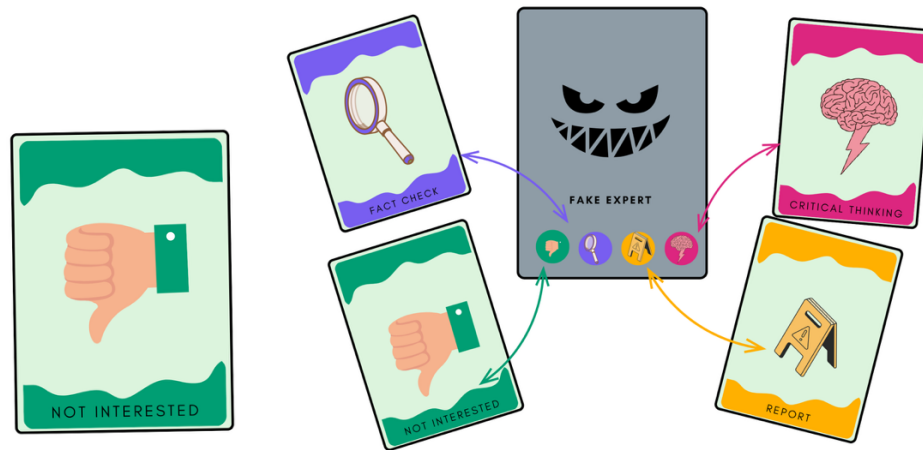


Figure 27: The new Not Interested skill card is in place of the filter card.

7 DISCUSSION

The primary aim of this paper was to explore skills required for safe engagement with online fitness and how these skills are developed. Based on our interpretation of participants' accounts, these skills include critical thinking, understanding and using platform affordances, diversifying sources, and creating a safe space. Participants described these skills as learned over time, through education, lived experience, and relational learning.

The secondary aim of this work was to speculate how a game-based design intervention may foster the development of these skills. We provide design recommendations for promoting these skills, (1) focusing on real-world scenarios, (2) emphasising critical thinking and misinformation detection, and (3) including social and community elements. These recommendations are based on participants' descriptions of how their competency for safe navigation was developed.

The methods used in this work have shaped the findings, so we take this opportunity to briefly discuss them. The scoping workshops in Phase 1 were well-suited to this exploratory study as they encouraged collaboration and group discussion, highlighting the relational nature of safe social media use. It is possible that the group setting amplified the relational aspect of the findings, although this community learning has been described in semi-structured interviews in previous work [296]. While the workshop provided a space for users to voice their opinions, and efforts were made to encourage equal discussion from participants, in some cases, there were dominant speakers and quiet participants. In the second workshop, two participants did not present original ideas; instead, they contributed to the group's discussion by agreeing and disagreeing. Upon reflection, it is interesting to consider whether an interview would have been a more suitable approach for those participants or whether they had the confidence to engage in the study due to the group setting.

It is also important to note that the primary researcher facilitated the workshops, conducted the data analysis and engaged in the design process. While this continuity allowed for a deep contextual understanding and ensured the design was embedded in user findings, the researcher indisputably influenced the workshop dynamic, theme generation, and design intervention. This subjectivity is, of course, a strength of reflexive thematic analysis, but it requires reflection in a reflexive journal. This journal provided an opportunity to reflect on where I showed up in the work. For example, after one of the workshops, I noted that: *“I felt like some of these experiences resonated with me.”* I related to participants who displayed a growth mindset, contrasting their past negative experiences of online fitness with their current, more active practices.

Finally, user feedback is received late in this process, rather than in a co-design process; the game was designed by the primary researcher. Although we initially had to engage with older, more experienced users who acted as ‘experts’ to identify their safe navigation skills, a suitable intervention may also have been developed by exploring unknowns with younger users. This feeds into criticisms of design failing to be user-centred, as we neglected the user’s voice until late in the design process.

7.1 Safe Navigation Skills for Online Fitness

The safe navigation skills identified in this work exist in various contexts across the field of HCI. We briefly reintroduce them in the digital fitness context by linking them to existing literature. Then, we discuss the final skill, ‘creating safe space’, in the following subsection, where we combine existing work to provide a deeper understanding of ‘safe space’ in the context of online fitness (and beyond).

Critical thinking – In the context of this study, critical thinking refers to the active engagement with fitness content, where participants are aware of what they are consuming and its origin. Prior work suggests that critical thinking in the fitness context requires examining influencers’ qualifications, considering their motives, and judging advice on merit [390].

Diversifying Sources – Building on critical thinking, users should verify their sources and not believe everything they see online. Many users do this by checking comments [43] or referring to a predetermined ‘trustworthy source’ [158].

Understanding and Using Platform Affordances – This describes users’ management of platforms and content, which combines being (1) aware of the platform features that can help keep them safe and (2) using them to make their social media experience safer.

Creating Safe Space - this skill is concerned with both (1) actively identifying potential harm and engaging with platforms to create a safe place, and (2) creating the mental distance between the user and the potential for the content to cause harm, by creating a safe distance. This safe space is similar to ‘*critical ignoring*’, which requires choosing what to ignore and what to attend to [198]. Users exercise agency [70] as they consciously try to curate safe online spaces. The distance they create is similar to how some other users feel they must ‘detach’ themselves from fitness content so they do not compare themselves negatively to what they see online [420].

These concepts have been elaborated upon significantly in the field of HCI, and as such, we describe our expansion of safe space in the following section. We situate it in the field of HCI by indicating its presence in existing work and leveraging concepts and theories to distinguish between (1) safe Space (big S) and (2) safe space (small s).

7.2 Creating Safe Space

Our work suggests that ‘Safe space’ is integral to safely navigating fitness online. In our work, we posit that there are two degrees of safe space in the fitness context. The first is safe Space (capitalised S), which is the safe place a user creates online by engaging with platform features and algorithms, i.e., curating a **safe place** online. The second is safe space (lowercase s), which refers to the mental distance they create between themselves and the impact of content that might harm them, i.e., a **safe distance**.

Women have been constructing safe spaces for decades, originating from the women’s liberation movement in the US in the 1960s as a conceptual space resisting violence [189]. More recently, it is used to describe spaces that offer

solace from physical, verbal and emotional harm [189]. These spaces can be physical locations, communities across cities, or online platforms [331]. Their meaning is highly contextual and is shaped by an individual's identity and experiences. Spaces are also embedded with cultural and social meaning, which are constructed through relationships and context [235]. Beyond how spaces or infrastructures are made, they are '*concrete manifestations of relationships, historical events and institutional memories*', highly complex and interconnected [111]. We draw from Dourish [110], who differentiates between place and space, to understand the differences between safe Space (big S) and safe space (small s). Dourish [110] views spaces as physical or virtual environments and when they are assigned meaning by human interaction, they become places. For example, an online forum is a space, and when women share fitness information [12], it becomes a place; it is given meaning by the interactions that occur in it. In this instance, the safe Space (capitalised S) we discuss is closely linked to creating a safe place, as Dourish describes.

7.2.1 Safe Space (Capitalised S)

Safe Space (big S) describes a social media platform (or experience) that has been made safe through algorithmic interactions and platform affordances (to make a safe place without harm). For instance, Mikaela unfollows users if they make her feel bad about herself, "*This isn't making me feel good, so I unfollowed a lot of people.*" Platform features are used to make these safe Spaces. Simpson and Semaan [350] find that TikTok algorithms can contribute to a safe Space where users feel a sense of belonging as they support LGBTQ+ identity work and reaffirm identities. Users in their work highlight the active engagement with platform affordances, such as 'not interested,' to correct 'transgressions' and return their 'For You' page on TikTok to its safe Space [350]. Other research captures users creating their safe

Spaces through the use of anonymity features on platforms. For example, environmental and queer-feminist activists utilise these features, but also request greater levels of anonymity to support their creation of safe Spaces online [219]. Work engaging with people who have experienced pregnancy loss describes users preferring to share their experiences in anonymous groups to avoid judgment [264]. In these cases, features that afford privacy help create safe Spaces.

In HCI, the idea of safe Space is represented in work aimed at understanding and intervening to create safer online experiences. That is, work in the field regarding safe Space often seeks to prevent, manage or identify harm in various contexts, and provides recommendations, redesigns and new technologies in response. In the design or redesign of technologies, Dourish calls for designers to pay attention to how the structures of the technologies being created can enable harm [110]. In this light, research by McKay and Miller [243] demonstrates, through case studies, that convenient technologies can facilitate both control and abuse. In response, they offer design recommendations for technologies that prevent abuse [243]. Other work engages with redesigns of social matching apps in ways that foreground women's safety, for instance, features for managing users' location visibility [3], or risk detection AI to supplement women's risk assessment strategies in online dating [94]. Agha, Badillo-Urquiola, and Wisniewski [5] present user-designed risk prevention interventions in the form of platform-based nudging, which provides guidance for managing risky digital situations and sensitivity filters to manage content that users want to see. To summarise, in the case of HCI interventions around safe Space, the aim is to **prevent** or **mitigate** harm, often at a **system level**.

7.2.2 Safe space (lowercase s)

On the other hand, safe space (small s) is the user's ability to identify potentially harmful content and then distance themselves from the negative impacts (to make a safe distance from the effects of harm). For example, Moya understands that fitness is a multifactorial combination of diet, exercise and health among other factors, which helps her to distance herself from believing fitness misinformation:

“It doesn't work like that. There's a lot more factors to it; doing a workout is not just how you get that [body], it's diet and nutrition.”

Similarly, literacy research involving young students with immigrant and refugee backgrounds found that they discursively distanced themselves from how refugees were portrayed in the text they were studying. They did so by changing the topic of discussion and collectively (and individually) refusing to connect to the text [318]. These users practised creating safe space by distancing themselves from how refugees were presented. Other online safety work calls for a shift from privacy-invasive restriction measures towards fostering resilience and autonomy. A participatory design study with 21 teens found that including them in the design process of safety solutions offers an opportunity to learn self-regulation of their habits, promoting resilience, autonomy, and digital well-being [77]. This shift towards resilience empowers users to utilise their knowledge to self-regulate and cope with online risks, therefore facilitating the creation of safe space. Similarly, research finds that resilience can neutralise the adverse psychological effects of online risk exposure, emphasising the importance of fostering such resilience and strength-building rather than focusing on restricting and preventing risks [83].

HCI work engaging with safe space aims to understand and facilitate the work that users engage in to stay safe online. This type of research aims to support and highlight the cognitive labour or literacy-type skills required to navigate online spaces safely. It also provides educational resources and policy recommendations in response. For example, a game-based intervention called Fakey, which participants found educational, aimed to improve news literacy [250]. Similarly, an online in-browser game developed by Roozenbeek and Van der Linden [325] teaches commonly used techniques for producing misinformation, helping users identify misinformation. Both of these interventions aim to foster the development of skills, such as news literacy and misinformation detection, that users can then leverage to create their safe space (small s). Other research concerned with creating safe space considers, for example, fostering agency among teenagers managing online risks and self-regulating their behaviours [58]. Further work to understand and prevent psychological harms associated with risk exposure in teens highlights the importance of resilience in neutralising the adverse effects of online risk exposure [83]. For HCI, safe space work is nuanced and focused on understanding the complexities of digital landscapes for a particular user group and helping those users to **recognise and avoid** harm (or its impact) at a **personal level**.

By situating our understanding of safe Space and safe space within existing understandings of space versus place [110] and online safety in HCI, we can distinguish between safe space (a safe distance) and safe Space (a safe place) and begin to unpack them.

7.2.3 Through digital fitness and beyond, modes of engagement framework situating safe spaces

We now turn to Peelo Dennehy *et al.*'s [295] framework to identify conceptual perspectives to interpret womens use of safe s(S)pace in online fitness. In

particular, we leverage Rancière's [312] concept of the emancipated spectator and Noddings' [271] Care Ethics to understand the creation of safe spaces versus safe Spaces in the context of women's online fitness engagement (and beyond).

The findings of this study extend these theoretical perspectives by providing some evidence that women's safe use of digital fitness is an active and relational process embedded in their lived experiences.

The scoping workshop in Phase 1 provides evidence that participants view online safety as a shared responsibility, one that is developed through relationships. Workshop participants detail their efforts to support a safer fitness community by calling for trustworthy sources to draw attention to potential misinformation. Additionally, they describe how these trustworthy community members counter misleading claims to contribute to a safer fitness community. Therefore, our findings prompt the consideration of the social implications of online interactions and not just the technical skills involved in digital literacy when designing online safety interventions.

The emancipated spectator provides a lens through which to view users as actively working to maintain their safety. Although they do not always consume safe content, by interpreting and recontextualising content, users can reclaim their agency and safety. In prior work, this activity involved users 'detaching' themselves from fitness content as they view it, so that they do not negatively compare themselves to what they see online [420]. An awareness of the curated nature of fitness content enables them to view what they see 'with a pinch of salt' and not take everything too seriously [296]. This detachment and awareness transition the user from a passive viewer to a more active one [312] who interprets and constructs meaning from what they see by engaging their intelligence and drawing on their experience. This can be difficult as users must identify that social

media and social representations of ‘fit and healthy’ create and reinforce digitally mediated ideas of fitness. These representations can and do have a negative impact on body image [24]. Sophia acknowledged the impact of this, noting that often ‘normal’ for women is socially and digitally mediated rather than informed by scientific or medical evidence (*We don’t even know as women like what’s a healthy size to be [...] you don’t actually know if it’s normal to have a little bit of a belly, or if it’s normal to bloat*”). It is likely that if users recognise the influence of social media and social norms in perpetuating an idea of what is fit and healthy (like Sophia), they may start to create a safe space.

Socially and digitally mediated representations online are not confined to fitness; they are also evident in news, health, lifestyle, and travel content, distorting our understanding of a wide range of norms. Recognising that these representations can skew perceptions allows users to start creating safe space.

Once they start to create safe space and develop critical awareness, they begin to take care of and express concern for one another in the digital fitness context. The critical awareness displayed by users when developing the safe space contributes to an empathetic and sometimes protective awareness of the potential harm fitness content may cause others. This relational care in online spaces is captured in HCI work, frequently in online communities and moderation work, for instance, among the Wikipedia community [15] and hackerspace communities [394]. Prior research has detailed how experienced Wikipedia editors offer guidance and emotional support to newcomers, helping them integrate into the community [15]. Similarly, Toombs, Bardzell and Bardzell [394] capture makerspace participants sharing their expertise and supporting members’ learning. The enactment of care in these digital spaces first implies that users are able to engage with the content and platform with a level of expertise that allows them to navigate safely. In doing so, users

begin to identify potential risks for other users and use their contextual understanding of platforms, users and harms to enact care for those they deem vulnerable.

In summary, the safe navigation skill ‘*creating safe space*’ builds upon data from the workshops and a pre-existing understanding of safe spaces in online safety and situates it within the context of HCI and online fitness. Users must recognise social media as a curated space and combine that understanding with other knowledge regarding fitness as multifaceted (encompassing exercise, nutrition, wellbeing, and rest), as well as an awareness of the dominant norms perpetuated in digital fitness content, to minimise the potential for the content or norms to cause harm. In doing so, they become active in their social media engagement and begin to express and enact care for other community members. The combination of understandings allows users to create *safe space* between themselves and content that may harm them, where they can view the content without being negatively impacted by it.

7.3 Supporting the Development of safe space (small s)

We describe safe space (small s) as the distance between a user and the potential harms associated with social media. It is formed over time, often through trial and error, and developed through relationships and experiences. It requires active and informed engagement with social media, where the user combines digital literacy, fitness literacy and critical thinking to navigate content safely. Together, these aspects enable users to view fitness content (for example) without experiencing harm.

The challenge of creating safe space is that its development is timely, context-specific, and highly individualised. According to our work, creating safe spaces takes time and often requires making mistakes to discover boundaries. It requires

understanding the context of the digital space the user is navigating, which is specific to the user; therefore, the user must have a good understanding of themselves, the topic, and their triggers. Users must acknowledge a series of factors in the context of their safe space. For example, in the fitness context users need to recognise (1) all bodies are different (“what works for them might not work for you” [296]) (2) social media is highly curated (“take everything with a pinch of salt” [296]) and (3) the intricate nature of fitness as exercise, rest, body, mind and nutrition (*“there's a lot more factors to it, doing a workout is not how you get that [body]”*-Moya). The benefit is that once users begin to create a safe space, they may start to express concern for and care for others within the digital space they are navigating. Additionally, users can engage with social media and content in a way that suits them, avoiding the adverse effects associated with social media use.

The design recommendations we provide in Section 5.1 offer ways in which design may foster the development of this safe space.

7.3.1 Focusing on real-world experiences.

This work shows that Safe space is highly contextual, individualised and is built from understandings gained through lived experiences. Embedding a design intervention in real-world experiences encourages users to develop this highly contextual skill in the context where they will employ it. Additionally, intervening in a way closely related to the real world allows users to practice their decision-making in a safe environment [355, 417], without real-world consequences. For example, thoughtful work by Maqsood and Chiasson [228] focuses on real-life experiences and presents a day-in-the-life style game. The game encourages players to conduct everyday online activities and decision-making as ‘Jos’ and explore the consequences of their actions [228], to learn about cybersecurity, privacy and digital literacy.

7.3.2 Encouraging critical thinking and misinformation detection.

The development of safe space requires a nuanced understanding of the content and topic that the user is distancing themselves from. We find that creating safe space requires users to critically engage with content and platforms. To achieve this, we suggest that an intervention should promote critical thinking and the detection of misinformation. Learning to evaluate content online has been shown to improve the accuracy of credibility judgments regarding politics [183].

Additionally, interventions that expose users to misinformation in games can have a positive impact on users' navigation of misinformation outside of gameplay [221]. A game by Roozenbeek and van der Linden [325] improves users ability to spot and resist misinformation using inoculation to teach users misinformation techniques and encourages them to apply these techniques within the game.

7.3.3 Including social and community elements.

This research shows that Safe space is highly relational and rooted in relationships; we see users enacting care for those in their community and learning from each other. While online communities can perpetuate harmful norms, they also actively work to identify and protect others from harm. Social learning plays a positive role in online platforms [379], and by encouraging social and community elements, an intervention can promote the relational nature of developing safe space and help users identify the benefit of enacting care for other community members. HCI work by Mitmann *et al.* [252] encourages community collaboration and supports social connection for young adults through a mystery-style augmented reality smartphone-based game. The game is played by an entire class working together to uncover a story about a fictional classmate who left the school suddenly [252].

7.4 Limitations and future work

This work described a series of workshops with only one evaluation workshop, and therefore, further work is needed to refine the game and assess its impact on improving digital literacy. This work highlights the importance of social media literacy across generations. We are still in the infancy of social media, and as this paper demonstrates, some of the related literacy lessons are hard-learned. Many adult participants here felt that making mistakes was essential to learning how to navigate social media and engage with fitness content. On the one hand, this might mean that future work concerned with digital literacy education beyond fitness may benefit from including older or more experienced users in the design of educational interventions. It is also crucial that end users are considered when evaluating an intervention, ensuring it is fit for use. Future work should consider more thoughtful intergenerational design work between the two generations to share knowledge, as a starting point. On the other hand, this work engaged educated female participants, whose digital literacy is informed by their experiences, including their education. Therefore, future work should incorporate more diverse samples to understand the development of digital literacy when it is not directly linked with education.

8 CONCLUSION

This work builds upon previous research that identified some users are competent in navigating fitness content on social media safely, and care for younger users who may not be able to navigate it safely. In this paper, we present empirical findings related to this competency for safe navigation and offer a preliminary educational game-based intervention to improve digital literacy among younger users of social media for fitness. Finally, we broaden the understanding of creating safe space online, moving from the understanding that the platforms and

the tools that create safe places (safe Space). Towards the contextual understanding of fitness, social media, and ourselves, which is required to separate oneself from potentially harmful content, creating a safe distance (safe space).

CHAPTER 6: DISCUSSION

1 INTRODUCTION TO THE CHAPTER

In this thesis, I leveraged qualitative methodologies to investigate women's use of social media for fitness and their nuanced safety practices. As outlined in Chapter 1, this work aimed to (1) establish a comprehensive understanding of the ways that women use social media for fitness, (2) advance the understanding of their attitudes towards privacy and online safety, and (3) delineate challenges and opportunities of their use and, in response, design an online safety intervention.

This PhD thesis is the culmination of three studies, as depicted in Chapters 2, 4, and 5. These studies comprised the systematic review in Chapter 2, the qualitative exploration in Chapter 4, and the conceptual design intervention outlined in Chapter 5.

Through a systematic review, qualitative methods, and a design concept, I offer a rich and nuanced understanding of user experiences. With this combination, I contribute a different perspective to existing research that cites the negative impacts of digital fitness for women. Instead, I provide evidence supporting the notion that women are confident and capable of safely navigating fitness on social media. I also identify a level of concern expressed by the women towards younger users who may not yet be able to navigate online fitness safely. My work underscores the relational, contextual and embodied nature of engaging with fitness on social media.

In this final chapter, I reflect on the aims and contributions of this PhD and integrate the findings with existing work. In doing so, I adapt the structure of conditional logic from mathematics to provide 'if-then' statements. These statements are for HCI and CSCW practitioners to consider when engaging in future digital literacy or online safety work.

2 REFLECTING ON THE RESEARCH AIMS

In this section, I reiterate the findings and contributions of this thesis in relation to the three research aims. This PhD research makes a direct contribution to the fields of HCI and CSCW through its novel insights and publications. The findings of this work also have applications in education and digital media, as well as for wider stakeholders, including teachers and parents.

2.1 Aim 1: To Establish a Comprehensive Understanding of the Ways that Women Use Social Media for Fitness

The first aim of this work was to gain in-depth insights into how women engage with digital fitness. To do so I conducted a systematic review that draws on a multidisciplinary research base. Compiling existing research contributes to a deeper understanding of women's engagement, which is crucial for supporting research and design across these fields to facilitate safer and more informed social media use. This thesis provides insight into women's modes of engagement, gendered experiences, and concerns related to digital fitness use.

2.1.1 Modes of Engagement

To establish a thorough understanding of women's use of social media, I began with a systematic review of 21 qualitative papers in Chapter 2. I compiled and analysed the existing evidence to map out the research landscape in a structured way. The searches reflected the multidisciplinary nature of HCI by searching across HCI, Media, and Sports Science [172].

This thesis makes a conceptual contribution in the form of the '*Modes of Engagement*' framework. The framework details women's cross-platform engagement on TikTok, Instagram, Facebook, Reddit, YouTube, and specific

forums. I categorise their use across four interconnected modes of engagement: producing, observing, interacting and managing. Producing refers to creating and sharing fitness-related content, for example, carefully filming and posting a workout routine video. Observing describes user engagement with produced content, searching for workout videos and learning from them. Interacting is the connection between users and the social aspect of social media, afforded by platform features including DMs, liking, and even the algorithms underpinning the sites. Finally, managing refers to the control exercised by users over their privacy and that of others, which can help them feel safe online. This framework was developed in response to my thematic synthesis of the studies included in Chapter 2 and work by Hoffman and Novak [167]. Hoffman and Novak [167] explore social media use in relation to users' behaviours and well-being, focusing on their fundamental needs. The *modes of engagement* framework updates Hoffman and Novak's framework, extends it, and applies it to HCI to understand how social media is used for engaging with fitness.

The *modes of engagement* framework aids in the sensemaking of women's use of social media for fitness and offers guidance for the continued exploration of the area. This framework may be leveraged to understand social media use in this context and advance the practical application of research in the field. The framework emphasises the importance of embodied and situated knowledge, drawing on methods and theories that highlight the value of participant voices, perspectives, and experiences. By centring users' experiences, the framework positions their embodied knowledge as valuable in developing our understanding of how women use social media for fitness.

HCI frameworks often acknowledge the complexities of user behaviour, such as their embodied and situated knowledge, and, as with the four modes, attempt to

condense them into simple categories to support understanding and intervention. Take the HCI framework for behaviour change support systems by Prost *et al.* (2013). This framework identifies three core mechanisms for behaviour change: contextualise, personalise and persuade, but emphasises that user behaviour is deeper than user interface design, and is embedded in users' socio-technical environments. In this sense, frameworks that simplify users' behaviour into structured categories can make it easier to identify areas for future research and develop user-centred interventions. However, frameworks that do so also risk ignoring the contextual factors of real user behaviour, for instance, cultural or environmental factors, which can lead to assumptions about users that do not match real life. The *Modes of Engagement* framework reduces the risk of oversimplifying user behaviour as it is specific to the fitness context. The framework also invites adaptation by recommending directions for future research and encourages testing in other contexts.

2.1.2 Gendered Complexities of Women's Use of Digital Fitness

In the chapters of this PhD, I identified gendered complexities regarding women's social media use in digital fitness contexts. Some of these dimensions refer to bodily norms and feminine expectations, perpetuated by digitally mediated representations of female bodies and fitness. Increasingly, these representations promote Western ideals of a thin and toned woman [47], as a result of the globalisation of Western media [304].

In Chapter 2, I identify some of the pressures on women (and young girls) to conform to Western societal norms and beauty standards. For instance, a young girl (14-17) recounts negative comments regarding her muscle mass ("*I do not like that you have so much muscle*") [63]. This type of comment depicts the scrutiny that women and girls experience when they share online, fueled by societal

expectations of what female bodies should look like. Research by Murenen and College [262] examined how people processed idealised images of bodies, ranging from thin to athletic and hypermuscular, finding a preference for muscle definition without appearing too muscular.

This kind of scrutiny of feminine appearances and behaviours can affect women's approach to exercise [112]. Grogan [148] suggests that women (in Westernised societies) are subject to cultural pressures to be thin, and those who participate in sport and exercise are subject to more specific pressures. For example, in sports like weightlifting, where performance is tied to strength, there is more pressure to develop muscle, which conflicts with societal expectations of 'femininity'.

The cultural expectations around femininity can and have influenced how women exercise for years, whether that is through creating sports for women or limiting the type of exercise they can do. For instance, netball was developed as a team sport for women, which was typically seen as 'inoffensive' for women to play due to its non-contact nature [397]. The type of exercise women can do is often moderated by societal norms, as women were historically excluded from gym floors and guided towards more 'feminine' sports that were developed from elements of dance [335], such as aerobics [48]. In this work, however, the cultural influence is captured as many exercises aimed at women are positioned to support aesthetic goals rather than strength goals, as Niamh describes in Chapter 5: *"the ones for women, it's always the lower belly fat"*. In this case and in many others, norms and expectations of 'ideal' or 'perfect' bodies shape how women exercise and what parts of their bodies they 'target'. Often, women modify workouts to focus on particular body parts (i.e., problem areas). For example, work by Currie [92] found respondents from exercise classes in Australia were motivated to

exercise by body image concerns, and they wanted the classes to incorporate more targeted exercises for ‘problem areas’, citing the abdomen most frequently. As Park [287] describes, sports are cultural artefacts and therefore reflect the dominant social structures and values of the societies in which they exist. With that in mind, it is understandable that fitness and online fitness would also reflect the structures and values of the times, for instance, the ideal of a thin and toned body [47].

Perhaps due to the values of this digital age and these social norms, Instagram often portrays fitness as an ongoing body project rather than a means to promote health. In Chapter 2 Camacho-Miñano and Gray [64] refer to *aesthetic labour* as women’s work on their bodies to conform to social aesthetic norms. Elias *et al.* [121] describe the need for women to work on their appearance in neoliberal societies as a form of self-management, which influences personal value and desirability. This *aesthetic labour* is unpaid yet socially demanded. These expectations are socially embedded and often masked under the guise of women investing in self-care or self-love.

Societal expectations not only influence women’s exercise and contribute to aesthetic labour, but they also impact women’s information-seeking behaviours. Women’s use of social media for accessing and sharing information about health and fitness is particularly beneficial when the topic of discussion is taboo or gatekept, such as doping. Often, this type of taboo information is shared online because relevant data is scarce. For instance, in Chapter 2, a participant writes: "*If I’m open about my course and my perceived side-effects, maybe it can help someone else*"[373]. In this case, sharing lived experiences is essential because information about female doping experiences is not readily available online; therefore, personal stories serve as evidence. The necessity for women to share their experiences in this way, and the fact that other women often rely on this type

of sharing, can perpetuate wider inequalities in access to health information and digital technologies [74].

Many women who have access to this value the community and the space to share and learn [217]. For example, women who experience pregnancy complaints use online forums to find and appraise information, with research finding that information provided by other women in similar situations is valued more than healthcare professionals' advice [135]. Research by Funnell *et al.* [137] with 627 participants who searched online for menopause information identified that the internet is often the first or only source of data for many women. Their work emphasises that if this is the case, it is essential that online sources provide high-quality and up-to-date information [137].

The need to share personal experiences as evidence (due to a lack of evidence) may be attributed to health stigma more broadly, rather than just female-specific health topics. It can be difficult to find information around many stigmatised health concerns, for instance, user experiences of obesity [276] are not always readily available.

The lack of evidence may also be attributed to the gender data gap [298], as Criado-Perez [275] indicates that most data is skewed towards male bodies and experiences. She highlights the widespread nature of the gender data gap. In HCI, such a gap can perpetuate bias in data-driven practices and result in technologies that are dangerous for marginalised groups [275]. There has been an increase in HCI work aimed at identifying gender nuances in technologies; however, many of the proposed interventions in the literature focus on detecting gender bias rather than addressing it [23]. We continue to play catch-up when researching and designing for women in a world designed for men. As Criado-Perez [275] puts it: *“the male experience, the male perspective, has come to be seen as universal, while*

the female experience – that of half the global population – is seen as, well, niche.”

Given the lack of relevant information and the ‘taboo’ associated with many women’s health topics, it is unsurprising that women turn to influencers for health and fitness information and share their anecdotal experiences online.

In response to Aim 1, which sought to understand how women use social media for fitness, I provide a conceptual contribution to the field in the *modes of engagement framework*. The framework categorises their cross-platform use across four modes of engagement (producing, observing, interacting and managing). Additionally, I provide further evidence that highlights the burden of navigating digitally mediated representations of fitness, as well as the abundance of fitness information that is not always factual or relevant for women.

2.2 Aim 2: To Advance the Understanding of Their Attitudes Towards Privacy and Online Safety

Secondly, this work aimed to enhance the understanding of women’s attitudes towards privacy and online safety in the context of digital fitness. As I identify in Chapter 2 and as indicated by Lupton [216], there is a gap in our understanding of women’s attitudes towards privacy, specifically regarding digital fitness.

Understanding women’s attitudes towards privacy and safety is essential as we aim to research and intervene to provide safer and more transparent social media experiences. In Chapter 4, I conducted 17 semi-structured interviews and administered 80 qualitative surveys to explore how women navigate safety and privacy in online fitness settings. In Chapter 5, I facilitated three exploratory workshops, building on women’s safe navigation as described in Chapter 4 to distil their capabilities into skills and translate those skills into a game-based concept. The findings of these studies indicate that attitudes towards privacy and online

safety vary. The privacy attitudes discussed largely refer to general concerns, including data usage, platform privacy features, and location sharing. However, the attitudes towards safety described are fitness-specific. The findings indicate that some users display a critical thought process, recognising the potential harms of fitness content and actively identifying and mitigating risks through behavioural adjustments.

2.2.1 Privacy Attitudes

Privacy, in the context of this thesis, typically encompasses data sharing and privacy-related platform affordances, such as password protection. On one hand, users acknowledge data usage issues and express their concern; on the other, they do not mind the data usage as it provides them with a personalised experience. In line with existing ideas around the privacy paradox, this work finds that while users express concern about data misuse and surveillance, their concerns do not translate into privacy-protective behaviours [196]. This misalignment may not be enough to encourage protective action as users favour the convenience of personalised algorithms and advertisements, *“[it's handy] because you're actually seeing content and adverts that are specific to you”* (Shauna, Chapter 4). Work by Mo *et al.* [253] similarly identifies users' decisions to share personal data in retail contexts for personalised offers and convenience. Convenience is cited as a significant motivator for data sharing, as it makes things easier for them, including receiving relevant recommendations and personalised advertisements [253]. For some users, the effort saved justifies the data sharing to a certain extent, with research detailing their discomfort when personalisation is too specific. For example, an observational study by Herder and Zhang [164] finds that users perceive some ads as ‘creepy’ when an item recommendation appears to be based

on information the system should not have. Work by Keyzer, van Noort, and Kruikemeier [96] finds that the tipping point of comfort lies between low and moderate personalisation. Moderate personal relevance increases the perceived creepiness of advertisements, but high personalisation does not increase it further. They find that the context of the ad is essential in determining the trade-off between personal relevance and ‘creepiness’, for example their participants deem it inappropriate for government and news sources to use personal data for advertising [96]. Interestingly, this ‘creepiness’ was not observed when data was used in a health or commercial context.

In comparison, in this PhD, the health context influences users’ tolerance for the use of their data. In Chapter 4, one participant voiced specific concerns around the use of their menstrual health data to “*incriminate [...] another woman*” around the time of the Roe v. Wade overturn in the US. This aligns with other qualitative research that details women’s distrust of their data safety when using menstrual cycle apps [254]. More specifically, the concern is validated by research that examines the use of these apps in a ‘post-Roe world,’ which finds that some female health apps misuse highly sensitive data. For instance, Mekioussa *et al.* [225] details apps requiring users to disclose information about miscarriages or abortions, and data safety labelling that does not match privacy policies. In Chapter 4, the user expressed her concern about how her data might be used, but she continued to use the menstrual tracking app. This behaviour aligns with the privacy paradox, where individuals express concern about data usage but do not change their behaviour to prevent it.

This thesis suggests that user concerns over data usage are insufficient to encourage action due to the perceived pervasiveness of data use and a lack of control over it, “*It’s just so normalised now that you nearly laugh about it*” (Jenny).

The perception that this privacy paradox is due to a lack of control is similar to Hargittai and Marwick's [156] view that users are apathetic to this data use and view it as a problem they cannot solve. Pangrazio and Selwyn [282] describe users' sense of powerlessness rather than apathy. They find that users are limited in their ability to take action, largely due to a lack of educational support for managing and controlling social media data [282], and instead, they accept data usage as 'just the way it is'. Similarly, some users in this thesis indicate an acceptance of data usage as fundamental in the current digital landscape, as Leah shares:

"If you want to be online [...] you just have to accept the fact that your data has to be somewhat available, and there's not really a way of escaping it."

Furthermore, some participants, including Lucy, use privacy features but are not convinced of their protective capabilities: *"I know that probably doesn't mean anything [...]"* This underscores the sense of powerlessness users feel towards the ubiquitous nature of data use: it is everywhere and unavoidable. Data literacy is vital here for supporting users in recognising the risks of their digital engagement and may help them regain agency or a sense of power. Although many users report using algorithms to their benefit, it remains essential that they are careful with their data.

This work extends the existing understanding of privacy attitudes, which suggests some users are aware of data usage and accept the tradeoffs for convenience and personalisation. Interestingly, while the findings offer additional insight into this lack of agency regarding privacy, the work describes a sense of agency regarding online safety. In the following section, I discuss this safety-related agency. First, I briefly reflect on how my understanding of online safety has evolved throughout this PhD, and the tone shifts to a more reflective one.

2.2.2 Safety Attitudes

Personal Understanding of Online Safety

At the beginning of this project, my interpretation of online safety led me to view the user as almost solely responsible for their own online safety, implying that a user could avoid harm. By my personal understanding at the time, harm encompassed scams, bullying, harassment and data leaks. This definition evolved over time through engagement with literature and my empirical work. I now view online safety as highly contextual and user-specific. I was surprised to encounter a competent user who felt they could safely navigate fitness content, and even more so to find that they were concerned about the potential harm fitness could cause to others. My understanding of online safety has also developed to incorporate offline safety. As users in my studies and in existing literature discussed how their online habits influence their offline lives, and influencers in the news were criticised for being attacked because they shared their live locations [401], I began to understand the intricacies of how our online and offline lives are inextricably linked. It is no wonder, then, that women do not share their locations until they have left places, or that they change their running routes, dress differently in response to online comments, or even participate in social media cleanses or digital detoxes. Why would they not, when the two are interwoven so tightly? My view of online safety has shifted; I now understand that being safe online might mean being offline. It does not mean everyone finds online safety in being offline, but it emphasises the individuality of online safety and how it is context-specific. Now my understanding of online safety aligns with De Kimpe *et al.*'s definition of online safety as encompassing “a set of issues that are, either directly or indirectly, related to the

physical and psychological well-being of Internet users” [97]. Now, I return to a less reflexive tone to discuss the participants’ attitudes towards online safety.

Users’ Safety Attitudes

Online safety for the participants is often a reflexive practice concerned with well-being, involving users’ recognition of potential harms and adjustment of their behaviour accordingly. This reflexivity develops over time, for example, users reflect on their use of social media in the past, which involved self-comparison, and they then pivot towards mindful consumption of content that makes them feel good (*“I consider how each person will affect my own life and mind [...] I have fallen into the trap of ‘OMG, I wish I looked like her,’ and it ended up ruining my day.”* P68, Chapter 4). This practice requires both self-assessment and an assessment of the circumstances. For instance, this sometimes involves reflecting on past mistakes or triggers and often requires engagement with the platform in the moment to prevent further harm. Similarly, existing digital fitness research reports that some users manage their exposure to fitness content by filtering limiting their screen time to avoid potentially problematic content [369]. Limiting screen time is likely effective [428]; however, it fails to account for the fact that users’ engagement with online fitness is not just determined by the technology but rather by the users’ daily life [324]. In other words, limiting general consumption of fitness may be useful, but the benefit of digital fitness is negated if a user refrains from accessing a workout to reduce their screentime. Another method of managing the potential harms is to engage with digital fitness content in a detached manner, attempting not to compare oneself to others online [420]. In these cases, women can identify what content harms them, actively avoid it, and limit their exposure.

This activity requires users to reflect on what content might cause them harm. Kozyreva, Wineburg and Hertwig [198] argue that this needs ‘critical ignoring’, which involves choosing what to pay attention to and ignore. However, this type of critical and reflective engagement is not easy and requires an understanding of the potential harms of digital fitness, how they may negatively impact a user and how to manage them.

Interestingly, a study by McLean *et al.* [244] found that higher levels of digital literacy can mitigate the adverse effects of exposure to ‘perfect bodies’ on women’s body image. They find that media literacy interventions increase users’ scepticism regarding what is real and their awareness of influencers’ monetary motivations [244], supporting users to actively and critically engage online. Livingstone *et al.* [214] share a perspective on digital literacy like the critical management approach detailed above, which encompasses analytical, ethical, and political elements. Similarly, their work suggests that young people (12-22) are reflexive about how their digital experiences relate to their biographies and how they evolve, users acknowledge past problems and ongoing vulnerabilities [214]. For example, “*young people attempt to be reflexive regarding their personal triggers and make efforts to anticipate and manage the algorithms that may amplify them*” [214]. In this thesis, participants are aware of content and creators that trigger low self-esteem and actively engage with the platform to mitigate the adverse impacts. As Mikaela described: “*This isn’t making me feel good, so I unfollowed a lot of people.*” Identifying and managing personal triggers requires a level of self-reflection, knowledge of the digital fitness landscape, and an understanding of platform affordances.

In some cases, this comprehension involves recognising the complexity of fitness and the curated nature of fitness content. The complex nature of fitness refers to

the interconnectedness of exercise, rest, nutrition and personal factors. For example, some users display knowledge about exercise, sports, nutrition, as well as experience with social media that can be drawn upon to infer meaning from the content they see online. Take Moya in Chapter 5, who indicates how: “*It doesn't work like that. There's a lot more factors to it; doing a workout is not just how you get that [body], it's diet and nutrition.*” She acknowledges the complexity of fitness and how exercise, nutrition and wellness are inextricably linked. Navigating fitness content online requires a basic understanding of fitness and an awareness of social media practices. Similarly, past research exploring users’ ability to discern truthful news finds that general news knowledge is an indicator of accuracy discernment [351]. Unsurprisingly, understanding the context of the content contributes to the ability to safely navigate it.

Combining knowledge of the performative nature of social media, a general understanding of fitness and reflexivity helps users to become active producers of meaning [91], where they critically consider social media and themselves to optimise their agency and develop resilience. Hassoun *et al.* [157] describe this resilience as key for safe navigation beyond digital literacy skills, requiring the ability to evaluate and manage risks in situ as they view content. This idea of resilience encourages a critical engagement rather than passive consumption, involving young people reflecting on what information means to them socially and personally. Hassoun *et al.* [157] argue that young people should be supported in developing agency to evaluate and manage risks in online spaces. In a similar vein, some HCI interventions focus on developing autonomy and resilience to maintain users’ independence and ability to self-regulate, rather than protecting them from harm [284].

In this thesis, participants are not merely either active or passive; instead, they are constantly negotiating agency and activity. For instance, some participants actively engage with digital fitness in non-obvious ways, by interpreting the content and creators they encounter online. For example, 10 participants in Chapter 4 describe taking everything they see online with *‘a pinch of salt’*, using their discretion to interpret the trustworthiness and reliability of fitness content and creators.

This ambiguity of agency and activity is evident in the work by Patibanda *et al.* [290], where their concept ‘Fused Spectatorship’ sought to blur the boundary between spectators and players of digital games by using electrical muscle stimulation (EMS). Spectators in this context loaned bodily control to a system [290]. In this game, spectators watched their hands play and sometimes found it difficult to distinguish between observing and participating. In this sense, the agency is shared between humans and machines. This is similar to the activity in Chapter 4, as participants describe co-creating their experience with the algorithms. They describe co-creating by directly interacting with the platform, for instance, *“express[ing] to the algorithm when there’s content that I don’t want to see.”* Or, by ignoring the content, as Sarah describes: *“I can see like multiple different fitness influencers or fitness pages, not that I actually want to watch or agree with [...] I just ignore it.”* Both interacting or choosing not to interact moves the user from passively watching what they are shown to actively creating a space with content they want to see. In this sense, the agency is negotiated through interactions with the algorithms and platforms, as users’ actions and decisions are shaped by their engagement with these technologies. Similar to the co-creation described in the chapters, as users co-create their ‘feeds’, Taylor *et al.* [380] detail co-creation through a public interactive performance installation. The installation

features musicians performing within a cube, allowing members of the public to interact with the cube and influence the audiovisual content. The audience interactions and the public performance are interwoven rather than reactive, as the audience co-creates the performance. Agency is negotiated through the interactions between the audience member, the system, and the performer. In the context of this thesis, agency is negotiated through ongoing interactions with social media sites as they learn how the systems operate and begin to use them in a way that works for them. In line with existing research, this agency is crucial for engaging critically and safely in digital fitness spheres [91].

This thesis contributes to a broader understanding of online safety focused on issues related to the physical and psychological well-being of internet users [97]. My descriptions of how users engage with platforms to create safe places (safe Space) and how they practice critical engagement and reflection to create a safe distance (safe space) can support future work around users' negotiations of safety in online spaces.

Next, I examine the challenges and opportunities for design intervention discussed throughout this thesis.

2.3 Aim 3: To delineate challenges and opportunities of women's use and, in response, design an online safety intervention.

The final aim of this work was to examine some of the advantages and disadvantages associated with women's use of social media for fitness. Then, in response, I sought to suggest how design may intervene to support safer online fitness experiences. Exploring users' perceptions of the advantages and disadvantages of using social media for fitness provides a basis for making user-informed interventions. Additionally, I posit that understanding users'

development of competency in navigating digital fitness provides an opportunity for helping more vulnerable users develop safe navigation skills. I offer insights towards the benefits of a game-based concept designed to help younger users learn to navigate online fitness safely.

2.3.1 Challenges

As I detail in the chapters of this work, existing research highlights many of the challenges associated with women's use of social media for fitness. For example, literature exploring women's use of social media for fitness indicates a host of problematic implications of engagement, including adverse effects on wellbeing [310], body image [428], self-comparison [131, 369, 412], disordered eating [402], exercise compulsion [425], and injury when exercises are not performed correctly [234]. For example, a narrative review by Cataldo *et al.* [73] details a host of psychopathological risks associated with using social media for fitness, citing concerns including exercise addiction, objectification, depressive symptoms, and excessively controlled eating.

In Chapter 4, a quote by Niamh reflects several of these risks, including negative comparison and disordered eating, as she identifies that:

“When I was younger [...], I'd be like, well, that's your own fault because you don't look like that, so stop eating.”

This statement illustrates a number of the well-reported harms associated with digital fitness use, but instead of referring to her current actions, Niamh reflects on her past behaviours. When these topics were discussed in interviews and workshops during this PhD, users described them in the past tense. Participants displayed a retrospective and reflective growth mindset as they discussed the harms associated with using social media for fitness and how it had previously

negatively impacted them. Instead, they detailed how they circumvent these harms and their precautionary practices.

2.3.2 Opportunities

Despite these harms, women continue to engage with fitness on social media for several reasons, including the fact that it provides access to free fitness advice, workout routines and nutritional information without requiring formal training or gym memberships [420]. A systematic review by Goodyear *et al.* [145] cites benefits of using social media for fitness, including increased exercise and improved nutritional practices. For example, a cross-sectional online survey found that fitness-related social media use has been reported to increase intrinsic motivation, exercise intention and actual exercise behaviour [427].

Although existing literature identifies several opportunities, the key one I describe in this work is the potential to leverage users' positive safety attitudes to help younger users develop safe navigation skills. This is particularly important as participants highlighted their concern for younger, less experienced users who may be more susceptible to the harms associated with digital fitness and social media use.

The competent user described in this work actively navigates digital fitness safely, for example, P27, specifically follows creators that make them feel good and align with their values, as she: *"follow[s] people who will be good for my mental health and not negatively impact me"*. Other studies have shown similar precautions, such as reducing screen time and limiting exposure to fitness content [369]. Research has found that viewing appearance-related fitness content reduces female body esteem compared to travel images [428]; therefore, reducing exposure to such content may improve body esteem. Similarly, Jiménez-García *et al.* [177] report that engaging with content that promotes body diversity and acceptance can

improve body satisfaction and mood in the short term. In these cases, the precautionary measures taken by users are a way to reclaim control and mitigate the harms associated with digital fitness. This active engagement presents an opportunity to explore how users develop this ability.

Users describe this capacity as learned through mistake-making and education, both of which are facilitated through relationships. For example, participants discuss the rite of passage of making mistakes online. However, participants recognise that some lessons are more harmful than others, and they call for interventions to safeguard younger users regarding the more harmful mistakes. As Chloe shares that:

“you need to separate mistakes in level of seriousness, [...] skipping meals or eating disorders or not knowing the proper way to do an exercise and doing it dangerously, that’s stuff you can try to filter out because that’s the kind of mistakes you don’t want them to make because they’ll have lasting impact.”

She identifies an opportunity to support younger users in navigating the harms and critically evaluating content to prevent them from making mistakes with lasting negative impact.

Participants also describe learning how to navigate content through formal education. In Chapter 4, Laura shares her educational experience through fitness-related personal training courses. She feels as though she can identify misinformation as a result of her education, and she worries about younger users who do not have a similar educational background:

“Things that I would see are definitely incorrect [...] young people, I think especially believe them because they wouldn’t know much about the industry.”

Participants’ competency and awareness of digital fitness and social media as complex and highly curated results in this concern for other users who may be

more vulnerable to the harms associated with online fitness. Similar to prior work, individuals who critically engage with social media and fitness often express concern for younger users who do not engage in a critical manner [299, 420]. This concern by users identifies a more vulnerable user group that may require support.

This support could be facilitated through formal education on safe social media use, as research has found that structured formal education can improve digital literacy [169]. For instance, work by Hsu and Hughes [169] suggests that students' digital literacy can improve with structured educational interventions regardless of their daily internet usage or the context of their use. In comparison, Getenet *et al.* [141] find that attitudes towards technology influence self-efficacy, which impacts engagement. However, literacy does not directly correlate with self-efficacy, indicating that users' beliefs, previous experiences and perceptions influence their ability to confidently navigate digital fitness [141]. Therefore, it is likely that a combination of formal and informal education may support digital literacy, once the intervention takes into account users' experiences and perceptions.

As users in this thesis refer to their education, they often draw on nutritional or exercise-based knowledge they acquired through sport or fitness-related higher education. This highlights the importance of fitness-specific education when navigating digital fitness. For example, one participant who did a personal training course spoke about how research is constantly evolving and new research often contradicts exercise trends: "*you can never trust anybody [...] because information changes all the time*". Her fitness-related further education gave her the confidence to navigate fitness by recognising the frequency of changing trends and research.

Additionally, participation in sports resulted in increased exercise and nutritional knowledge for many participants. This suggests that fitness knowledge may be assimilated informally. For example, Aimee feels that her experience

playing sport introduced her to various exercises, and her familiarity with them reduces the potential for misinformation: *“I’ve done all kinds of different exercises [...] I know the exercises, so I don’t really care because I’m not looking at their form or anything like that.”* Her experience enables her to use fitness content as a source of ideas rather than relying on it for direction, which she views as mitigating the risk of injury from incorrectly following a workout.

The combination of formal and informal education influencing safe navigation provides an opportunity for an intervention that combines formal learning practices with informal learning. For example, a suitable intervention might teach concepts through challenges while facilitating problem-solving and collaboration. Drawing on participants’ expressed concern for younger users and their competency in navigating digital fitness, this PhD presents an opportunity to examine how such competency develops and how it might support safer navigation for younger users.

2.3.3 Des(I)gn Intervention

In this section, I reflect on the design process undertaken throughout this thesis to develop an online safety intervention, from design recommendations to a final design concept. I briefly describe my role as a designer in developing design recommendations and the game-based concept, or the ‘I’ in design. Initially, this project aimed to investigate how a sociotechnical intervention could promote safer social media use among digital fitness users.

As the final aim of the thesis was to create design an intervention, I managed my positionality as a designer and researcher while negotiating the complexity of digital fitness. I reflected on two components in particular: (1) the design response

would primarily rely on my own perspective, [90], and (2) because this was a HCI project, the response would *presumably* be technology-based [258]. During this process, I was conscious of the influence of my power as both designer and researcher.

I grappled with the position of power I held as the designer, as I interpreted the data, translated it into design recommendations and into a design concept. I was therefore responsible for understanding the user's experience and designing a response. In paraphrasing Spiel [365], I had taken on the responsibility of coming up with ideas, but I needed to recognise my responsibility to abandon the ideas if they were not useful. I have included brief descriptions the 'concepts' abandoned in Chapter 5. For example, '*Burst your bubble*' (Fig. 28 Below) is a co-operative game where players work together to identify whether a scenario is misinformative or truthful by swapping information on fact cards, in a manner similar to go-fish. This game was deemed too complex for the user group and contained inappropriate topics that would expose users to content regarding eating disorders and body concerns.



Figure 28: 'Burst your Bubble' the upper cards are scenario cards, and the lower cards are fact cards.

This admission of imperfection is often omitted from publications due to space constraints, format, or perhaps even pride. Just because the concepts did not ‘work’ does not mean they do not ‘matter’ [438]. Haraway [154] notes that her idea of ‘staying with the trouble’ requires being present and rejecting a view that “*only if things work do they matter*”, and goes on to say that it matters “*what thoughts think thoughts*”(p.35). In this sense, including failed concepts helps to reveal the *thoughts* that the concepts underwent during the design process. HCI practitioners often adopt Haraway’s ideas in active and ethical design practices with complex topics, even if considered ‘wrong’ [358]. For instance, Søndergaard [358] utilises her design projects, such as Period Share (a smart menstrual cup) and Marcelle (a wearable sex toy), to explore the complexities of women’s health, intimacy, and taboo topics. These design projects recognise how women’s health and intimacy are interwound with biological, cultural and political factors. Søndergaard [358] encourages designers to draw on taboo topics to create ethical and creative design [358]. As Haraway [154] sees it, “*our task is to make trouble [...] as well as to settle troubled waters*”(p.1), and she calls for us to engage mindfully with complex challenges and find ways to live together.

This mindful engagement challenges the assumption that design must provide ‘quick fixes’, and work by Bardzell *et al.* [22] suggests employing scepticism for this purpose. Offering ‘quick fixes’ is one of the common critiques of solutionism, which is the tendency in design to treat complex, messy problems as though they can be solved with a new technological fix [38]. Work by Blythe *et al.* [38] critiques solutionism and, in response, offers ways to reject the search for solutions through critical design and design fiction, which aim to provoke, question, and reveal insights or further questions. It can be difficult for this type of work, which

is often deemed ‘silly’, to be taken seriously in some settings (i.e., universities), and it must be managed correctly to avoid being performative [38]. Other work similarly encourages mindful engagement, including speculative design, which, through the creation of fictional products and designs, promotes a ‘what if’ style discussion about potential futures, prioritising “*imagination, materiality, criticality and everyday life*” (vii) [115]. In HCI, speculative thinking is often used for either design experimentation and implementation, or in the discussion of methods in case studies [434]. By imagining futures at the end of Chapter 4, I speculate how the design recommendations might be applied. They serve merely as examples in the context of the chapter, but they involve critically imagining how insight might be actioned in everyday life. This is not precisely what Haraway has in mind when she talks about staying with the trouble. According to her concept, the tensions I provide in Chapter 2 (Table 11 below) are closer to what she proposes, in that they are complicated and complex. Some of the issues below are complicated and can be broken down to find a solution. However, in the context of their competing issues, they are complex and conversely evolve with the interactions between users, social media platforms and fitness content (i.e., desire to monetise public accounts vs need for privacy).

Table 12: Tensions arising from two competing desires as laid out in Chapter 2.

Issue 1	Vs	Issue 2
Insufficient data transparency in online platforms	Vs	Lack of concern from users about safety and privacy
Desire for public accounts (exacerbated by the monetisation of public accounts)	Vs	The need for privacy
Desire for the representation of ‘real bodies’ on social media	Vs	Expectation for creators to share ‘ideal bodies’

As I evaluated the design concepts, I determined that some were unsuitable for the target demographic, as they may have caused undue harm. For instance, in Chapter 5, I reflect on the concept *‘Burst your Bubble’* that contained “*topics [that] were inappropriate; they would expose these young users to topics concerning eating disorders and body concerns,*” and as such, I abandoned this concept. Some HCI work meaningfully reflects on design choices and the unintended harms that can result, as Helms and Fernaeus [160] discuss a wickedness in caring for loved ones. They reflect on their use of home technologies as ‘naughty’ and highlight four troubling orientations of care. They identify how technology can be used to ‘care’ but also cause harm, they provide an example of a mother ‘caring’ for her children by monitoring their every movement in or around ‘unsafe zones’ [160], keeping them safe but violating their privacy. Work by Pierce and DiSalvo [301] explores design as something that confronts users with discomfort rather than something that makes problems disappear. They use language to disrupt the tech narrative that systems like cloud computing are invisible and efficient, but rather ‘dark clouds’ make technology appear more uncertain and prompt reflection on how we use systems [301]. Reflecting on how we design and use systems is crucial

to the development of more responsible systems in the future. Without this type of reflection, we risk continued development of technologies by HCI designers that can lead to ‘accidentally evil’ consequences [34]. Berger *et al.* [34] suggest these consequences are afforded by designers’ assumptions and normalised by the technosolutionist narrative (the assumption that technology can and should solve complex problems). By looking out for these ‘questionable values’ as they name them, designers can look around corners to better anticipate concerns and minimise the worst of the harms [34]. Hence, I have been committed to evaluating my role as a designer and addressing my subconscious predisposition toward technological interventions.

In an attempt to challenge my technosolutionist position, I created a non-digital card game. Additionally, a non-digital game was more suitable for a classroom setting due to the barriers to acceptance and use for digital game-based learning described in prior work. Kaimara *et al.* [184] cite concerns regarding the lack of available financial resources, up-to-date devices, software and even the development of teacher training. A technological response may have posed concerns for teachers integrating the game into their classrooms, primarily due to technological barriers, including access to technology and funding, as identified in a systematic review [361]. This hinders the accessibility and inclusivity of digital games for use in schools. Furthermore, in the context of this research conducted in Ireland, concerns have been raised regarding the technology and support in this area [400]. Therefore, a non-digital game was well-suited to the context of use and offered an opportunity to challenge my initial technosolutionist assumptions. It also supported my new perspective of safety as being negotiated both online and offline, as I described in 2.2.2.

The evaluation workshop did not take place in a classroom, nor did I consult with teachers in the design process. Although users reported a desire to play the game in school (without boys), it is important to note that playing the game would likely be facilitated by teachers. Teachers would have to provide educational supplementation around the game topics and perhaps engage in difficult conversations with students. As I have not included teachers' perspectives in this project, it is not possible to determine whether it is something they could facilitate in classrooms or whether they think it would be effective. Some work identifies the key role that in-situ evaluation can play in offering contextually driven insights regarding users and technology in educational settings [132, 349].

However, work by Venn-Wycherley *et al.* [407] exploring evaluation in educational settings highlights difficulties surrounding disruptions to the work, including behavioural issues and the 'research' practices of recording or photographing. Additionally, the work finds that classroom setups, like seating configurations, can hinder collaboration [407]. If '*Bad Actors*' were played in a classroom, it would not be possible for 30 students to participate; they would likely have to play in smaller groups. Furthermore, the table size and shape would likely influence the collaboration of users, with those closer to the 'pile' being more likely to play. Another point for consideration regarding collaboration is the variety of communication styles or sensory preferences, particularly in cases of neurodivergence. Some HCI research considers neurodivergent classrooms, for instance, PartiPlay a participatory game design kit for inclusive co-design that accommodates various communication styles and sensory needs [300]. However, my work does not make these considerations.

The game design process can foster collaboration, relationship building and creativity in intergenerational groups [323]. A growing body of research emphasises how meaningful intergenerational collaboration can be, particularly in digital literacy and fitness, where adults and children can co-create and bridge generational gaps in knowledge and experience. Existing research often emphasises the value of mutual learning and relationship building. For instance, an intergenerational e-health literacy program called I-HeLP promotes social participation by empowering young volunteers to support older adults around e-health literacy [424]. The I-HeLP program reports benefits that extend beyond digital literacy skills, into emotional well-being and intergenerational communication. In contrast, I adopted a sequential, but not collaborative, intergenerational style approach. By engaging with the young adult women, I gained insight into the development of their agency and sensibility around digital fitness. Their experiences and reflections directly informed the design recommendations and the resulting design concept, which was subsequently tested by a younger cohort.

The design highlights the benefit of leveraging insights from an experienced user group to design an intervention for a less experienced user group. By positioning the older participants (women 18+) as experts in navigating fitness online, I centre their voices and emphasise the importance of their lived experiences as valuable insight.

The design recommendations, concepts and evaluation make a design contribution to the field. They also extend knowledge by proposing safer socio-technological futures and integrating new possibilities for digital literacy education in the context of digital fitness. I have developed and recommend the following style of prompts for designers seeking to adopt a more reflexive approach to

design. For designers looking to engage reflexively in design or research, they should account for their preconceived ideas, balance the reality of ‘problem solving’ and *just give it a go*. These prompts can be integrated into the research, ideation and evaluations phases of any design process to help designers consider their role in what they design.

1. Account for preconceived ideas:

What do I know about X? What do I think I know about X? Why do I think that? Where did I learn that? What do I not know or need to learn about X? Where is the overlap? Are there things I thought I knew, but I did not?

2. Balance the reality of problem-solving:

What is the ‘problem’ I’m solving? Who benefits from solving the problem, and who is harmed? Is this problem a result of something deeper related to society, climate, or access? Can this problem *really* be solved? *Should* this problem be solved?

3. Just give it a go:

Keep a notebook or perhaps reflect on concepts as they are developed.

Where did this come from? What is this inspired by? Who can use this? Who might not be able to use this? Why/why not, and can I make it more accessible? Who am I making it more accessible for?

3 IF THIS IS TRUE, THEN WHERE DO WE GO FROM HERE?

In the closing sections of this chapter and thesis, I conclude this research, but not before identifying some limitations and listing four ‘if’ and ‘then’ statements that arise as a result of this work. If the following is true (which it is within this thesis), then there are several follow-up questions that may be difficult or impossible to address.

If:

Women are competent and caring users in the online fitness space, and they have developed this competency through education, lived experience, and relationships.

Then:

Our understanding of the user must shift from a deficit model, in which they are subject to harm online, to an assets model that acknowledges their growth mindset regarding fitness and social media engagement. How can we shift our understanding and our interventions from associating users as passive consumers who require protection to active users who manage their online experiences?

If:

Digital literacies and online safety are context-specific.

Then:

We must adjust our approach to researching and teaching literacies to account for this complexity. How can we support the contextual knowledge required for navigating health, news, politics, travel and wellness across various contexts? How can we help individuals or groups in developing context-specific skills? Are these skills transferable? Are existing digital literacy curricula sufficient?

If:

Women continue to use social media for fitness, and trust influencers for advice because it is accessible, embodied, relatable and individual.

Then:

We must seek to regulate their advice. Perhaps, as with nurses, reporting to their ‘scope of practice’, standards should be upheld when sharing ‘advice’ on the internet. How can we support regulatory personnel in developing legislation that protects users and influencers in such a case? There is an ‘influencer’ level 8 degree at Southeast Technological University in Ireland, which offers a BA in Content Creation and Social Media. This could be a place to encourage influencer responsibility and accountability, or to advocate for legislative changes regarding responsible online sharing. China has recently implemented regulations that require influencers speaking on topics from fields such as medicine, law, education, or finance to demonstrate their qualifications [439]. Perhaps we could draw from such legislation.

If:

Women have a blasé approach towards their data usage on social media platforms and by third parties, and accept it as just the way it is.

Then:

We should make data usage visible and personalised, and start to map the extent of data usage. How can we map and communicate data usage to users? Can we have individualised reports for data use? Can we make not-for-profit platforms?

3.1 Limitations & Future Work

This work is not without its limitations. While each chapter briefly identified limitations for the studies, the main limitation of this work is the lack of diversity among participants, which is evident throughout the thesis. For instance, this work identifies the capacity for safe use among a highly educated population; the

limitation is that their safe navigation skills are reported as stemming from their education and may vary in less educated populations.

Additionally, the perspectives in this work indicate the influence of digitally mediated representations of fitness that perpetuate a thin and lean ideal in line with many Westernised beauty standards. Chapter 2 highlights the impact of Westernised norms on fitness creators with different cultural and religious backgrounds and describes how one Muslim woman negotiates her desire to be successful online and the impact of her cultural and religious norms on her success. She highlights that not being able to wear the same type of fitness apparel and show her body negatively impacts her ability to gain followers. This space should be further explored to identify whether the digitally mediated representations are different or if, as in the case in Chapter 2, success is measured against Westernised fitness ideals.

Of course, this work examined women's perspectives and did not study male views. This is another limitation of the work, as the safe navigation represented in this work includes the invisible work women engage in to stay safe online. There are likely male-specific safety mechanisms to ensure online safety, but they are not accounted for in this work. Future work should explore online fitness with more diverse populations to deepen our understanding of what it means to be safe in digital fitness communities for varied populations (e.g., across cultures, education levels and genders).

If the statements above are true, as the data in this thesis suggests, we must develop our understanding, research, and interventions in response. If users are more capable than previously thought, and they care about younger users and their community, we need to support their capabilities and promote their continued development. If digital literacies are context-specific, we must align our

understanding accordingly and shift to support the development of transferable skills, accounting for the contextual element of literacy. This work pushes these ideas into HCI and other relevant spaces, but the concepts should be recognised and built upon with more diverse groups to help support safer, more empowered online experiences.

4 CONCLUSION: RE-FRAMING DIGITAL FITNESS USE

This thesis details women's use of social media for fitness and their attitudes towards safety. The studies described in the chapters aimed to strengthen our understanding of women's safe use of social media for fitness and how we might design interventions to support their safety. I have developed a novel framework for the sensemaking of women's engagement with fitness (Chapter 2). The framework details four modes of engagement: producing, observing, interacting and managing. The framework provides theories and methods for future research. This conceptual contribution can inform practice, guide policy development, and shape future research priorities.

Additionally, I conducted two qualitative studies that identified that women use digital fitness in a way that feels safe for them by engaging with platform affordances, algorithms and other users. The empirical contributions from these studies capture users' active and critical navigation of fitness content, misinformation, and many of the digitally mediated norms associated with fitness, as well as their expressed concern for younger users. I provide a deeper understanding of this user group as competent and caring. I also extend the knowledge of cross-platform engagement by reporting user practices previously missing from the literature. My work positions women as active and critical

consumers, who are often motivated by a concern for others rather than being passive and naïve.

Drawing on this new knowledge base of competent users, this work begins to identify how to support digital literacy interventions. As such, I designed a game-based conceptual intervention with three main advantages: (1) it is non-digital, which incorporates the ‘on and offline’ nature of online safety and is more accessible for Irish classrooms. (2) It focuses on collaborative sensemaking, which is key for developing safe navigation skills, and (3) it is fitness-specific, as digital literacies are context-specific. This design contribution supports education-based games as a suitable medium for exposing children to digital literacy skills, enabling them to explore both the benefits and harms associated with social media use. This work demonstrates that game-based interventions grounded in experienced users’ understandings can foster safe navigation skills in a fun way.

My work highlights the contextual and individualised nature of safely navigating online fitness. This thesis underscores that care and competence make users a valuable resource for learning and teaching about digital literacies, in the context of fitness and beyond. Given the novel framework, the nuanced findings and the learnings from the game-based intervention, this thesis provides unique contributions to HCI, CSCW and digital media regarding women’s digital fitness.

As social media continues to reshape how we learn and share about fitness, HCI plays a role in facilitating this learning and sharing to support users in their individual and community-based sensemaking. Recognising the role of individuals and their peers in shaping their online experiences, safe or otherwise, and acknowledging the complexity of navigating this experience is key to facilitating safer and more empowered social media use.

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Appendices

A. Chapter 2: Keeping Fit & Staying Safe: A Systematic Review of Women's Use of Social Media For Fitness.

(i) *The spread of themes across papers.*

Table 1. Spread of themes (Producing, Observing, Interacting and Managing) across the papers.

Paper	Producing	Observing	Interacting	Managing
Visability&Vulnerability2021 (Toffoletti <i>et al.</i> 2021)	X	X	X	
FitnessCommunity2021 (Carter and Alexander 2020)		X		
BetterUnderstanding2018 (Lupton 2020)		X		X
KeepingitRaw2021 (Reade 2021)	X	X	X	
DigitalAffect2021 (Toffoletti and Thorpe 2021)	X	X		X
EmbodiedUnderstanding2021 (Toll and Norman 2021)	X	X		X
Biopedagogiesoflnsta2019 (Maria José Camacho-Miñano, MacIsaac, and Rich 2019)		X	X	
FitnessCulrure2016 (Jong and Drummond 2016)	X	X		
FitnessEngagement2018 (Raggatt <i>et al.</i> 2018)		X		
FitnessDoping2021(Henning and Andreasson 2021)		X		
FitspirationTrend2018 (Easton <i>et al.</i> 2018)	X	X		
SaudiPt2021 (Basabain <i>et al.</i> 2021)	X	X	X	X
SocialNetworks4Sports2020 (Braumüller 2020)		X		
FemaleFitness2013(Andreasson and Johansson 2013)	X	X		
PedagogiesofPerfection(Camacho-Miñano and Gray 2021)	X	X	X	
GenderedFields2021 (Maria José Camacho-Miñano <i>et al.</i> 2021)		X	X	

SisScienceDoping2020(Sverkerson, Andreasson, and Johansson 2020)				X		X	
WomenOnlyDoping2021 (Andreasson and Henning 2021)				X			
GainingWeight2020 (Hocken-Boyers, Pope, and Jamie 2020)		X					
WomenonInstagram2018 (Rajan 2018)		X				X	X
CriticalConsumers2023 (H.C. Wood and Watson 2023)				X			X

(ii) *Details about each paper included in the review.*

Table 2. Paper Details of Reviewed Papers (Author, Country, Aim, Participants, Data Collection Methods, Social Media Sites, Analysis and Findings)

Author & Country	Aim	Participants	Collection	Social Media Site	Analysis	Findings
Kim Toffoletti <i>et al.</i> [2021] Australia	How is safety experienced, navigated and cultivated online?	12 Women aged 20-40	Interviews & Shared Looking	Instagram, Facebook & Twitter	Thematic Analysis	Knowledge of Instagram platform affordances and ethics contribute to posting content.
Carter <i>et al.</i> [2021] United States	How are fitness communities used as a mechanism for increasing adherence to physical activity?	15 women aged 19-57	Interviews, participant observation.	Facebook	Grounded Theory	Community members who engage with fitness groups have improved physical activity adherence. Experiencing empowerment, accountability and less intimidation.
Lupton [2018] Australia	What technologies do people use for health-related purposes?	30 (men and women) aged 16-25	Telephone Interviews	Youtube and Google.	Thematic Analysis	Youtube is a popular source for health information. Young people learn about health and bodies through digital technologies but work within existing relationships with families, friends and healthcare professionals.
Reade [2021] Australia	Is the nature of fitspo changing? Do	21 self-identified	Interviews and observations of	Instagram	Thematic Analysis	Authenticity exists online as sharing the body as it is without

	users want real/genuine expression?	women (aged 20-35)	Instagram sharing activity.			editing, sharing mundane everyday and through talking about topics like mental health and body image. Rawnness cultivates digital intimacies between users adding to a shared sense of belonging and connectedness.
Toffoletti & Thorpe [2021]	How affect reverberates through fitspo images in fitness communities.	155 Instagram Posts	Netnography	Instagram	Compositional Interpretation	Supporting others in the community through platform affordances. Validating feelings. Feeling of body pride are inside social and cultural gendered body norms. & interplays with shame.
Toll and Norman [2021] Canada	How do Kinesiology students cultivate body capital on Instagram & what does health and fitness mean to them?	9 Women (aged 20-24) enrolled in a kinesiology degree programme	Semi-structured interviews & auto-driven photo-clecitation & demographic survey.	Instagram	Thematic Analysis	Complex instagram practices. There are 4 informal rules for acquiring body capital – showing the body, being vainglorious without being vainglorious, not editing but enhancing images and sharing a healthy and active lifestyle.
Camacho-Miñano [2019] Spain	How do young women participate in Instagram fitness culture. What meanings do they construct about being a female on Instagram?	41 Female participants on Instagram (aged 14-17)	Interviews & Focus Groups	Instagram	Post Structuralist Discourse Analysis	Instagram instructs and regulates women's bodies. Women engage in often contradictory ways experiencing empowerment & surveillance & anxiety. Girls learn about aesthetic labour to achieve the perfect body and is

						seemingly freely chose rather than culturally required. Constantly exposed to perfect bodies making them work hard to achieve them.
Jong & Drummond [2016] Australia	How do young women gather health information online, how can it teach them?	22 Female Fitness users on Facebook or Instagram (aged 18-24)	Blended Netnography (Semi-Structured interviews & netnography)	Instagram & Facebook	Thematic Analysis	Online fitness culture users strategies of biopedegogy to get health ideas and ideals across.
Raggatt <i>et al</i> [2018] Australia	Who engages with fitspiration, what type of content do they access and what is the perceived impact of consumption?	155 Women, Men & Non- Binary (aged 16-24)	Survey	Instagram, Facebook	Open, Axial and Thematic Coding / Content Analysis	Accessing content including clean eating and posts generated by athletes and PTs. Passive viewing or liking content, not posting. Everyday users were more relatable and trustworthy rather than models or celebrities. Positive benefits including social support & motivation.
Henning & Andreasson [2021] United States	How perceptions of adherence are communicated through lived experiences of women engaging in group-fitness at Titan Fitness	Women & Men 16,000 posts.	Netnography	ThinkSteriods.com	Similar to Thematic Analysis	Women's usage is similar to mens – information on usage & risk. Women want to make their experiences of PIED known to give & receive advice & feedback. The forum is dominated by men. Women accepted advice from men and pushed back against dismissive and misogynistic commetns.

Easton <i>et al.</i> [2018] United Kingdom	Investigate how people experience viewing Fitspiration on social media and why and how they engage with it.	20 Women & Men aged 18-25	Interviews, Survey, Focus Groups	Instagram, Facebook, Youtube, Wordpress, Snapchat and Pinterest	Thematic Analysis	Fitspo provides knowledge and motivation to support healthy lifestyles. Can cause harm – annoyance/negatively impact mental and physical health. Using content to learn about exercise techniques, healthy recipes & workouts.
Basabain <i>et al.</i> [2021] Saudi Arabia	How do Saudi female exercisers experience Instagram & what motivates them to share?	NA	Autoethnography	Instagram	Thematic Analysis	Instagram is a good way to brand oneself as an athlete, athletes can communicate with followers directly and build their online persona.
Bramüller [2020] Germany	Examine user perceptions of sports related interactions on social media.	10 Female & Male students. Aged 19-26.	Semi Structured Interviews	Facebook	Qualitative category-led text analysis.	Online sports-related interactions are important for sport activities. Reported improved sporting abilities & increased motivation. Social networks are good for social interaction, information seeking and belonging.
Andreasson and Johansson [2013] Sweden	How is the self presented in blogs and how is gender displayed and negotiated?	3 female fitness blogs (read 20 picked 3)	Netnography	Random Fitness Blogs	Discourse Analysis	Various ways to represent gender but there is a tendency to fit to certain gender fantasises and many blogs contained sexualised images of female personal trainers.
Camacho-Miñano & Gray [2021] Spain	How is perfect femininity articulated in fitness cultures and in women's subjectives.	37 women aged 15-17	Focus group & interviews (tasks including sending Instagram posts of creators they followed to prompt discussion).	Instagram	Foucauldian-informed poststructuralist discourse analysis	Health & fitness content has influence on how young women learn about their bodies and healthy lifestyles.

Camacho-Miñano <i>et al.</i> [2021] Spain	What and how are young people learning about the body, physical activity and health in the context of PE and Instagram?	37 Highschool female students aged 15-17.	Interview & Focus Groups	Instagram	Thematic Analysis	Instagram is a useful place to learn exercises, and in some cases prefer to learn from Instagram than school.
Sverkerson <i>et al.</i> [2020] Sweden	Focus on women's narratives and experiences of doping in male dominated online fitness community.	551 Threads posted by Women	Netnography	Flashback	Thematic Analysis	Potential platform for dissemination of ethnopharmacological information to wider audiences. Majority of male experiences being shared but women are learning from them. Observing more so than sharing.
Andreasson and Henning [2021] United States of America	To describe and analyse how this female only doping forum is interacted with when views are not interrupted by misogynistic discourse.	Women 244 Threads	Netnography	ThinkSteroids.com	Thematic Analysis	Women engage positively and seem to prefer the women only forum.
Hocken-Boyers <i>et al.</i> [2020] United Kingdom	Transformation photos to understand ED recovery relating to sport, exercise and health.	19 Women with history of eating disorder who weightlift in their recovery. 17+ years old.	Interviews, Photo elicitation and netnography	Instagram	Thematic Analysis	Participants use online platforms to reflect and narrativize their experiences. Over representation of white 'ideal' bodies.
Rajan [2018] Online	Aim to understand the hermeneutics of 'fit' selfies and how the body is used in ways which can lead to maladaptive behaviour.	Indian women with more than 1000 followers on Instagram (aged 18-35)	Selfie Analysis & Semi-Structured interviews	Instagram	Frosh's Approach to Analysing Selfies	Selfies represent wanting to be seen. Encouraging women to manage their bodies to cater to the male gaze.

Wood and Watson [2023]	How do users navigate and perceive fitness content.	9 females (aged 18-30) with high autonomous motivation (9 interviewed 26 recruited but reached data saturation after 9)	Semi-structured Interview following an online survey of fitness social media usage and autonomus motivation questionnaire.	Instagram, YouTube, Facebook, TikTok, Twitter, Pinterest	Reflexive Thematic Analysis	Social media for fitness motivates and demotivates users and can be considered a harmful environment. Fitness content impacts motivation differently for users even if their motivation levels are similar.
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B. Chapter 3: Methods and Methodologies

(i) Snippets of the coding process for the thematic analysis



Fig. 1. Uploading codes from the data analysis in Chapter 2 into Miro and displaying them on sticky notes.



Fig. 2. Starting to group the codes into tentative categories, as seen in the red and orange sticky notes.

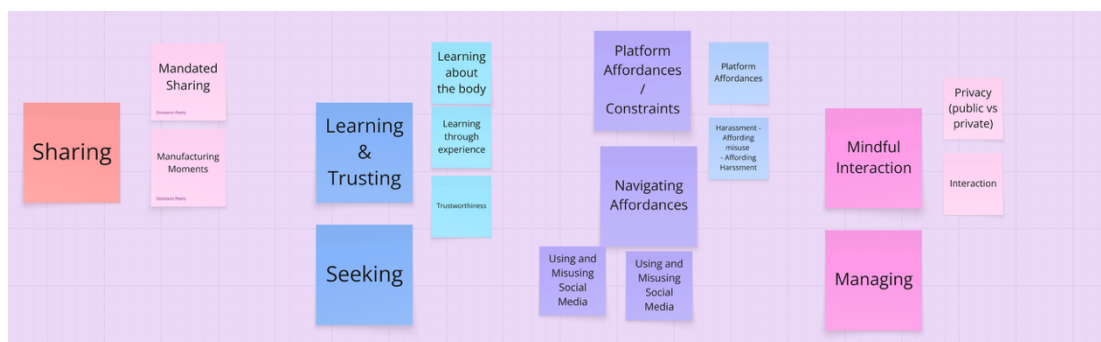


Fig. 3. Generating themes from the tentative categories. The themes continued to develop and experience name changes throughout the write-up of Chapter 2.



Fig. 4. Inserting codes from the data analysis in Chapter 4 into Miro and displaying them on sticky notes. Pink notes are the codes.

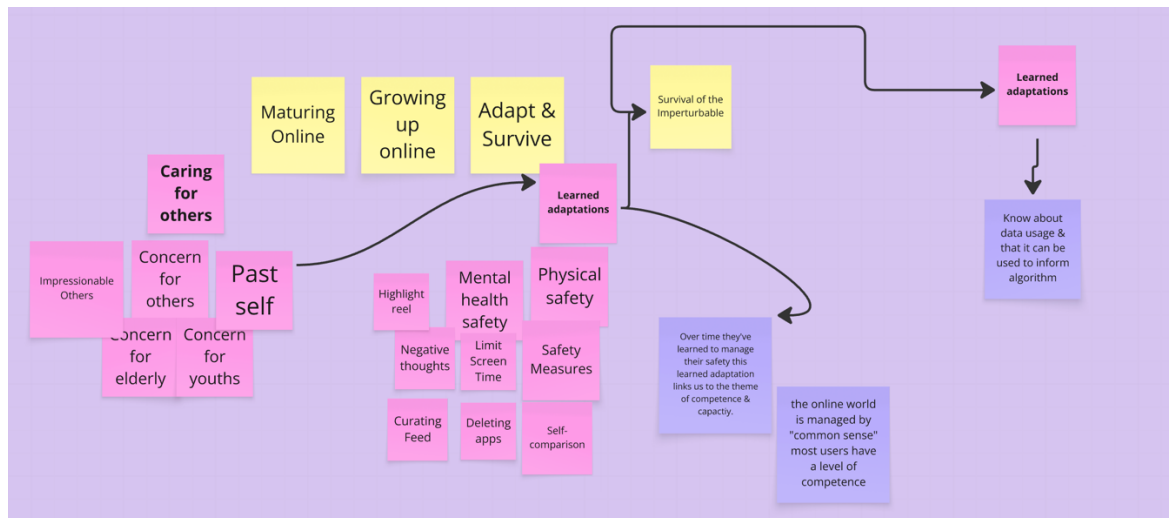


Fig. 5. Pink Codes are grouped and organised under tentative categories (yellow notes). Purple notes provide context and explanations.

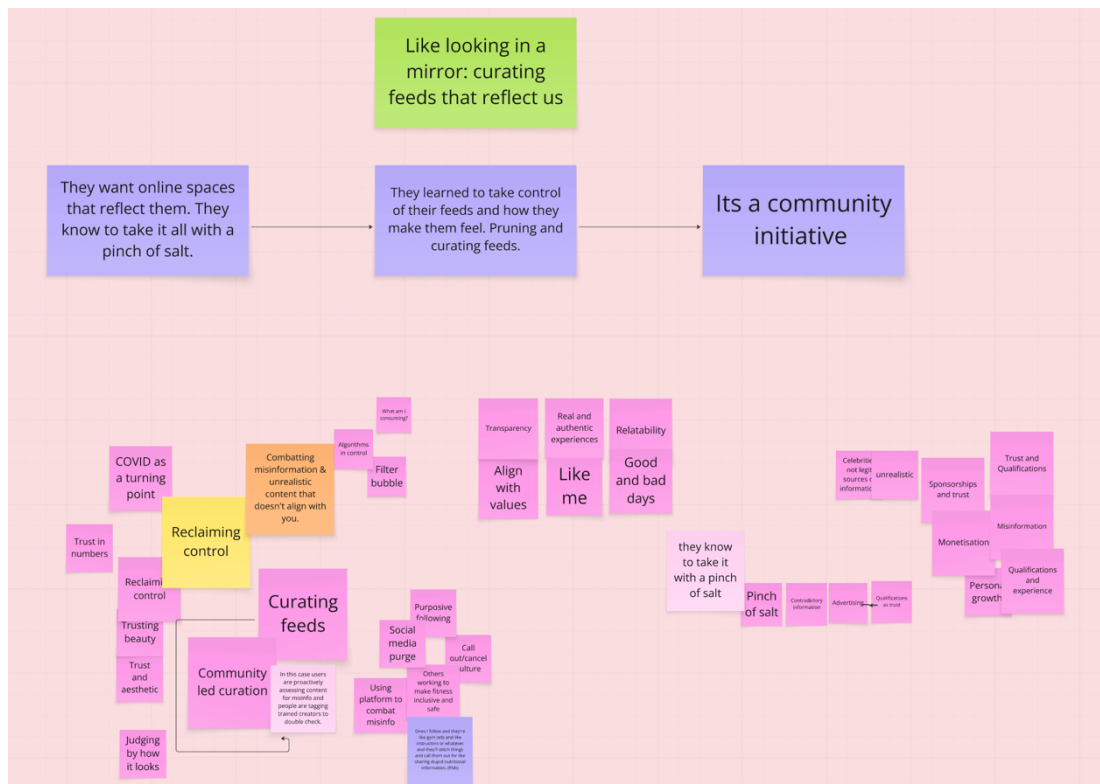


Fig. 7. A theme from Chapter 5 on a green sticky note, with purple notes providing explanations. The pink codes are grouped with similar codes to aid the writing process. The themes continued to develop through the writing phase of the analysis.

C. Chapter 4: ‘Take Everything With a Pinch of Salt’: Learning to Navigate Fitness On Social Media

(i) Study Materials

The following is a selection of survey and interview questions, along with prompts for the shared looking for this study. The interview was semi-structured and therefore these questions varied from interview to interview.

Survey Questions

1. What is your favourite social media platform to consume content on, and why?
2. How often do you consume fitness content?
3. Who is your favourite fitness influencer, and why?
4. What makes a good influencer?
5. What type of content do you consume?
6. What considerations (if any) do you make when you use social media?
7. Do you consider your safety and privacy when you use social media?
8. How do you stay safe online?

Interview Questions

5. Why do you consume fitness content online?
6. What type of content do you consume?
7. How regularly do you consume content?
8. What platforms do you use?
9. Why do you use those platforms in particular over other ones? (for instance, TikTok over Instagram based on findings from survey)
10. What considerations, if any, do you take when consuming content or following creators?
11. What type of content do you engage with?
12. Does the content impact you offline?
13. On which social media platform do you feel the most comfortable consuming content? Why?
14. Do you ever notice false information online? (How do you know it’s false?)
15. Do you engage with content or influencers who discuss women’s health and fitness?
16. Are you ever concerned about your safety when you consume this content? (in what way are you concerned, what makes you feel safe?) (users expressed some concern in the survey)
17. How do you stay safe online?
18. Do you ever think about data safety or are you ever concerned about your data? (Users expressed some concern in the survey).
19. Do you ever think about how your data are used?

Shared Looking Script/Prompts

Now would you mind opening up any of your favourite apps for looking at fitness content and just interacting with it as you would.

Would you always like videos like that?
Why did you like that video?
Would you usually comment on videos?
Why didn't you watch that video?
Do you like that creator?
Do you use the DM feature?
Do you use the explore feature?
How would you use the search feature?

D. Chapter 5: Playing it Safe: Developing an Educational Game to Teach Safe Navigation of Fitness Content to Girls Aged 10-13.

Workshop Recruitment Flyer (Phase 1: Scoping)

The flyer features a background image of a woman in a gym setting, wearing a white tank top and black leggings, with a red overlay. The text is white and reads:

**Do you use
social media
for fitness?**

**Are you over 18?
Do you identify as a woman?**

We want to hear from you.

As part of a PhD study at the School of Applied Psychology in UCC, we are recruiting adult participants over the age of 18 who use social media for fitness to take part in a workshop.

What is involved?

This would involve you joining an hour long workshop close to you. There will be activities to encourage you to talk about your experience of using social media for fitness and what advice you would give to your younger self.

Contact Doireann at doireannpeelodennehy@uicall.ucc.ie to get involved or find out more.

 **UCC**
University College Cork, Ireland
Coláiste na hOileáine Corcaigh

 **LERO** Software for a better world

Workshop Structure Plan (Phase 1: Scoping)

The first activity is **Story Sharing** where participants will discuss their experiences of using social media for fitness. They will be prompted by open-ended questions from the facilitator and group members. Questions may include: why did you start looking at fitness content online? What type of content do you enjoy? Are there any influencers you like or dislike? What sports do you play and does that impact the content you watch? How have your fitness content consumption habits changed over time? (Participants will be diagnosing issues with fitness content and safe navigation by sharing stories and experiences)

This activity will be audio recorded and should last between 10 and 20 minutes.

Activity two is a **Scenario Analysis** where participants will be shown a number of scenarios that they might see online. Including misinformation, their friend sharing fitness content, an influencer promoting protein and creatine for muscle growth and an influencer promoting a skinny tea (see example below). These will be fictional scenarios and will not include real creators or influencers. Participants will be encouraged to discuss their impressions of the content, what they would ideally do in that scenario, what they would actually do, what the 'right thing' to do might be and how 'doing the right thing' might be made easier. (In this activity participants will action plan as we identify the right thing to do in scenarios and issues associated with doing the right thing).

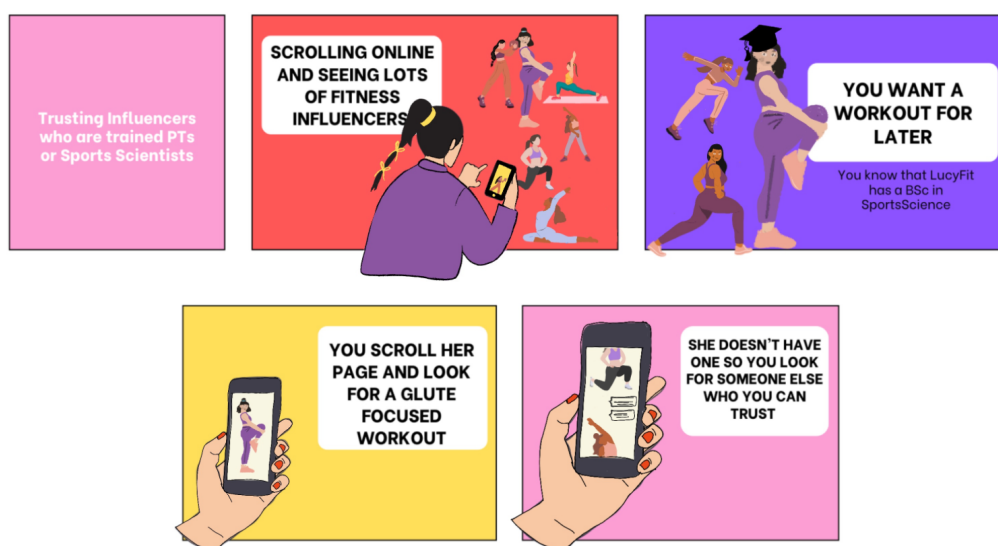
This activity will also be audio recorded and should last 15 minutes.

The third activity will be an **Advice Column** this final activity will work towards a solution or guidance for younger or newer users. Here users will use post it notes

and paper to share advice with their younger selves or newer users. Advice that they learned over time or little phrases of motivation. (In this activity participants will be action planning, evaluating and specifying learning as they work through advice, comment on advice and highlight points for learning and sharing with other, newer users).

This activity will be audio recorded and should last 20 minutes.

Scenarios



There is so much information online, you see lots of influencers sharing workouts and exercises. You want to get inspiration for your workout later and look for someone you can trust. Your usual creator has no glute workouts. How do you pick someone else to trust? How do you find them?

Fig. 9 Scenario from Chapter 5. The user wants to find a workout, but her trustworthy source does not have one. How might participants determine another trustworthy source?

Workshop Structure (Phase 3: Evaluation)

Welcome the participants and reiterate their right to withdraw, the nature of recording and the process of the workshop. Confirm parental/guardian's consent and children's assent to participate.

The workshop will begin with an ice breaking game, of **Social Media Fitness Charades**. Images of different athletes playing different sports will be shared on the screen, the participants will act out the sport and the researcher will guess. Images of social media related activities including, liking or taking a photo will also be included.

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This will lead into the first activity, round 1 of gameplay. This will involve the researcher explaining the concept of the game, the rules and handing out cards. Then a round of the game will be played and the researcher will participate.

Activity two is another round of gameplay where participants can play the game on their own. There can be as many rounds of the game as the participants want during the allotted time of 30 minutes.

Following game play the participants will fill out a survey evaluating the game and talk through their thoughts about the game. Participants will be asked questions like: 'What was the best/worst part of the game?' 'What was the point of the game?' Did you learn anything?

Participants will be thanked, asked if they have any follow up questions, offered support channels, and reinforced of their right to withdraw for 2 weeks.

(i) Excerpts from the first author's reflexivity journal

Reflexivity in Analysis

“I felt like some of these experiences resonate with me” The familiar experiences, like doing exercises from Chloe Ting, following creators like Sean Casey Fitness and learning through education, were easier to code; they were easily recognised. Others were more difficult to code when they were less familiar. This extended to previous research and the ability to recognise and name theories and ideas, which were easier due to experience; this time, they jumped out as fitting into those categories, whereas in prior research, the ideas were formed much later.

“Even though that was said as a joke, it’s kind of frightening” Some users made jokes about having eating disorders when they were younger, or losing their periods, how nobody knows about women’s bodies and how common it is that some people are using Ozempic for aesthetics. It was uncomfortable during the workshops, even though they were always jokes, it felt like they needed to be addressed and that the humour needed to be communicated through the transcription and the analysis, to capture the true essence of the participants and the context of their statements. It was difficult to capture the group's agreement, as one person made a statement, and many voices agreed; it was difficult to differentiate between the voices.

Reflexivity in Exploration

During the exploration phase, the author reflexively engaged with the design process and the ideas; for example:

“I am conscious that these are really specific examples of fitness misinformation, but they all revolve around body image and questionable eating habits. I know it comes from the data, it comes from my work, I watched as other people brought it up and agreed. It just feels wrong to be introducing these concepts to kids who might not encounter them till much later or even never. Why bring attention to it now,

even if it's educational?" This concern about the content on body image stayed with the first author throughout the ideation stage; it impacted the development of any real prototypes, and upon a discussion with the third author, it was agreed that the fitness concepts would be more abstract and focus less on bodies and nutrition.