ADOLESCENTS, SOCIAL MEDIA, PHYSICAL ACTIVITY AND WELLBEING: CO-PRODUCING A SCHOOL-BASED INTERVENTION

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Abstract

Most adolescents are inadequately physically active in relation to the reccomendations outlined by the World Health Organization. Simultaenously, social media has become an intrinsic part of adolescents' lives and they are the first generation to have constant access to social media through smartphones. While untethered access to screens and the internet may provide barriers to physical activity, more work is needed to understand the influence of new technologies and how social media can be used as a resource for physical activity engagement.

Study 1 and 2 in this thesis aimed to develop a better understanding of the interaction between adolescent social media use and physical activity by co-producing and developing a school-based social media intervention. Study 1 used co-production activities with adolescents (n = 32) to better understand how schools could use social media to promote physical activity engagement. Study 2 extended this focus to adults and used focus groups and 1:1 interviews to further develop intervention ideas with school staff and parents (n = 24). Following the thematic analysis and thematics comparisons of the data from Study 1 and 2, an intervention was developed using complex intervention design actions. This included a change in focus from physical activity to mental wellbeing, and Study 3 tested the feasibility of a 7-Day Social Media Detox using mixed methods (surveys and interviews) with 146 adolescent participants and nine class mentors (form tutors) across three schools.

This thesis contributes to knowledge by providing new insights into how schools can approach social media use, through a focus on supporting adolescent autonomy and by

developing adolescent capabilities in self-regulation. The data provides new evidence about the ways in which adolescents' uses of social media informs physical activity engagement and mental wellbeing. Taken together, new evidence is provided on: (i) the time, affordances and content on social media that adolescents attend to and use; (ii) the role of schools in supporting adolescents' uses of social media; and (iii) the key features of a school-based social media intervention that are acceptable and feasible to adolescents and teachers in Sweden.

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List of Definitions

AAP	American Academy of Paediatrics
BRIS	Barnens Rätt i Samhället (In English: Children's Rights in Society)
MVPA	Moderate-to-Vigorous Physical Activity
PA	Physical Activity
PE	Physical Education
PPI	Patient and Public Involvement in research
PAQ-A	Physical Activity Questionnaire for Adolescents
UK	United Kingdom
USA	United States of America
RE-AIM	The Reach, Effectiveness - Adoption, Implementation and Maintenance Framework
SRS	Self-Regulation Scale
SWEMWBS	Short Warwick-Edinburgh Mental Wellbeing Scale
WHO	World Health Organization

Chapter 1: Introduction

1.1 Research Aims and Contributions

This thesis consists of three iterative and interrelated studies which aimed to develop and test the feasibility of a school-based social media intervention. The initial focus was on how schools can leverage social media as a resource for adolescent physical activity (Study 1 and 2). Based on in-depth engagement with adolescents, school leaders and parents in Study 1 and 2, the third study aimed to understand if a Social Media Detox was feasible with adolescents in schools. This thesis contributes to current literature by:

- Demonstrating how methods of co-production and complex intervention design can be applied in a school-context.
- Evidencing how social media is used by adolescents, and how schools and teachers can use this knowledge to support adolescents health and wellbeing.
- Providing insights into the feasibility of a novel Social Media Detox Intervention delivered in schools for adolescents.

From the outset, the purpose of engaging with this research was twofold. Firstly, emergent participatory research with adolescents highlighted the powerful role social media has in their lives and in relation to health related behaviours, such as physical activity (Goodyear & Armour, 2019). Despite this, the practices in schools were misaligned with adolescent experiences and heavily focused on the risks associated with social media use (Goodyear & Armour, 2021). Secondly, despite the positive influence of social media reported in physical

activity interventions with adults (Goodyear, Wood, et al., 2021) and the clear influence it has in adolescents lives, there was a lack of evidence on how social media could be used in positive ways and as a resource for physical activity. Amongst the backdrop of inadequate levels of physical activity amongst adolescents for decades (Nyström et al., 2023; Swedish Public Health Agency, 2023), this thesis sought to seize an opportunity, where the clear influence of social media on adolescents engagement with physical activity could be leveraged as a resource for schools to support physical activity.

The context for the three studies was in Stockholm, Sweden and focused on adolescents aged 13-15 years old. The research questions were constructed based on an iterative design where each study influenced the approach in the next phase. As is reflected in the research questions, the initial focus was on social media and physical activity in Study 1 and 2 (see RQ1 and RQ2) and through engagement with adolescents, school staff and parents in these studies, RQ3 was adapted to focus on social media and mental wellbeing.

The research questions were:

RQ1: What school-based practices do adolescents report will support them to use social media to improve their knowledge, attitudes and behaviours related to physical activity?

RQ2: What school-based practices do school leaders, teachers, and parents report will support adolescents to use social media to improve their knowledge, attitudes and behaviours related to physical activity?

RQ3: What is the feasibility and acceptability of a social media intervention focused on improving adolescent mental wellbeing?

As a result of answering these questions, this thesis contributes to practices in schools and informs how teachers can work with adolescents to better understand and support their social media use. The processes and methods used in this thesis contribute to future research which seeks to develop health-based interventions in schools. The findings of all the studies have theoretical/practical significance for future research and the considerations needed for a large-scale definitive trial.

1.2 Structure of the Thesis

Following this introductory chapter, the first four chapters will explore the current literature (Chapter 2), introduce and justify the methods (Chapter 3) and present the findings of Study 1 (Chapter 4) and Study 2 (Chapter 5). Chapter 6 is an extension of the complex intervention design process, and focusses on the analysis of data from Study 1 and Study 2 to co-produce a school-based social media intervention. The final chapters present the Social Media Detox feasibility study (Chapter 7) and discuss the collective findings of the thesis (Chapter 8).

Chapter 2 - *Review of Literature* - The review of literature begins by outlining how physical activity is an important health related-behaviour but how the majority of adolescents in Sweden fail to meet physical activity guidelines set out by the World Health Organisation The chapter then explores the influence of new technologies, and specifically how social

media is engaging the current generation of adolescents (Generation Z) with physical activity. As a means to draw upon the potential of social media to support physical activity, schools are identified as a key context to use social media to reach adolescents and improve their physical activity behaviours. Based on a lack of evidence regarding how social media can be used as a resource in school-based physical activity interventions the research questions for this thesis are set out.

Chapter 3 - *Methodology* - This chapter explains how participatory approaches were considered as a means to answer the research questions. It provides an overview of the methodological frameworks used to support the research process which include complex intervention design and the process of co-production. The specific details of the research methods are then outlined, including how the mixed methods studies in this thesis are structured.

Chapter 4 - *Co-Production with Adolescents to Develop a Social Media-Based School Physical Activity Intervention* - This chapter outlines how adolescents conceptualise social media as an important health and wellbeing resource, and that can be used to facilitate their behaviours related to sport engagement, participation in fitness activities, and sleep and dietary habits. Social media was not positioned as an important resource to be used by teachers in schools for physical activity, and this contrasted against the fundamental aims and purpose of the thesis.

Chapter 5 - *Co-Production with School Staff and Parents to Develop a Social Media-Based School Physical Activity Intervention* - The chapter outlines the key opportunities and

challenges schools and parent foresee with the use of social media to promote physical activity. Similar to the findings in Chapter 4, social media was positioned as an important and relevant topic but not primarily as a resource to support physical activity in schools. Adolescent mental wellbeing became apparent as a more relevant focus in relation to social media use.

Chapter 6 - *The Intervention Design Process* - This chapter uses the complex intervention design process as a framework to analyse the data from Study 1 and 2. The analysis foregrounds a change in focus to a school-based social media intervention to support mental wellbeing. An overview of new literature and theory outlines the processes followed to integrate findings from Study 1 and 2 to design the Social Media for Wellbeing Study which was a 7-Day Social Media Detox Intervention for schools.

Chapter 7 - *The Feasibility of a 7-day Social Media Detox Intervention in Schools* - This chapter seeks to answer research question 3 using the Reach, Effectiveness – Adoption, Implementation, Maintenance (RE-AIM) framework for feasibility. Using mixed methods, the findings outline the feasibility of the Social Media Detox intervention and sets forward key practical and theoretical considerations for future iterations of the intervention.

Chapter 8 - *Discussion* - This chapter draws together the combined findings from the thesis using the questions (i) What happened? (ii) So what?, and (iii) What now?. The thesis provides new evidence about the ways in which adolescents' uses of social media informs physical activity engagement and mental wellbeing. An overview of originality, rigour and significance provides insights into how schools can approach social media use. Future

recommendations include a focus on supporting adolescent autonomy and developing their capabilities in self-regulation of their social media use.

Chapter 2: Literature Review

2.1 Introduction

This chapter provides a review of the literature relevant to the research questions in this thesis. The initial sub-sections will outline how current adolescents are inadequately physically active and how Generation Z (who are defined by their early immersion with mobile digital technologies) are highly sedentary and use social media to engage with physical activity. A review of new technologies and their influence on research, policy and practice provides the background to justify and define social media as a relevant focus for this thesis. The review then explores existing ways adolescents use social media in relation to physical activity in informal settings and how this provides opportunities and risks. An overview of Interventions which have used social media to promote physical activity in a more formal and targeted manner then provides insights into how social media can support adolescent physical activity engagement. The final section will use examples of local and international research, policy, and practices to explain how schools are an important context where physical activity can be supported using whole-school programs. This foregrounds the research questions, which focus on the process of developing a school-based social media intervention to promote physical activity.

2.2 The Importance of Physical Activity in Adolescence

Physical inactivity endures as a major public health concern worldwide and is the fourth most prevalent cause of non-communicable disease and death, with a significant economic burden (Andersen et al., 2016; Ding et al., 2016; Kohl et al., 2012). Amidst the calls for more evidence-based and innovative approaches to support adolescents' health as a major building block for life (Sawyer et al., 2012), physical activity is an important area of focus. An estimated 81% of adolescents worldwide (Age 11-17 years of age) do not meet the current recommendations of 60 minutes of Moderate-to-Vigorous Physical Activity per day (MVPA) (Guthold et al., 2020).

Adolescence is defined as a phase between 10-19 years old (World Health Organization, 2021a) and is a comparative high point of health across the lifespan. Striving towards and/or meeting the World Health Organization's physical activity guidelines and being more physically active include a range of short-term benefits, such as improved cardiometabolic health, bone health, muscular fitness, motor skill development and coordination (Chaput et al., 2020). This phase of development is also an important time in relation to long-term health outcomes, where physical activity knowledge, attitudes, and behaviours influence health trajectories which extend into adulthood (Kari et al., 2017; Rollo et al., 2020).

Physical activity acts as a protective function against anxiety and depression and supports cognitive functions, such as memory (Alves Donato et al., 2021; Ma et al., 2020). Adolescents who are more physically active are at lower risk of depression than their more sedentary counterparts (Alves Donato et al., 2021; Ma et al., 2020) and there is significant correlation

between higher levels of physical activity and increased mental wellbeing among adolescents (Swedish Public Health Agency, 2019).

While the benefits of physical activity on mental health and mental wellbeing are clear, there are some competing definitions and approaches to mental health (Herrman et al., 2005). Mental health, mental wellbeing and mental illness are explored further in Chapter 6, however, it is important to outline how they are approached at this early juncture in the thesis. The dual approach to mental health from Keyes (2005) provides the initial platform to approach these concepts, where pathogenic and salutogenic approaches are distinct and interrelated. From a pathogenic perspective mental health can be diagnosed and is situated across a spectrum of low to severe mental illness (e.g., depression). The salutogenic lens considers wellbeing as a component of mental health, but from a strengths-based orientation whereby mental health is not conceptualised on the basis of a medical diagnosis, but rather on an individual's engagement and access to resources which support mental wellbeing. The wellbeing continuum from Keyes (2005) ranges from languishing (low) to flourishing (high mental wellbeing) and considers the importance of promoting mental, social and emotional wellbeing as components of mental health (Corey, 2002).

Despite the benefits of physical activity being widely understood, the following section outlines how adolescents are inadequately physically active in relation to current recommendations. The evidence draws largely upon data from Sweden, which is where the research reported in this thesis was conducted.

2.2.1 Adolescents, Physical Activity and Sedentary Behaviour in Sweden

The proportion of physically active adolescents in Sweden has remained largely unchanged over the past 20 years, with self-report data showing that 1 out of ten girls, and 2 out of ten boys in early adolescence (age 13-15) meet the World Health Organisation's physical activity recommendations (Swedish Public Health Agency, 2023; Swedish Public Health Authority, 2018). Objectively measured data has shown slightly higher levels of physical activity than self-reported data, indicating that between 30-50% of Swedish adolescent are meeting the recommendations (Kjellenberg et al., 2021; Nyberg et al., 2020). The proportion of adolescents who train regularly (i.e. organised sport, gym, exercise) has increased in Sweden since it was first measured in 1986, where present data (2023) shows that 33% of girls and 38% of boys (age 15) train four or more times per week outside of school (Swedish Public Health Agency, 2023). Simultaneously, non-organised physical activity appears to be decreasing, where movement is a less natural part of adolescents' daily movement. For example, evidence suggests that steps per day significantly declined between the years 2000 and 2017 (25-30%) amongst 14-year olds (Raustorp & Fröberg, 2019). These trends are comparative to other international contexts, where the majority of adolescents do not meet the current recommendations of 60 minutes MVPA per day, where boys are more active than girls, and where organised physical activity may be gradually supplementing decreases in non-organised and low intensity physical activity (e.g., steps) (Guthold et al., 2020; Nørager Johansen et al., 2018; van Sluijs et al., 2021).

Levels of sedentary behaviour tend to increase in adolescence with age, and four out of 10 adolescents in Sweden report sitting for a lot or most of their free time (Swedish Public

Health Agency, 2023). Objective measurements show that adolescents in Sweden spend an average of 10 hours (75% of their day) being sedentary (Nyberg, 2017). Based on the potential health risks of extended sitting time (independent of physical activity levels) and a linear increase in sedentary behaviour throughout childhood and adolescence (Kontostoli et al., 2021), the World Health Organisation have added an additional recommendation to reduce extended sedentary behaviour (Chaput et al., 2020).

When adolescents in Sweden were asked about increasing their physical activity levels and reducing sedentary behaviour in a study by BRIS (*Barnens Rätt i Samhället*), a third reported a desire to be more physically active than they are today (BRIS, 2022). When asked what support adults could provide to encourage their physical activity the most common responses from adolescents were: (i) ask more about their needs and interests, (ii) make sports available for all regardless of economic situation, (iii) build more outdoor spaces for physical activity, and (iv) reduce the screen time of adults so they engage more with adolescents activities (BRIS, 2022). In addition to the need for increased provision for physical activity based on adolescent preferences, the fourth ranked answer is of particular interest in this thesis, where the impact of new digital technologies and physical activity are in focus. In the same study, 21% of adolescents thought that limiting their screen time would help them to be more physically active (BRIS, 2022), indicating that screen time is negatively effecting the physical activity behaviours of many adolescents. The need to address screen time and physical activity has also been highlighted in international evidence, which shows that reduced screen time and increased physical activity can benefit adolescents because they are jointly associated with higher mental wellbeing (Khan et al., 2021).

2.2.1.1 Sweden as a Research Context

Conducting research with adolescents in Sweden requires some description of the context with relevance to this research; the final part of the review of literature will provide some insights into the Swedish context.

Sweden is a comparatively well-developed country as defined by the UN Human Development Index; the index, which combines components such as life expectancy, gross national income per capita, expected and mean years of schooling ranks Sweden 5th amongst 193 UN member states (United Nations Development Programme, 2024). As a comparatively wealthy country Sweden has historically welcomed and used new digital technologies and embraced new technological advancements. This is shown, for example, through the early investment in digital infrastructure and the promotion of digital literacy in schools (Swedish Internet Foundation, 2024).

Similar to many countries, Sweden has a rich history of physical activity which has developed across time and with society. Participation in sport and exercise is characterised by high civic engagement, voluntary leaders and substantial government support (Fahlén & Ferry, 2018) While Sweden has a strong international sporting legacy comparative to its population (10.5 Million: Statistics Sweden, 2023) evidence shows that society widely values voluntary, democratic culture of movement above elitism and international sporting success (Center for Swedish Sports Research, 2023). A unique aspect of Swedish movement culture which is worthy of note is outdoor life or '*frilusftliv*', where being and moving in nature for the purpose of wellbeing and connection with the natural environment is reflected in societal

norms, education values and behaviours (Gelter, 2000). Overall, Sweden is an economically and technologically advanced nation, where movement culture is valued through a lens of broad participation and outdoor life.

2.2.2 Conclusion

Despite widespread understanding of the health-related benefits of daily movement, adolescents in Sweden are inadequately physically active and sedentary for most of their day. The influence of new digital technologies and screen time is an emerging trend in how physical activity is impacting the movement patterns of adolescents. The following sections outline the changing digital landscape and how this adds both complexity and opportunities to physical activity engagement during adolescence. As adolescents develop in an increasingly digitalised world, the considerations made by stakeholders related to their physical activity require ongoing critical examination and evidence-based innovation.

2.3 Adolescents, Digital Media and Social Media

2.3.1 Generation Z (soon to be Generation A)

Most adolescents (age 10-19, Patton et al., 2016) currently fall within Generation Z (also referred to as the iGeneration) and are those born between 1996 and 2010 (Hoffman & Åkerström, 2024). Generation Z are characterised by their experience in a connected world, and the digital habits and behaviours which are central in their lives (Dimock, 2019). Mobile internet, smartphones and social media have been readily available for Generation Z since they were born (Dimock, 2019). While the closest older generation of millennials (born

between 1981-1995) are often referred to as digital natives 2010 (Hoffman & Åkerström, 2024), current adolescents are the smartphone and social media natives, and the first generation where mobile connectivity and constant access to the internet is the norm (Chun, 2018; Cilligol Karabey et al., 2024). Compared to previous generations, current adolescents are reported to spend a large proportion of their time at home with family, keep up-to-date on current events, have a strong interest in health and are distinctly more individualistic and interest driven (Hoffman & Åkerström, 2024). While these characteristics are not isolated from societal and geo-political changes, the role of the new technologies is an important and influential aspect in the changing knowledge, attitudes and behaviours of contemporary adolescents (Livingstone, 2018). Attention to adolescents' engagement with new technologies is particularly important based on the ongoing neurological development which occurs during these years; where increased sensitivity to social influences and reduced impulse control increases the appeal of technology such as social media and produces unique considerations for how they can be effectively supported in their development (Blakemore, 2018, 2019; Blakemore & Mills, 2014).

While Generations are often easier to define retrospectively over time, the current alpha generation (Gen A) who were born after 2010 are now moving towards young adolescents or 'tweens' (8-12 years). Their early immersion with social media and mobile internet means that they are hyperconnected and have likely accessed to a wide range of external influences and digitally mediated activities from a young age (McCrindle & Fell, 2020). The early use of mobile digital technology is a key influence on current and future adolescents, where smartphone use and ownership increases incrementally prior-to and during adolescence in

Sweden, 54% of 6-10-year-olds have a smartphone, and by age 16 most adolescents own one; 90% of 11-19 year old's use their smartphone device every day (Swedish Internet Foundation, 2019). These trends are similar in other comparable western nations, such as the UK and USA (Ofcom, 2023; Rideout et al., 2022).

For contemporary adolescents the smartphone has become an extension of self, with new technologies mediating learning, routines, formations of friendships, methods of play and creative activities (Ito et al., 2010; Shapiro, 2019). How these mobile and communicative technologies impact the identity development, learning, behaviours and overall wellbeing of new generations is a key consideration for stakeholders (such as parents and teachers) in adolescents lives (Granic et al., 2020).

2.3.2 New Technologies: New Research

A wealth of research which seeks to understand the implications of the digitalised childhood has been conducted over the last two decades. Population annual based surveys on adolescents digital habits are now commonplace in most western nations, and they provide important insights into their digital habits, screen time, app-use, content engagement, and the challenges adolescents experience online (Ofcom, 2023; Radesky et al., 2023; Swedish Media Advisory, 2023). These reports are also supported by a growing body of research which uses methods such as interviews (Vermeulen et al., 2018), focus groups (Bell, 2019), ethnography (MacIsaac et al., 2023; Marwick & boyd, 2014), and digital content analysis (Quan-Haase & Sloan, 2022) to better understand the online experiences of adolescents.

The current research related to adolescents' uses of new technologies is interdisciplinary spanning across psychology, sociology, media/communication studies, public health and education (see for example, Brailovskaia et al., 2023; Cooper et al., 2024; MacIsaac et al., 2023; Moreno & Radesky, 2023; Oduro et al., 2023; Scully et al., 2023). This reflects the wide influence of new technologies, where adolescents are navigating multiple identities, global connections, new pathways of learning, and new ethical challenges online (Chambers & Sandford, 2019).

From a disciplinary background of sociology and communication studies, researchers such as Sonia Livingstone and Amanda Third have made a significant contribution to the topic of engagement with new technologies during adolescence. A focus on issues such as online safety, digital literacy and the impact of digital media on wellbeing has provided valuable insight into how new media technology mediates adolescents engagement with the world, and has informed policy and practice which prioritises their rights and online safety (Livingstone, 2021; Livingstone et al., 2018; Livingstone & Smith, 2014; Livingstone & Third, 2017; Third et al., 2017). Examples of policies informed by research in this area includes the European Union's legislative guidance on the protection of children and adolescents online (European Commission, 2022), the Online Safety Bill in the UK (UK Parliment, 2023) and guidance on Children and Young People's Rights on Digital Platforms in Sweden (Swedish Authority for Privacy Protection, 2020). New policies to protect adolescents are needed and welcomed by many, however, adolescents encounter both opportunities and risks online, and there are warnings that a predominant focus on reducing risk and regulation from parents, educators and policy makers also risks denying them opportunities to develop

resilience in their online engagements (Smahel et al., 2020). Overall, the proliferation of digital media use amongst adolescents has been a key driver of new research and policies and where current evidence suggests they need support to develop skills which minimise risks and maximise the opportunities of new digital media (Chassiakos et al., 2016).

One critique which is seen to limit progress in research, policy, and provision for adolescents and their use of new technologies is the broad approach and a heavy reliance on generic measures of technology use (i.e. screen time, internet use) as an independent variable to assess health-related outcomes (Kross et al., 2021; Livingstone, 2021). The overarching critique of technology use or screen time as measures in research is the diversity in the type of activities which occur online and using screens (e.g., gaming, video chat, watching films) and how this does little to unpack how new technology is being used (Trust, 2018). As a result, a broad measures such as screentime can create a conceptual messiness, which often fails to capture the context, type of engagement and goal-directedness of use (e.g., schoolwork on a laptop or chatting with friends through social media on a smartphone) (Kaye et al., 2020). Therefore, as a means to add focus, insight, nuance and new knowledge to research in this area, this thesis focuses specifically on how adolescents engage with social media, which is the most popular use of new technology (Radesky et al., 2023).

2.3.3 Social Media and Adolescents in Sweden

In Sweden, social media use is ubiquitous amongst adolescents: 95% of 13-16 year old's have a social media account, with 85% using them every day (Swedish Media Advisory, 2019). An estimated 87% of Swedish 11-19-year-olds use social media, of which 69% are daily users

(Swedish Internet Foundation, 2019). The most popular social media apps used daily amongst 13-16-year-olds are Snapchat (81%), TikTok (71%), Instagram (47%) and YouTube (44%) (Swedish Media Advisory, 2023). Daily social media time during adolescence has recently stopped increasing, however, the age of induction (i.e. first uses of social media) is still decreasing and the number of 9-12 year old's using social media for more than three hours a day has doubled since 2012 (Swedish Media Advisory, 2019, 2023).

Social media is by far the most popular daily use of time outside of school for 13-16-year-olds (85%), succeeding daily exercise (18%), meeting friends face-to-face (16%), reading (11%), and homework (23%) (Swedish Media Advisory, 2019). This may be due to ease-of-access; however it is clear that social media has become a central component in adolescents lives. When asked about what they do on social media adolescents often report their main activities as general scrolling and socialising with friends (Swedish Media Advisory, 2023). While this is not an exhaustive list, social media is a place where adolescents share photos and videos in public and private spaces (Bell, 2019), message friends (Vermeulen et al., 2018), like and comment on videos and posts (Fatt & Fardouly, 2023), follow influencers and celebrities (Schmuck, 2021), take part in challenges and trends (Ortega-Barón et al., 2023), and watch live streams (Cabeza-Ramírez et al., 2021).

2.3.4 Defining and Understanding Social Media

In this thesis, social media is defined as a digital platform which allows for a personal profile, user-generated content and interaction between users (Greenhow & Lewin, 2015; Manning, 2014). Through their seminal work defining social networking sites, boyd and Ellison (2007)

provided the springboard for interdisciplinary and social media specific research. A profile (public/semi-public) within a bound system and shared connections (e.g., friends) provided a frame for research into research popular social media sites in the 2000s, such as MySpace, Bebo and Facebook. The concept of networked publics facilitated research by focusing on the structures within society which were influenced by social networks and their affordances, which included; public/private online spaces, online friends, comments, private messaging and media integration (boyd, 2008, 2014). The initial framing of networked publics unpacked how persistence of communication, searchability of people, replication of interactions and unseen audiences influenced the social behaviours and identity formation of adolescents (boyd, 2008). Networked publics have facilitated an important focus on the experiences of adolescents on social media and the exploration of online personas, digital self-expression, management of privacy, the mediation of friendships, social activities and digital wellbeing (Abiala & Hernwall, 2013; Baym & boyd, 2012; Chambers & Sandford, 2019; Durante, 2011; Ito et al., 2010).

Specific reference to social media instead of social networks was made first made by Kaplan and Haenlein (2010), where the term 'user-generated content' henceforth gained a firmer foothold in the literature (Aichner et al., 2020). A more explicit focus on the relationship between users, user-generated content, and the new types of communication they facilitate has since emerged in line with new affordances of social media (Carr & Hayes, 2015). These include: disappearing content and stories (Kreling et al., 2022), emojis, stickers, likes and reactions (Sánchez-Hernández et al., 2021), live streaming (Hong, 2023), short-form written and video content (Anderson, 2020), location tracking (Vanherle et al., 2023), and

augmented reality and filters (Javornik et al., 2022). Such technical functions evolve quickly and change how adolescents engage with social media, how they consume information, form and maintain social connections. For example, from the start to the end of this research (2020-2024) short-form algorithm-led video content (Qian & Jain, 2024) has increased in popularity across multiple social media platforms. Most notably through the rise in popularity of TikTok and the introduction of YouTube Shorts and Instagram Reels (Anderson, 2020; Menon, 2022; Violot et al., 2024).

Social media research has continually responded to diverse and changing affordances. Since the early work of boyd (2014) and explorations of youth culture online (Ito et al., 2010), there has also been a growing focus on opportunities and risks for adolescents using social media (Anderson & Jiang, 2018; Duggan et al., 2015; Livingstone, 2009). In particular, contributions from the fields of psychology and neuroscience have extended over time, with an increased focus on the relationship between social media use and outcomes related to adolescent health and wellbeing (Odgers & Jensen, 2020; Orben & Przybylski, 2019; Twenge, 2020). For example, Ferguson et al. (2024) draws on neuropsychology to explain how the features of social media such as anonymity, asynchronistic engagement, editability, personalisation, publicness and quantifiability create increased uncertainty in adolescent social worlds. Further work has sought to better understand the impact of social media on wellbeing by exploring different types of use, such as active use (e.g., posting, sharing) and passive use (e.g., viewing, scrolling) (Valkenburg et al., 2021).

Notwithstanding the growth of work related to adolescents and social media, there are ongoing challenges which limit understandings of social media's impact on adolescents. This

is largely grounded in how the changing functionalities (affordances) adds complexity to the dynamic ways adolescents engage with and respond to it (Goodyear & Armour, 2019). These challenges are compounded by how social media is used throughout the day. For example, when and how young people instantaneously switch from/or combine activities, such as messaging friends on Snapchat, playing mobile games, running for the bus, checking their Instagram feed, calling their parents, and 'whatsapping' the class about homework (Granic et al., 2020). As a result, the complexity for researchers working with social media is not only based on dynamic use, changing functionality and individual differences, but that it is difficult to objectively and/or subjectively isolate social media use from other digital activities (e.g., gaming) and non-digital activities (e.g., physical activity).

2.3.5 Conclusion

Current adolescents (Generation Z) are the first generation where ubiquitous access to the internet through smartphones. As a means to better understand the use and influence of new technologies, this thesis focuses specifically on social media, which is the most popular use of new technology and smartphones amongst adolescents. The influence of social media on adolescents has become a popular topic of research spanning across multiple disciplines. This includes a focus on how adolescents need to be protected and supported online, and how social media influences social dynamics, friendships, health and wellbeing. A challenge within research has been understanding how adolescent use social media and how they can be adequately supported. This is, in part, because the affordances and uses of social media are constantly evolving and social media use is often combined with other activities throughout the day.

2.4 The Intersection of Social Media and Physical Activity

2.4.1 Introduction

This section provides an overview of the literature which investigates the relationship between screen use, social media use and physical activity. An overview of the research related to the relationship between physical activity levels and new technologies will foreground more specific exploration of adolescents, social media use and physical activity engagement in informal contexts.

2.4.2 Screen Time and Physical Activity in the Pre-Smartphone era and Beyond

Anecdotally, comments about adolescents sitting in front of a screen and not playing with their friends or being physically active are not uncommon in public discourse (Boseley, 2019). At a cursory glance, broad claims that screentime replaces physical activity amongst adolescents are unsurprising, as population level data shows an inverse relationship between screen time (increasing) and physical activity (decreasing) during adolescence (Swedish Public Health Agency, 2023). This has been referred to as the 'displacement hypothesis', which is based on the idea that screen time (originally on computers and/or television) displaced time otherwise spent being physically active (Lizandra et al., 2019). Work in this area was originally conducted as a result of naturalistic observations of a reduction in physical activity following the introduction of the television into small communities (Brown et al., 1974; Robinson, 2001). More recent extensions of the hypothesis were based on observations of significant associations between higher levels of adolescent screen time and lower levels of physical activity (Ogunleye et al., 2012; Sandercock et al.,

2012; Serrano-Sanchez et al., 2011). However, it is now evident that claims of sedentary behaviour directly substituting physical activity are often overstated, with observed effect sizes being small (Pearson et al., 2014).

At this juncture, it is important to note that screen use has historically been one of the primary indicators of sedentary behaviour within research (Biddle et al., 2010), and evidence of the relationship between screen use and daily movement behaviours has been lacking as a result. However, objective measures of physical activity and sedentary time can increase the validity and reliability of work in this area (Tremblay et al., 2017). Examples using these measures include a prospective study in Sweden. Using a small sample of children and adolescents (age 10-15) at two schools with high and low socioeconomic status, cross-sectional data showed no association between objectively measured smartphone self-reported screen time and physical activity (MVPA) (Dahlgren et al., 2021). While this shows a lack of association between screen time and physical activity, Raustorp et al. (2020) identified a negative association between self-reported smartphone and tablet use and steps per day amongst 14-year-old girls. Associations were also evident in a study by Kjellenberg et al. (2021), who found a negative association between weekday screen time above five hours and cardio-vascular fitness across both genders (ages 13-14). The relationship between screen time and the type of physical activity may also be of relevance, with evidence showing that Swedish adolescents who take part in organised physical activity three times or more per week are twice as likely to report low screen time (under 5 hours) than those who do not (Yman et al., 2023). While the initial studies show mixed results, and some association between screen time and sedentary behaviour are evident, more work is need to

understand causal relationships. Current recommendations for adolescents often include a reduction in screentime and increased physical activity (Nyström et al., 2023), however, there is currently little evidence to suggest that reducing one behaviour will increase the other.

2.4.3 Social Media Use and Physical Activity

Social media research has largely sought to investigate specific types of use and how they impact physical activity behaviours. For example, lower levels of physical activity were found in relation to problematic social media use (defined by addictive tendencies) amongst girls, however this was the opposite for boys (Buda et al., 2021). Some have claimed that physical activity is a buffer against problematic social media use and longitudinal evidence shows a negative association between the frequency of physical activity engagement and Facebook addiction (Brailovskaia et al., 2018). Other research indicates that social media use may reinforce existing physical activity behaviours, with increased time on social media associated with less vigorous physical activity amongst the least active, and higher levels of social media use amongst the already active adolescents (age 13-18) in the USA (Shimoga et al., 2019).

Morningstar et al. (2023) investigated specific types of social media use (non-active/non-social, active/social, intense/frequent, and problematic use) and their relationship with the attainment of physical activity guidelines amongst 11–15-year-olds in Canada. They found an association between intense social media use (categorised by being on social media 'almost all of the time throughout the day') and an increased likelihood of meeting physical activity

recommendations. They also found that non-active (non-social) social media users were less likely to engage with physical activity compared to active (social) users. Problematic social media use did not have a significant association with the likelihood of meeting physical activity guidelines, but it was associated with lower levels of exercise. A promising aspect of this approach was a focus on diverse uses of social media and types of physical activity (i.e., physical education, organised sport, exercise, outdoor play and active transport). These findings suggest that social and active uses of social media could be a catalyst for physical activity engagement, whereas isolated use of social media where adolescents are mainly consuming content is an indicator of lower physical activity engagement.

Overall, the evidence-base is mixed and limited, and largely reliant on cross sectional studies and self-report measures for physical activity and social media use. When specific types of screen use are examined (e.g., social media) and the characteristics of use (e.g., addictive, active, passive) are measured, a more nuanced picture between social media use and physical activity begins to emerge. While there is no evidence to suggest that social media displaces physical activity, this might be the case for certain individuals and specific types of social media use. The following section provides a more in-depth examination of the interaction between social media and physical activity by focusing on measures beyond time.

2.4.4 Social Media use and Physical Activity Engagement Beyond Time

The previous section highlighted a lack of evidence regarding physical activity levels and social media use. However, it is clear the current generation of Swedish adolescents are

more health conscious and interested in topics related to exercise, diet and health as a result of their social media use (Hoffman & Åkerström, 2024). International evidence indicates that many adolescents are turning to social media to access and support their engagement with physical activity (Goodyear et al., 2019c). For example, it was reported that in the UK social media (specifically YouTube) was used by nearly half of adolescent participants (44%) to access fitness related content (Armstrong et al., 2021). In Australia, 76% of girls (aged 15-17 years) were reported to use YouTube and 38% used TikTok to increase their physical activity levels (Kate Parker et al., 2022). This evidence indicates that social media is a popular tool used by adolescent to support their physical activity. Engagement with physical activity related content on social media is beginning to garner more attention and evidence shows that consuming fitness influencer content can increase motivation to exercise amongst in youth (age 15-25) (Sokolova & Perez, 2021).

The types of health-related social media content constructed by Goodyear et al. (2019c) provide key insights into how social media use can inform knowledge attitudes and behaviours. Using participatory research they identified the different forms of content and affordances that informed adolescents' learning and behaviours, namely, (i) automatically sourced content; (ii) suggested or recommended content; (iii) peer content; (iv) likes, and (v) reputable content (Goodyear et al., 2019c). These provide a lens to better understand how social media can act as a source of motivation and inspiration for physical activity and to understand the risks.

2.4.4.1 Automatically Sourced and Suggested/Recommended Content

Automatically sourced and suggested/recommended content relates to how algorithms select and present content to adolescents based on trends, previous online behaviours and interactions, interests, and demographics (Goodyear et al., 2019c). This often provides adolescents with personally relevant images, videos and text which algorithms pre-select or recommend based on their interest in physical activity (e.g., exercise, specific sports, and fitness). This is particularly relevant in relation to how adolescents currently use social media and how algorithm-led short-form video content is a feature which has proliferated in recent years (Schellewald, 2023). The prevalence of automatically sourced and suggested content means that adolescents who are interested in specific types of physical activity are likely to be presented with that content (Goodyear et al., 2019c). Simultaneously, evidence shows that adolescents who are less interested in these topics may also be presented fitness, exercise and sport content because this is something most adolescents engage with to varying degrees (Armstrong et al., 2021; Leary et al., 2019; Kate Parker et al., 2022).

A popular area of focus in the literature related to social media content and physical activity is referred to as 'fitspiration' or 'fitspo' (meaning: inspiration for fitness) (Cataldo et al., 2021; Jerónimo & Carraça, 2022). Fitspiration includes images and videos on social media sites which show exercise, fitness and/or diet related content, often through a narrow ideal of a lean and muscular body type (Carrotte et al., 2017). Body-positive content is also present (Davies et al., 2020), and recent analysis of fitspiration content indicates a subtle shift towards a more exercise-specific focus and less emphasis on physical appearance (Bell et al., 2024). However, the majority of 'fitspiration' content predominantly situates physical

activity as a means to achieve narrow and gender specific beauty ideals which both commodify and sexualise the body (Deighton-Smith & Bell, 2018).

Fitspiration research has been widely conducted with adolescent girls and young women with a focus on the negative impact content on body image, self-esteem, mood and exercise behaviours (Fioravanti et al., 2021; Jerónimo & Carraça, 2022; Prichard et al., 2020). The underlying assumptions within the this research imply that social media mediates increased social comparison (Verduyn et al., 2020) and a Fear Of Missing Out (FOMO), particularly amongst girls (Oberst et al., 2017), which can result in lower self-esteem (Vogel et al., 2014), worsened body image (Fardouly & Vartanian, 2016; Fatt et al., 2019) and risks such as exercise addiction and/or exercising beyond safe limits (Bell et al., 2019; Cataldo et al., 2021). Those who engage with 'fitspiration' content have acknowledged that 'fitspiration' ideals can be unrealistic, but also emphasise how it provides them with new knowledge which informs their physical activity attitudes and behaviours (Easton et al., 2018). A theme amongst these findings is that adolescents are learning about physical activity, body ideals, diet, and lifestyle through 'fitspiration' content but they are critically navigating content and risks (Bell et al., 2019; Goodyear, Andersson, et al., 2021).

Overall, there is clear evidence that social media algorithms are presenting adolescent with content related to physical activity. Research has largely focused on the risks associated with this content, but there is also evidence that automatically sourced and suggested/recommended content provides adolescents with sources of inspiration and motivation for physical activity.

2.4.4.2 Reputable Content

Reputable content relates to the extent to which adolescents trust and critically navigate physical activity related content, such as relying on information from familiar sources, celebrities and/or influencers (Goodyear et al., 2019c). Sport and fitness influencers are powerful sources of motivation and inspiration for physical activity (Cooper et al., 2024), particularly when they are considered to be credible, trustworthy, high in expertise, and attractive (Durau et al., 2022). A well-known example of this can be drawn from the COVID-19 pandemic, where influencer Joe Wicks became a popular source of inspiration for physical activity during lockdown in the UK (Ahmed et al., 2024).

Another source of reputable content is how social media is a tool used to inspire engagement with sport (Hayes, 2020), with evidence suggesting that social media is part of an authentic and contemporary view of sport for adolescents (Luguetti et al., 2019). In comparison to 'fitspiration' content, adolescent engagement with sport related content on social media is lacking. However, most sports federations use social media to communicate with their members (Broms, 2023) and sports teams often market themselves to increase interest from their fans (Filo et al., 2015; Nisar et al., 2018). Social media is also used in grassroots and community sports for communication between coaches, teams and parents, but there is a need for more studies regarding its specific uses and how adolescent engage with it (Goodyear et al., 2022).

Reputable content is important because it relates to the trusted sources of physical activity content online which have the largest influence of adolescents knowledge, attitudes and

behaviours. The evidence shows that trusted sources of physical activity knowledge on social media include relatable influencers and recognisable organisations.

2.4.4.3 Peer Content

Peer content relates to the influence of physical activity content posted by friends and acquaintances (Goodyear et al., 2019c). This includes the consumption and curation of sport, fitness, exercise, health and lifestyle content and the potential impact this may have peer norms, peer pressure, and feedback loops which can influence adolescent's attitudes and behaviours (MacIsaac, 2016; MacIsaac et al., 2023). Peer content can influence physical activity attitudes and behaviours by, for example, prompting adolescents to exercise to look a certain way (Goodyear et al., 2019b). This includes being motivated by and/or feeling guilt through comparing/getting feedback on bodies, physique or physical activity habits (Rich & Lupton, 2022). Some scholars have highlighted the risks associated with peer content, claiming that upward social comparison may encourage physical activity, but it can also lead to risks such as body dissatisfaction (Dane & Bhatia, 2023; Scully et al., 2023). However, evidence also suggests peer based physical activity content has a dual nature, where online peer groups can provide spaces which challenge peer pressure experienced offline, and provide positive motivation to engage in exercise (Plaisime et al., 2020).

2.4.4.4 Likes

Likes are strongly related to peer content and are a form of digital endorsement on social media posts which can influence what adolescent post about physical activity and how they assess the credibility of physical activity related posts (Goodyear & Armour, 2019). Likes

attribute status, and evidence shows that adolescents adapt what and how they post on social media based on getting more likes and positive responses from their peers (Chua & Chang, 2016; Goodyear et al., 2019a). Other research supports this, and online comparison with peers based on likes and followers can mediate social status, provide validation and influence if and how adolescents present themselves online (Jong & Drummond, 2016; Macisaac et al., 2018).

2.4.4.5 Key trends: Social Media for Inspiration and Motivation and the Negative Effect of Beauty Ideals

A key trend amongst social media and physical activity literature is that social media can be a source of inspiration for physical activity but this needs to be balanced against risks presented by upwards social comparison and the pressure of aesthetic ideals present on social media. Adolescent girls in Sweden have explained how social media can set the agenda for the socially acceptable 'infinite and largely unattainable body' (Ferguson et al., 2021 p.211), where girls are expected to be strong and skinny (Wiklund et al., 2019). The processes of critically navigating online pressures are similar in a UK context, where girls have expressed the pressured norms of navigating a 'not too skinny look' (Goodyear, Andersson, et al., 2021, p. 9). This is similar and gender specific for adolescent boys who have expressed pressure to be 'ripped' through social media content (Goodyear & Quennerstedt, 2020). It has been suggested that physical activity content on social media supports physical activity by modelling behaviours, however the presence of unattainable ideals is seen as a factor which is common and potentially demotivational (Nuss et al., 2023). This is not to denigrate the capacity of adolescents to navigate these pressures and to build

resilience against societal pressures; For example, adolescents have signposted the importance of adults (e.g., teachers, sports coaches) as important safety nets who can help them navigate physical activity content on social media (Wiklund et al., 2019). There is also ample evidence of adolescents engaging with body positive content and alternative body ideals (Papageorgiou et al., 2022), navigating aesthetic ideals through memes, hashtags, irony and humour (Goodyear & Quennerstedt, 2020), and through online self-expression and participation (Goodyear, Andersson, et al., 2021).

2.4.5 Conclusion

The research suggests that adolescents are exposed to inspirational and motivational physical activity related content through social media, indicating that social media should be considered as a legitimate source of learning and influence on adolescent physical activity behaviours. While there is evidence of some of the risks associated with engagement with physical activity related social media content (e.g., body satisfaction), adolescents have demonstrated a capacity be critical consumers and producers of that content. In this space, adolescents also consider adults (such as teachers and parents) to be important sources of knowledge and support for physical activity and social media. Collectively this evidence shows that interventions can use social media as a valuable tool to motivate and inspire adolescent physical activity and to help them navigate the risks.

2.5 Social Media based Physical Activity Interventions

The following section focuses on how social media has been positioned within interventions to support and/or promote physical activity. In contrast to the previous section which

explored how social media is used informally by adolescents in relation to physical activity, this section will explore how social media has been used in a more formal and targeted manner by groups of people to change physical activity.

In their meta-analysis of behavioural interventions delivered through interactive social media for adults, Petkovic et al. (2021) found an increase in MVPA by an average of 28 minutes per week. A further systematic review of social media interventions showed how social media has been used diversely and successfully to improve physical activity and diet (Goodyear, Wood, et al., 2021). In this systematic review, social media sites such as Facebook, Pinterest, Reddit, and Twitter facilitated behaviour change through mechanisms such as information, interaction and gamification (Goodyear, Wood, et al., 2021). Information related to educative materials, guidance, shared media and personalised content, interaction included community support and real-time coaching/counselling, and gamification related to incentives, competitions, challenges and rewards (Goodyear, Wood, et al., 2021). The forthcoming sub-sections use these three mechanisms to examine the potential of social media based physical activity interventions for adolescents. However, due to a limited number of studies with adolescents in this area (Plaisime et al., 2020), the following sections will make wider reference to adult populations and other health-related outcomes, such as diet and lifestyle.

2.5.1 Information

One key advantage of social media interventions is their ability to reach a wide population and potentially sustain improvement in health-related behaviours (Maher et al., 2014;

Plaisime et al., 2020). This includes online interventions which have successfully used information sharing as a mechanism to increase physical activity amongst adolescents (McIntosh et al., 2017). For example, reminders of healthy behaviours through notifications show promise as a mechanism to support physical activity (Ryan et al., 2017). Social media has been more widely used as an information delivery platform for adults, offering personalised nutrition advice (Chau et al., 2018), group coaching for weight management (Willis et al., 2017) and, healthy lifestyle education (Wang et al., 2021). Evidence suggests that effective messaging on social media to increase physical activity amongst adults needs to include information about the intrinsic benefits of physical activity, share physical activity resources (e.g., tips, tricks, workouts) and to signpost accessible opportunities (e.g., local events, clubs, gyms) or products (González-Serrano et al., 2024).

While existing evidence is limited, what does appear suggests that social media may also be a feasible approach to deliver physical activity information to adolescents. For example, an 8-week intervention used Facebook for the delivery of motivational posts, local physical activity opportunities and other physical activity information (Wojcicki et al., 2014). The findings showed a small but significant increase in leisure time physical activity and high participant engagement and satisfaction with the intervention (Wojcicki et al., 2014).

Information is a mechanism which emphasises the dissemination of physical activity content independent of the interactive affordances of social media (see next section: interaction). The advantages of using social media for information is the real-time delivery of multimedia which can be tailored to support healthy behaviours by providing reminders and knowledge to support physical activity (González-Serrano et al., 2024). There is a general lack of age

relevant health-related information for adolescents on social media (Plaisime et al., 2020), and the type of physical activity information they would engage with and benefit from in a physical activity intervention is a key gap in the literature. Future studies may draw inspiration from the co-design approach used by Malloy et al. (2024) to develop a nutrition-based social media page for university students. In this study, young women aged 18-24 co-designed content for a nutrition-based Instagram account. Their insights into existing uses of social media and the challenges they faced provided valuable understanding which informed the design of the intervention. Considering the gaps in the literature and the lack of age-relevant physical activity information for adolescents, the use of participatory methods (e.g., Malloy et al., 2024) shows promise as a means to develop engaging and relevant information for adolescents on social media.

2.5.2 Interaction

The ease of use and ongoing real-time interaction facilitated by social media (e.g., likes, comments, emojis, GiFs) provides the potential for peer-supported and network-based physical activity interventions (interaction). Social support through social media (e.g., group chats, discussion forums) is one of the most utilised affordances of social media in online public health interventions with adults (Giustini et al., 2018) and diet/nutrition interventions with adolescents (Chau et al., 2018). For example, in their review of public health and medical interventions using social media (also called e-health), Giustini et al. (2018) found that interaction with similar peers who can share tips and information with each other was welcomed by participants. In their review of social media based diet/nutrition interventions with adolescents, Chau et al. (2018) found that most interventions used group chats and

forums for social support; however, while these group chats were effective, they also noted that online engagement decreased over time. Both review studies highlighted that social media was a feasible component of many interventions, but the isolated contribution of social media to intervention effects was difficult to assess.

Social media has often been used to provide increased real-time social support to motivate engagement with physical activity. For example, a study with 18-year-old girls found that a Facebook walking group had significantly higher increase in steps per day in comparison to a group without social media support (Rote et al., 2015). An additional study with university students (age 21-51) highlighted how social comparison and encouragement from anonymous peers increased engagement with organised exercise activities (Zhang et al., 2015). Maher et al. (2015) found motivation and feedback from peers in online groups to be valuable features of a Facebook-based physical activity intervention (Age 18-65). However, despite an increase in self-reported physical activity in the intervention group, objective data showed no significant change in physical activity levels (Maher et al., 2015).

The available evidence regarding social media interventions to promote physical activity amongst adolescents is explorative in nature. For example, a qualitative study with adolescent girls highlighted how participants wanted a social media intervention to promote self-improvement through sport, exercise and fitness (Van Kessel et al., 2016). Opportunities for socialising with peers was an appealing aspects of a future social media based physical activity intervention, however, the participants also expressed how pressure and social dynamics could reduce engagement (Van Kessel et al., 2016). The importance of interaction with peers in a social media intervention to promote physical activity was also reported by

12–14-year-olds in Belgium (Van Dyck et al., 2019). They expressed how Facebook events could provide opportunities for social physical activities driven by friendships and shared interests. Overall, these suggestions from adolescents show how information and interaction can work simultaneously to promote physical activity through social media.

Interaction is a central affordance of social media, particularly for adolescents who use social media more with peers than adults do (Swedish Internet Foundation, 2023). However, the use of social media with peers has mostly been explored with adults who support and encourage each other online. While adolescents consider interaction with peers to be an important aspect of a social media intervention which promotes physical activity, more evidence is needed to understand how social dynamics may support or hinder their engagement.

2.5.3 Gamification

Gamification refers to features such as competitions, challenges, leader boards, incremental rewards and virtual prizes which are effective and powerful component of behaviour change in online physical activity interventions with adults (Mazeas et al., 2022). Physical activity interventions with adults and specific to social media show that weekly challenges and competitions are often the most popular mechanisms, and they often facilitate significant improvements in physical activity levels (Goodyear, Skinner, et al., 2021).

Gamification is a popular and potentially effective mechanism which has shown promise online settings with adolescents. For example, exergames have shown potential to support children and adolescents engagement with physical activity (Goodyear, Skinner, et al., 2021;

Mazeas et al., 2022). While there is limited evidence of gamification being used in combination with social media, evidence suggests that it is an engaging mechanism in school-based physical activity interventions (Goodyear, Skinner, et al., 2021). This includes, how step counters are feasible and acceptable when combined with team competitions, individual prizes, team cash prizes and individual weekly rewards in schools (Rekesh et al., 2018). A gamified school-based team step challenge has also shown good feasibility through high levels of engagement and positive feedback from students (Corepal et al., 2019). While social media was not a central component in this study, it was used in the follow-up period as a space for the research team to share information and for participants to share progress (Corepal et al., 2019).

Although gamification shows promise as a means to engage adolescents with physical activity, the main gaps in the literature are in relation to the combined use of gamification strategies with social media. Also, as many studies have prioritised feasibility, there is a need for more evidence regarding the efficacy of gamification using social media amongst adolescents.

2.5.4 Conclusion

Overall, social media interventions provide promise as a tool to support physical activity engagement in adult populations (Günther et al., 2021), but there is limited evidence of social media being used to support adolescents. Most studies with adolescents include discussions about the design of a social media intervention to support physical activity or the interventions have used Facebook—which is no longer a popular platform amongst

adolescents (Swedish Internet Foundation, 2023). This highlights a key gap in the literature, where there is a need for more evidence of how social media can be utilised to support physical activity with adolescents.

The following section outlines how schools are a valuable context to support adolescent physical activity using a whole-school approach. Using the existing evidence, it provides an overview of how social media has been used in to support physical activity in schools. This foregrounds the reiteration of the aims and objectives in this the thesis.

2.6 Schools as a Context to Support Adolescents Physical Activity and to use Social Media

In Sweden, the school day accounts for approximately 35% of adolescents' daily engagement in MVPA (Swedish Public Health Agency, 2019), and schools are key sites to support physical activity (Daly-Smith et al., 2020). Schools provide adequate structures and facilities to support engagement with physical activity (Larsson & Jakobsson, 2023; World Health Organization, 2021b), and evidence indicates that Swedish adolescents are significantly more physically active and less sedentary during weekdays and during school-hours than on weekends (Nyberg, 2017).

2.6.1 Schools and Physical Activity

As part of their mission to improve global health, the World Health Organisation has established targets to achieve a 15% reduction in physical inactivity by 2030 (World Health Organization, 2018). Drawing upon their physical activity recommendations for adolescents,

the World Health Organizations' action plan signposts the important role schools can play to support a strong foundation for lifelong physical activity (World Health Organization, 2018).

Schools are encouraged to promote and support physical activity engagement for a number of reasons, including reported benefits for mental health (Biddle et al., 2019; Lott & Jensen, 2016) cognitive functioning (Erickson et al., 2019; Vazou & Smiley-Oyen, 2014), attainment (Watson et al., 2017), attention (Álvarez-Bueno et al., 2017), educational outcomes later in life (Kari et al., 2017), and improved behaviour (Watson et al., 2019). Taken together, the evidence highlights the importance of physical activity promotion in schools for supporting adolescents overall development (Bull et al., 2020).

Based on the evidence of the benefits of physical activity, schools in Sweden are mandated to support physical activity during the school day. Recommendations from the Swedish government state that:

> Students should be provided with opportunities and be encouraged to take part in health promoting physical activities during the school day. When physical activity is a natural part of the students day, their education can contribute to the understanding of how it can affect their health and wellbeing.
>
> *(The Swedish National Agency for Education, 2019, p. 15)*

These recommendations are largely grounded on making physical activity more habitual and encouraging the internalisation of physical activity benefits during childhood and early adolescence. A key point to consider is how recently this guidance was published (2019), and it is the first of its kind in Sweden. The formal role of schools in promoting physical activity through national strategies and guidelines is in its infancy in Sweden, particularly by

international comparison (see for example, Finland, UK, USA, Denmark). The key differences between Sweden and other comparable countries is the lack of more collective and national level initiatives which develop, implement and review physical activity in schools. A recent analysis of physical activity in Swedish schools indicates the need for increased provision for physical activity, with only 47% of schools offering regular organised physical activity opportunities (Annwall et al., 2023). Driven partly by new government recommendations, whole-school physical activity strategies have increased significance in this context.

2.6.2 Whole-School Physical Activity

Systematic reviews of school-based physical activity interventions show increases in physical activity between five to 45 minutes per day (age 6-18) and a mean increase of approximately four minutes per day (Dobbins et al., 2013; Metcalf et al., 2012). A further review shows how half (47-65%) of school-based physical activity interventions were considered effective, but most promise was shown when a multi-component approach was used (Kriemler et al., 2011). This approach brings together the curriculum, school environment and home environment, and offers a more holistic approach to supporting physical activity across the whole day rather than an approach focused on school alone (Russ et al., 2015). In line with a multi-component approach, it has been suggested that school-based interventions need to better address the constraints of the adolescent environment within and beyond the school, particularly if the least active adolescents are to be supported (Love et al., 2019). This includes the inclusion of multiple key stakeholders (i.e. parents, school leaders and teachers) as a means to increase physical activity engagement (Messing et al., 2019; Sevil-Serrano et al., 2020). Engagement with multiple stakeholders is also important in relation to long-term

success of school-based physical activity intervention, as the social structures which can support physical activity are often overlooked (Larsson & Jakobsson, 2023).

An example of an effective multi-component school intervention is a two-year intervention that increased daily MVPA by approximately four minutes by forming community links, focusing on physical activity in the physical education, and providing information to parents (Sutherland et al., 2016). An additional intervention observed significant increases in the attainment of daily physical activity goals (24% to 65%) by promoting healthy lifestyles through information for the school community, curriculum changes, and extracurricular activities (e.g., bike to school week) (Sevil et al., 2019). While each school may need to adapt the multi-component approach to suit their context (Daly-Smith et al., 2020), this holistic approach has garnered consensus as best practice, where the opportunities to support physical activity are optimised by drawing together multiple stakeholders and extending beyond the school context.

A holistic approach is also an important aspect of understanding the impact of school-based physical activity interventions. For example, in 2014 Denmark made 45 minutes of physical activity a national requirement in schools (age 7-17 years) but this was not multi-componential. While this resulted in increases to school-time moderate-to-vigorous activity by 6.5 minutes per day, longitudinal results showed that physical activity outside of school decreased during this time (Pedersen et al., 2023). Overall, the effectiveness of a holistic multi-component approach to school-based activity interventions has been shown and is reflected in the current recommendations and guidance for schools (Lee et al., 2019).

2.6.3 Social Media to Support Physical Activity in Schools

Despite the potential social media has to support physical activity interventions and to address the opportunities and constraints in adolescents' digital and social worlds (see van Sluijs et al., 2021), the literature in this area includes mostly proposals and suggestions. Overall, there is limited evidence of how schools have approached social media to support physical activity.

Scholars have suggested that schools should use social media as a pedagogical tool helping adolescents develop their physical activity related knowledge, attitudes and behaviours (Bopp & Stellefson, 2020), and they can help to shape the narrative regarding social media and health (Goodyear, 2019). The majority of proposals in this area are focused on teaching in physical and health education, where teachers can draw upon existing ways adolescents engage with physical activity content on social media (Wilson et al., 2023). For example, it has been proposed that physical and health education teachers need to engage directly with the physical activity content their students consume on social media as a means to address misconceptions and understand their learning (Goodyear, 2021; Wilson et al., 2023). Others have suggested that teachers should consider explicitly addressing how the form of social media influences physical activity content, or to focus more specifically on understanding the affective responses of adolescents to social media use (Kirk, 2019). This connects to suggestions from Cale (2019) who has articulated that the success of future interventions is based on continued efforts to better understanding how adolescents engage with social media for physical activity.

One example of physical activity promotion in schools using social media is provided by Taylor (2021) who conducted a pilot study where secondary school PE teachers encouraged adolescent students to publicly post or privately send pictures of their healthy lifestyle activities outside of school each day. The findings showed that social media provided key insights into the physical activity engagement of their students, but that there was a high level of resistance from students. This singular example and the rejection of the approach by many participants highlights the need to develop shared understandings of social media use and to co-produce school-based approaches with adolescents (see Enright & Gard, 2019).

Given the focus on physical activity and social media in this thesis, the recent findings of Nyberg et al. (2021) are particularly pertinent. Their cross-sectional study in Sweden showed that school phone-bans were associated with a small but significant increase in physical activity among 13–14-year-olds. Specifically, an additional four minutes of MVPA per day were shown by adolescents at schools where a phone ban was implemented. While the cross-sectional design limits understanding of causality, this evidence suggests that prohibiting phone use in schools may support adolescents physical activity engagement during the school day.

Overall, the use of social media to support physical activity engagement in schools is limited and proposals are often restricted to physical and health education. The absence of multi-component approaches and the views of adolescents in this space highlights a gap in the literature. The current evidence for schools related to social media also sends a mixed message. On one hand social media is a source of inspiration, motivation and learning which schools can draw upon and engage with. Simultaneously, some literature suggests that

prohibiting engagement with smartphones and social media could support physical activity in schools.

2.6.4 Conclusion

This final section has outlined the significance of schools as an ideal setting for providing and promoting physical activity. It has reported on the potential of school-based physical activity interventions and the importance of a whole-school approach. Such interventions are underdeveloped in a Swedish context and the importance of physical activity during the school day has only recently been emphasised by the ministry of education. A notable gap in the literature also included the use of social media as a resource in school-based physical activity interventions. Overall, the school has a potentially powerful role in supporting physical activity behaviours via social media, but there is a lack of robust evidence on how this can be achieved.

2.7 Chapter Conclusion

The literature review has highlighted the importance of supporting adolescent physical activity and the need for further innovation following two decades of limited changes in MVPA. The review has also explored the influence of social media on adolescents' engagement with physical activity and how this represents a noteworthy departure from the experience of previous generations. The research in this chapter has shown that social media may not be a significant threat to physical activity as is espoused in public discourse and social media is a popular means through which adolescents seek inspiration and motivation for physical activity.

Engagement with physical activity content through social media is weakly associated with risks such as worsened body image, but the evidence also indicates that adolescents develop strategies to navigate these risks critically. In response to the risks associated with social media, there is a wealth of research which seeks to inform social media policy and to protect young people. However, there is also a need to help them optimise the benefits of social media use; This includes helping them to develop their online resilience and to optimise their use of social media to support physical activity engagement.

Social media has been used widely and successfully in physical activity interventions with adults, however there is a lack of understanding of and how it can be effectively used with adolescents. Schools have been identified a key context to support adolescent physical activity and a whole-school approach is the most effective way to achieve this. Nonetheless, there is a need to further explore the potential role of social media in school-based physical activity interventions.

2.7.1 Aims and Objectives

The aim of this project was to develop new understanding of how social media can be used in schools to support and enrich adolescents knowledge, attitudes, and behaviours related to physical activity. The overall design of the research questions was based on co-producing knowledge with adolescents (RQ1), school staff and parents (RQ2), to implement a school-based social media intervention to promote physical activity. During the research process, and based on an iterative approach to data collection, the primary outcome focus for RQ3 changed from physical activity to mental wellbeing.

Research Questions

RQ1: What school-based practices do adolescents report will support them to use social media to improve their knowledge, attitudes and behaviours related to physical activity?

RQ2: What school-based practices do school leaders, teachers, and parents report will support adolescents to use social media to improve their knowledge, attitudes and behaviours related to physical activity?

RQ3: What is the feasibility and acceptability of a school-based social media intervention focused on improving adolescent wellbeing?

Chapter 3: Methodology

3.1 Introduction

This chapter is structured within two main sections: (i) Participatory and Complex Intervention Design and (ii) Research Methods. Following an overview of the research paradigm rationale and research positionality, the first section presents the rationale for using participatory research methods, beginning with an overview of participatory research approaches. The adoption of the complex intervention design framework (O'Cathain et al., 2019; Skivington et al., 2021b) as an overarching framework for the thesis is then explained. The Research Methods section outlines the initial logic model (or theory of change) (Weiss, 1997) that informed the construction of the thesis, and provides details of the mixed methods approach.

3.1.2 Paradigm Rationale

The research questions and overarching approach to the research across the thesis were designed with a pragmatic stance (Creswell, 2003) and were not universally aligned with ontological and epistemological positions across the constructivist and positivist continuum (Morgan, 2014). Instead, the choice of methods (which may typically align with constructivist and/or positivist ontological and epistemological stances) were driven by the research questions, which, in turn, were guided by gaps in the existing evidence and the researchers beliefs about them. As shown in the review of literature, multiple sources of evidence which assumed a variety of ontological and epistemological stances were considered equally. Thus,

the rationale for using pragmatism as a paradigm for the design of this thesis was the desire to produce socially useful research which draws upon the strengths of knowledge produced across methods typically aligned with different worldviews (Feilzer, 2009).

In this thesis, both constructivist and positivist worldviews were acknowledged and drawn upon based on their ability to reach practical outcomes and to drive the inquiry set out by the research questions. While there is some criticism to this non-dualistic approach from a paradigmatic level (Lipscomb, 2008), mixed methods research continues to flourish and expand across disciplines due to its ability to address complex research (O'Cathain et al., 2015). Moreover, pragmatism as a methodological paradigm has been explored and established in the literature (Feilzer, 2009). For example, Morgan (2014) draws upon Deweyan pragmatism as a pluralistic way, focusing on the practical consequences and problem-solving, prioritisation of multiple voices and a collaborative approach to research. This approach not only expands pragmatism beyond a worldview which is assumed because it is aligned with multiple methods (Feilzer, 2009), but it focuses on the nature of researcher driven inquiry on experience, beliefs and how they are connected. The forthcoming chapters will evidence these principles of pragmatism and the forthcoming section will outline the positionality of the researcher. This is a key consideration because were the central actors within the inquiry process within the thesis.

3.1.3 Researcher Positionality

Research is largely a human experience, based on the beliefs and actions of researchers at work (Morgan, 2014). Thus, the purpose of outlining the positionality of the researcher is to

provide the reader with important insights into the context of the research and the background of the researcher as a means to understand how data was produced and interpreted to create new knowledge (Manohar et al., 2017). Part of the rationale for outlining researcher positionality is to understand what has been referred to as the insider/outsider perspective (Dwyer & Buckle, 2009), where the similarities between the researcher and the researched and details of their relationship provide important understandings of their closeness to the research participant and the topic of the research (Manohar et al., 2017). The importance of setting out positionality is also grounded in the influential and central role of the researcher in the participatory and analytical phases of the research (Muhammad et al., 2014).

Researcher positionality can provide information into the decisions made across the research process, extending beyond interactions with participants and influencing aspects such as methodological choices and analytical decisions. Braun and Clarke (2019) emphasise this point, and express how qualitative research methods are not a set of rigid procedures but a process of decisions and actions which should be deliberate, thoughtful, deliberative and reflexive. The approach from the design and implementation to the analysis and write-up phases of this thesis did not assume or apply an external theory from the outset, instead theory was chosen in response to the data (e.g., self-regulation in Study 3). No explicit theory was used in Study 1 and 2, neither were they absent of theory (Smith & McGannon, 2017). As a means to understand how theory was applied in this thesis and as a means to

understand their insider and outsider perspective a narrative of the researchers background and positionality will be presented (De Lyon, 2018)[1].

> I am a white male born in the UK in 1990. My background is a physical and health education teacher who trained as a teacher in the UK. Directly after completing my teacher training I moved to Stockholm, Sweden where I worked at a newly started international school. Since moving to Sweden over 12 years ago I have learnt the language and feel like an insider in society. However, there are part of my professional experience and background which make me an outsider in Swedish contexts. Specifically, my background, education and professional experiences largely reflect a UK or international standpoint.
>
> Being the sole teacher at a new school had a profound impact on my approach to research to this day and I did not experience the occupational socialisation reported widely in the literature (Curtner-Smith, 2010). Instead, I joined the workforce as a physical and health education graduate with the freedom to develop a new curriculum, continuing to apply the knowledge from my four years at the University of Worcester. As a teacher within the International Baccalaureate (IB) program, I have become a strong advocate for concept-based teaching where the transfer of conceptual knowledge facilitates interdisciplinary understanding.
>
> Since my university education in Physical Education and Sports Coaching Science I have been a passionate advocate of models-based practice and student centred-pedagogy. For example, the work of Dyson et al. (2004) was a key driver in my advocation for student-centredness and I went on to publish work focused on how students discuss their learning, co-construct knowledge and are influenced by power dynamics (Jones et al., 2023; McKeever & Runceanu, 2022). My continued interest and student-discussion and the co-construction of knowledge is reflected in the design of the studies in this thesis and how co-production is approached. Where the collective construction of knowledge through dialogue and mutual understanding reflects my pedagogical beliefs which are grounded in social constructivism. My previous work has also drawn upon Deweyan pragmatism, where I have prioritised understanding what works in school and used by teachers in their daily practices (see McKeever & Runceanu, 2022; Morgan, 2014).

[1] The narrative is presented in first person.

> A final, yet equally relevant part of my positionality as it related to my work in this thesis includes to values of democracy and power. While I was largely disinterested in political, social and philosophical work when I moved to Sweden, I have become increasingly engaged with these topics. My published work on power relations in physical education reflect this to an extent, where myself and the co-authors explore how hierarchical power dynamics can be disrupted in a pedagogical context (Jones et al., 2023). The democratic values which I assume are also reflected in the construction of this thesis, where work with a range of key stakeholders central to all of the studies.
>
> From an insider/outsider perspective, it is important to note that one school took part in all of the three studies in this thesis and I was still an employee of the school on study leave. My insider role at the school facilitated their participation in the studies, where I had direct access to members of the school leadership team. As an insider I had not taught the adolescent participants previously, however, I may have been someone they recognised. The advantages of the insider perspective when conducting research at this school was grounded in my understanding of the teachers, school practices and policies they referenced. An additional insider role I assumed in the research was a teacher, where I could relate to other teachers as a colleague. This was largely the opposite for my work with adolescents and parents, where I had little understanding of their experiences, particularly in relation to social media.

This excerpt on researcher positionality helps to further illuminate the relationship between the researcher and the research in this thesis. While the work in this thesis is firmly grounded in the literature, the positionality of the researcher goes some way to unpacking the central role of the researcher in interpreting and applying theory and knowledge. With that said, the work in this thesis also required collaboration, and a number of key collaborators are shown in Table *1*. The names, initials and roles of these people are shown and they will be referred to throughout the thesis.

Table 1: The Lead Researcher and the Key Collaborators who are Signposted in this Thesis

Initials	Name	Role
JM	Jonathon Mckeever	The lead researcher and author of this thesis
VG	Dr Victoria Goodyear	Lead supervisor (2020-2024)
JT	Dr Janice Thompson	Second supervisor (2020-2021)
CW	Dr Colin Webster	Second supervisor (2022)
WP	Dr Will Patz	Critical friend

3.2 Participatory and Complex Intervention Design

Building on the literature discussed in Chapter 2, current understandings on how adolescents use social media are grounded in adult perceptions of risk and not the complex and dynamic ways in which they engage with social media (Orben, 2020a; Trust, 2018). A youth participatory action research project conducted by Goodyear and Armour (2018) emphasised the disconnect between adult and adolescent perspectives. Specifically, how adolescents perceived social media practices in schools to be irrelevant and misaligned with their own experiences (Goodyear et al., 2019c). A key outcome from this research were strong recommendations for better collaboration between adults (including, school staff, researchers) and young people (co-production), as means of moving school-based social media practices away from a primary emphasis on risk avoidance and towards more meaningful digital practices (Enright & Gard, 2019; Goodyear, 2019). The underlying principle of this recommendation is consistent with broader critiques of social media

research, which claim that practices designed for young people are often not effective because they are developed solely from adult perspectives and fail to adequately consider the experiences and viewpoints of adolescents (Orben, 2020a; Orben et al., 2020).

To effectively address these limitations and to design school-based interventions that optimise health related outcomes (e.g., physical activity), it has been suggested that research should aim to develop a more nuanced understanding of adolescent needs as they relate to social media (Parry et al., 2021; Throuvala et al., 2020). Building upon social media related participatory approaches in schools used by Goodyear and Armour (2018), an exploration of participatory research methods in intervention development was conducted. This was done as a means to identify the most suitable approach for the development of a school-based intervention which focuses on using social media as a resource in a school-based physical activity intervention.

3.2.1 Participatory Research Approaches

Participatory research is an umbrella term for research which values the inclusion of participants in shaping and influencing the research process and outcomes (Cargo & Mercer, 2008). Vaughn and Jacquez (2020) emphasise the flexibility and wide application of participatory research by identifying over twenty research methods where participatory strategies are applied throughout the research process. According to this literature, participatory research methods can incorporate traditional participatory approaches like action research, or adopt 'participatory choice points' to strengthen their participatory nature (Vaughn & Jacquez, 2020). Fundamentally, participatory research prioritises the

engagement of stakeholders who are the intended beneficiaries of the intervention, initiative, or scheme (Bergold & Thomas, 2012).

Participatory research in the global north has often been conducted within an action research framework and this is still one of the most popular approaches (Bergold & Thomas, 2012). The history of action research can be derived from the work of Kurt Lewin in the late 1930s, where he advocated for the use of democratic principles to improve workplace productivity (Adelman, 1993). Cyclical processes of critical reflection, dialogue, decision making and action were conducted as a means to bring about social change, and typically with people who were oppressed (Adelman, 1993). The Lewin lineage has led to multiple iterations of action research, such as; action science, action learning, appreciative inquiry, community based action research, living theory, participatory action leadership action research, participatory action research and, activist approaches (Morales, 2019).

Iterations and applications of action research beyond Lewin in schools first occurred in the USA (Corey, 1953) and UK (Elliot, 1991) in the 1950s and 1960s. Action research has since been used as an effective framework for school improvement, pedagogical development and to develop solutions addressing context specific challenges (Atweh et al., 1998; Feldman et al., 2018). For example, teachers have used action research to integrate technology into the physical education curriculum (Bodsworth & Goodyear, 2017; McKeever & Runceanu, 2022), to support the implementation of pedagogical models in physical education (Casey & Dyson, 2010; Goodyear, 2017), and to improve inclusive teaching practices (Messiou & Ainscow, 2020). The work of other key action research figures (for example Elliot, 1991) emphasised the efficacy of the action research framework for curriculum reform, an approach which has

commonly being applied as a framework for professional development or pedagogical innovation in school contexts (Morales, 2019). As a consequence of action research's diversification, further taxonomies such as, 'critical' or 'critical participatory' action research have emerged. These approaches re-emphasise the pursuit of social change, critical theory, and/or the centrality of participants in the research process (Kemmis et al., 2014).

3.2.2 Participatory Action Research and Its Role in Intervention Design

Participatory action research is a form of action research where the participants take on a more active and collaborative role, and where they contribute throughout the planning, implementation and sharing phases of the action research cycle (Chevalier & Buckles, 2019). Branches of participatory action research include community based participatory research (Coughlin et al., 2017), and youth participatory action research (Anyon et al., 2018), where the key difference is the study population (community/youth). Participatory action research is commonly grounded upon a collaborative and systematic learning process between researchers and participants which includes; authentic participation, meaningful action, empowerment and mutual benefit (McTaggart, 1997; Minkler & Wallerstein, 2011).

Participatory action research has shown efficacy as an approach to develop school-based interventions (Anselma, Altenburg, & Chinapaw, 2019), and has also been put forward as a powerful means to transform education regarding the use of social media and other digital technologies in schools (Enright & Gard, 2019). In part, the growing use of participatory action research in schools is supported by the emphasis on children's rights as established by the UN charter (UN General Assembly, 1989), and the assertion that children and

adolescents have the capacity and the right to transform their social context for the better (Cammarota & Fine, 2008; Chambers et al., 2023). Participatory action research and youth participatory action research have been widely used with children and adolescents in school and community settings to achieve outcomes ranging from the inclusion of youth voice in organisational change to community awareness and fostering positive youth-adult relationships (Shamrova & Cummings, 2017). Youth participatory action research has shown particular popularity and promise in schools in the USA to promote social action, such as improving the social determinants of health (Anyon et al., 2018). The organisation and involvement of youth participants in a school-setting is not without challenges, such as maintaining student engagement and cultural/organisational friction (Ozer et al., 2010). While these interventions are grounded in democratic values, there are also important organisational principles such as youth training and the time invested needed to conduct them successfully (Bradbury-Jones & Taylor, 2015). This often results in small youth action groups or panels who represent a wider local population (see Anselma, Altenburg, & Chinapaw, 2019).

A scoping review of parent and child participation in health interventions shows that a range of *'participatory'* action research frameworks such as participatory action research, community based participatory research, and youth participatory action research were used to include young people in the research process (Crowther et al., 2023). A third of the reviewed studies used community based participatory research as a framework and only a small proportion of the studies used a participatory action research framework (Crowther et al., 2023), indicating that there are diverse approaches to including participants in

intervention development and delivery. Referencing a further scoping review by Larsson et al. (2018), participatory interventions aimed specifically at health and wellbeing promotion with young people rarely incorporated participatory action research. Instead, alternative methods such as public and patient involvement (PPI), novel participatory designs, and co-production were used to design intervention (Larsson et al., 2018). While there is much heterogeneity between 'bottom up' approaches such as participatory action research and PPI/ co-production, the latter are widely applied in public health and medical-based literature. This led to considerable reflection for Study 1 and 2 in this thesis, where the emphasis was on how young people can use social media to support physical activity in schools. While this focus intersects with the usual settings and populations for action research (i.e., schools), it also considers health-related outcomes. The prevalence of co-production in the medical and health related literature and the limited representation of participatory action research with general populations led to further exploration of the PPI and co-production literature.

3.2.3 The Importance of Co-production in Research

Co-production is a more refined form of PPI which emphasises authenticity, inclusivity, and depth of engagement based on the insights and experience of stakeholders (Allen et al., 2020). The roots of co-production research can be traced back to the civil rights and social welfare in the USA (Ostrom et al., 1973), the Scandinavian approach to participatory design (Gregory, 2003), and developments in the delivery of healthcare in the UK in the 1970s and 80s (Realpe & Wallace, 2010). With the ultimate aim of enhancing healthcare and social policy services, the underlying principle driving the development of co-production was to

challenge hierarchical systems and to facilitate meaningful collaboration with service users (Realpe & Wallace, 2010). Although verifying the effectiveness of co-production can be challenging (Oliver et al., 2019), the approach aims to increase the effectiveness and appropriateness of interventions by incorporating multiple perspectives (Durose et al., 2017).

Co-production is primarily used in public health research where building relationships between researchers and communities is increasingly called for (Staniszewska et al., 2022; Tembo et al., 2021). Co-production has been defined as a 'participatory turn' which allows people to assert influence over research which relates to their lives (B. Smith et al., 2022). It has also been described as an 'emerging methodology' in the development of school-based health interventions because co-production can synthesise knowledge and experiences from multiple stakeholders to address complex outcomes in complex settings (Reed et al., 2021, p. 475). While there are multiple interpretations of co-production, in the UK the National Institute for Health and Care Research (NIHR) guidance is widely used, and where co-production is defined within the principles of power sharing, including all perspectives and skills, respecting and valuing knowledge equally, reciprocal benefit, and the development and maintenance of relationships (NIHR, 2020).

3.2.4 Co-production and Participatory Research: Methodological Choices

At a cursory glance, it is not easy to distinguish differences between participatory action research and co-production. They both place the participants as central influencers in the research process and employ a 'bottom-up' approach which challenges the traditional

hierarchies within research. Participatory action research and co-production have also been combined in research, indicating that they are not the same, and neither are they mutually exclusive. For example, one obesity prevention study used youth participatory action research and co-production to develop interventions across multiple schools (Anselma, Altenburg, & Chinapaw, 2019; Anselma, Altenburg, Emke, et al., 2019; Anselma et al., 2020). From this review of participatory methods, there is little to suggest that co-production methods differ markedly from those typically applied within youth participatory action research. These similarities led to the initial conclusion that the combined use of youth participatory action research and co-production was seemingly inconsequential. However, some key differences could be gleaned from the historical development of each approach and how they are used today.

Given the varied application of participatory action research and co-production across health and organisational research, it is apparent that the nature of knowledge and pathways to democracy are different. Participatory action research was founded on the idea that people drive change and thus dismantle power structures by taking on agency. Conversely, the application of co-production in healthcare and social policy is based on those with knowledge or power sharing responsibility with others who typically have little influence. This may, in part, be based on the capacity 'normal people' have to find solutions to their problems in a healthcare setting. For example, co-production may not be chosen as a means to develop health innovations (e.g., vaccines) but may be more readily applied as a means to understand why an intervention is needed—or most probably, how it can be delivered. When deciding the most appropriate participatory methods, it was therefore important to

consider how knowledge and power are viewed and the capacity of people to solve their problems.

Participatory action research and co-production show similar characteristics through their collaborative and participatory nature. They share the goal of producing practical outcomes that can inform policy and practice, highlighting the importance of generating knowledge together to bring about meaningful change. These differences are largely grounded in the outcomes and their consequent transferability/scalability. Specifically, participatory action research is distinctly cyclical, and aims to solve problems and change practices specific to a particular context. Co-production seeks to inform and develop services, which, dependent on the characteristics of the population and the co-production processes, can be transferred for the benefit of other people (Leask et al., 2019). Here the difference may be somewhat related to cyclicality, but more largely based on outcomes (i.e. praxis or services) and scalability (i.e. transferability of findings).

In conclusion, the efficacy of participatory action research at the intersection of non-clinical health interventions and school practices provides an appealing and suitable strategy to approach the use of social media as a resource for physical activity in schools. However, there are some limitations which relate to study focus, pathways to action and scalability/transferability of findings. Firstly, the participant-led identification of problems used within participatory action research can divert studies from their pre-identified focus, as they often require a broad approach to context specific barriers. For example, a large scale youth participatory action research project which focused on engaging youth in social action resulted in multiple projects, ranging from depression and suicide support to

contraception availability (Suleiman et al., 2006). Secondly, the fundamental principles underpinning the shift in the locus of control towards participants within participatory action research means that context specific challenges may take precedence over wider population level issues. The final limitation of participatory action research, in the context of this thesis, is the commonly narrow interpretation of context to a specific setting. While there are some examples of participatory action research which has scaled their findings (Kangovi et al., 2014), action researchers are generally uninterested in the application of their findings beyond the setting/context it was conducted (Herr & Anderson, 2014). As a result, action research is not aligned with the vision of a scalable population level intervention which can be tailored to suit context. While co-production may fall under the same criticism, there are examples of how it can be framed to consider the scalability of findings (Leask et al., 2019). As such, co-production appears to be a more appropriate method for incorporating the voices of both adults and youth in the design of interventions, particularly those intended for population-level impact.

Therefore, while collaborative methods and iterative cycles of knowledge production are used within participatory action research, co-production provides the flexibility to apply these principles in collaboration with adolescents in a way that better supports scalability. Participatory action research places larger emphasis on context specific interventions, whereas co-production is a versatile method that has been used in various ways to support intervention design (see Boote et al., 2016; De Rosis et al., 2020; R D Neill et al., 2022). Co-production also aligns with established methods of transferring and applying knowledge in different settings (Skivington et al., 2021a). The following section explores complex

interventions as a framework for intervention design that embeds co-production. Complex intervention design literature is then outlined as a way to support the design and test the feasibility of the intervention.

3.2.5 Complex Intervention Design

Given the complexities associated with developing and evaluating interventions in 'real world' settings, the Medical Research Council (MRC) in the United Kingdom (UK) produced guidance for so called 'complex interventions' around the turn of the century (Campbell et al., 2000). The inspiration behind this was, for example, a lack of adherence to medical treatments and the need to evaluate health interventions outside of clinical trials (Brian Haynes et al., 1996). Henceforth, to increase rigour and impact in research, multiple iterations of this guidance have been developed and widely employed (Campbell et al., 2007; Craig et al., 2008; O'Cathain et al., 2019; Skivington et al., 2021a). In their review of complex interventions, B. Smith et al. (2022, p. 4) define complex interventions as those with:

> Multiple behavioural, technological and organizational interacting components and nonlinear causal pathways and components that act independently or interdependently.

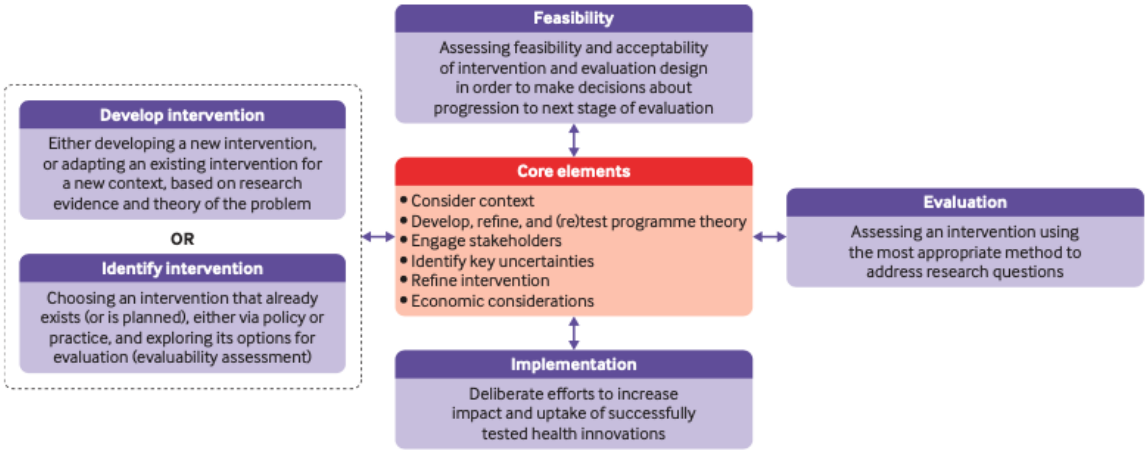
Thus, the definition of a complex intervention is not only based on the type of intervention but the width of the analytical lens in the research (Petticrew, 2011). The recent guidance on complex intervention design and implementation builds upon earlier definitions of 'multiple components' (characteristics) asserting that 'complexity' can also emerge when the

local/contextual factors can impact the outcomes of an intervention (Skivington et al., 2021a).

Early guidance emphasised how the theoretical underpinnings of a complex intervention require sequential phases of evidence building and feasibility testing (Campbell et al., 2000). Close engagement with relevant literature and the population where the intervention will be implemented provide a foundation for intervention development (Smith et al., 2015). This initial research serves as a basis for developing a theory of change (logic model) that guides the design, revision, implementation and evaluation of the intervention (Smith et al., 2015). The guidance is situated at the intersection between clinical and healthcare research, and applies multiple methodologies in the fields of health promotion/prevention (Minary et al., 2019). While the initial application of complex intervention design was intended for medicine and healthcare, other fields such as education, public health, psychology and social sciences have begun to apply the framework (for example Evans et al., 2015; Hasson, 2010; Shemilt et al., 2004; Wille et al., 2008). This has influenced current iterations of the MRC guidance, which have been adapted to consider multiple research fields (Skivington et al., 2021a, 2021b). The guidance on the development of complex interventions provides a structure for the design, implementation, evaluation and scaling-up phases of an intervention. The most recent framework includes four phases with flexibility regarding the movement between them; (i) development; (ii); feasibility; (iii) implementation; (iv) evaluation (O'Cathain et al., 2019; Skivington et al., 2021b) (see Figure 1). Forthcoming reference to complex intervention design draws from this the most recent MRC guidance (see Skivington et al., 2021a, 2021b), and a further more detailed paper which has heavily

informed this guidance (see O'Cathain et al., 2019). The complex intervention design framework (see Figure 1) includes (i) identifying and/or developing an intervention, (ii) assessing the acceptability and feasibility of the intervention, (iii) evaluating the intervention in a larger scale trial, and (iv) implementing the intervention widely. One key difference between Figure 1 and previous iterations of the framework is how the process for intervention development may not be cyclical but movement within each phase is flexible and dependent on a judgement of the findings.

Figure 1: The Complex Intervention Design Framework



(Skivington et al., 2021b, p. 4)

Co-production has been extensively applied as a participatory approach to design complex-health interventions and applied health services (Lim et al., 2020; H. Smith et al., 2022). Recent evidence and guidelines demonstrates a growing emphasis on the importance of co-production in the design of school-based interventions, and the need to involve multiple stakeholders to address the distinct characteristics of educational settings (Daly-Smith et al., 2020; R D Neill et al., 2022). As a result, complex interventions which use co-production are becoming more common in school settings. For example, Maciver et al. (2021) conducted workshops with school staff to co-design an inclusion framework for local schools. Lindqvist et al. (2023) used qualitative research with parents and children to inform the design of an active travel to school intervention. A further example from a school context includes co-production to reduce exam stress, with a wide range of pupils, teachers and school leaders designing and refining the intervention (R D. Neill et al., 2022). Co-production can also be used to adapt existing practices in schools, as shown by a mental health study which used

engagement with a transdisciplinary group to re-design existing school mental health and wellbeing services (Gobat et al., 2021). Overall, the increasing adoption of co-production in designing complex interventions for school settings demonstrates its potential to address the research questions in this thesis.

The principles for developing interventions should be dynamic, iterative, creative, and flexible, while also taking future evaluation into consideration (Skivington et al., 2021a, 2021b). This can include activities such as drawing on existing evidence and theories, developing new theories, gaining an understanding of context, engaging with stakeholders, and working collaboratively (O'Cathain et al., 2019). One valuable aspect of the MRC guidance is how principles and actions are applied to gain a better understanding of the problem and an understanding of existing and future solutions (Skivington et al., 2021a, 2021b). The development phase can be iterative, and flexible based on findings. For example, intervention development may inform a comprehensive intervention underpinned by a theory of change, or equally, it may conclude that there is no feasible intervention, or that an effective approach already exists (O'Cathain et al., 2019; Skivington et al., 2021a, 2021b). One particular strength of the most recent guidance for complex intervention design is an emphasis on the potential use of pre-existing theories and/or interventions with new knowledge produced through engagement with stakeholders (see O'Cathain et al., 2019; Skivington et al., 2021b). This approach is particularly relevant to this thesis, where co-production and emerging findings can be used to inform the design of the intervention (see Chapter 6). Drawing upon the work of O'Cathain et al. (2019) and their actions for intervention development, the co-production in this thesis (see Chapters 4-7) represented a

target-population and implementation based approach. This meant that real-word uptake of the intervention was prioritised through engagement with key stakeholders, including adolescents.

A challenge with co-production is that it has often been defined ambiguously and over-used in research (Masterson et al., 2022) and there is an ongoing debate regarding the characteristics of co-production (Vargas et al., 2022). Much research has been broadly labelled as co-production, sometimes without sufficient clarification behind its design and leading to criticism of tokenism (McGill et al., 2022; B. Smith et al., 2022). In other cases, co-production is rigidly defined, for example, some would argue that the involvement of adolescents throughout the entire research process is a core element (see Rouncefield-Swales et al., 2021, p. 3). The specific type of co-production used in this thesis (Chapter 4-7) is best aligned with 'citizens contribution to public services' (B. Smith et al., 2022) and a pragmatic approach (Pavarini et al., 2019) which recognises that stakeholder engagement with research should be iterative, dynamic and flexible (Dovey-Pearce et al., 2019). In practice, co-production resulted in engagement with adolescents in the development process through workshops and focus group interviews (Chapter 4). Teachers, school leaders, and parents also contributed to the development of the intervention through interviews and focus groups (Chapter 5). Their inclusion in the development process was based on guidance which suggests that the involvement of 'implementers and other stakeholders' can improve the feasibility of consequent interventions (see Ponsford et al., 2021).

Pulling together the complex intervention design guidance and applying them to development and feasibility, the first step was to develop a theory of change or logic model (see Table 2); this was based on the review of literature in Chapter 2. The logic model was developed through collaboration between JM and VG, where the design of the development phase of the thesis was largely based on the gaps in the literature and the utility of co-production to create new knowledge and action through intervention.

Table 2: Initial Logic Model for Intervention Development using Co-Production, Focused on a School-Based Social Media intervention to Promote Physical Activity

Context	Assumptions from the Review of Literature	Resources/Inputs
Adolescents (age 13-15) in Sweden often do not meet the WHO[2] physical activity recommendations. 49% of boys and 27% of girls (14-15 years old) meet MVPA recommendations[3]. Stockholm: 30.2% of adolescents (average age 13.4) meet PA recommendations[4].	A high proportion of adolescents using social media to engage with physical activity content The affordances of social media provide opportunities to influence adolescent knowledge, attitudes and behaviours, such as, information, interaction and gamification Schools are key contexts to influence adolescent physical activity knowledge, attitudes and behaviours when holistic approaches to physical activity promotion are adopted that cross curriculum, school environment and home contexts Schools are key contexts to support adolescent engagement with social media	Complex intervention development Co-production with adolescents Co-production with adult stakeholders, including school staff and parents
Social Media Use among Adolescents is prevalent 95% of 13–16-year-olds in Sweden have a social media account; 85% use it daily. Daily usage rates: Snapchat (81%), TikTok (71%), Instagram (47%), YouTube (44%)[5].		
Potential short to long term participant outcomes: Improved knowledge, attitudes and behaviours related to physical activity		

[2] World Health Organization

[3] Nyberg, G., Ekblom, Ö., Kjellenberg, K., Wang, R., Larsson, H., Thedin Jakobsson, B., & Helgadóttir, B. (2021). Associations between the School Environment and Physical Activity Pattern during School Time in Swedish Adolescents. *International Journal of Environmental Research and Public Health*, *18*(19), 10239. https://doi.org/10.3390/ijerph181910239

[4] Kjellenberg, K., Ekblom, Ö., Stålman, C., Helgadóttir, B., & Nyberg, G. (2021). Associations between Physical Activity Patterns, Screen Time and Cardiovascular Fitness Levels in Swedish Adolescents. *Children*, *8*(11), 998. https://doi.org/10.3390/children8110998

[5] Swedish Media Advisory. (2023). *Youth and the Media*. https://www.mediemyndigheten.se/rapporter-och-analyser/ungar-medier/

3.2.6 Logic Model as a Theoretical Basis for the Study

The logic model (p. 70) provides an overview of the theory of change underpinning the intervention and is used as a tool to support the design and development of the intervention (Millar et al., 2001). While this model will be expanded upon later in the thesis and in response to research findings, the context is based on the low levels of physical activity amongst adolescents and high social media usage rates. The assumptions are grounded in the opportunities the affordances of social media provide and how schools are situated as key contexts to support physical activity using a holistic approach. The research inputs needed to inform intervention development is complex intervention development with adolescents, school leaders and parents. The potential long term particpant outcomes resulting from this process are improved knowledge, attitudes and behaviours related to physical activity. Overall, co-production is situated as a means to bridge the gaps between social media's influence on physical activity outside of school (see Goodyear, Andersson, et al., 2021; Goodyear & Armour, 2019; Goodyear & Quennerstedt, 2020) and apply them appropriately in a school context to support physical activity. The logic model is expanded upon after Study 1 and 2 (see Chapter 6) and after Study 3 (see chapter 8).

3.3 Research Methods

3.3.1 A Mixed Methods approach

Building on the initial logic model, the overarching design across the three studies in this thesis (Chapter 4, 5, and 6) was mixed methods. Mixed methods research informs the collection, analysis and interpretation of data and is the combined use of qualitative and

quantitative methods within or across a series of studies (Creswell, 2021). Mixed methods were chosen based on the advantages and insights into complexity provided by qualitative depth and quantitative breadth (Creswell et al., 2003). The specific type of approach across the three studies was an exploratory mixed methods design (Ivankova et al., 2006), where the qualitative methods in Study 1 and 2 informed the design of Study 3. Table 3 shows the methodology, types of data collected, and analysis methods used in the studies in this thesis and how they are situated within each chapter.

Table 3: An Overview of the Methodology, Data Collection and Analysis methods

Chapter	Methodology	Data Collection Methods	Data Analysis Methods
Chapter 4: Co-Production with Adolescents to Develop a Social Media-Based School Physical Activity Intervention	Qualitative	Workshops (Workshop artefact) Focus Groups Reflective Researcher Journal	Thematic Analysis with visual image integration
Chapter 5: Co-Production with School Staff, Parents and Guardians to Develop a Social Media-Based School Physical Activity Intervention	Qualitative	Interviews Focus groups	Thematic Analysis
Chapter 6: Intervention development			
Chapter 7: The Feasibility of a 7-day Social Media Detox Intervention in Schools	Mixed Methods	Surveys Focus Groups	Analysis of Variance Descriptive Statistics Deductive/Inductive Analysis
Chapter 8: Discussion			

The age range of adolescent participants in Study 1 was 13-14 years and in Study 3 it was 15-18 years. This followed the chronology of the original cohort and where a small number of participants who participated in both studies.

3.3.2 Qualitative Methods and Analysis

Qualitative methods were used in Study 1 and 2 (Chapter 4 and 5) to provide depth into the intersection between adolescents' social media use and physical activity. Interventions often build on theories of change which combine the available quantitative evidence (e.g., meta-analysis), however, qualitative methods such as interviews and focus groups are a valuable method to inform meaningful aspects of intervention design (Maciver et al., 2021). For example, qualitative research provides specific insights related to context (Dumka et al., 1998), where pre-existing understandings can be refined to meet the needs of a population (Barrera Jr & Castro, 2006). They also provide particular insight into complex issues and have been used to understand health related behaviours in interventions (Farquhar et al., 2006), such as how messages are delivered to engage participants (de Visser et al., 2015). Qualitative work in this context is often referred to as 'engaging stakeholders' where in-depth insights from those delivering and/or receiving a complex intervention informs the design, delivery and refinement of an intervention (Bonell et al., 2022; Maciver et al., 2021). For example, intervention principles, characteristics, mechanisms and content are developed through iterative meetings and workshops (Aworinde et al., 2024; Creaser et al., 2023; Leask et al., 2016). Thematic analysis has been used widely in intervention design and refinement studies (Aworinde et al., 2024; Creaser et al., 2023; Hindmarch et al., 2023; Turcotte et al., 2022) and was an underlying method used to analyse the qualitative data in all three studies (Braun & Clarke, 2006). Albeit, with nuanced adaptations and distinct applications of the approach which are described in chapter 4, 5, and 7.

3.3.3 Quantitative Methods and Analysis

Quantitative survey methods, specifically, descriptive statistics and analysis of variance (ANOVA) tests were used to answer research question 3 (Study 3). While Chapters 6 and 7 provide a more detailed explanation of how mixed methods were applied, it is important to note that the decision to use mixed methods was underpinned by robust arguments advocating for their use in feasibility studies and complex interventions (Schoonenboom & Johnson, 2017). The results and discussion sections in Chapter 7 draws together the mixed methods data specific to Study 3, and Chapter 8 integrates the interpretation of the combined findings across Studies 1, 2, and 3.

3.3.4 Ethical Procedures

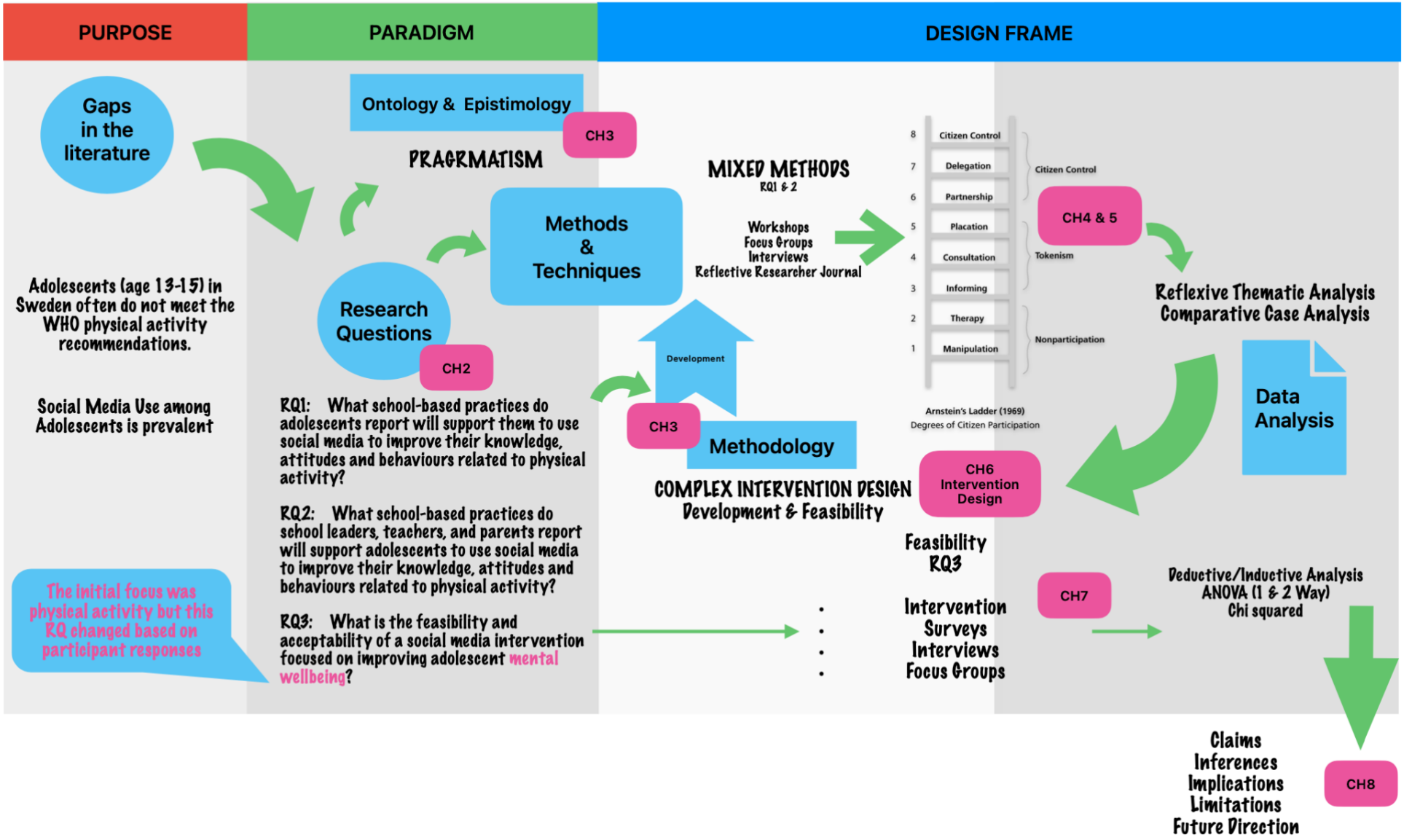
In relation to ethical procedures, all three studies received ethical approval from the University of Birmingham Science, Technology, Engineering and Mathematics (STEM) Ethical Review Committee Birmingham (ERN 21-0373B). Study 3 also received ethical approval from the Swedish Ethical Review Authority (2022-06440-01). Before conducting the studies, the headteachers from all participating schools provided written informed consent for their school to take part. All adults participants including parents/guardians, teachers, pastoral staff and school leaders provided written informed consent across all studies. For adolescent participants in Study 1 and 2 (age 13-14) ethical consent was provided by both parents and/or guardians and written assent provided by participants. In line with local Swedish ethical guidelines, adolescent participants in Study 3 (age 15-18) provided informed consent.

While none of the studies provided any explicit and overarching risks to adolescent participants, it was recognised that there were some risks to participants who had health-related disorders or students with body image concerns and/or obsessive exercise behaviours. Consequently, participant were informed about the focus and content and risks of the studies, informed about support services at the school and external to the school, and the school staff were asked to be vigilant of behaviour changes. In alignment with established ethical procedures, participants were made aware of their voluntary participation and right to withdraw from the studies at any time and without explanation.

3.3.5 A Visual Summary of the Purpose, Paradigms and Design of the Thesis

Figure 2 was constructed as a means to draw together and provide a zoomed-out perspective of the relationship between the purpose of the studies in the thesis, the methodological approach, the use of methods and their iterative design. One additional component included in the figure is Arnstein's model of participation (Arnstein, 1969). This shows how the power sharing in Study 1 and 2 (Chapters 4 and 5) to be at the placation levels, where participant are informing decisions but where facilitators make the ultimate decision (see Chapter 6).

Figure 2: The Research Purpose, Paradigm and Design Frame



3.4 Methodology Conclusion

In this chapter, participatory research approaches were examined, emphasising their key role in shaping the methodological foundations of this thesis. Following a justification for the use of co-production as a participatory method, the complex intervention design framework was introduced as a means to address the research questions through development and feasibility. Based on the identified contextual needs and gaps in the literature regarding school-based social media interventions aimed at supporting physical activity, an initial logic model was outlined to illustrate how these gaps underpin the methods used in Study 1, 2, and 3. The second part of the chapter introduced mixed methods as the primary research design, and explained how qualitative and quantitative approaches will be used to answer the research questions. An overview of the subsequent studies (Chapters 4-8) was provided, detailing their design and integration within the overall thesis. The chapter concluded by focusing on the use of procedural ethics across the studies in this thesis and the positionality of the researcher.

Chapter 4: Co-Production with Adolescents to Develop a Social Media-Based School Physical Activity Intervention

4.1 Introduction

Building upon the review of literature (Chapter 2) which explored the role of social media in adolescents' lives and physical activity, this chapter seeks to better understand adolescents' perspectives on how social media can be used as a resource to support their physical activity engagement. The aim of this study was to co-produce knowledge to inform the development of a school-based social media intervention to promote physical activity engagement. This chapter employed co-production with adolescents' aged 13-14 years, and used a series of participatory workshops and focus groups to inform the design of the intervention.

The chapter outlines the qualitative methods used through three main steps with adolescent participants: (i) pilot, (ii) workshops and (iii) focus groups. Following an outline of the methods, the findings are presented through two overarching themes: (i) Inspiration for Sport and Fitness, and (ii) Appropriate Online Spaces for Connections and Surveillance. The chapter concludes with a discussion that synthesises the findings and considers their implications for subsequent stages of intervention development and the broader research context.

4.2 Methods

4.2.1 Setting & Participants

Two schools were recruited for this study. Using convenience sampling (Sparkes & Smith, 2014, pp. 70-71) JM recruited a school they had previously taught at and where they currently worked in an administrative co-ordinator role one day per week. This provided an advantage because they were familiar with the school environment and had established relationships with the staff. Another school in the region was then recruited by emailing contacts with the study information.

The sample size of the two schools was based on the need to gather in-depth data with adolescents over time, while also considering the transferability of findings which would support the design of a scalable intervention. A sample of two schools was therefore deemed as an appropriate sample for in-depth data collection which could simultaneously provide considerations relevant for generalisability and transferability of findings (Smith, 2018; Tracy, 2010). Table 4 provides an overview of the two schools.

Table 4: School Sample Characteristics (Study 1 and 2)

Municipality	Stockholm	Sollentuna
	School 1	School 2
School Profile	Municipal, International	Independent, International
Admissions	International only	Non-selective
Language of Instruction	English	Swedish/English
Age Range	6-19	6-15
Student Population	610	273
Girls %	54	53
International Background %	91 (avg. Stockholm 34.85)	49 (avg. Sollentuna 37.6)
Parents with University Education %	61	68

Note. Information generated from the Swedish National Agency for Education (Skolverket). Retrieved from https://www.skolverket.se/skolutveckling/statistik/sok-statistik-om-forskola-skola-och-vuxenutbildning?sok=SokC.
*Comparative statistics taken from Statistics Sweden (SCB). Retrieved from https://www.scb.se/
*All other information is from the respective schools websites

In Table 4, both schools exhibited similar characteristics while still maintaining a level of dissimilarity. For example, School 1 was a municipality school and School 2 independent. Both schools followed the International Baccalaureate (IB) program[6] and had a similar proportion of parents with a three-year university education (or more) which was similar to the national average (63%). The proportion of students with an international background

[6] The International Baccalaureate (IB) program is an international educational program used across the world often in combination with local national curricula.

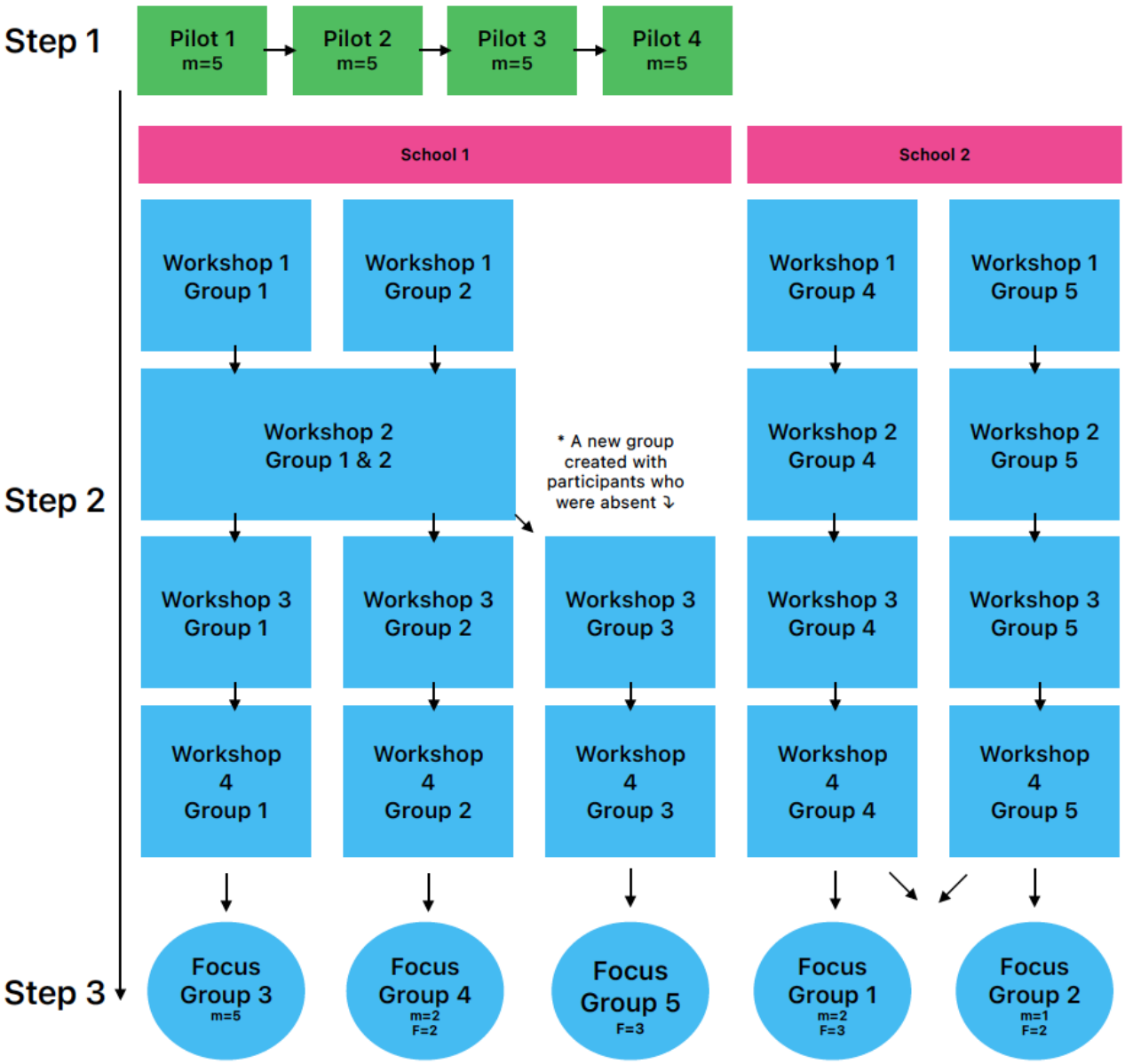
was greater in School 1 (91%) than School 2 (49%), and higher than the average across both municipalities in the Stockholm region (36.2%) (Statistics Sweden, 2022).

A total of 32 participants took part in the pilot study workshops and/or focus groups and were aged 13-15 years old. This age group aligns with the normative legal age for joining many social media sites (13 years), where 93% of adolescents' use social media (Swedish Media Advisory, 2019) and normative behaviours may not yet have been established (boyd, 2014; Ito et al., 2010). The early adolescent years are also a time where both participation in organised sport and physical activity tends to decline (Corder et al., 2019; Malm et al., 2019). This age was therefore deemed to be an important phase to understand and target physical activity and social media related behaviours.

4.2.2 Data Collection Methods

Data collection was conducted by JM and took place over a three-month period, where data generated from each of three steps informed data collection techniques in the next. The data collection activities took place in both Swedish and English and this was dependent on the preference of the participants. The activities were common across both schools. Figure *3* shows the three overarching steps followed through pilot workshops, workshops, and focus groups.

Figure 3: Data Collection Steps in Study 1: Pilot Workshops, Workshop Groups, and Focus Groups



Note. M = Male, F = Female

4.2.3 Step 1: Piloting workshops with Adolescent

The first step involved piloting workshops activities at School 1 which were adapted and then conducted at both schools in Step 2. Focus groups were then conducted with the workshop participants in Step 3. Workshops have been applied in a range of formats as useful contexts for qualitative data collection. For example, Goodyear et al. (2019c) used participatory class activities to investigate adolescents' social media use, where they created digital pinboards which were later used in elicitation interviews about health-related social media use. Workshops have also been used in public and patient involvement (PPI). For example, Abrehart et al. (2021) used a Young Persons Advisory Group to adapt healthcare delivery and information. Based on the uses in both co-production and PPI research, collaborative group activities were chosen to encourage collaboration between participants, to create a space where ideas could be generated, and where the researcher could work with groups of participants for an extended period of time. The term 'workshop' was chosen in favour of other common co-production terms such as, advisory groups, because there was an inherent educational value for the participants. This was a key ethical consideration, where it was decided that research with adolescents in schools had a stronger justification if it aligned with educational practices and reciprocal benefit (Head, 2018).

In Step 1 (Piloting Workshop with Adolescents), four informal pilot workshops were conducted with five male 15-year-old participants in School 1. While the single gender of the participants was a limitation, their responses provided valuable feedback on the design of the workshops and the structure of the tasks. School 1 was chosen based on convenience to JM who was on site at the school one day per week, and participants took part in workshops

outside of scheduled lessons (e.g., at breaks and lunchtimes). The main aim of this phase was to develop relevant and effective data collection methods and to adapt the design of the workshops before data was collected in Step 2.

The five participants completed the workshop activities and provided feedback after each session in the form of verbal reflections. The main insights gained from this process were the high levels of support participants needed to develop intervention ideas and the diversity of experiences with both physical activity and social media in the small group. After the pilot, the workshops for step two were adapted to: (i) be inclusive to a range of social media users; (ii) ensure that the groups had enough examples and ideas of intervention strategies which use social media to inspire them; and (iii) provide participants with more time to revisit, adapt and summarise their intervention ideas.

4.2.4 Step 2: Workshops

Step 2 involved generating data from participants recruited from one year group (Year 8, Age 13-14) at each of the two schools (n=28, m=14, f=14) using participatory class activities (Appendix 1). The aim of this phase was to generate data on the perspectives thoughts, experiences and ideas of contemporary adolescents related to social media, physical activity and schools. The workshops were designed to facilitate an effective, ongoing, and trust building collaboration between the researcher and participants to enhance the knowledge that could be co-produced.

Data collection took place during four weekly advisory time lessons (also referred to as form time, tutor time or homeroom) with each period of data collection lasting between 30-50

minutes (avg. 45 minutes). Participants used school computers to complete written group tasks and used either Microsoft PowerPoint or Microsoft Word to produce responses.

4.2.4.1 Workshop 1

The first workshop began with a short introduction of the expectations for the workshops. These were based on being principled and open-minded communication. These were chosen based on their importance in the workshops and because the participants were already familiar with these terms and approaches in their curriculum (Wells, 2011). The expectations aimed to provide a safe and tolerant space for sharing personal experiences and to ensure participants felt they were able to express their thoughts and feelings openly without judgment or criticism. Physical activity guidelines (World Health Organization, 2020) were first shared with each group and also after the participants explained their own physical activity behaviours. The benefits of physical activity were discussed before further discussion about the personal/environmental factors which impacted their engagement with physical activity. JM then introduced the definition of social media to the group; participants shared their understanding of the definition and began to discuss how they engaged with social media.

4.2.4.2 Workshop 2

Workshop 2 sought to connect the initial topic of social media with physical activity by drawing on participant experiences. Participants briefly shared what types of physical activity content they usually saw on social media. They then worked in pairs or small groups to create an image collage which represented the physical activity related content they

engage with on social media. Photo-elicitation (Henwood et al., 2017) techniques were used to engage students in discussion about images related to social media and physical activity. At the end of the task participants were asked if they would like to share and discuss their collage with the group.

4.2.4.3 Workshop 3

Workshop 3 sought to develop a greater understanding of physical activity related social media content and the impact it had on participants. Participants discussed and documented if and how social media content impacted their learning about physical activity (knowledge), their feelings about physical activity (attitudes) and their physical activity choices (behaviours). After discussing this, participants used graphic organisers to discuss and note down the positive and negative impact social media has on their knowledge, attitudes and behaviours. The participants then discussed how their school approached social media and if/how they used social media for physical activity. Due to time constraints at School 1, only participants from School 2 completed a school policy task at the end of the workshop. This task involved a 'fill in the blanks' activity where participants created a social media and physical activity policy for schools.

4.2.4.4 Workshop 4

Workshop four began with a quick review of all the content in the previous workshops. The participants were asked to work in pairs or small groups to develop ideas for a school-based intervention that will support adolescents aged 13-15 to: (i) take action to be physically active (Behaviours); (ii) increase their enjoyment/appreciation of physical activity

(Attitudes); and/or (iii) help them to learn more about physical activity (Knowledge). The participants were instructed to develop intervention ideas which use social media as a resource to support physical activity.

4.2.5 Reflective Researcher Journal

The researcher kept a reflective journal that provided a written summary of the workshops. Directly after each workshop JM followed a 5-minute reflection protocol (which often became 10 minutes in practice). This has previously been used as an open and unstructured free writing protocol in educational action research (Bodsworth & Goodyear, 2017). The journal produced rich qualitative data from the perspective of the workshop leader (JM) and included a total of 12 journal entries documented across the 17 workshops (4498 words). The reflective journal acted as a reflexive tool to identify bias, and was a means to navigate challenges, ethical considerations, and to support the objectivity of the analysis. It was also a source of evidence from the workshops as it capturing the participants perceptions from the perspective of the researcher (McGrath, 2021). The reflective journal became a record of the key ideas participants discussed (and may not have been recorded by the adolescent participants), it gave insights into the group dynamics and capturing the thoughts and feelings of JM throughout the co-production process. In practise, the journal produced a record of key observations from the workshops and it became a valuable source of data because the majority of the groups preferred for verbal discussions over written communication.

4.2.6 Step 3: Focus Groups

> Focus groups involve the interaction of group participants with each other as well as with the researcher/moderator, and it is the collection of this kind of interactive data that distinguishes the focus group from the one-to-one interview.
>
> (Wilkinson, 1998, p. 112)

Focus groups are a group-based interview format which was originally used as a data collection tool in marketing and the social sciences (Vaughn et al., 1996). Focus groups were chosen based on their potential to gather in-depth data on participant views and experiences which could inform the design of a complex intervention (for example, Hage et al., 2023). The main reason focus groups were chosen they were chosen instead of 1:1 interviews was the comfort of discussing in a group format (Sim & Waterfield, 2019). The focus groups acted as a natural extension of the workshops and participants were used to discussing social media and physical activity with each other and JM. Respectful agreement and/or disagreement was encouraged between the members and the dynamics of the conversations between the participants became a rich source of data (Stewart & Shamdasani, 2014).

Topic guides from a previous social media-based study were used as an initial guide to develop the interview questions (Goodyear et al., 2019c). The topic guide (Appendix 2) was then developed using a broad to narrow approach which included, introductory questions, broad questions (uses of social media), specific questions (social media in schools and a school-based intervention) and closing questions (Hennink et al., 2020, p. 144). The semi-

structured approach provided the flexibility for in-depth discussion while also maintaining a consistent structure across all of the focus groups. The workshops informed the content of the questions and feedback from the advisory team (VG & JT) was used to iteratively refine the topic guide. The workshop artefacts (e.g., written responses and picture collages) for each group and were printed out and given to participants so they could refer back to them. Having access to their written workshop responses was a means to minimise pressure to respond, break down power dynamics, and to remind participants about their previous discussions (Pheonix & Rich 2016). The workshop artefacts (e.g., visual collage images from Workshop 2) also acted as a potential bridge to access contentious or challenging topics (see Henwood et al., 2017, p. 603) and was an approach inspired by participatory visual methods (Enright & O'Sullivan, 2011). The focus groups largely mirrored the structure of the four workshops and focused on the participants' experiences with physical activity related social media, and how schools could support physical activity engagement using social media.

All participants were invited to participate in the focus groups with the same participants from their workshop. However, some participants were mixed due to student absences at School 2 (see Figure *3* to see the flow of participants between workshops and focus groups). From the 28 participants who took part in at least two workshops, two dropped out before the final workshop, two moved schools, and four were absent during focus groups. This resulted in a total of five focus group interviews conducted with 20 participants which lasted between 30 and 40 minutes. The focus group participants included 12 students from School 1 and eight from School 2. There were 10 male and 10 female, and all participants were aged between 13 and 14 years old.

4.3 Analysis

The data collection methods included workshops and focus groups which produced four types of data including: (i) textual workshop artefacts, (ii) visual workshop artefacts, (iii) a reflective researcher journal, and (iv) interview recoding/transcripts (see Table 5).

Table 5: An Overview of how Multi-Modal Data was Organised in Study 1

Data Collection	**Data Produced**	**Initial Data Organisation**
Focus Groups	Interview recordings - three in English - two in Swedish	1) All transcripts were transcribed verbatim 2) Swedish transcripts were translated to English 3) Transcripts were anonymised removing identifiable information such as names and school names.
Workshops	Textual and Visual Artefacts -Physical activity reflection (Workshop 1) -Visual artefacts (Workshop 2) -Social media and physical activity reflection (Workshop 3) -Intervention ideas (Workshop 4)	1) The data was checked and any blank pages were removed. 2) Visual collage images were copied individually and saved as a .jpeg 3) Textual workshop artefacts were saved in pdf format.
	Reflective Journal	1) The reflective journal was saved as a pdf. file

The data were organised, translated, transcribed, anonymised and saved in the appropriate formats before the analysis was conducted (see Table 5). All data analysis was conducted using Nvivo 12 software (Woods et al., 2015). Two separate projects were created in Nvivo, one using the Interview transcripts, textual artefacts and reflective journal, and another with

the visual artefacts; These were later combined into a final project. During the analysis an audit trail on Microsoft Word recorded the actions taken during the analysis and the reflections/justifications of JM.

4.3.1 The Process of Data Analysis

The analysis was guided by research question 1 (see page 2) and was conducted inductively. Reflexive thematic analysis was deemed as a suitable method to follow (Braun & Clarke, 2006, 2012; Braun, 2016) due to its extensive use in qualitative research, and (when used as intended) how it is a robust framework for qualitative analysis (see Braun & Clarke, 2019). The flexibility of reflexive thematic analysis was an advantage because it supported the analysis of a diverse data set, including transcripts, workshop artefacts, reflective journal, and images. The approach was also chosen because it aligned with participatory methods and it recognises the centrality of the researcher's perspective throughout the research process (Braun & Clarke, 2023). Reflexive thematic analysis aligned with the pragmatic research philosophy in this chapter because it facilitated the analysis and triangulation of multiple perspectives using multi-modal data. Moreover, qualitative data was deemed to be the best way to produce a depth of inquiry which would facilitate a better understanding of the relationship between beliefs and actions, as reflected in the focus on adolescents knowledge, attitudes and behaviours.

Steps A-G (see table Z) provide a zoomed out and chronological overview of the analysis. The updated six-step process of thematic analysis (Braun & Clarke, 2006, 2019) was used as an underlying framework for: (i) data familiarisation and writing familiarisation notes; (ii)

systematic data coding; (iii) generating initial themes from coded and collated data; (iv) developing and reviewing themes; (v) refining, defining and naming themes; and (vi) writing the report. The reflective researcher journal and the visual data were integrated into this six-step process at different phases. The initial visual data was analysed independently using the first three parts of visual analysis set out by Glaw et al. (2017) and then combined with the thematic analysis. The following section provides an in-depth overview of parts A-G with examples from the analysis (see Table 6).

Table 6: An Overview of the Thematic Analysis Steps using Visual and Textual Data in Study 1

Step	Analysis	Data
A	(1) – Familiarisation (2) – Initial Codes (3) – Theme Development	Interview Transcripts & Workshop Artefacts
B	(1) – Coding deductively using the pre-existing codes from Step A	Researcher Reflective Journal
C	(4) – Developing and Reviewing Themes	Interview Transcripts, Workshop Artefacts & Researcher Reflective Journal
D	(1) – Organising and naming the images (2) – Searching the source of the images and adding a descriptor (3) – Coding and grouping images	Visual Data
E	(1) – Deductive coding	Visual Data
F	(4) – Developing and Reviewing themes (5) – Refining, defining and naming themes	All data
G	(6) – Writing the report	All data

Note. Numbers in bracket show the alignment with the six steps of thematic analysis from Braun & Clarke (2019)

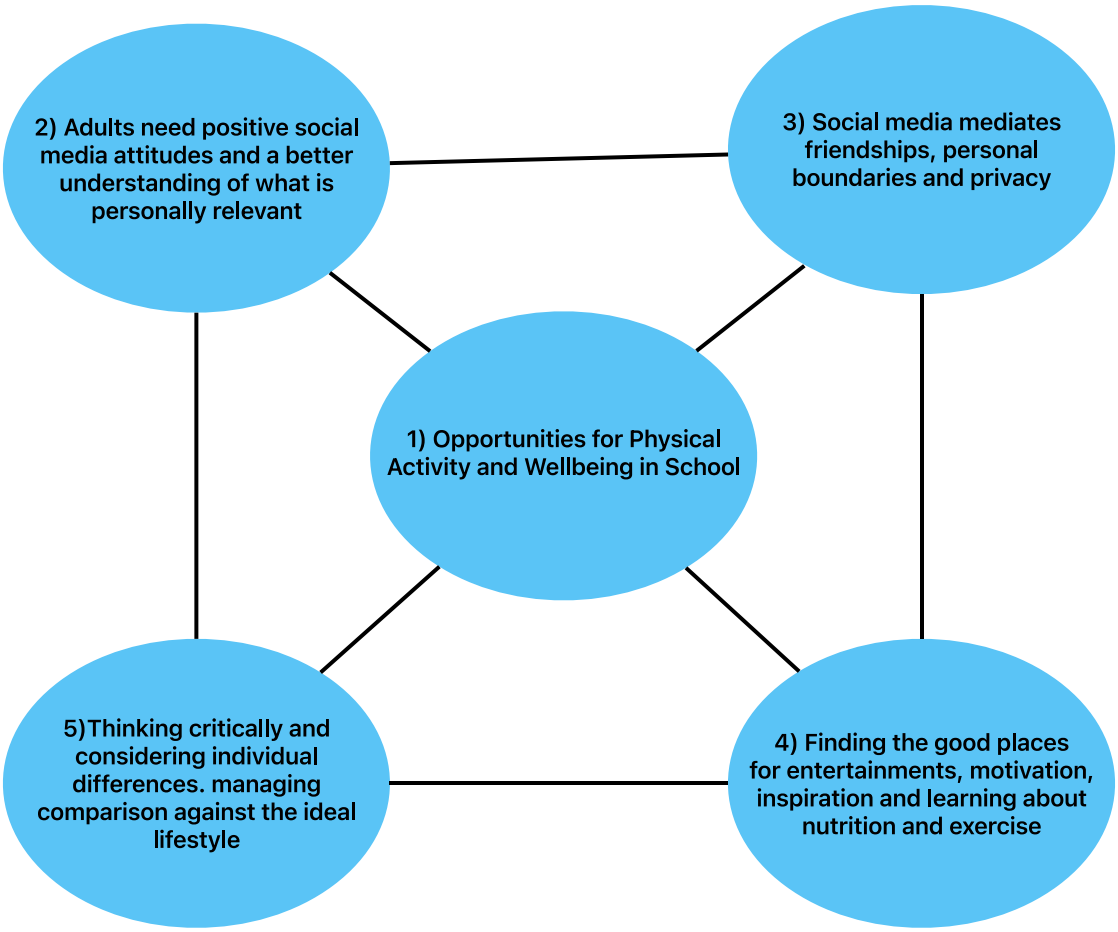
4.3.2 Step A: Familiarisation, Initial Codes and Theme Development with Interview Transcripts and Workshop Artefacts

The thematic analysis began with familiarisation and coding the focus groups and textual workshop artefacts. The familiarisation process included reading through each of the transcripts twice and noting down short-form observations in a table, e.g., ‘SM platform has

a purpose’. The initial coding process included two systematic coding waves where codes generated in the first phase were coded consistently across the data set in wave two. The next phase included coding and the generation of analytical questions such as: is ‘SM tips for wellbeing’ related to an 'Aesthetic' or a 'lifestyle'? These questions were used to re-examine, rename and redefine existing codes, to understand the similarities and differences between the codes, and to understand the significance of codes which showed potential to construct a theme. Reflexive notes showed how this step resulted in the consolidation and renaming of codes e.g., ‘SM addicting’ and ‘SM distraction’ seem related’. Before moving into theme generation, a zoomed-out approach was assumed and the frequency and consistency between codes was analysed using coding maps, word clouds, and coding density maps.

The codes were then grouped together and initial themes were developed. The reflexive notes were central to this process, and they supported decisions to continue constructing a theme or to re-organise the codes around other concepts. For example, ‘reorganise PE’ was an initial code group which showed potential as a provisional theme. However, it was deemed that this did not speak strongly enough to the research question and was single faceted; thus it was changed to be code group within Theme 1. Figure 4 shows the thematic mapping at this stage and where opportunities for physical activity and wellbeing in schools was a central concept.

Figure 4: Initial Thematic Mapping in Study 1



4.3.3 Step B: Deductive Coding: Reflective Researcher Journal

After initial themes were constructed and loosely defined, JM's reflective journal was added to the analysis and imported into NVivo in a pdf. format. The decision to deductively code the reflective journal following the initial coding of the student data was based on the primary focus and significance assigned to the voice of adolescent participants. Student participants were considered as the primary source of information for the analysis; however, it was also acknowledged that the reflections provided valuable insights which added depth

to the overall understanding of the research context. The initial themes were then reviewed by working through the data, regrouping codes and more established themes were developed.

4.3.4 Step D: Analysis of Visual Data

The analysis of the visual data followed an approach inspired by Trombeta and Cox (2022), who proposed independent and then integrated thematic analysis of visual data with textual data. The rationale for analysing visual images was, in part, based on the idea that multi-method analysis adds additional layers of depth (multivocality), and sensitises the analysis to the thoughts and ideas of participants (Mik-Meyer, 2020). Photo elicitation images have not always been used in the analysis stage, however this is largely due to a lack of adequate guidelines to support their integration (Brown & Collins, 2021). According to Brown and Collins (2021), visual data does not provide a direct and unbiased record of reality, but the examination of both textual and visual data can produce distinct and interconnected insights.

This initial and separate analysis of visual data included the first three steps outlined by Glaw et al. (2017): (i) organising and naming the images; (ii) searching the source of the images and adding a descriptor; and (iii) coding and grouping images. No further steps were used because it became apparent that the underlying epistemological assumptions behind the remaining steps did not align with the wider analytical approach and the type of visual data collected. For instance, the continued analysis outlined by Glaw et al. (2017) included counting and categorising themes based on frequency and the interpretation of images.

Moreover, while finding the sources of the images offered a degree of context to the analysis, the visual data was not generated by the participants themselves (e.g., drawn) but selected by searching for online images. It was therefore deemed that further separate analysis would not produce additional insights of value to the research question. At the end of the separate analysis of visual data simple code groups were constructed. These image categories provide a 'zoomed out' view of the physical activity content the participants engaged with on social media (see Table 7).

Table 7: Table of Initial Codes: Visual Data in Study 1

Codes	Sub-codes
Celebrity These pictures include both influencers and celebrities.	Child Celebrity
Fun These includes pictures which include some sort of comical or fun aspect.	Challenges Funny/Entertaining
Sports Pictures which show a particular sport, outdoor pursuit or sports team.	*Over 20 different sports
Workout Pictures which relate to exercises such as yoga, gym training or tracking progress.	Gym Tracking Progress Yoga
Lifestyle & Motivation These images are related to lifestyle such as clothes, as well as nutrition and motivational content.	Inspirational Quotes Marketing & Clothing Nutrition & Food Weight Loss

4.3.5 Part E: Integrating Images with the Main Analysis

The analysis of the images was imported into to the same Nvivo 12 project as the textual data and the images were then deductively coded using the existing textual themes and underlying codes. JM then engaged in reflexive dialogue about the data integration with a critical friend (WP). This approach, referred to as a 'deliberative strategy' by Goodyear et al. (2017), aligns with the guidance on high-quality qualitative analysis (see Smith & McGannon, 2017; Tracy, 2010) and is a consensus-building process where team members actively engage in discussions to reach an agreement in the analytical process. The initial deliberation with WP included four steps: (i) presenting research questions and methods; (ii) sharing themes, codes, textual, and visual data; (iii) engaging in a deliberative discussion and receiving feedback; and (iv) making notes for further actions. These further actions involved an agreement that JM would address an overlap between two themes and then match direct quotes about the pictures (from focus groups) to the pictures in the analysis. A key outcome from the integration of textual and visual data in the analysis was increased credibility of the findings through methodological triangulation (Patton, 1999). This process also added an additional layer of complexity where the visual images provided richer description of the themes.

4.3.6 Part F & G: Developing, Reviewing and Writing up Themes

JM read through all of the visual and textual data and refined and renamed the themes by reorganising codes and code groups by moving backwards and forwards between the visual and textual data. Some additional overlaps between themes were identified after further

deliberation with VG and this resulted in the refinement of the initial five themes into three themes. Based on further analysis of the themes and their thematic depth and alignment, this was reduced to two final themes which are shown in the results section.

4.3.7 Rigour

Rigour was grounded in how the perspective of the researcher was examined throughout the research process and where deliberation and methods of transparent self-reflection drove the methodological processes (Braun & Clarke, 2023). This approach not only accepted, but sought to illuminate the perspective of the researcher (JM) and the justification behind their decisions. Key practices which underpinned the reflexive approach were the consistent use of reflexive tools; a reflective journal during data collection and an audit trial during analysis (Braun & Clarke, 2021).

The use of a reflexive journal during data collection was an important outlet for JM to examine their thoughts, observations and assumptions. The journal reflected a genuine attempt to understand the participants' perspectives and to build trust and rapport with them. It also highlighted observations and interactions with participants within and outside of the workshops and focus groups, and included reflections on how to address the equal contribution of participants in the workshops and focus groups. These reflections included the need to probe for deeper verbal responses and to provide participants with more guidance in their tasks. An audit trail was used to document how and why codes were constructed and regrouped in the analysis phase. This was particularly important due to the inductive nature of the analysis and a transparent way of documenting and referring back to

interpretive pathways which were, or were not, pursued. The audit trial also informed deliberations with VG and WP regarding their construction of codes, subthemes and themes.

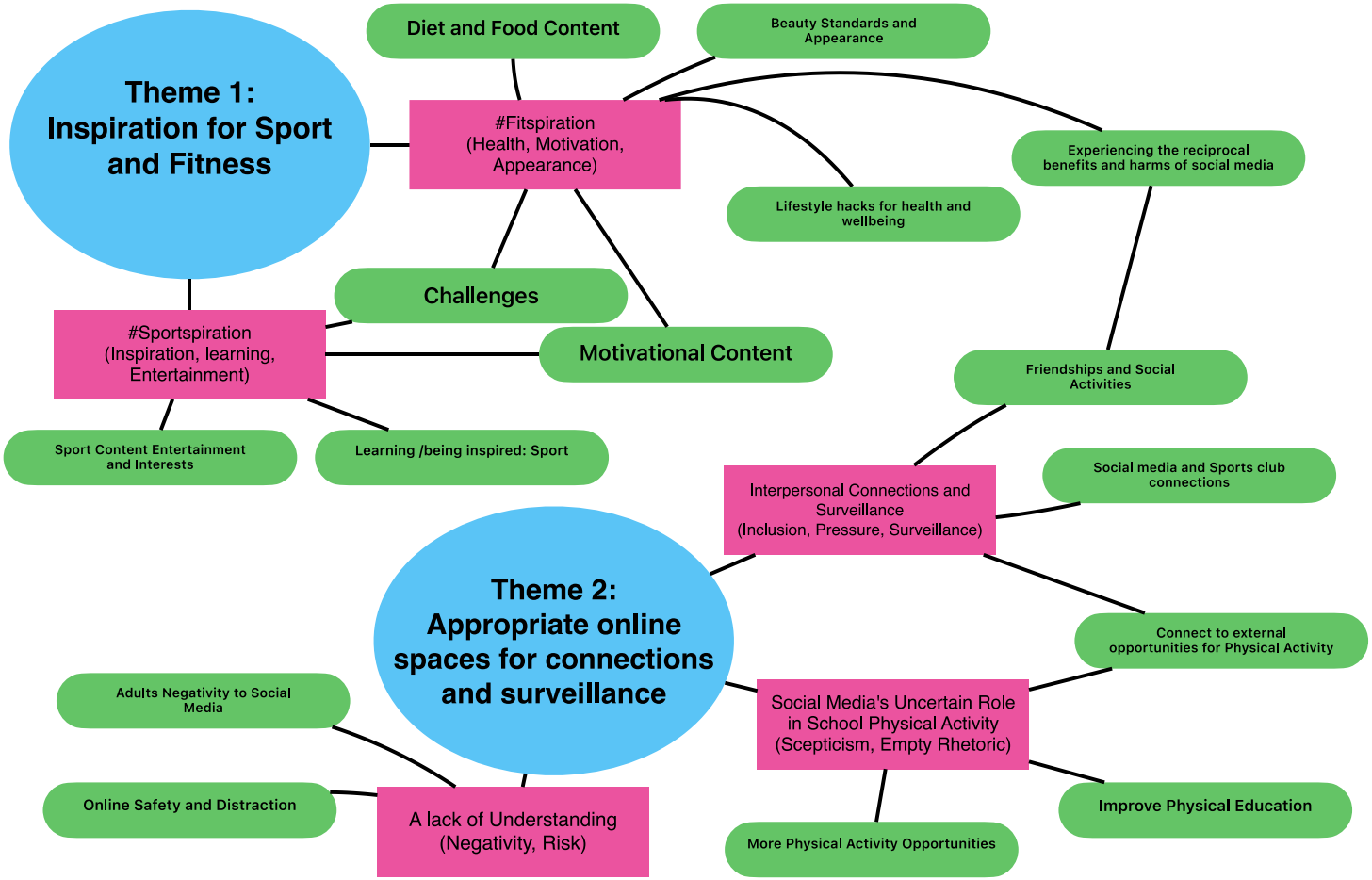
4.4 Results

The following results draw together two themes produced in the analysis.

- Theme 1: Inspiration for Sport and Fitness
- Theme 2: Appropriate Online Spaces for Connections and Surveillance

The thematic map in Figure 5 shows some of the main underlying codes within and across subthemes.

Figure 5: A Thematic Map of the Themes in Study 1



The following two sections will provide an in-depth description of the themes and the underlying subthemes, codes, and quotes are used to illustrate their meaning. Theme 1 represents how adolescent engage with social media for inspiration for fitness, sport and other lifestyle behaviours. Theme 2 provides more insight into the suitability of schools as a context to engage with social media.

At this early juncture, it worthy to note how participants did not consider social media to limit their physical activity levels significantly. However, when referencing the behaviours of their peers they noted how it could be a distraction and a driver of sedentary behaviour. For example, ‘some people just scroll and then they, like, don't go outside’ (Focus Group 3, School 1: Male) and ’you can just swipe and keep going and going until you can’t stop’ (Focus Group 5, School 1: Female).

4.4.1 Theme 1: Inspiration for Sport and Fitness

Theme 1 refers to the combined used of social media for entertainment, motivation and learning in relation to sport, exercise, diet and other lifestyle behaviours. Table 8 introduces the theme, the subthemes #sportspiration and #fitspiration and key words within each subtheme.

Table 8: Overview of Theme 1 in Study 1

<table>
<tr><th>Theme</th><th>Subthemes</th></tr>
<tr><td rowspan="2">Theme 1: Inspiration for Sport and Fitness

This theme refers to wide engagement with sport and fitness content as a source of inspiration. In line with previous research on #fitspiration which includes popular health trends, the theme shows how participants situated physical activity content amongst other healthy lifestyle behaviours such as exercise, diet and sleep. This broad approach highlights the integrated view of health assumed by adolescents. This was, in part, underpinned by an emphasis on physical appearance portrayed through social media.</td><td>#Sportspiration

(Inspiration, learning, Entertainment)</td></tr>
<tr><td>#Fitspiration

(Health, Motivation, Appearance)</td></tr>
</table>

4.4.1.1 #Sportspiration

It was clear that social media exposed many participants to new and familiar sports in the form of suggested content and online videos and pictures. For example, algorithms meant that 'you might just get videos of different sports' (Focus Group 3, School 1: Male) and where entertainment and learning were often combined and interest driven.

> I learn about new skills in football and also about players and teams around the world.
>
> (Focus Group 3, School 1: Male)

> I follow indoor hockey brands, I follow clubs. I like to see videos when indoor hockey players shoot at the goal and stuff.
>
> (Focus group 2, School 2, Male)

The collage data from Workshop 2 emphasised the wide range of physical activity related engagement on social media, where over 20 sports were represented in images ranging from basketball and handball, to cycling and archery. Social media was a key place to keep up to date with specific sports, teams or players. Participants explained how they engaged with content that related to sport entertainment such as highlights of matches/games (see Figure 5).

Figure 6: A Representative Image of Football Highlights in Study 1



(Andrea, 2018)

Discussion regarding physical activity on social media were heavily interest driven and participants engaged with content which was related to their preferences. The discussions often explored personal experiences of being inspired, but also included feeling like they were wasting their time. In this context, participants came across diverse videos and images showing sports. For example, those interested in football shared collage pictures which included skill challenges and small games such as 'the feint challenge' and the 'first touch challenge' or tips and tricks (see Figure 7).

Figure 7: Freestyle Skills Image from Study 1



(Unisport, 2019)

The nature of scrolling on social media meant that engagement with physical activity content was often short-form and integrated with other content. However, some participants provided examples where they used social media more intentionally to learn new skills and to develop their knowledge in their sport of interest.

> We will learn from one video or the one post and then there will be a few in between that aren't related at all and then you can learn some again.
>
> (Focus Group 5, School 1: Female)

> Male: You might just get videos of different sports and sometimes you go 'but I don't play this sport'
>
> Female: Yeah. I like horse riding, so it can be a source of inspiration, or it can just be a waste of your time.
>
> (Focus Group 3: School 2: Male & Female)

> I watch a lot of volleyball matches [on YouTube]…to create new strategies, or to see the way how to bump, set, and spike the ball (See Figure 8).
>
> (Focus Group 4, School 2: Female)

Figure 8: A Representative Image of a Volleyball Game in Study 1



(Fleming, 2019)

Sports content was present and varied when participants talked about physical activity engagement on social media, however, this was not the case for all. For example, one participant saw 'nothing to do with sport' (Focus Group 2, School 2: Female). This highlights the clear individual and interest driven differences, which, for example, 'greatly depend on your FYP [for you page][7] or feed (Group 1, School 2: Workshop 2). Collage images further highlighted the role of social media as a source of motivation through inspirational quotes.

> 'To be a great champion you must believe you are the best. If you're not, pretend you are.' (Mohammad Ali)
>
> 'If you never know FAILURE you will never know SUCCESS' (Unknown Source)
>
> (Group 3, School 2, Workshop Artefact)

[7] For You Page is a form of suggested content on on Tiktok where content is recommended by an algorithm based on user characteristics, previous engagement with content, who the user follows and general popularity of the content.

Social media was a source of motivation in relation to a range of activities including sports, but equally in relation to fitness, exercise and health. The following section will outline how #fitspiration was also a key source of physical activity related engagement through social media.

4.4.1.2 #Fitspiration

Fitness related content included exercises such as deadlifts, pull ups, planks, stretching and squats. For example, ‘it'll be like a clip of someone working out… and then there's white text on it and a motivational quote like ‘here is what I did on leg day' (Focus Group 5, School 1: Female) (see Figure 9).

Figure 9: A Representative Image of Motivational Gym Content in Study 1



(Mieke, 2019)

Similar to #Sportspiration, the collage images provide further insight into the presence of #fitspiration content in the form of challenges (Raggatt et al., 2018) which included, plank challenges, '30-day fitness challenge' and '#workoutchallenge'. These were often graphics

with lists of exercises or pictures of influencers who were marketing their own workout programs and merchandise.

Despite an explicit focus on physical activity throughout the focus groups, health related behaviours such as sleep and diet were also important to the participants. Through discussions with multiple groups it became clear that physical activity was framed in connection to other health-related behaviours.

> We learn a lot about the benefits of physical activity and what food you should eat [on social media].
>
> (Focus group 1: School 2: Female)

> You learn tricks on how to get better sleep, and then we have healthy recipes to be strong.
>
> (Focus Group 1, School 2, Female)

This often related to optimising the impact of physical activity, where hacks or tricks helped participants to optimise the effects of exercise. For example, 'to get an effect from training you need to sleep' (Focus Group 1, School 2: Female). While sleep was deemed to be important, the most relevant health related topic on social media included nutritional information, and food/diet tips.

> I get pictures of some vegetables that are cut (see Figure 10), and for me personally I found [on TikTok] some recipes are actually very healthy food… I've become a half vegetarian.
>
> (Focus Group 3, School 1: Female)

Figure 10: A Representative Image of Healthy Food Bowl in Study 1



(Pelzer, 2017)

Figure 11: What I Eat in a Day Content from Study 1



(Saska, 2020)

Tips for diet or recipes were a valuable source of knowledge and inspiration for participants, but they also highlighted how nutritional information could focus on the extreme behaviours and diets (see Figure 11).

> It’s a lot how to eat healthy, but then there's the ‘what I eat in a day’ videos for people either eat only junk food or they eat really healthy and diets.
>
> (Focus Group 5, School 1: Female)

Diet was discussed in the group discussions regarding the impact of social media on knowledge, attitudes and behaviours (Workshop 2). The following written reflection illustrates how participants felt that diet culture and stereotypes were influencing adolescents' attitudes and behaviours.

> People talk a lot about diet culture [on social media], sometimes being positive to it, and sometimes being negative to it. Diets and stereotypes are encouraged and people can gain a negative body image, or positive. Social media platforms can encourage us to exercise more, but it can also discourage us and bring down our motivation thinking we have to look the way people on social media can do.
>
> (Group 1, School 2: Workshop Artefact)

This example is indicative of the diverse engagement-with and responses-to #fitspiration content based on individual differences, and how adolescent participants were navigating the reciprocal benefits and harms. Through discussions about food related content, the data showed how participants were manipulating their social media algorithms and changing who they follow to receive healthier messaging.

> Before I had a lot of ‘do this to get a smaller waist or stronger legs’, but then I started to follow other accounts and I got more ‘do this to make tasty recipes’ and not just focused on ‘look like this’.
>
> (Focus Group 1, School 2: Female)

In the example above, healthy recipes were considered more positive than content related to changing the body through exercise. Taking this evidence further, the awareness and critique of physical appearance and beauty standards was a clear trend in the discussions about #fitspiration. For example, one participant stated that social media 'can make you

hate your body while seeing others' (Group 3, School 2: Workshop Artefact). Participants explained how social media 'encourages a lot of unrealistic comparisons' (Focus Group 2, School 2: Male), but 'it's just something that you are around and then you just realise that don't or you shouldn't really care about it' (Focus Group 5, School 1: Female). Insights into the impact of beauty standards on social media were enriched when participants were discussing their collage pictures.

> I put in a picture of a really pretty model (see Figure 12) and I think that many people can look at models and think 'why don't you look like'… you can simply feel bad about your body.
>
> (Focus Group 1, School 2: Female)

Figure 12: A Representative Image of a Model in a Bikini in Study 1



(Augusto, 2020)

These comments highlighted the negative effects social media can have on body image, with participants noting how it can encourage unrealistic comparisons and negative self-

perception. Through further discussions, there appeared to be dichotomy between content where #fitspiration was aimed at wellbeing and others where it was for physical appearance. For example, one participant, who stated:

> There are people [on social media] who eat healthy and do sports to just feel good and people who do it to look a certain way.
>
> (Focus Group 5, School: 2: Female)

Between this dichotomy of exercise for wellbeing and exercise for physical appearance, participants often valued physical activity for the benefits on mental wellbeing, but highlighted its absence on social media. For example, when discussing Figure 13 one participant stated:

> Easy ab workout at home, so you can get the look you want, that's the ideal is in society right now, more than 'do this so you have better control over your mind or concentration.'
>
> (Focus Group 1, School: 1: Female)

Figure 13: A Representative Image of Easy ab Workout at Home in Study 1



(Kim, 2020)

Throughout these conversations participants showed a critical awareness of the navigating #fitspiration content. For example, TikTok was highlighted as a social media platform where more body transformation content was present.

> 'If you eat this you will get bigger muscles and a bigger bum and stuff', it is a lot more negative around food on TikTok.
>
> (Focus Group 1, School 2: Female)

In further critique of social media content for physical appearance, some participants 'touched on advertising of fit teas…and laughed [ironically] at the fact that they know how to get abs in a week and a big booty' (Group 2, School 2: Researcher Reflection). While physical appearance and beauty were more commonly discussed by female participants, it was also the relevant for boys. For example, a male participant referred to Figure 14.

> He is an influencer… he talks a lot about his body and how he started doing steroids to get more muscles…you shouldn't need to take stuff to feel like you look good.
>
> (Focus Group 1, School 2: Male)

Figure 14: A Representative Image of a Body Building Influencer in Study 1



(Patel, 2020)

At school 1 participants talked at particular length about physical education and body image on social media, particularly how they wanted more of a focus on mental wellbeing. For example, in relation to their encounters with health-related content on social media one participant stated,

> It is hard for us to do anything if there isn't anyone who has taught us about it a little bit. None of us have learnt what we should do or anything. It is really hard.
>
> (Focus Group 4, School 1, Female)

4.4.1.3 Theme 1 Summary

Engagement with #sportsipriation and #fitspiration was diverse and interest driven. Positive outcomes included how participants stated that social media 'encourages us to exercise more' (Focus Group 1, School 2: Female) and 'it can inspire you to go outside and try

something that you saw' (Group 3, School 2, Workshop Artefact). However, negative outcomes included unrealistic comparisons and negative self-image. The first subtheme #sportspiration highlighted the wide range of physical activity related content participants engaged with through social media and how they were learning about sport they were interested in. #Sportspiration included using social media in diverse ways for interest-driven entertainment, learning and inspiration about sports. The second subtheme '#fitspiration' shows how participants situated physical activity within a broader spectrum of health-related behaviours, such as diet and sleep. The underlying messaging behind #fitspiration content was often discussed by the participants who situated #Fitspiration content within a lens of lifestyle behaviours to feel good/be healthy, or to look a certain way. However, according to the participants, narratives focused on physical appearance tended to dominate over those concerning health and/or wellbeing. Overall, this themes shows how social media is an influential source of inspiration, motivation and learning for physical activity and health for adolescents.

4.4.2 Theme 2: Appropriate Online Spaces for Connections and Surveillance

Theme 2 refers to how social media is situated as an appropriate tool for connections and surveillance in multiple contexts and in relation to physical activity, but where there are multiple challenges in schools. Table 9 introduces the theme, three subthemes and key words within them.

Table 9: Overview of Theme 2 in Study 1

Theme	Subthemes
Theme 2: Appropriate online spaces for connections and surveillance This theme highlights how social media is used to navigate complex layers of interpersonal connections, privacy, and surveillance. The data shows that social media mediated multiple social connections and was used diversely in community sport contexts to share achievements, organise events, and foster a sense of community. While there were clear examples of how social media was used by sports clubs and where appropriate surveillance was accepted, there was an underlying sense of uncertainty when schools were proposed as a context to use social media to support physical activity. When considering the use of social media in a school-based physical activity intervention, the participants had numerous suggestions for how physical activity provision could be improved in their schools, but social media was seen as a lower-ranking consideration. The data indicated that using social media as a resource in physical activity intervention may be best situated outside of schools.	Interpersonal Connections and Surveillance (Inclusion, Pressure, Surveillance)
	Social Media's Uncertain Role in School Physical Activity (Scepticism, Empty Rhetoric)
	A lack of Understanding (Negativity, Risk)

4.4.2.1 Interpersonal Connections and Surveillance

The data from focus groups and workshops illustrated that social media was a strong mediator of friendships and social activities for the participants; a place where 'you can communicate, [and] you can write to your friends' (Focus Group 2, School 2: Male). The participants reported using a range of social media sites (e.g., Snapchat, Instagram, TikTok, WhatsApp, Twitter and Facebook) and they were engaged with a number of different social groups with friends and family members. In this context, participants considered access to social media as a requirement to be involved in the social aspects of teenage life.

> On WhatsApp there is a ton groups.
>
> (Focus Group 4, School 2: Male)

> Social media is a big part of everyone's lives and a way to connect to friends. When I didn't have social media I would be left out because I didn't have social media.
>
> (Focus Group 5, School 1: Female)

Using social media could also be accompanied by the burden of responding to peers. For example, one participant stated: 'I go onto Snapchat and see that I have so many notifications that I can't be bothered to answer, so I just post on my story.' (Focus Group 2, School 2: Female). This illustrated the potentially burdensome nature of social media, stemming from pressure to respond across various platforms and groups. However, this was set against the apparent adeptness of adolescents to navigate and strategically prioritise their digital interactions.

In focus group 2 at school 1, two participants provided valuable insights into the contrasting implications of using 'Snap Map' [8] to keep track of their friends. On one hand, they found it convenient to check if someone was at home before making plans to hang out. However, they also expressed a sense of unease when their own 'Snap Map' was active because their location was exposed to others. For example, how '[one friend] writes out of nowhere 'what are you doing?' if you are out somewhere in town or abroad, 'why are you stalking me on Snap Map?' (Group 2, School 1: Female). This presented an intriguing paradox, where adolescents wanted to know where their friends were located through social media, yet they maintained a desire for control over their own shared content.

> You can go into Ghost mode, but I want to know where people are.
>
> (Group 2, School 1: Female)

Functions such as Snap Map were therefore used with an accompanying sense of unease. The comment: 'I turn it off sometimes' (Group 2, School 1: Male) accompanied by a high pitched 'WHAT!' (Group 2, School 1: Female) and the rebuttal; 'But I usually have it on,' (Group 2, School 1: Male), shows how activating the Snap Map may be, at least in part, driven by peer pressure.

[8] A function on Snapchat where you can see where friends are if your own location is turned on.

Social media was often used in conjunction with leisure activities, and was a place where participants could ‘find new interests and friends’ (Group 1, School 1: Male) and ‘connect with others who enjoy the same things,’ (Group 5, School 2: Workshop 2 artefact). This extended to physical activity and during workshops where ‘they visited their Instagram accounts on their phone and showed pictures from their sports teams,’ (Group 2: School 1: Research reflection). Many participants shared logos and pictures of social media accounts from their local sports team when they created collages to illustrate physical activity related content they were engaged with (see Figure 15).

Figure 15: A Representatives Image of a Sports Club Badges in Study 1



(Canva, 2023) Original images sourced in Workshop 2 at school 1 & 2

Participants expressed how social media was used by local sports clubs as a ‘communication centre’ (Focus Group 3, School 1: Male) and to share ‘when people have won competitions and information about competitions and camps,’ (Focus Group 1, School 2: Female). In a sports club context, social media served to connect the community so ‘people who haven’t been there for a while can see and parents who can’t be at games can see what we are up to,’ (Focus Group 2, School 2: Male) (see Figure 16 and Figure 17)

Figure 16: A Representatives a Sports Team Huddle with Coach in Study 1



(Lin, 2018)

Figure 17: A Representatives a Group Workout at Sports Club in Study 1



(Vallet, 2020)

For some participants, social media was used to share videos from games to parents and used to analyse their performance. For example, one sports coach posted games to a closed Facebook group: ‘My coach films the matches, then me and my friend, we usually watch the matches, to see what we can improve,’ (Focus Group 2, School 2: Male).

4.4.2.2 Social Media's Uncertain Role in School Physical Activity

In a school context social media was used either as a school promotional tool (i.e. official school account) or informal student-initiated accounts. For example, School 1 had a number of student-led accounts for school groups, after-school clubs, and even fun accounts where 'people are sleeping and taking photos of them [student] and putting them on social media,' (Focus Group 3, School 1: Male).

Some participants thought that their school 'was doing a good job supporting them and they felt it was becoming more normal with social media in school' (Workshop 8, School 1: researcher reflection). There were some examples of social media being used by teachers and support staff with students. For example, the 'school counsellor can be contacted through social media' (Group 3, School 1: Workshop artefact); the 'PE teacher used social media a lot and they had experience of learning new skills online in their current yoga and mindfulness unit' (Workshop 8, School 1: researcher reflection).

Uses of social media by teachers, staff and students was evident in the data, however, there was more uncertainty around schools using social media, particularly when it could intersect with private student accounts. This was particularly clear in Focus Group 5, where one participant stated: 'I would say the way we use social media privately... the school would want to control the media,' (Focus Group 5, School 1: Female). This extended to concerns around schools using social media to promote physical activity, namely, that the freedoms afforded by social media would be limited and that would 'take away the whole point of social media,' (Focus Group 5, School 1: Female). In their written responses during Workshop

3 and 4 participants from Focus Group 5 wrote that ‘social media is a place to get away from school and schools should stay out of it,’ (Group 3, School 1: Workshop Artefact). Therefore, despite widespread use of social media for social activities, family connections and sports clubs, the evidence shows some participants drew a clear boundary between schools engaging with more ‘personal’ social media accounts.

> If the school wants to use social media it should be on a different account because certain platforms, like Strava’s, is more leaning towards education…Snapchat, you would not use that for, like, education.
>
> (Focus Group 5, School 1: Female)

While the use of social media to support physical activity knowledge, attitudes and behaviours was well documented outside of school, it was unclear to the participants how social media could be used to support physical activity engagement within school. For example, ‘We have never tested it in school, so we don’t know if it will be good or bad,’ (Focus Group 2, School 2: Male). To some extent the idea of schools using social media was abstract to the participants, where, for the most part, the schools talked about 'the problems like digital citizenship and bullying and stuff' (Focus group 3, School 1, Female).

Intervention ideas created by participants related to how they used social media outside of the school, such as engaging with social media groups and exercise challenges. For example, social media could be used to help ‘find people who are interested [in similar sports] and making groups so you can start activities’ (Focus group 1, School 2: Male), and ‘fun challenges on social media’ (Group 1, School 3: Workshops Artefact). However, there was little consensus or widespread support for the use of social media in school related to

physical activity. Indeed, when developing ideas for a school-based physical activity social media intervention to promote physical activity, it became apparent that this was a challenging concept for many participants. For example, one student thought schools should not have anything to do with social media: ‘Just do the cyberbullying stuff and leave it'’ (Workshop 12, School 1: researcher reflection).

When discussing school-based physical activity practices in workshops and focus groups, participants often became impassioned and felt that their schools could do more to provide physical activity provision during the school day. The workshops in School 1 ‘painted a clear picture of how their school do not prioritise physical activity,’ (Workshop 3, School 1: researcher reflection). Ideas mainly related to increased choice and opportunity; for example, ‘Students can be part of deciding the activities by providing ideas and more people will want to take part,’ (Focus Group 3, School 1: Male). The wealth of ideas for improving physical activity provision included improved physical education lessons, competitions, trips, equipment during breaks, and physical activity breaks in lessons.

For the most part, physical activity was held in high regard in schools: ‘They [teachers] have always said you need to be active, (Focus Group 2, School 2: Male). The teachers say, ' ‘the more you move the better you will feel’ but they don’t do anything to affect it,’ (Focus Group 2, School 2: Male). Overall, the prioritisation on physical activity by schools was largely perceived to be an empty rhetoric.

> The school cares about promoting physical activity through what they say, but sometimes it’s a lot of talk, saying and doing are two different things.

(Group 1, School 1, Workshop Artefact)

4.4.2.3 A Lack of Understanding

The concept of using social media in a school-based physical activity intervention may have been further limited by the perception of teacher and parent attitudes and competencies. For example, when discussing schools and social media one participant stated:

> 'For the most part the way we use it is kind of frowned upon.'
>
> (Focus Group 5, School 1: Female)

Some participants felt that digital citizenship and online safety lessons were not appropriate for their age and that schools 'often make it into a negative thing with social media' (Focus Group 1, School 2: Female) and they 'rarely talk about any positive things we do [on social media]' (Focus Group 5, School 1: Female). Online safety was seen as something more relevant for younger students and acknowledgement of their competencies on social media was lacking:

> There's a lot of things students already know much more than them, the teachers teach us like we don't already know it [how to use social media safely], but we already know it.
>
> (Focus Group 3, School 1: Male)

According to participants, adults needed a better understanding of what adolescent social media use is like, because 'they did not grow up the same way that we do,' (Focus Group 3,

School 1: Female). When discussing adult attitudes and competencies on social media, participants felt they were well situated to provide support with their existing uses of social media, but they 'don't see the sort of media the way we see,' (Focus Group 5, School 1: Female), and they need to 'learn a bit more about what is positive with social media and try to teach that,' (Focus Group 1, School 2: Female).

4.4.2.4 Theme 2 Summary

This theme encompassed the real passion participants had for physical activity and the numerous ideas for how current school practices such as PE and break times could be improved. While their ideas varied, there was a clear call for action on physical activity which was grounded in providing a range of physical activity opportunities to suit a range of student interests. Considering how the workshops and focus groups were focused on developing a school-based physical activity intervention which used social media as a resource, the relative absence of ideas in this theme is noteworthy. A lack of adult understanding regarding social media was a point that participants felt needed to be addressed. While there were examples of social media being used by sports clubs and in physical and health education lessons, the whole-school use of social media in connection with students was seen to provide too much insight, connection and/or surveillance. If social media is to be utilised in a school-based physical activity intervention a whole-school approach does not appear to be feasible, acceptable or desirable.

4.5 Discussion

The analysis of qualitative multi-modal data from co-production activities with adolescents has provided rich evidence of the relevance social media has on adolescent physical activity knowledge, attitudes and behaviours. Despite in-depth workshops and focus groups spanning five sessions and with multiple groups, the adolescent participants produced limited ideas for how social media could be used as a resource in a school-based physical activity intervention. This was largely because participants often struggled to conceptualise the role of social media in schools and they were more concerned with how schools could increase the opportunities for physical activity without the use of social media.

Participants across all of the workshops and focus groups situated physical activity content within a broader framework which included sport, health, lifestyle, and/or fitness. These findings are similar to previous research where social media was a source of entertainment and inspiration, where adolescents navigate health-related content on social media critically (Goodyear et al., 2019c). Engagement with sports content was not deemed problematic in the present study and it was used for news, match highlights, video clips, challenges, and to support engagement with local sports clubs. Equally, #fitspiration content was seen as motivational, but it was also accompanied by potentially negative outcomes such a negative body image and unrealistic comparisons. These finding are similar to Raggatt et al. (2018), who found that #Fitspiration content had both positive and negative influences on wellbeing and perceptions of health goals amongst young adults. While some adolescents considered healthy food recipes to be more positive than exercise content, the diet related content

appeared to be most problematic. For example, literature shows that #WhatIEatInADay videos including lifestyle content can trend toward body-focused and disordered eating themes (Davis et al., 2023). This highlights the importance of focusing more on diet related content as a component of #Fitspiration. Particularly, the role that responsible adults can play by providing appropriate support for adolescents at heightened risk.

The data showed that social media can promotes aesthetic-driven views of exercise, which may reflect wider findings that adolescents have limited and narrow understandings of what it means to be physically active (Wilson et al., 2023). However, the data also showed that adolescents were seeking to navigate and resist these pressures. For example, this was shown through their critique of physical appearance and beauty standards on social media, and their concerns about a lack of attention given to the benefits of physical activity on mental wellbeing. In combination with the holistic approach to sport, fitness, diet and other lifestyle behaviours expressed by participants, these insights provide potential new directions for school-based physical activity interventions. Specifically, where current practices may be too uni-dimensional for contemporary adolescents and their holistic view of health and wellbeing.

Taking this discussion further, social media mediated multiple interactions within and beyond school and was a common prerequisite for social inclusion (Dredge & Schreurs, 2020). Functions such as location tracking had clear implications for social engagements and adolescents would change their communication based on the location of their friends. These findings contribute to wider research which has highlighted how functions of social

surveillance such as location tracking and read notifications can contribute to a Fear of Missing out (FoMo) (Vanherle et al., 2023). Pressure to respond and engage on social media was also evident in the focus groups, and the motivations behind usage are an area where adolescents may need support, particularly those who have higher levels of FoMo and/or higher levels of conformity (Kim & Lim, 2020).

It was also clear from the data that social media was a resource for physical activity engagements across multiple contexts. Participants were inspired by challenges, workouts and recipes. Sports clubs used social media to share achievements and games/physical activity performance with the wider community. These findings highlight the role of social media as a resource in both organised and non-organised physical activity engagements outside of school.

When social media was applied to a school setting there was an underlying sense of uncertainty of its suitability to the context. This seemed to stem from adolescent perceptions of appropriate online spaces for connections and surveillance, where school-based practices were often risk-based or antagonistic towards social media (Goodyear & Armour, 2021). Therefore, while schools have been suggested as contexts to mediate informal learning online and formal learning in school (Greenhow & Askari, 2015) participants tended to resist this to an extent. This was, in part, because participants often situated social media as a distinctly informal and personal activity. Therefore, while Goodyear and Armour (2021) found that existing school policies and practices were not conducive to harnessing social media, the findings in this study highlight how these

challenges may be bi-directional and also limited by adolescents' perceptions of school practices and their desire to protect their privacy.

4.5.1 Future Directions

The findings contribute key insight towards the complex intervention design framework, and the development of a school-based social media intervention to promote physical activity (Skivington et al., 2021a). The key uncertainty highlighted in this study is how schools are deemed as somewhat inappropriate to use social media. Most notably, the appropriate online spaces for connections and surveillance theme highlights a hierarchy of needs in relation to a school-based physical intervention. Specifically, how participants prioritised opportunities for physical activity over the use of social media within it. The findings not only support evidence of the lack of opportunity for organised physical activity in Swedish schools (Annwall et al., 2023), but adolescents' desire for this provision. The forthcoming chapter is conducted with adult stakeholders and will further inform how social media can be used as a resource in a school-based physical activity intervention.

Chapter 5: Co-Production with School Staff and Parents to Develop a Social Media-Based School Physical Activity Intervention

5.1 Introduction

Building on the insights gained in Chapter 4, this chapter shifts the lens towards school staff and parents, aiming to further co-produce a school-based intervention that uses social media to support adolescent physical activity engagement. This chapter addresses a critical gap identified in Chapter 4, where social media is used by adolescents for physical activity in connection with friends, sports clubs, and online content, but is notably absent in its use related to physical activity in schools.

This chapter uses qualitative methods and aims to better understand school staff and parent perspectives to inform the development of a complex intervention. Firstly, the details of the data collection methods, qualitative focus groups, and 1:1 interviews with school staff and parents/guardians will be explained in the methods section. The findings provide insight into three themes that were developed in the analysis; Aligning Policy and Practice: Student Safety, Privacy and Control; Connect the Physical Activity Community; and Quality Content and Strategies for Engagement. The chapter concludes with a discussion which synthesises the findings and their implications for the development and implementation of a school-based social media intervention to promote physical activity.

5.2 Methods

This qualitative study sought to better understand how social media could be used as a resource in schools to support physical activity and was aligned with research question 2:

> What school-based practices do school leaders, teachers, and parents report will support adolescents to use social media to improve their knowledge, attitudes and behaviours related to physical activity?

5.2.1 Setting, Participants and Recruitment

The research was conducted at the same two schools as Study 1 in Stockholm, Sweden (see Table 4) and convenience sampling was used to recruit participants (Sparkes & Smith, 2014, pp. 70-71). Due to challenges during recruitment, parent recruitment was extended to beyond the two schools. Study invitation emails were sent to school staff and parents at the two schools and (following ethical amendments and approval) additional recruitment of parents was conducted using a flyer on social media platforms (LinkedIn, Facebook and Twitter). The eligibility criteria for parents, teacher participants, pastoral support staff and school leaders was as following: parents had at least one child aged 13-15; teacher participants were required to teach students aged 13–15; pastoral support staff needed to have regular contact with this age group; and school leaders had to be responsible for the eligible teaching staff.

The diverse cultural background and lived experience of participants are of particular importance in this study, because the norms, attitudes and practices of the participants were more international than in a typical Swedish school setting. The contribution of both Swedish and non-Swedish participants provided unique insights into the development of an intervention with relevance in national and international contexts. A total of 24 participants included, two female school leaders, 11 teachers (7 male, 4 female), two pastoral support staff (1 male, 1 female), and nine parents (7 female, 2 male). Their ages ranged from 37 to 51 years, 46% were Swedish, and a slight majority of the participants were female (58%) (see Table 10)

Table 10: Information about the Focus Groups and Interviews Conducted in Study 2

Interview type	Online /FTF	Role	School	Participants (n)	Country	Gender	Age Range
Focus Group 1	FTF	Teacher	1	2	Sweden	1M, 1F	44-48
Focus Group 2	FTF	Pastoral Support	1	2	Sweden	1M, 1F	37-46
Focus Group 3	FTF	Teacher	1	5	Sweden	3M, 2F	37-51
Focus Group 4	FTF	Teachers	2	4	Sweden	3M, 1F	37-42
Interview 1	FTF	Deputy Head	1	1	Sweden	F	49
Interview 2	Online	Coordinator	2	1	Sweden	F	37
Interview 3	Online	Parent	1	1	Sweden	F	52
Interview 4	Online	Parent	1	1	Sweden	F	47
Interview 5	Online	Parent	Other	1	France	F	49
Interview 6	Online	Parent	1	1	Sweden	F	42
Interview 7	Online	Parent	1	1	Sweden	F	49
Interview 8	Online	Parent	Other	1	UK	M	48
Interview 9	Online	Parent	Other	1	Sweden	F	43
Interview 10	Online	Parent	Other	1	Sweden	M	41
Interview 11	Online	Parent	Other	1	Sweden	F	47

Note. *FTF refers to face-to-face interviews. *F and M refer to male and female participants.

5.2.2 Data Collection Methods

Data collection took place over ten weeks and included four focus group interviews and 11 semi-structured 1:1 interviews. Semi-structured interviews were conducted with parents, pastoral support staff, and school leaders and lasted between 30-45 minutes. Focus group interviews were conducted with teachers and pastoral support staff and lasted between 38 and 65 minutes. The majority of the interviews and focus groups were conducted in English, however, one focus group and one interview were conducted in Swedish. Interviews and focus groups were offered online and face-to-face based on the preference of participants.

Participants preference for both language and interview/focus group format was discussed before they were conducted and was a practice underpinned by a culturally and linguistically responsive approach to qualitative data collection (Filep, 2009).

Interview and focus group topic guides were developed in collaboration with the supervisory team (VG and CW) and included multiple iterations before and after Study 1 (see Chapter 4). The iterative development of the topic guides addressed their relevance to the research question, the structure and flow of the questions, clarity of the questions and appropriate probes.

5.2.3 Focus Group Interviews with Teachers and Support Staff, and Semi-Structured Interviews with School Leaders

Focus group interviews and semi-structured interviews with school staff included 15 questions (see Appendix 3). The topic guide included initial opening questions, a main body with probes to provide examples, and open ended summary questions (Krueger, 1997). Part one of the interview topic guide focused on the factors which influenced adolescents physical activity behaviours. Part two focused on social media, beginning with how social media was used in the home, progressing to how the school approached social media, and ending with how schools could use social media as a resource to support physical activity. Questions and probes were shown sequentially on a projector screen or sent using the chat function in online interviews when possible. Focus group interviews were used with teachers and they were the preferred method of data collection due to the 'idea generation' aspect of

the topic guide. However, 1:1 semi-structured interviews were conducted with school leaders because only one was available at each school (practical reasons).

5.2.4 Semi-Structured Interviews with Parents

Semi-structured 1:1 interviews were conducted with parents for practical and ethical reasons. While a focus group format may have generated more ideas, it was decided that there were limitations to unacquainted parents sharing personal information about their children and family life (Pinto da Costa, 2021). This may have limited parents from sharing important information relevant to the research. The 1:1 interview format was also chosen because recruiting parents for interviews at a time that suited them better facilitated recruitment.

The topic guide (Appendix 4) followed a similar sequence of questions as school staff interviews. Part one focused on their child's engagement with physical activity. Part two focused on social media, beginning with how social media was used in the at home, progressing to how the school approached social media and ending with how schools can use social media to support physical activity.

5.3 Analysis

5.3.1 Data Organisation

The audio recordings from interviews and focus groups were transcribed and anonymised. Interviews that were conducted in Swedish were transcribed in Swedish and then translated

to English by JM. All transcripts were uploaded to NVivo 12 qualitative analysis software (Woods et al., 2015).

5.3.2 Analysis Overview

The analysis of the qualitative data shared many commonalties with Study 1 (see chapter 4) and used reflexive thematic analysis (Braun, 2016). These steps were, (i) data familiarisation and writing familiarisation notes; (ii) systematic data coding; (iii) generating initial themes from coded and collated data; (iv) developing and reviewing themes; (v) refining, defining and naming themes; and (vi) writing the report. The forthcoming overview of the analysis will not seek to reiterate points from the previous chapter but it will highlight key differences between this study and Study 1.

In Study 1 reflexive thematic analysis offered a robust framework for the analysis of multi-modal data, however, the current study produced different data. Specifically, the current study included a more diverse sample and data from both individual 1:1 interviews and focus groups. The inherent flexibility within the reflexive analysis framework and the inductive (yet research question focused) approach meant that the unique sets of data in the two studies led the analysis in different directions. This study extended upon the pragmatic philosophical stance established in Study 1 by adding additional voices and perspectives to the overarching inquiry in the development phase of the thesis, using the experiences and beliefs of people to generate knowledge and action. Moreover, as evidenced in the unique

ways reflexive thematic analysis was applied in Study 1 and 2, the flexible and reflexive method of inquiry reflected the pragmatist paradigm.

5.3.3 Reflexive Thematic Analysis: Researchers perspective

According to (Braun & Clarke, 2023) the reflexive position of the researcher is commonly overlooked in thematic analysis and is often not reported. In this study researcher reflective notes were combined with an audit trail and helped to describe the analytical choices that were made. When re-examining the reflexive commentary of the audit trail, it was clear that a focus on designing the intervention influenced the direction of analytical travel. This acted as a strength, because a focus on the forthcoming intervention culminating from the data in Study 1 and 2 was aligned with the research question. A focus on intervention design also influenced the structural mapping of themes and codes. For example, while the initial themes in Study 1 were mapped around a central theme (see Table 7), the initial themes in this study were mapped across a continuum (see Figure 19)

5.3.4 Data Familiarisation

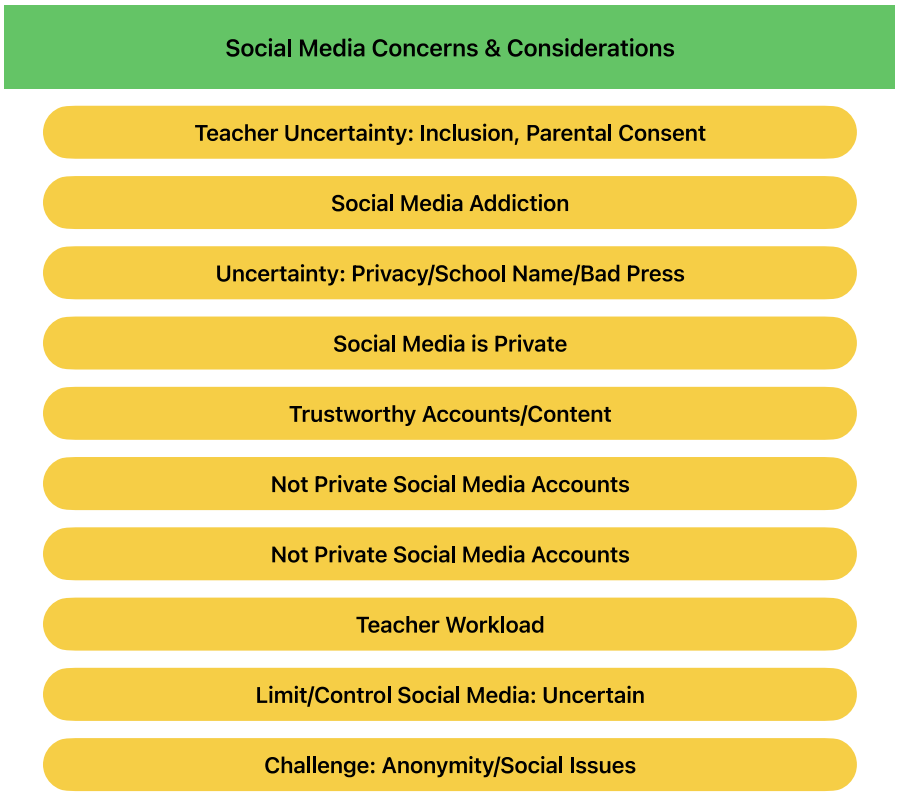
Familiarisation began when the interview data was being translated and transcribed. This then continued by reading through the transcriptions and making notes. A number of overall impressions from the data were noted down as part of reflexive practices. These included: (i) comparisons to Study 1 and the additional depth in the intervention ideas from school staff and parents, (ii) the concerns aired regarding safeguarding and inclusion, (iii) varied levels of

open-mindedness of schools regarding social media, and (iv) varying staff social media competencies, knowledge and experience.

5.3.5 Systematic Data Coding

The systematic coding included initial codes in the data. This initial coding was quite descriptive and this supported subsequent iterations of coding by helping the researcher to identify key messages and regroup them into code categories. For example, the 'Social Media Concerns and Considerations' code group was constructed from much more specific codes (see Figure 18).

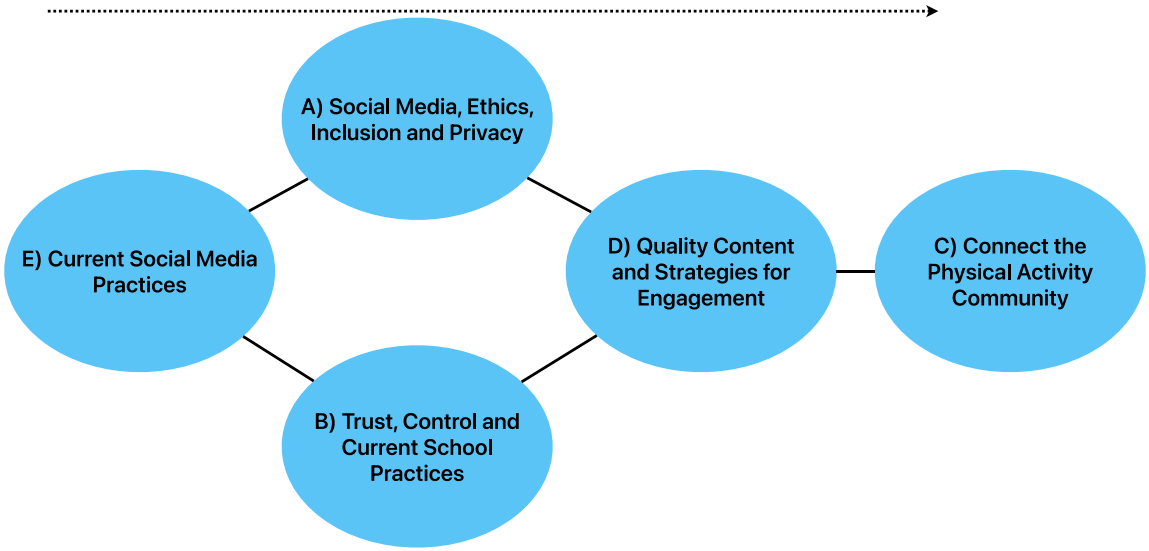
Figure 18: Initial Coding Example from Study 2 Constructed from Nvivo



5.3.6 Generating initial themes from coded and collated data in Study 2

Initial theme generation included five overarching themes. The thematic map (see Figure 19) represented an initial pathway towards answering the research question and informing the design of an intervention.

Figure 19: Initial Thematic Map example from Study 2 Constructed from NVivo



Reading from left to right, Figure 19 showed that, at this point of the analysis, (E) 'Current Social Media Practices' were the starting point. This was followed by two significant challenges: (A) 'Social media, Ethics, Inclusion and Privacy', and (B) 'Trust, Control and Current School Practices'. Addressing these would then facilitate the ideas expressed by the participants which were based on (D) 'Quality Content and Strategies for Engagement', and to use social media as a means to (C) 'Connect the Physical Activity Community'.

5.3.6 Developing and Reviewing Themes

When re-addressing these initial themes it was deemed that they answered the research question, but a more in-depth written explanation of each theme was needed. The reflexive thematic analysis literature was then reviewed (see Braun & Clarke, 2019), and it became clear that some themes did not clearly extract meaning through either their name or their overall categorisation. For example, the theme 'Current Social Media Practices, theme represented more of a summarising topic than any latent conceptual meaning or understanding. The code categories and codes within this theme were then reviewed and when necessary recoded within existing themes. A miscellaneous theme category was created in NVivo to move existing codes which were incompatible with the meaning of existing themes (see Byrne, 2022). The miscellaneous theme was iteratively reviewed to decide whether an additional theme needed to be developed or codes needed to be moved in alignment with existing themes.

5.3.6 Refining, defining and naming themes

The reviewed and adapted themes from step four were written out in a longer format with an in-depth description, subthemes and example quotes. These were then further reviewed by the supervisory team (VG) and deliberated over in a theme related meeting. Themes and theme descriptions were then further refined and renamed.

5.3.7 Writing the Report

Due to overlaps between subthemes while writing the report, themes one and two were reviewed and analysis returned to step four and five before writing again. The main outcome from this review was the combination of Theme 1: Ethics, Inclusion and Privacy, and Theme 2: Current School Practices and Alignment with policy, into one coherent theme and the recategorization of some codes.

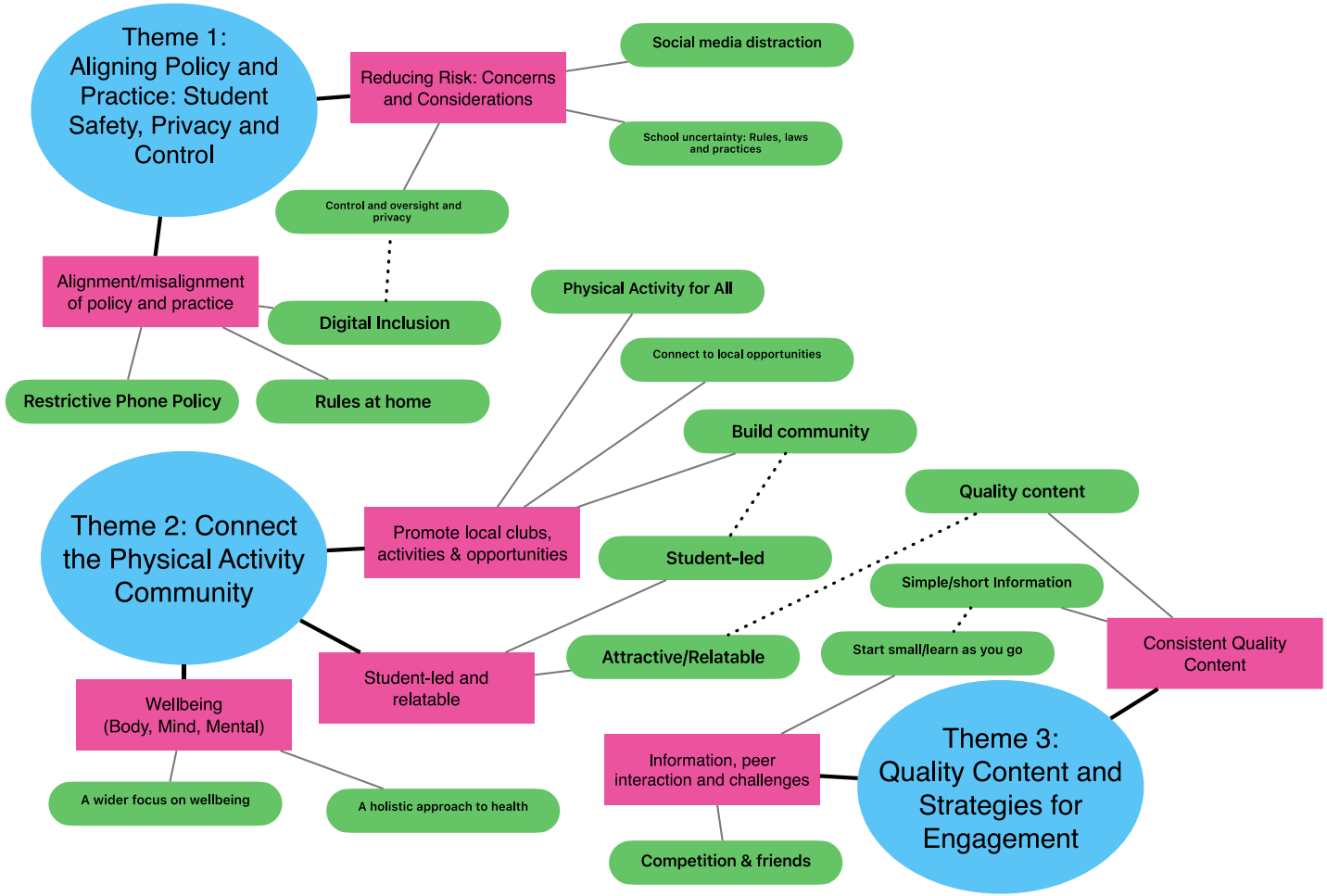
5.4 Results

The process of reflexive thematic analysis produced three themes:

- Theme 1: Aligning Policy and Practice: Student Safety, Privacy and Control
- Theme 2: Connect the Physical Activity Community
- Theme 3: Quality Content and Strategies for Engagement

The following three sections will provide an in-depth description of the themes and use their underlying subthemes, codes, and quotes to illustrate their meaning. The thematic map (see Figure 20) provides a visual representation of the three themes, their subthemes and example codes within each subtheme. Theme 1 represents key considerations and challenges for a school-based social media intervention to promote physical activity. Themes two and three provide more insight into the structural and conceptual elements that could be included in the intervention.

Figure 20: A Thematic Map Showing Three Themes, their Subthemes and Example Codes within each Sub-Theme



5.4.1 Theme 1: Aligning Policy and Practice: Student Safety, Privacy and Control

Theme 1 'Aligning Policy and Practice: Student Safety, Privacy and Control' refers to the tensions between student safety and privacy and the use of social media in schools. Table 11 introduces the theme, two subthemes and key words within them.

Table 11: Overview of Theme 1 in Study 2

Theme Summary	**Subthemes**
Theme 1: Aligning Policy and Practice: Student Safety, Privacy and Control This theme highlights the varied school-based practices which use social media. Social media was seen as a potential distraction in schools and the alignment of practices between home and school was seen as a potential barrier to the implementation of a social media intervention. Schools had concerns regarding how a social media-based intervention could be digitally inclusive and how it could safeguard adolescents. A lack of teacher knowledge was seen as a limiting factor for schools to use social media. Safeguarding and/or workload was at the forefront of some teachers' minds, leading to uncertainty about whether using social media was worth the risks or the time. Schools were clearly driven by a duty to protect students and limit distraction, and school/teacher competence and knowledge regarding social media largely underpinned the levels of control they had or wanted to have over student digital interactions.	Alignment/misalignment of policy and practice (Digital Inclusion, Unclear School Policy) Reducing Risk: Concerns and Considerations (Safeguarding, Privacy)

5.4.1.1 Subtheme 1: Alignment/Misalignment of Social Media Practices at School and Home

Social media was used for different purposes in each of the schools. It was common for schools to have an official social media account which they used to share school activities. For example, 'a Facebook page… where they put out official news' (Interview 11, Parent 11, Female). All other uses were student initiated or they came from specific teacher-led accounts. For example, one teacher used the Snap Map[9] feature on a 'teacher account' to keep track of students on a trip. One of the pastoral staff at School 1 also ran a work-related Instagram account where she posted information about local activities during school breaks and students could book meetings with her. Despite these practices, a common view from school staff was that social media was not common in schools.

> I used social media with the students last week when we were at [a local theme park]. I used Snapchat to see where they were, and to send messages in the group.
>
> (Focus Group 4, School 2, Female)

> Students can book meetings with me through Instagram… and I communicate with them through Instagram as well during the day.
>
> (Focus Group 2, School 1, Support Staff: Female)

> It [social media] is not promoted very much within the school community, other than it is student-led.
>
> (Focus Group 1, Teacher, School 1, Male)

[9] A feature on the Snapchat app where the location of friends can be tracked using GPS

Social media use was less common at School 2 than in School 1. Phones were collected at the start of the day and a social media intervention was seen as something that would add to teacher workload.

> I don't think the school is too involved. There is a policy which we talk to the student about… The school doesn’t have the time or resources to deal with everything that happens on social media.
>
> (Focus group 3: School 2: Male)

> Teachers are already under massive strain and massive workload.
>
> (Focus group 3: School 2: Male)

In addition to considerations regarding teacher workload and buy-in, this evidence pointed to the fact that school phone policies required consideration, particularly in more restrictive contexts. For example, one parent shared that:

> The school where [Daughter 2] is attending right now, phones are just not allowed. They can't have their phone turned on at school during school hours, even during break time.
>
> (Interview 5, Parent 3: Female)

This also related to digital equity and inclusion, where teachers and parents were concerned that a social media intervention could exclude students without a smartphone. Teachers were also cognisant of varying rules from parents and restrictions on social media use.

> I know, some students don't even have cell phones, for example, they're not allowed to use social media.
>
> (Focus Group 4, School 1, Teacher: Female)

> Maybe not all students have a phone.
>
> (Focus Group 4, School 1: Teacher: Male)

> I know most kids have [a smartphone] these days, but there's always going to be a few who have got a Nokia brick still.
>
> (Interview 8, Parent 6: Male)

Further considerations for inclusion included the legal ages for social media use and how schools could only use certain applications with some age groups at the same school. These insights emphasise the importance of tailoring a social media-based intervention based on student access to smartphones and social media. The data also showed how consideration needs to be given to the justification behind social media use in schools where some students may be allowed to use it, but not all.

> Facebook has a 13-year-old age limit, then the school can't have that for anyone who is under 13, then that’s weird.
>
> (Interview 9, Parent 7: Female)

> A challenge is as also balancing the expectations of families, we don't know a lot of the policies of families…some parents might not want them on social media at all…we can't force everybody to, we can encourage and do it in a learning way. Some families just don't want to be engaged in it at all for their own personal reasons, whether it be ethics, or data mining…or just being more trouble than it's worth.
>
> (Focus Group 4, School 1: Male)

Apprehension regarding the variance of rules at home was not unfounded, as rules for social media, screen time and phone use varied among families. Nevertheless, a key theme

amongst parents was the need to trust their children to use social media and most parents did not have strict screen time or social media limits.

> They use their mobile phone max three hours a day, and if they want to see something more, they use their computers from school, I have a limit.
>
> (Interview 4, Parent 2: Female)

> I basically trust them to be smart about it, and we do talk about it, but I don't look at what they do.
>
> (Interview 3, Parent 1: Female)

> 'I'm not checking on them, I don't have an app controlling, I told them that I will not do that, I need to trust them.
>
> (Interview 6, Parent 4: Female)

Despite the reliance on trust in the home environment, parents had some concerns with smartphones and social media being a distraction in the school environment. While parents acknowledged the potential role social media could play in a school-based physical activity intervention (see Theme 3), it was also evident that minimising distractions in school was important.

> I think it's really good that at my youngest daughter's school, they have to give up their phones in a big basket, so they don't have them during the day, which I think is excellent. I don't think they would be able to concentrate. And I think that interaction would be hampered significantly if they didn't. I think most children would just sit around with them instead and then you wouldn't have any physical activity.
>
> (Interview 10, Parent 8: Female)

Overall, the existing school practices using social media were rarely centralised or school-led, but it was normal to have a public social media page for the school. Social media was used by school staff for varying purposes which supported their role. However, organised school-level uses of social with students was limited. This was due to a range of uncertainties regarding students access to social media and rules at home. Despite varied rules at home, there was an apparent child-parent trust relationship which was largely absent in schools. From a parent perspectives the use of social media in a school context was considered a risk due to distraction. The following subtheme further unpacks the concerns and considerations for schools. The underlying concepts of control and confidence regarding social media use in schools will also become more apparent.

5.4.1.2 Subtheme 2: Reducing Risk: Concerns and Considerations

In many ways, wide levels of uncertainty regarding social media use among school staff were related to a lack of knowledge and experience. For example, there were uncertainties regarding the legal considerations which led to an avoidance of social media.

> The law needs to be clear [on] what schools can and can't do with social media.
>
> (Focus Group 4, School 2, Teacher: Male)

> The GDPR[10] things…that has kind of made everybody just stay away from things for a while.
>
> (Interview 1, School leader 1, School 1, Female)

[10] The General Data Protection Regulation is a data protection law in the European Union which came in to effect in 2018.

A school leader went on to explain how a lack of knowledge underpinned legitimate caution towards using social media. This also extended to some teachers who—in addition to parents—were concerned that social media could be a distraction. The disparities in teacher confidence and control over technology became apparent as central factor which could influence the feasibility of social media use in a school-based physical activity intervention.

> I think a lot of the teachers and staff, me included, we don't know enough to be able to use it effectively and safely for the students…that that has been one of the discussions…how do you make sure that it's a safe environment, and not everyone can join?
>
> (Interview 1, School leader 1, School 1, Female)

> It's a risk for some teachers, there's a risk involved in saying you can have your phone out, you have to be willing to take the risk that yes, some of them will get off target, off track, it will distract some of them, but my opinion is that so do a lot of things in a classroom. Phone is just one of them.
>
> (Focus Group 1, School 1, Female)

Uncertainty regarding the use of social media in an intervention was largely driven by a duty to protect students, reduce risk and to keep them safe. This included how social media was 'too accessible outside of [school] hours' (Focus Group 4, School 1, Teacher: Female), and the consequent blurring of personal/professional boundaries. Other teachers were more confident using social media in their teaching and they applied principles and practices to maintain public/private boundaries. For example, when discussing student-led accounts for clubs and activities, one teacher stated:

> Not sharing pictures of anybody's faces or creating a space where people can start having various discussions that get out of hand.
>
> (Interview 1, School leader 1, School 1, Female)

> I follow the students things [on social media], but I won't let them follow on me because that's a separation… I wonder if next year, that might be an idea, that I have a separate Instagram account that I engage with students?
>
> (Focus Group 1, Teacher, School 1, Female)

For teachers who were hesitant towards social media, their school's existing online learning platforms appeared to be the preferred and protected online space for student interaction. This was because 'they're sort of safe and monitored by teachers and parents and we're all in there and we know what's there' (Focus Group 4, School 1, Teacher: Female). Here consent and control became apparent as something a cross-section of teachers prioritised. For example:

> If I created a class Instagram account I had control over, then we could… share it with older students. We're not saying you have to use an Instagram account, because you can't do that. But a class controlled one.
>
> (Focus Group 1, Teacher, School 1, Female)

The tendency towards teacher control and safety when considering future uses of social was also seen as a limitation created through how schools approached social media. Notably, the data suggest that a cautious teacher-initiated approach to social media may have manifested in how adolescents engage with a school-based intervention.

> As a result of us teaching them so well about consent and about how to use social media, that creates a limitation to them using social media, because they're so careful.
>
> (Focus Group 4, School 1, Teacher: Male)

5.4.2 Theme 2: Connect the Physical Activity Community

Theme 2: 'Connect the Physical Activity Community' refers to the power of social media to connect the community and to support wellbeing. Table 12 introduces the theme, two subthemes and key words within them.

Table 12: Overview of Theme 2 in Study 2

Theme Summary	Subthemes
Theme 2: Connect the Physical Activity Community This theme is comprised of 3 unique and interconnected subthemes; (i) student-led and relatable, (ii) promote local clubs, activities and opportunities, and (iii) wellbeing. Collectively, this theme shows how a social media based physical activity intervention can provide unique opportunities for schools and adolescents. Social media was considered as a means to inspire or reach adolescents in new ways, particularly those who may be less physical active and more sedentary. The intervention was seen as something to be conducted in collaboration with students, and despite some safeguarding concerns, there was general support for an intervention being student-led. One key aspect of the ideas generated was connecting-to and promoting opportunities for physical activity within and/or beyond the school. Notwithstanding the breadth and depth of these diverse ideas, there was a sentiment that physical activity may not be too narrow of a focus for schools. Instead, there was a need to situate the intervention within a wider wellbeing framework.	(Physical Activity for all, School=uncool) Promote local clubs, activities & opportunities (Community, Promotion, Opportunities) Wellbeing (Body, Mind, Mental)

5.4.2.1 Subtheme 1: Student-Led and Relatable

Despite the concerns about using social media outlined in Theme 1, a school-based social media intervention to promote physical activity was seen as an opportunity to approach physical activity in new ways. Social media had the potential to provide a way to make physical activity more inclusive by broadening the types of physical activity adolescents could engage with. For example, a school based social media intervention was seen as a way to promote normative ideals of physical activity which were grounded in promoting health over appearance.

> To make it accessible you don't have to do a sport to get physical activity.
>
> (Interview 7, Parent: Female)

> You want a whole breadth of different teachers with different backgrounds and genders and ages [taking part in the intervention] …whatever size and shape.
>
> (Interview 3, Parent 1: Female)

> I would want students to understand that being fit doesn't mean you need to look a certain way. It's extremely important for me, especially in the world of social media.
>
> (Interview 2, School leader, School 1: Female)

Providing relatable sources of inspiration for physical activity on social media was something participants felt could reach less active adolescents. Even participants who showed scepticism regarding their own contribution to a physical activity intervention noted that they, 'like[d] the idea of helping students who are not active to find activities' (Focus Group 4, Teacher, Male).

> The person who needs to move more maybe needs.. someone who they can identify with.
>
> (Interview 9, Parent 7: Female)

It became evident that the use of social media in a school-based physical activity intervention needed to appeal to adolescents, and a key concept to achieve this was relatability and relevance through a student-led approach. While parents supported student engagement in the intervention, they also noted the importance of teacher supervision.

> You really have to package it nice because I don't think kids naturally want to follow something that's offered by the school.
>
> (Interview 4, Parent 2, Female)

> I think students need to have a lot of ownership of it, to drive it. I think rather than a teacher imposing on a student, I think you need the students to be taking the lead and managing the community because I think you'll get more engagement that way.
>
> (Focus Group 1, Teacher, School 1, Female)

> You obviously want the kids to contribute to it, but I think it’s got to be set up by run by the teachers. If it was done as a whole school, we might want someone to have more of an overview over it, how it's used, and how to use it safely.
>
> (Interview 8, Parent 6: Male)

Notwithstanding challenges related to control and autonomy highlighted in Theme 1, student engagement and their contribution to leading the intervention was a source of consensus across the adult stakeholders.

> Social media provides a lot of opportunities to for community building [and] for role modelling.
>
> (Interview 1, School leader, School 1, Female)

Overall, there was a clear message that with the right group of adolescents, with the right levels of adult support, schools could successfully inspire adolescents to be physically active using social media.

5.4.2.2 Subtheme 2: *Promote Local Clubs, Activities and Opportunities*

Subtheme 2 related to the use of social media as a promotional and informative community tool. It was seen as a means to connect students with physical activity opportunities at school and in the community. Social media was even likened to the modern-day message board.

> You can [use social media to] create groups where the students can like meet and train.
>
> (Interview 10, Parent 8, Female)

> An Instagram account for the sports activities … [because] more people will be probably drawn to them.
>
> (Focus Group 3, Teacher, School 1, Male)

> It's a way to reach out to students in terms of after school clubs.
>
> (Focus Group 3, Teacher, School 1, Female)

A perceived advantage of using social media to support adolescent physical activity engagement was to create a sense of community and generate interest in school events. For example, in reference to sports tournament some students had recently attended, one teacher stated:

> Imagine if that was promoted much more on social media around that time [a football tournament], you'd probably get more people wanting to sign up and be involved in clubs.
>
> (Focus Group 1, Teacher, Male)

Participants expressed that social media could not support or promote physical activity without adequate provision and opportunities. Where, for example, ‘you actually need to come up with the activities or ideas’ (Focus Group 1, Teacher, School 1: Male). It was perhaps for this reason many saw social media as a means to promote external activities such as, ‘certain sports or activities that are out there that people just don't know about’ (Focus group 2, Support Staff, School 1, Male). For example, one parent discussed how social media could establish links with local sports clubs and another highlighted how online connections through social media may also provide an alternative to traditional sports club structures for less active adolescents.

> It could somehow be connected to the local clubs that are available, and that way promote the clubs… and show clips of the different sports that are around.
>
> (Interview 11, Parent 9: Female)

> For a lot of children it's also hard to join a group of something to do sports. So it's also nice that you can say you can go out and do sports in a group, but you can do it at home.

(Interview 4, Parent 2: Female)

A key aspect identified within this theme were the cultural and contextual differences in how schools approach physical activity. For example, the interview data showed that School 1 had more of an international profile and offered additional sports clubs for students; School 2 had a profile more aligned with a typical Swedish school and no regular extracurricular sports or activities were offered. Parents and teachers in this study also came from both Swedish and international contexts and drew from a range of experiences in schools. This heterogeneity highlighted how physical activity culture can vary widely between countries and schools.

> I see a lot more effort and enjoyment of physical activity in Northern Europe than it comparison to where I taught in China and in France,…I think, is a part of what that culture values or even considers the role of physical activity in the in the life of not only children, but as adults.

(Focus group 3, Teacher: Male)

This variance provided a rich source of perspectives on how physical activity could be approached. The prioritisation and structure of physical activity within the school were highlighted as key factors in the potential success of a school-based intervention that uses social media to support adolescent physical activity engagement. It was intriguing to observe that participants who were more familiar with Swedish conventions often suggested using social media to connect to local sports clubs outside of the schools. Teachers at School 1 (an

international school), viewed club sport as an underutilised resource and they recognised the cultural engrailment of sports clubs in Sweden (see Fahlén & Ferry, 2018).

> In Stockholm, there's… a lot of good community resources… [but the school] 'don't promote those resources that much.
>
> (Focus Group 2, Pastoral Staff, School 1: Male)

Overall, this aspect of connecting the physical activity community highlighted how these communities could vary across local school contexts and external organisations. Regardless of physical activity opportunities at the school, there was widespread support for connecting students with the broader physical activity community using social media.

5.4.2.3 Subtheme 3: Wellbeing

The final subtheme was initially coined as the 'wellbeing umbrella' and it related to how participants often situated a social media intervention within a wider wellbeing-related framework. For example, one parent emphasised they would like an intervention to help adolescents develop a holistic understanding of physical activity and its benefits.

> I would want them to learn that physical activity is not just going to PE class, physical activity is part of your daily life, physical activity is about your wellbeing, like your body and your mind.
>
> (Interview 5, Parent 3: Female)

The framing of physical activity and other health-related behaviours is of particular importance in this theme. Where, for example, the importance of adolescent engagement

with diet-related content was suggested as an engaging and relevant topic in the intervention.

> I have [received] a lot of questions about diet recently… I see that as part of the physical activity, wellness kind of umbrella.
>
> (Focus Group 3, Teacher, School 3, Male)

> My son would actually engage most with wellbeing content because he's realising that if he if he eats well, he's going to get stronger.
>
> (Interview 11, Parent 9: Female)

In many ways, health related behaviours such as physical activity and diet were situated under this so called 'wellbeing umbrella'. There was also a sentiment that the mental aspects of health was more engaging for adolescents than the physical aspects in isolation. One teacher emphasised this point In reference to a previous health related project between Physical Education and Design. They stated how their class:

> had to design an app that met a need for some of the students, and there were a lot that chose mental health as their aim rather than physical.
>
> (Focus Group 1, Teacher, Female)

This comment was indicative of the idea that adolescents would prefer to focus on the mental aspects of health and/or wellbeing in an intervention. Notably, the framing of physical activity as a means to support mental wellbeing was made by both school leaders. In reference to a social media intervention the school leader at School 2 articulated how:

> The first things I would want to be taught to the students is the connection between physical wellbeing and mental wellbeing... we're already trying to support parents in our newsletter on how to help the kids not only eat right, but how to get them engaged and moving during off time.
>
> (Focus group 2, School leader, School 2, Female)

This idea was echoed at School 1, whose school leader stated:

> If we're to look into using social media more to promote any type of physical activity, we'll probably be more focused on wellbeing, under that umbrella...from my position in an admin role I could use social media to provide information to students, but I would want the wellbeing team to manage it.
>
> (Focus group 2, School leader, School 1, Female)

This final two examples of a wellbeing focus may have particular significance for a future physical activity intervention, as they were shared by key decision makers in schools. Overall, the focus on interrelated components of health and lifestyle such as diet and their impact on wellbeing were situated as a relevant area of focus in schools and with adolescents.

5.4.3 Theme 3: Quality Content and Strategies for Engagement

Theme 3: 'Quality Content and Strategies for Engagement' refers to the important strategies and principles in a school-based intervention that uses social media to support adolescent physical activity engagement. Table 13 introduces the theme, two subthemes and key words within them.

Table 13: Overview of Theme 3 in Study 2

Theme Summary	Subthemes
Theme 3: Quality Content and Strategies for Engagement A number of strategies for engagement were suggested for the intervention. Sharing information about physical activity or wider topics such as health and/or wellbeing were generally seen as a safe base to start an intervention from. However, more strategies to sustain adolescent engagement and the consistency and quality of social media content were also emphasised. This included weekly themes, short and snappy content and titles e.g., five things to do. Further suggestions to engage adolescents through social media were challenges, competitions, peer interaction and feedback on school events.	Consistent Quality Content (Short, Engaging, Planned)
	Information, peer interaction and challenges (Start small, Friends, Competition)

5.4.3.1 Subtheme 1: Consistent Quality Content

During discussions with parents and teachers there was widespread agreement on the necessity for consistently high-quality social media content that promotes physical activity effectively. This involved curating content specifically designed to engage adolescents, such as, lists or attention-grabbing headlines. They shared the importance of providing clear, simple and high-quality information, and suggested content such as, 'five things you can do

to just shake it off' (Interview 2, School leader, School 2: Female) or '10 things I will do this month to make me healthier or to increase my physical activity (Interview 5, Parent 3: Female)

> You cannot use the platform and then have garbage content…you need to have content which is engaging… then you can start to attach headlines… like what can I do during the day to stay active?
>
> (Interview 10, Parent 8; Female)

> Give information that is clear and simple.
>
> (Interview 4, Parent 2: Female)

Discussions surrounding content delivery strategies emphasised the importance of clear messaging and clearly defined intervention objectives. Participants also highlighted that successful social media pages require consistent monitoring and updates and they were cognisant of the ongoing commitment required. In their view, regular distribution of content was important to drive engagement and to be suggested by social media algorithms. The teachers drew inspiration from professional content creators and proposed developing a social media curriculum where scheduled releases of content would help to maintain online visibility and student engagement.

> You need a clear plan and objective with it, like… what do we want to see happen?
>
> (Focus Group 2, Pastoral Staff: Female)

> The algorithm loses you…so it will be much better just to keep sending out even small pieces of information about regularly so that people know that they can check up.

(Focus Group 3, Teacher, School 1, Male)

> Have a schedule of releases in order to keep in the algorithm. If you have a group of teachers who can collaborate on content, they come up with 10 weeks of content.

(Focus Group 3, Teacher, School 1, Male)

While school control over social media was grounded in safeguarding concern in a previous theme, it was considered to be a mechanism for more organised and focused uses of social media in this theme. For example, a more consistent handover of student and staff-led social media accounts was seen as a means to make the schools presence on social media more focused.

> So one thing that would be really effective is a more effective handover of school social media accounts, particularly [as] there seems to be a new one every year because the people change. That's why maybe a centralised person can be the overseer of things.

(Focus Group 3, Teacher, School 1, Male)

In addition to the consistency and quality of content, the main ideas and mechanisms for student engagement in the intervention were broad and varied. However, sharing wellbeing/physical activity information, peer interaction and challenges were most prominent; these are covered in the forthcoming subtheme.

5.4.3.2 Subtheme 2: Information, Peer Interaction and Challenges

The approach to a social media-based physical activity intervention was firmly grounded in feasibility and participants showed an awareness of the novelty of their ideas. As a result,

using social media to promote physical activity meant starting with a low-risk risk approach and to initiate student engagement. For example, social media could be used to share information regarding physical activity and broader health and wellbeing themes.

> Start out small and build on it…[for example, providing] information seems to be the safest way to start…not even just physical activity but health.
>
> (Focus Group 1, Teacher, School 1, Male)

> Wellbeing content, sharing physical activity guidance or benefits… a weeklong campaign every day.
>
> (Focus Group 3, Teacher, School 1, Female)

Providing information on social media was seen as a tool to remind students about the importance of physical activity. However, there were concerns that this might not produce meaningful engagement if it was delivered in short-form, and interaction and was seen as a central component to keep adolescents engaged.

> Reminders, and if they do it, they do it, and if they don't, they don't.
>
> (Interview 3, Parent 1, Female)

> Promote [physical activity], remind people encourage them.
>
> (Focus Group 1, Teacher, School 1, Male)

> To have just pure information, especially if you need to keep it short… they just won't care, they won't engage with the content to the degree which they would gain anything from it. So you get the interaction, you get the engagement.
>
> (Interview 10, Parent, Female)

It was suggested that social media could be used to seek feedback from students about sports events or other activities supporting physical activity. Others suggested interaction should be more peer-based and connected to social activities.

> [For my daughter it is] more important for her that it's other people involved and that there's a group.
>
> (Interview 11, Parent 9, Female)

> Posing those questions out to students to engage them, not only just view, but actually to respond to. It’s like reading the room in a digital way before we spend a lot of time organising an event.
>
> (Focus Group 3, Teacher, School 1, Male)

The use of challenges generated widespread support among adult stakeholders and they were viewed as an engaging approach. This stemmed from their own experiences with adolescents, such as teachers using challenges to motivate adolescents while teaching online during the pandemic, or parents using challenges or 'bucket lists' to keep their family active during the summer break.

> We tried to use the whole idea of challenges, competitions, rewards
>
> (Focus Group 3, Teacher, School 1, Female)

> We made a big board with like 100 things to do this summer. And it goes from hiking, to geocaching, to eating at a bad restaurant, to go and visit that beach, to go to the zoo, to have a water fight
>
> (Interview 5, Parent 3, Female)

Ideas for challenges often lacked specificity but they included elements of gamification such as individual tasks and group competitions to incentivise physical activity.

> 'Twenty-day challenge today you do five push ups etc'.
>
> (Focus Group 3, Teacher, School 1, Female)

> Different types of challenges, that could be part of a house activity [for example] we collect steps.
>
> (Interview 1, School leader, School 1, Female)

> You have little challenges that you have to tag yourself in.
>
> (Focus Group 1, Teacher, School 1, Female)

5.5 Discussion

Qualitative data from interviews and focus groups with school staff and parents/guardians offers nuanced insights into the considerations, principles and ideas for implementing a school-based social media intervention to promote adolescent engagement with physical activity.

5.5.1 Existing Policies and Practices

The findings provided examples of diverse social media policies and practices within schools, and there were clear differences in teacher engagement with social media their and digital confidence/competence. While social media was used to promote schools and increase their presence online, most teacher uses of social media use were decentralised and *adhoc*. While uncommon, this included student communication with pastoral care, uses for teaching and

learning, and to track student locations on field trips. These practices align with findings from Thunman et al. (2016) who found a similarly informal approach to social media use in schools, and where 31% of teachers in Sweden used social media for communication with students (age 13-15). Interviews with school leaders and teachers showed a lack of formal school-based uses of social media with students, and an underlying sense of unease towards social media was grounded in ambiguity regarding laws and regulations. These findings emphasise the need for more explicit guidelines for schools to use social media safely and effectively (Greenhow et al., 2020).

Social media was not reported as a negative influence at home, and parental mediation and trust regarding social media use were prevalent in the data. However, both parents and teachers situated social media as a potential distraction within the school environment. This aligns with previous findings, which show that concerns about distraction are a common and shared by teachers and students (see Ott et al., 2017). The findings provide additional insights into adolescent social media use, highlighting that while they are generally trusted to use social media responsibly at home, parents primary concern was regulating the timing and extent of its use. At this juncture, the need for control of social media emerges as a critical consideration and highlights tensions between the findings from Study 1 and 2. Specifically, findings from Study 1 showed how adolescents had concerns regarding adult encroachment on their personal uses of social media and how school control over social media would detract from its intrinsic value. In combination with the finding in the current study, this suggests that a school-based social media intervention to promote physical

activity needs to strike a careful balance between student autonomy and necessary school/teacher oversight.

5.5.2 Communities for Physical Activity

Leveraging social media to connect adolescents with existing opportunities was a common theme amongst the adult stakeholders. These ideas are supported by the principles of interest-driven networks which suggest that adolescent engagement increases when they pursue their passions in supportive, socially connected online environments (Ito et al., 2010). These ideas suggest that schools can use social media to reinforce and create new connections with local and external physical activity opportunities (e.g., sports clubs). This approach shows particular promise as it aligns with established pathways of engagement with organised physical activity in Sweden. Specifically, where sports clubs have a wide reach and larger contribution towards organised sport than schools or physical education (Jakobsson et al., 2012; Redelius & Larsson, 2010). Connections to sports clubs and other physical activity opportunities (e.g., gyms, running clubs, recreational sports, dance studios) further align with adolescent behaviours highlighted in Study 1 (see Chapter 4), where those who take part in organised physical activity often follow them on social media. Building on this, and recognising a tendency towards decreased participation in organised physical activities during adolescence (Jakobsson et al., 2018), social media may offer new pathways to sustain engagement with physical activity. By leveraging existing social media connections to sports clubs, peers, and other organisations, schools may serve as a potential nexus where they can facilitate new connections with the wider physical activity community.

5.5.3 Increasing Student Engagement

Insights from the day-to-day engagement the adult participants had with adolescents provided valuable knowledge regarding the principles that could be applied to a school-based social media intervention to promote physical activity. Particularly in areas such as competition, peer-relationships and how to present clear and engaging information. While the use of information on social media was considered to be a safe initial step, combined use with interaction and gamification were seen as the best way to engage different adolescents. The participants wanted the intervention to be inclusive and they demonstrated an awareness of the beauty-driven aesthetic and fitness-based presentation of physical activity in the media (Bell et al., 2024). As a result, they wanted an intervention to provide alternative sources of knowledge that challenged these messages.

The pedagogical insights from teachers who were more fluent users of social media drew upon the intersection of pedagogy and content creation. For example, short, engaging, scheduled and consistent content through a curriculum was considered to be an important aspect of visibility on social media and adolescent engagement. The interactive aspects of social media were also seen as a means to seek feedback and to tailor school physical activity provision based on responses from students. Taken together, school staff and parents/guardians provided key insights into how social media could be used as a resource for schools to promote physical activity engagement. Simultaneously, they also highlighted the complexity of this task and how they were concerned this could be an added burden to their workload.

5.5.4 Future Directions

The combined findings highlight opportunities and challenges regarding the role of social media in school-based physical activity interventions. While the potential of social media to increase student engagement with physical activity was evident in the findings, there were also a number of contextual challenges. These included concerns regarding social media as potential distraction, the blurring of personal/professional boundaries, workload, and privacy concerns. These findings highlight the needs for clearer social media guidelines and training for schools and school staff in Sweden. Notwithstanding the need for evidence-based and practical guidelines that give schools the confidence and competence to use social media, the data from adult-stakeholders indicated that an initial intervention should use social media to focus on sharing information about health and wellbeing. This approach not only presents itself as potentially feasible, but important for establishing student engagement. Subsequently, the intervention could then follow an iterative process of monitoring and evaluation based on student engagement and the introduction of additional mechanisms to support physical activity. This approach aligns well with suggestions that a future intervention should be student-led and how ongoing collaboration with students could develop the intervention further. The following chapter addresses the combined findings from Study 1 and 2 and outline how these informed the final development of a school-based intervention.

Chapter 6: The Intervention Design Process

6.1 Introduction

The aim of chapters four and five were to co-produce a school-based physical activity intervention that made use of social media. This chapter will outline the steps taken to design the intervention and feasibility study using the data generated from Study 1 and 2. The approach is grounded in complex intervention study design, and this chapter marks the transition between development (Chapters 4,5,6) and feasibility (Chapter 7) (O'Cathain et al., 2019; Skivington et al., 2021a). Feasibility studies are typically conducted to address novel issues or apply innovative intervention methods (Wight et al., 2016). The design of the feasibility study in this thesis was guided by O'Cathain et al. (2019), who proposed 11 actions for the development of complex interventions. The main aim of this chapter is to explain the steps taken in the intervention design process.

6.2 The Complex Intervention Design Steps

The design of complex interventions includes a wide range of approaches. These include participant centric design where decisions are driven by stakeholders, and a development team centric approach, where key design decisions are informed by stakeholders but taken by the team (Rousseau et al., 2019). As this thesis sought to work with a range of stakeholders (adolescents, teachers, parents, pastoral staff, school leaders), a design team-centric approach (also referred to as informed design approach, Rousseau et al., 2019) was deemed to be the most effective. Indeed, in Study 1 and 2 in-depth conceptual insights were

provided from over 30 adolescents and 20 adult participants. The intervention development actions outlined by O'Cathain et al. (2019) were chosen to guide the process of development and feasibility testing. The strengths of this approach (see Table 14) were deemed to be the balance between structure and flexibility within each action.

Table 14: Intervention Development Actions from O'Cathain et al. (2019) and how they were applied in this Thesis

Actions from O'Cathain et al. (2019)	**How the intervention development actions were applied in this thesis, the current chapter and forthcoming chapters**
1) Plan the development process	The overarching approach to the development process is outlined in CH3: Methodology.
2) Involve stakeholders, include these who will deliver, use and benefit from the intervention	Co-production of the intervention through participatory methods and interviews with adolescents (CH4) and school staff and parents/guardians of adolescents (CH5).
3) Bring together a team and establish a decision-making process	The team for the intervention design included JM- pedagogical researcher and teacher practitioner and VG - pedagogical researcher on social media and adolescent health and wellbeing. The decision-making process was based on comparing data from Study 1 and 2.
4) Review the published research and evidence	To refine and develop the intervention, literature related to social media and adolescent wellbeing was reviewed.
5) Draw on existing theories	Self-regulation through a digital detox was identified as a relevant theory for the intervention. This was combined with the reviewed literature and findings from Study 1 and 2 to inform the program theory and intervention design.
6) Articulate program theory	A logic model for the intervention (Study 3) is presented and an outline of the intervention provided in this chapter.
7) Undertake primary data collection	These steps are represented in CH7.
8) Understand context	
9) Pay attention to future implementation of the intervention in the real world	
10) Design and refine the intervention	These steps are discussed in CH8.
11) End the development phase	

Intervention development (Step 1) was discussed in Chapter 3 and the development process was outlined. Step 2 and the involvement of stakeholders was conducted in Study 1 and 2

(see Chapter 4 & 5). The relative uniqueness of the approach to intervention development in this thesis was the sole use of qualitative methods, which been recognised as a powerful tool in the development and evaluation of health interventions (Yardley et al., 2021). The following sections will outline intervention development actions 3,4,5 and 6 (see Table 14).

6.3 Action 3: Bring Together a Team and Establish a Decision-Making Process

O'Cathain et al. (2019) suggest bringing together a team with relevant experience related to the research topic and/or the potential intervention. JM worked together with VG, who is also a pedagogical researcher with experience working with adolescents to better understand their engagement with social media.

JM and VG chose to base intervention decision-making process on deliberation and consensus during a 1-day workshop. In practice, this process extended beyond the workshop and included a number of follow-up meetings to reach final decisions. Both JM and VG had experience synthesising qualitative data from multiple stakeholders and VG had particular experience using the deliberative approach (Goodyear & Quennerstedt, 2020). The initial inspiration behind the deliberative approach is rooted in pragmatism and it is based on 'intelligent deliberation and balanced consideration of alternatives through mutual communication' (Englund, 2006, p. 508). Deliberation had previously been applied to reach collective agreement when analysing qualitative data (Goodyear et al., 2017; Goodyear & Quennerstedt, 2020). More specifically, it had been used during the collective analysis of data from focus groups with adolescents and related to social media (including Study in this thesis). In the context of this study, deliberation was deemed to be an equally appropriate

strategy to draw together knowledge and understanding of the data which would inform a future intervention.

The strengths of adopting a deliberative approach were JM's close involvement with the research participants in Study 1 and 2 which was balanced by VG's broader outlook. VG had not interacted with the research participants but had subject specific knowledge through previous work conducting participatory research with adolescents and in relation to social media and health. These differences in perspectives provided the platform for a reflexive, critical and rigorous dialogue where different perspectives of the findings could be explored.

Before JM and VG met for the 1-day workshop, JM forwarded the results from Studies 1 and 2 to VG via email to allow time for the development of initial ideas. The themes from Study 1 and 2 were reviewed during the workshop (see figure 1) and the direction for the intervention was decided. Following this, the team conducted multiple meetings to discuss the literature and to develop a protocol for the intervention.

6.3.1 Summarising the Findings from Study 1 and 2

Study 1 highlighted how social media exposed adolescents to a range of health-related content, including sports highlights, news and challenges, instructional workout videos and information related to nutrition and sleep. The workshop activities and interviews with adolescents highlighted how social media provided ways to access and engage with physical activity, such as, the use of social media in sports clubs and the sharing of physical activities with friends. The potential use of social media in schools as a means to support, improve

and/or promote physical activity was often context dependent and reliant on the existing physical activity opportunities offered by the school.

In Study 2, adult stakeholders (teachers and parents) provided more insight into the specific details of a school based social media intervention to promote adolescents physical activity engagement. While social media was framed as an opportunity to support physical activity, the adult stakeholders also highlighted the problematic role social media played in some schools and classrooms. For example, social media was seen as a distraction to learning and some teachers and parents were hesitant to use social media with students because of the challenges regarding inclusivity of device availability and/or misalignment with restrictive school phone policies. Study 2 also highlighted how social media could support physical activity engagement by promoting existing school activities and/or to facilitate wider engagement with physical activity opportunities in the community. Adult stakeholders also preferred to focus on physical activity within a wider wellbeing framework, where physical activity was one of a range of health-related behaviours that could support adolescent mental wellbeing.

6.3.2 A Synthesis of the Findings

A synthesis of sequential qualitative data drew out similarities and differences between themes and subthemes and the two studies produced data that was both complementary and contradictory. Drawing on a comparative approach to analysis of cases (Baxter & Jack, 2008), the two studies and their themes are shown in a thematic comparison table (see

Table 15). Table 15 was constructed by comparing the data within each theme and subtheme, noting similarities, differences, common themes and insights.

Table 15: A Comparison of Similarities, Differences and Common Themes from Study 1 and 2 to Inform Intervention Design

Theme	Subthemes	Key words	Similarities	Differences	Common themes and conclusions
	Study 1		**Comparison with Study 2**		
Theme 1: Consumers of Health-Related Content	#Sportspiration	Inspiration Learning Entertainment	Study 2 highlights the potential of social media connecting adolescents to local sports clubs through social media.	NA	Connecting to external sports clubs shows promise as an intervention pathway.
	#Fitspiration	Health Motivation Physical Appearance	There were similarities between how social media was seen as a source of inspiration for fitness. Challenges were seen as something engaging across both groups. Both group wanted more positive messaging about what it means to be healthy. Both wanted to focus more on **wellbeing**. Social media as a distraction, something that displaces physical activity was similar across both data sets.	Adults indicated that peers and teachers could be source of inspiration for physical activity, whereas this was absent in the adolescent data. The focus on diet, sleep and lifestyle behaviours was more absent in the Study 2 data. However, a preference for focusing on wellbeing may have similar meanings.	A desire to focus on the wider components of health were shared. This indicates that the intervention needs a wider focus on health, **wellbeing**, lifestyle behaviours. There was a shared focus on making approaches to physical activity less about appearance/self-judgement.
Theme 2: Appropriate online spaces for connections and surveillance	Appropriate Interpersonal Connections and Surveillance	Inclusion Pressure Surveillance	Schools were often seen as a context where social media use was difficult or inappropriate. Contexts **outside of the school** were more relevant for social media. This was seen as something welcomed by restrictive policies, where teachers did not have to deal with issues arising from social media because it was not allowed in school.	Teachers generally wanted **control** and adolescents did not want to give insight or control over personal social media accounts.	There is a significant link to **control** here. If schools want to control social media then adolescents are not engaged and do not see it as social media. Neither do adolescents want schools to have insight into their **private** social media. This is more accepted on specific types of social media and with specific self-selected teachers. The focus on social media was largely related to behaviours **outside of school**.
	Social Media's Uncertain Role in School Physical Activity	Scepticism Empty Rhetoric	Provision for physical activity was emphasised as important across adults and adolescents.	In Study 2, the use of social media to promote schools sports and events was supported.	This theme connects strongly to Theme 1: Aligning Policy and Practice: Student Safety, Privacy and Control. There are clear challenges using social media in a school context.
	A lack of Understanding	Negativity Risk	Both groups, for the most part, felt that adults and schools were ill-equipped to use social media in a school context.	Despite their reservations, adults were able to provide more developed ideas regarding	Staff training needed for confidence with social media and to **have less antagonistic/negative approach to social media**.

Theme	Subthemes	Key words	Similarities	Differences	Common themes and conclusions
				the use of social media in a school intervention.	
	Study 2		**Comparison with Study 1**		
Theme 1: Aligning Policy and Practice: Student Safety, Privacy and Control	Alignment/misalignment of policy and practice	Digital Inclusion Policy Alignment Trust	Social media was prioritised by adolescents as something to be used outside of school. It was also difficult for adolescents to perceive in a school context and this may have largely been due to existing policies and practices being restrictive or social media being 'frowned upon'. **Personal integrity** and appropriate levels of connection between schools and students was a concern. Different rules at home were present. For example some adolescents were not allowed to use certain apps or had time limits. This confirms concerns from teachers related to digital inclusion.	NA	There is a clear connections to Study 1, theme 2, subtheme 2: Social Media's Uncertain Role in School Physical Activity. The blurring of lines between social media and schools was a concern on both sides. An intervention needs to address these adolescent **privacy** and right to deny surveillance.
	Reducing Risk: Concerns and Considerations	Safeguarding Privacy	The risks of social media in both studies were related to **personal integrity** and the management of **personal boundaries/privacy**. There is a similarity between the concerns regarding **distraction** in Study 2 and peer-pressure/surveillance in Study 1.	Pressure to respond was a risk identified in Study 1, but not explicitly adressed in Study 2. Adolescent were less worried about the negative consequences of using social media. They felt generally they had the competence to navigate it **autonomously.** Adolescent showed a needs for autonomy and trust but this was largely absent in schools. Trust and autonomy were more present with parents.	Adolescent demonstrated critical uses of social media and they seemed able to **self-regulate**. This was echoed by parents; however schools did not demonstrate as much acknowledgement of adolescent competencies, neither did they focus on **trust.** Adolescents suggested that 'others' struggled to **self-regulate** their social media use.
Theme 2: Connect the Physical Activity Community	Student-led and relatable	Physical Activity for all School=uncool	NA	Peers were not put forward as inspirational. The relatability of physical activity content seems to be more personal and interest-driven in Study 1.	
	Promote local clubs, activities & opportunities	Community Promotion Opportunities	There was agreement that social media is a feasible pathway to connect to sports clubs.	Study 2 was more focused on engaging those who were less physically active. This was absent in Study 1.	Schools could use social media to promote local sports clubs. This could be student-led.

Theme	Subthemes	Key words	Similarities	Differences	Common themes and conclusions
	Wellbeing	Body Mind Mental	A focus on physical activity for **wellbeing** was shared.	Study 1 was more connected to a wider range of lifestyle behaviours and the importance of physical activity in relation to **wellbeing.** Study 2 was more related to a preference to focus on **wellbeing** in the intervention.	The intervention should focus on **wellbeing**, lifestyle or health.
Theme 3: Quality Content and Strategies for Engagement	Consistent Quality Content	Short Engaging Planned	There was alignments between how adolescents engaged with social media and adult ideas for content in an intervention.	NA	
	Information, Peer interaction and Challenges	Start small Friends Competition	Physical activity challenges, and competitions with peers was a shared idea across both groups.	Study 1 participants did not see the schools as content creators.	

There were some clear similarities and differences in the data from Study 1 and 2 which provided conceptual insights into the design of the intervention. These challenge some of the underlying assumptions which underpinned a focus on social media and physical activity in schools outlined in the review of literature (Chapter 2). The following four sections outline the thematic comparisons which were identified and the collective findings from Study 1 and 2.

6.3.2.1 (i) Health-Related Behaviours and Mental Wellbeing

There was a consensus across both studies that a wider approach to physical activity that recognises the interrelatedness of health-related behaviours was preferred. Schools perceived adolescent wellbeing to be more aligned with their areas of responsibility and focus on health-related behaviours and mental wellbeing was also aligned with how adolescents viewed physical activity. For example, adolescents wanted a greater emphasis on mental wellbeing both online and in schools. The evidence from both studies also indicated that social media use could be approached as a health-related behaviour, as it was considered to influence mental wellbeing.

6.3.2.2 (ii) Autonomy and Privacy

When comparing the perspectives of adolescents and adults in relation to social media use there were clear tensions between choice, control, privacy and autonomy. In many ways, the essence of social media for adolescents was autonomy and freedom. However, this view was challenged when the use of social media in a school context was discussed. For example, varied school policies, adolescent access to social media, and the need for both adult and

adolescent groups to control their own shared content and privacy highlighted key tensions. There were also differences between the two studies related to perceptions of social media use, where adolescents articulated a higher sense of control and positive use than adult participants had observed. Overall, autonomy and privacy became apparent as important principles for a feasible school-based social media intervention

6.3.2.3 (iii) Social Media use Outside of School

The data for both adults and adolescents showed that social media was most strongly used in connection with activities outside of school. This also related to intervention ideas, which included support for the use of social media to connect adolescents with physical activity opportunities in the community. In fact, the use of social media in a school context was somewhat rejected by participants, particularly in relation to different opinions of social media facilitated by a generational gap. Moreover, while adolescents demonstrated a degree of knowledge and critical use when discussing their uses of social media, the data also indicated that they would benefit from support in developing certain skills. This included how much and when they use social media and how they engage with content. This could also include helping them with online pressures such as peer pressure and body image, and critical engagement with healthy lifestyle content.

6.3.2.4 (iv) Trust and Distraction

Parents highlighted the importance of a trust-based relationship with their children in relation to social media use, but they were also supportive of restrictive policies in schools. The main challenges highlighted by teachers and to some extent parents, were not in

relation to how adolescents used social media, how they interacted with friends or the content they engaged with. Their concerns were related to adolescents ability to manage their social media use, to manage distraction and to not use it too much. Social media was situated as an activity that could limit health related behaviours such as physical activity and sleep by adult participants.

6.3.3 Deliberations and Further steps

Deliberations regarding the findings from Study 1 and 2 highlighted how social media was not the most desirable solution to supporting physical activity. Tensions between adolescent uses of social media and uncertainties about its potential applications in schools posed significant challenges. These were related the viability-of and desirability-for a whole-school physical activity intervention where social media can be used as a resource to support adolescent physical activity engagement.

Physical activity was framed within a broader spectrum of health and lifestyle behaviours by adolescent participants in Study 1; In Study 2, adult stakeholders often situated physical activity within a wellbeing umbrella. These collective findings indicated that a singular focus on physical activity was not sufficient for a school-based intervention. As a means to support feasibility, the team therefore decided to focus on mental wellbeing as the main outcome of the intervention. Based on the in-depth analysis of data regarding adolescent uses of social media and the focus on feasibility in schools, the team decided to apply this knowledge to design an intervention which sought to support adolescent mental wellbeing.

The following sections will provide insight into the transition towards designing the intervention and how the combined findings from stakeholder engagement were integrated with wider evidence and theories (Skivington et al., 2021b). A review of published research and evidence (Action 4: O'Cathain et al., 2019) was conducted to explore mental wellbeing as it relates adolescent uses of social media. Following this review, it was deemed that a mental wellbeing intervention would need to account for complex and dynamic uses-of and responses-to social media, and (in alignment with finding from Study 1 and 2) support adolescents needs for autonomy, privacy and freedom on social media. The theory development section (Action 5: O'Cathain et al., 2019) then shows how digital and social media detox interventions were being applied with adults and both theoretically and practically aligned with the combined findings from Study 1 and 2. Most notably, digital detox interventions were seen as applicable because they could, (i) focus on health-related behaviours/wellbeing, (ii) bridge the gap between home and school contexts, and (iii) provide adolescents with autonomy and privacy. The theory development section highlights how one of the main theoretical approaches to a Social Media Detox was self-regulation (Bandura, 1991). Upon further examination of self-regulation theory and social media use, it was decided that a Social Media Detox underpinned by this theory could address social media use outside of school by facilitating self-regulatory processes of digital self-observation, judgement and self-response. Based on an assessment of the combined evidence from stakeholders and the reviewed literature, the program theory was articulated through a logic model and an outline of the intervention was developed (Action 6: O'Cathain et al., 2019).

6.4 Action 4: Review the Published Research and Evidence

Mental wellbeing is a broad term with varying approaches and definitions, but it is generally connected to feeling well and functioning well (Ryan & Deci, 2001). Eudaimonic (purpose, meaning, self-actualization), and hedonic (positive emotions, social connectedness) dimensions are one of the most popular means of understanding mental wellbeing and they are rooted in Greek philosophy and modern psychology (Clarke et al., 2011; Ryan & Deci, 2001; Stewart-Brown, 2017). These two dimensions are widely used in mental wellbeing literature with adolescents (Rose et al., 2017) and they have particular relevance in social media and mental wellbeing research. For example, some claim that social media provides quick hedonic gratifications which generate positive affective outcomes (e.g., fun, distraction) for adolescents, but they can displace behaviours which support mental wellbeing when repeated over time (Reinecke et al., 2022).

The following section provides a review of literature related to mental wellbeing and adolescent social media use. It also includes reference to mental health (e.g., anxiety, depression), because, while mental wellbeing and mental health are both distinct, they are related (Kinderman et al., 2015) and often adressed concurrently in the social media literature.

6.4.1 Social Media and Mental Wellbeing

The adolescents and adult stakeholders in Study 1 and 2 indicated that social media can have both positive and negative influences on health and wellbeing. However, the majority of wider research has focussed on time/type and dose-response relationships, emphasising

negative associations between social media use and mental wellbeing (Valkenburg, 2022). Cross-sectional studies generally suggest that social media use could be a contributing factor or a risk factor for depression (Viner et al., 2019). For example, Primack et al. (2017) found an association between the use of multiple social media apps, and depression and anxiety amongst adults. Other studies have focused specifically on adolescents, and identified incremental increases in depressive symptoms with time spent on social media, particularly amongst girls (Kelly et al., 2018). These negative outcomes on adolescent mental health are mediated by complex factors, such as experiencing online bullying, reduced sleep quality and quantity, negative body image and increased upward social comparison (Kelly et al., 2018). Factors such as social comparison, body dissatisfaction, FoMo and online bullying through social media have particular relevance for adolescents, who are in a phase of neurological development where they are more likely to be influenced by peers and more likely take part in risky behaviours than both children and adults (Blakemore, 2018).

Despite a focus on time/type does-response relationship between social media and wellbeing, longitudinal evidence shows a lack of support for the hypothesis that increased time on social media increases mental health issues, such as depression and anxiety, particularly when within-person effects are considered (Beeres et al., 2021; Coyne et al., 2020; Kreski et al., 2021). While some research claims that associations between time on social media use and worsened adolescent wellbeing are small to negligible (Vuorre et al., 2021), others have found that this varies widely on an in-person level (Irmer & Schmiedek, 2023). For example, social media use has significant negative effects for certain adolescents, and there is evidence which suggests that this is partially mediated by upward social

comparison (Irmer & Schmiedek, 2023). Therefore, while the factors which could influence worsened wellbeing through social media use are becoming more evident (e.g., social comparison), there is a lack of evidence which can guide adult stakeholder to support adolescent wellbeing as it relates to their social media use.

Another consideration in the longitudinal research is that increased social media use can could be a symptom or coping mechanism in response to reduced mental wellbeing, as opposed to a cause (Beeres et al., 2021). This is supported by a systematic review of longitudinal studies which examined the relationship between social media use on depression (Tang et al., 2021). The combined findings show a potential bidirectional association between time spent on social media and depressive symptoms, and indicate that depressive symptoms and social media time influence each other (Tang et al., 2021). These findings imply that intense social media use (usually defined as more than five hours per day) may be a cause of adolescent mental ill health and/or a coping mechanism.

Taking this discussion further and focusing more specifically on wellbeing, Boer et al. (2020) used data with adolescents from 29 countries and found no linear association between increased time on social media and worsened wellbeing. It was apparent that there are a growing number of studies that show how social media supports wellbeing amongst most adolescents. For example, a Danish study found that frequent social media communication (e.g., Snapchat and Instagram) supported adolescent wellbeing, however, this was conditional to those who had a positive body image (Krogh, 2021). Qualitative interviews with adolescents highlight how social media can support mental health and wellbeing through engagements such as: connections with friends, family and online communities,

using it as an outlet for self-expression, coping with challenges, accessing mental health awareness resources and enjoying fun and motivational content (Vaingankar et al., 2022). Collectively, this evidence points to the fact that social media has negative outcomes for some, but not all, and may even be beneficial for the wellbeing of most adolescents most of the time (Boer et al., 2022; Odgers, 2018). For example, Beyens et al. (2020) measured the direct effects of how adolescents felt after using social media (hedonic wellbeing). They were unable to predict positive and negative affective responses based on the active or passive use of WhatsApp, Instagram, or overall social media use, and real-time affective responses were more often positive (44%) than negative (10%).

Overall, the evidence reporting on relationships between social media use and mental health and wellbeing is grounded on assumptions of screen time, with the general direction reporting negative associations (Odgers et al., 2020). In this sense, increased time spent on social media is assumed to lead to worsened mental health and wellbeing outcomes in adolescents (Coyne et al., 2020). However, the evidence-base is overall mixed, and there are uncertainties in the strength of associations and this is mainly due to a reliance on cross sectional studies and self-reported data (Boer et al., 2022).

It has been argued that new ways of interpretating and analysing relationships between adolescent social media use and mental health and wellbeing are required (Orben, 2020b). Notably, there have been calls for social media research to be less risk/concern-centric research and to embrace more innovative approaches which facilitate a more holistic understanding of adolescents wellbeing in relation to social media (Ferrari & Schick, 2020;

Orben et al., 2020). For example, Orben (2022) suggests that a digital diet approach could be applied to social media research, where adolescents can reflect on the specific engagements with social media (e.g., type, quality, amount, when?, why?) as a means to improve their 'diet'. This type of approach moves beyond the simple relationship between time on social media and wellbeing and it seeks to unpack the dynamic ways adolescents use it. The following section will provide an overview of problematic/addictive social media use research, which has been one of the main areas of work in this domain.

6.4.2 Problematic/Addictive Social Media use

In their systematic review of social media and wellbeing studies, Bekalu et al. (2023) found that most studies approached social media use as a normal behaviour, but most other studies (28%) focused specifically on problematic use. Problematic social media use is currently framed as a non-recognised psychological addiction (Bányai et al., 2017). This work is based on theories of addiction, and social media use is considered problematic when users are cognitively pre-occupied by it, social media use is compulsive, it is used despite negative outcomes, and used to regulate mood (Henzel & Håkansson, 2021; Marino et al., 2018). This approach has particular significance for adolescents wellbeing. For example, Boer et al. (2020) found that negative effects of social media on adolescents life satisfaction were primarily mediated by problematic use and not by social media use duration. This suggests that the quality of social media interaction is potentially more influential on mental wellbeing than isolated quantitative measures of use. A further study supported the hypothesis that problematic use is associated with decreased mental wellbeing, also finding that all decreases in problematic use were associated with increased subjective mental

wellbeing (Donoso et al., 2021). This underpins a clear need to identify and support those adolescent who have problematic use.

In the Finnish arm of the Health Behaviour in School-aged Children study with 11-15 year olds, Paakkari et al. (2021) used a 9-item scale to measure problematic social media use. The scale was developed using the DSM-5[11] criteria for internet gaming disorder and measured concepts commonly associated with behavioural addictions (e.g., preoccupation, tolerance, withdrawal, conflict and persistence despite a desire to cut-down or reduce) (van den Eijnden et al., 2016). They found that 9.4% of adolescents showed problematic social media use and it was more common amongst those who were older, had low health literacy, inadequate parental supervision and lower academic achievement. In this study, it was reported that a third of adolescents were at risk to develop problematic social media use and that future interventions are needed to target those at risk and to help them self-regulate their social media behaviours (Paakkari et al., 2021).

The literature within problematic social media use seeks to help identify the potential reasons adolescents experience negative associations between using social media use and mental wellbeing (Boer et al., 2022; Boer et al., 2020). More specifically, the literature draws upon multiple factors which influence the development of problematic social media use and suggests various ways to reduce and/or support it. These include, developing self-regulation

[11] The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

skills, mindful use, and stress management (van Deursen et al., 2015), improving emotional regulation skills (Giordano et al., 2023; Yildiz, 2017), and improving health literacy and social support (Lenzi et al., 2022). As problematic social media use is more prevalent in deprived communities and in families with low supervision, parental guidance and broader social support may also be suitable interventions (Lahti et al., 2024; Paakkari et al., 2021). A final consideration concerning how adolescent may require support with problematic social media use is understanding their mindset towards it. Findings from Lee and Hancock (2024) suggest that adolescent who believe their social media use is harmful and who feel they have less control are those who require most support and are at increased risk for negative effects.

6.4.3 Conclusion

Considering how the research on adolescents social media use can be applied to a future intervention in schools, it is clear that approaches need to move beyond the prevailing risk-based narrative that reducing time on social media will support mental wellbeing. The longitudinal data shows that the relationship between social media use and mental wellbeing is complex, and time on social media is a weak isolated measure to support adolescent mental wellbeing. The literature on problematic social media use suggests that a mental wellbeing intervention may need to focus on the quality and motivations behind social media use. However, the findings in these studies should not obfuscate the positive outcomes many adolescent experience as a result of using social media. Considering the evidence presented, the digital diet approach put forward by Orben (2022) shows promise

as a more nuanced way to approaching individual uses-of and responses-to social media. This type of approach can be used with adolescents as a means to refine their social media use, to help them and others understand it's influence on their mental wellbeing, and to provide support to those who need it. The literature also indicates that nearly half of adolescents may be at risk for problematic social media use, and interventions are needed to reduce the development problematic social media use. The literature suggests that interventions which seek to achieve this could draw upon the positive aspects of use, incorporate self-regulation skills, encourage mindful usage, support stress management, emotional regulation, and/or health literacy.

6.5 Action 5: Draw on Existing Theories

The current evidence-base is dominated by research studies reporting on relationships between social media use and adolescent mental wellbeing. However, few studies seek to use social media as a resource for adolescent wellbeing or to develop interventions to address social media use. This absence was challenging when searching for existing theories to support a school-based social media intervention to support adolescent mental wellbeing.

6.5.1 Digital-Detox Interventions

At the time of this study, it became apparent that Digital and/or Social Media Detoxes were increasingly common in schools (Adams, 2022; Morris, 2017) and were being widely applied in adult populations to support mental wellbeing (Plackett et al., 2023; Radtke et al., 2022). However, there were no identifiable detox studies with adolescent populations. While, a

form of digital detox may be seen through the increased prevalence of school mobile phone bans, there was little current evidence to date that this has a positive impact on adolescent mental wellbeing (Wood et al., 2023).

The absence of work with adolescents in this area provided a compelling case for further investigation. However, at a cursory glance, a digital detox did not seem appealing because previous research suggests that merely reducing screen time may not reliably support adolescent wellbeing (Kross et al., 2021). Despite this initial hesitancy, it became apparent that 'digital detoxes' were characterised by a period of time where people refrain from, or reduce engagement with/use of certain types of media, including healthier uses of specific types of media (i.e. without the reduction of time) (Radtke et al., 2022). This definition indicated that Social Media Detoxes had a more nuanced approach which aligned with the literature on social media and mental wellbeing and with the findings from Study 1.

In adult populations, there are mixed outcomes from participating in a digital detox. For example, limiting social media access to 30 minutes a day led to increases in mental wellbeing and social connectedness (Brown & Kuss, 2020). A further study used a randomised control trial design to compare participants with a 50% reduction in their social media use duration with a control group, however the control group also reduced their time on social media and they did not observe a significant impact on mental wellbeing (van Wezel et al., 2021). An additional 7-day digital detox highlighted the mixed findings in the detox literature, where authors notes the presence of withdrawal symptoms and a 59% relapse rate among participants (Stieger & Lewetz, 2018). Taken together, these studies not

only indicate contradictory outcomes, but the variance in how digital detoxes are conducted, such as the type and amount of change participants are expected to make.

Coyne and Woodruff (2023) provide a rigorous example of a Social Media Detox with a sample of 43 adults. Using within-subject design and objective measures to track social media use, they conducted a two-week Social Media Detox (30-minute limit installed on their phones) using pre, post, follow-up measures. Surveys and interviews (mixed methods) were used to evaluate the impact of the intervention on a range of health-related outcomes. Following a 77% decrease in social media use compared to baseline, the Social Media Detox had a significant impact on reducing smartphone and social media addiction (problematic use), improved life satisfaction (eudaimonic wellbeing), reduced stress, increased perceived wellness, and engagement with supportive relationships. Overall, this study highlights the positive impact a digital detox can have in adult populations and it provided key insights into the design of a mental wellbeing related intervention for adolescents.

6.5.2 Self-Regulation as a Theory for Digital Detox

When considering the theoretical approach to supporting mental wellbeing using a digital detox it was clear from the literature that there are personal components, such as self-regulation and emotional regulation, which drive problematic social media use (Mahapatra, 2019; Valkenburg et al., 2022). When considering the theoretical approach in a digital detox intervention, self-regulation appeared to be a suitable theory because it was common amongst detox studies (Radtke et al., 2022) and largely aligned with autonomy driven

motives towards social media evident in Study 1. Self-regulation in the context of social media use relates to how adolescents manage their digital interactions and activities in a way that aligns with their immediate desires and their long-term mental wellbeing (Reinecke et al., 2022). This involves deliberate and successful regulation of their social media use to support their mental wellbeing. For example, managing time on social media in relation to other important activities, the content they consume and the type of online interactions they have (Reinecke et al., 2022).

The choice to use self-regulation theory in a future intervention was further inspired by a cross-sectional study by Schmuck (2020). In this study, self-regulation was a key mechanism for youth (aged 18-25) who monitored their social media use through using a weekly screen time app and experienced a higher sense of wellbeing and life satisfaction (eudaimonic wellbeing) than those who did not. While the study targeted those who were already monitoring their screen time and it was cross-sectional, using the screentime app as a means to understand social media use provided an appealing approach for a future intervention in schools. The study used self-regulation as a key underlying theory (Bandura, 1991), suggesting that the information gathered by smartphones about social media usage patterns can provide adequate insight for people to self-regulate their use (self-monitoring), increase their mental wellbeing through a processes of self-judgement (setting goals based on observed patterns of behaviour) and self-reaction (adapt their response in relation to the achievement of their goal) (Schmuck, 2020). When considering the self-regulation literature it also became apparent that it may be a key boundary condition that needs to be developed in relation to social media use (Reinecke et al., 2022). Specifically, because of the unique way

social media is designed (e.g., push notification, positive reactions, temporal content), it's social nature (e.g., FoMo), and the characteristics of the user (e.g., social media rules, habits, mindfulness) (Reinecke et al., 2022). When considering the application of a Social Media Detox intervention in this thesis, and considering the combined findings from Study 1 and 2, similar self-regulation practices were deemed as feasible by the design team.

6.5.3 Aligning Digital Detox with findings from Study 1 and 2 and developing the Intervention

Drawing together insights from the digital detox literature and applying them to the combined findings from Study 1 and 2, it was decided that a school-based social media detox intervention could (i) address health-related behaviours and mental wellbeing, (ii) support adolescent autonomy, privacy and freedom, (iii) address their social media use outside of school, and (iv) develop trust and methods to limit social media-driven distraction. It was therefore decided that the combination of previous literature and findings produced through stakeholder engagement provided ample evidence to further develop a school-based social media intervention to support mental wellbeing.

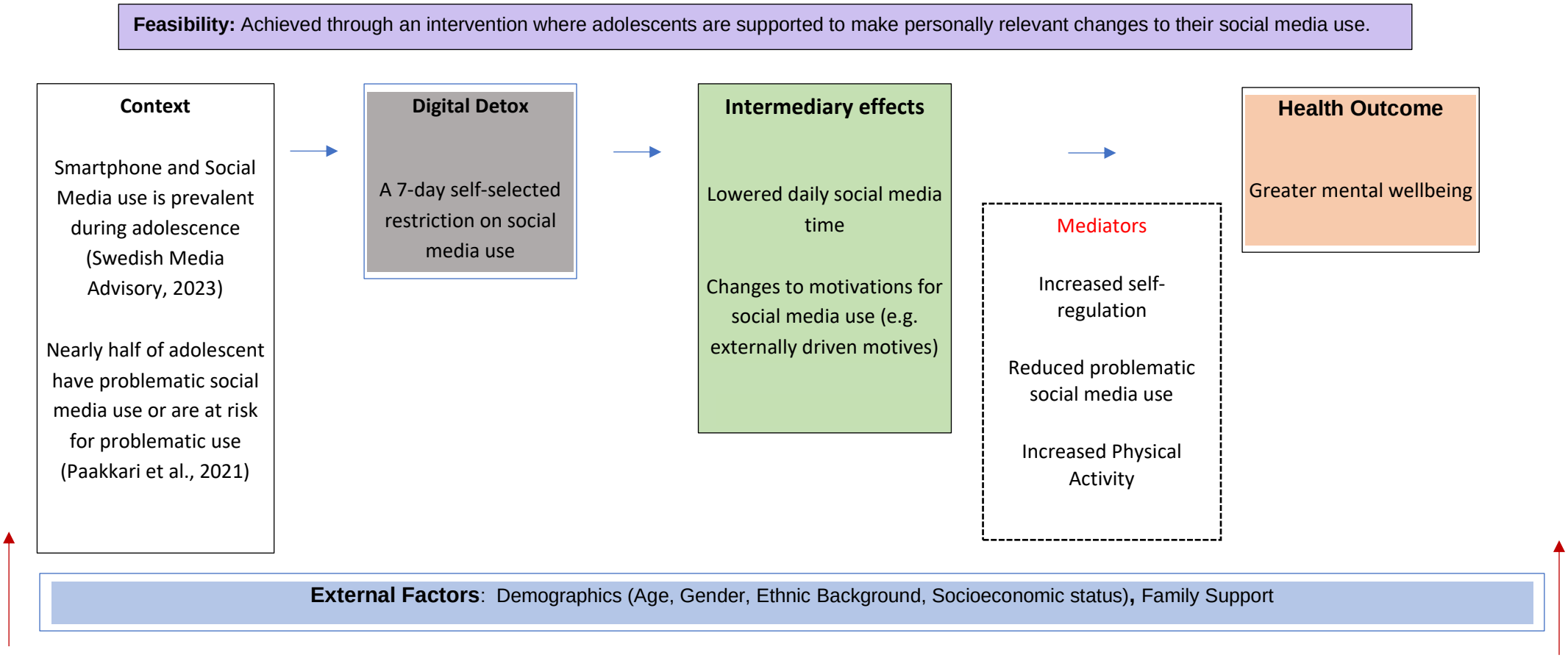
To further understand (and support) the complex relationship between social media use and mental wellbeing, the feasibility study was designed to build on recommendations that individual differences and variance in social media use are required (Orben, 2020b; Valkenburg, 2022). Moreover, considering that (i) contemporary adolescents' social media use is multi-platform and highly individualised (see Study 1: Shankleman et al., 2021), (ii) evidence that they are critical users of social media (see Study 1 and 2: Goodyear et al.,

2019c), and (ii) adolescents need for privacy and autonomy (see Study 1 and 2), the intervention was founded upon the notion that adolescents are well situated to identify challenges and, with teacher support, self-regulate their social media use to support their wellbeing and associated health-related behaviours. Drawing together these insights, it was concluded that a Social Media Detox intervention in schools could be developed to (i) address a wide gap in the literature, (ii) support schools in their approaches to social media use and adolescent mental wellbeing, and (iii) support adolescents to refine their social media use as a means to better support their mental wellbeing.

6.6 Action 6: Articulate Programme Theory

The logic model has been reconstructed (see Figure 21) from the initial co-production-based logic model (see Chapter 3). It provides a *context* for the intervention which builds upon current literature and the results from studies in chapters four and five. The *Social Media Detox* intervention facilitates adolescents' introspection and reflection on their social media use, followed by a 7-day self-selected restriction on social media use. The *intermediary effects* include a decreased time on social media and a change in the motivations for use. The model hypothesises that wellbeing will improve as a result of mediators such as increased self-regulation, reductions in problematic social media use, an increase in physical activity. Based on the literature, *external factors* such as age, gender, socioeconomic status and family support may also influence intervention outcomes.

Figure 21: Logic Model Theory of Change for the Influence of a Social Media Detox on Health-Related Outcome



6.6.1 An Overview of the Intervention

6.6.1.1 Social Media for Mental Wellbeing

While the Social Media Detox provides a shared term to identify studies in the literature, it was decided that the name of the intervention would require particular consideration. The term detox (short for 'detoxification') can imply that something is inherently harmful and should be removed, and this was contested assumption amongst adolescent participants in Study 1. Moreover, considering the widespread negative approach to social media being present in both the literature and school-based practices, the intervention name (and implementation) needed to appeal to adolescents and remove negative value-laden approaches to social media. The intervention was therefore named 'Social Media for Mental Wellbeing' and the key message was that social media can be used in ways which support wellbeing.

6.6.1.2 Intervention Details

In the development of intervention components, key aspects of Social Media Detox interventions were identified as: (i) the type of detox (total abstinence/partial reduction), (ii) voluntary/involuntary participation, and (iii) detox components (i.e. app/notification limits or individual goals to reduce or eliminate social media use) (Plackett et al., 2023). The template for intervention description and replication (TIDieR) framework provides an overview of the intervention and is detailed in Table 16. The framework was designed to improve the replicability of interventions and provide specific insights into their design and delivery (Hoffmann et al., 2014).

Table 16: The Tidier Framework Including all Intervention Factors, a Description of the Factor and How it was Applied in the Intervention

Factor	**Description** (from Hoffmann et al., 2014, pp. 3-8)	**Application**
Name	'The name or a phrase that describes the intervention'	Social Media for Wellbeing
Description	'Rationale, theory, or goal of the elements essential to the intervention.'	School activity where individual participants (i) reflect on their use of social media individually and collectively (ii) set goals (time, type, and/or content) for their social media use for one week. When setting goals participants outline the strategies they will use to achieve their goals.
Materials	'Physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Information on where the materials can be accessed.'	A digital slides pack in pdf. format for mentors/tutors/class advisors which outlines the procedures their class will follow, including the dates and links to all surveys.
Procedures	'Each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.'	Adolescents set goals to reduce or adapt their social media use to improve their mental wellbeing.
Provider	'The types of intervention provider, their, expertise, background, and any specific training given.'	Mentors/Tutors/Class Advisors for each class. They are provided with written instruction on how to deliver the intervention and offered an online meeting for clarification of the instructions.
Mode of Delivery and location	'The modes of delivery of the intervention and whether it was provided individually or in a group. The type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.'	Mentors lead the intervention at the school during the regularly scheduled mentor time. It is delivered to the whole class where they sit in their normal seats.

Factor	Description (from Hoffmann et al., 2014, pp. 3-8)	Application
Time Period	'The number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity, or dose.'	The intervention is delivered once, and participants set goals for the following 7-days. The intervention takes 30 minute to complete and is designed to be completed during the normal scheduled mentor time.
Tailoring	'If the intervention was planned to be personalized, titrated or adapted, then what, why, when, and how.'	Participant set specific goals and tailor the intervention to their needs. These include goals for changes in social media time, apps used and other personally relevant goals.
Adherence and Fidelity	'If intervention adherence or fidelity was assessed, how and by whom, and if any strategies were used to maintain or improve fidelity, describe them'	Mentors/Tutors/Class Advisors complete a questionnaire detailing how they delivered the intervention. This includes closed and open questions such as include adherence to instructions. Follow-up teacher interview further assessed fidelity.

The Social Media Detox was designed to facilitate adolescent reflection on their social media use and how it impacted their mental wellbeing (description). The importance of the reflection phase in the intervention was underpinned by the lack of adequate measures to identify those who would benefit from a Social Media Detox. This, in combination with the insightful reflections provided by participants in Study 1, provided a foundation for the assertion that adolescents are best equipped to identify their needs and to pursue specific goals for a Social Media Detox.

The intervention was designed to allow the participants to set specific goals regarding their social media use (procedures & tailoring) and outline strategies they will apply to achieve this during 7-days (time period)—the most common time-period for digital detox studies

(Radtke et al., 2022). During the intervention, participants will be asked to set goals in relation to time, but also prompted to consider how they would change their social media use, for example, the content and type of use. To emphasise adolescents autonomy, they will also be offered the choice to increase, decrease or not change their social media use. The choice to rely on adolescent self-regulation (instead of app limits or other limits) was two-fold. Firstly, this provides adolescent with the autonomy to make personally relevant changes based on their own self-identified mental wellbeing needs. Secondly, the open-ended nature of goal setting and individualised strategies provides insight into adolescent self-regulation and what they can achieve with limited adult support.

6.6.1.3 Social Media Detox Measures

To better understand what variable may be most appropriate as a outcomes in a future large-scale definitive trial, multiple measures which may influence social media use and/or act as confounders were identified. These included age, gender, family support, family affluence, social media use, problematic social media use, mental wellbeing, physical activity, and self-regulation (see logic model: Figure 21). Based on recommendations from previous detox studies, the Social Media for Mental Wellbeing study will use more objective measures of social media use and include follow-up measures (Radtke et al., 2022). A focus on self-regulation and personal choice will show how adolescents want to change their social media use, the strategies they use, their levels of success, potential impact this has on mental wellbeing, and the feasibility of the approach in a school context. Further details of study measures and design will be shown in chapter 7.

6.7 Conclusion

This chapter began with an overview and thematic comparison of the findings from stakeholder enagegment. These were: (i) Health-Related Behaviours and Mental Wellbeing, (ii) Autonomy and Privacy, (iii) Social media use Outside of School, and (iv) Trust and Distraction. By reviewing the relevant literature and engaging in a process of deliberation, it became apparent that a Digital Detox could practically and theoretically align with the thematic comparisons produced through stakeholder engagement. The Digital Detox study was then designed by considering (i) the combined findings from Study 1 and 2, (ii) findings in the social media and mental wellbeing literature, (iii) theories of self-regulation, and (iv) the previous designs and outcomes in digital detox interventions in adult populations. The logic model and overview of the intervention foreground Chapter 7, where a Social Media Detox intervention was feasibility tested in schools.

Chapter 7: The Feasibility of a 7-day Social Media Detox Intervention in Schools

7.1 Introduction

This chapter reports on Study 3 that tested the feasibility of a 7-Day Social Media Detox intervention at three schools in the Stockholm region. The study sought to answer Research Question 3:

> What is the feasibility and acceptability of a social media intervention focused on improving adolescent mental wellbeing?

Using a mixed methods and a pre-post-follow-up design (experimental condition), the methods and results of this study were framed using the reach, effectiveness – adoption, implementation, maintenance (RE-AIM) framework (Glasgow et al., 2019; Glasgow et al., 1999). The following introduction section foregrounds the purpose and design of feasibility study before the methodology, results and discussion are presented.

7.1.1 Feasibility studies

As discussed in Chapter 3, feasibility is the second phase of complex intervention design (Skivington et al., 2021a). When the development of a public health intervention is considered novel and there is a lack of previous data in a particular area, feasibility studies are commonplace (Bowen et al., 2009). The main aim of a feasibility study is to answer the question ‘Can it work?’ with an increased focus on the research process (Orsmond & Cohn,

2015). Feasibility studies are distinguished by a focus on assessing recruitment, sampling, the acceptability of the intervention, the study procedures and measures, the resources needed (e.g., cost, time, personnel), and a cursory assessment of the data (Orsmond & Cohn, 2015). In essence, these are key considerations for scalability (see Indig et al., 2017) and can indicate whether a larger-scale trial is a worthwhile investment or whether further adaptations are needed.

7.1.2 RE-AIM

While approaches to feasibility vary widely, the Reach, Effectiveness, Adoption, Implementation, and Maintenance Framework (RE-AIM) is one of the most consistently applied (Glasgow et al., 2019; Glasgow et al., 1999). A number of studies provided inspiration when considering to how to design the feasibility study using the RE-AIM framework (Åvitsland et al., 2020; Beames et al., 2021; Cowley et al., 2022; Jong et al., 2020; Lubans et al., 2014; Sanders et al., 2018; White et al., 2022). These studies evaluated aspects such as recruitment/dropout, retention, adherence, satisfaction, and contextual factors which require tailoring. For example, Lubans et al. (2014) utilised intervention questionnaires (pre-post-follow-up) and focus groups to evaluate the effectiveness of a smartphone app designed to reduce obesity and screen time; the study focused on app usage, enjoyment, and satisfaction. Jong et al. (2020) used questionnaires, interviews, focus groups, observations, and website analysis, to assess the reach, recruitment, dose, and fidelity of the GoActive school physical activity intervention. A further online intervention which was designed to support physical activity amongst adolescent girls used logbooks, exit surveys, and self-report logs to understand feasibility and response rates were used to

measure adherence and dropout (Cowley et al., 2022). One important aspect when designing the study was the combined use of mixed methods data as a means to understand feasibility (Holtrop et al., 2018) and this informed how study measures were considered and mapped on to the RE-AIM framework (see also Beames et al., 2021). One important process that can be gleaned from the literature and the approach to feasibility in this study were intentional utilisation of study measures intended for use in a larger-scale trial.

7.2 Methodology

7.2.1 Study Design

The study design was mixed methods. An initial sample of five schools was then reduced to three schools due to one school dropout before data collection and low participant numbers at another control school, which led to a lack of usable data. Initially, the study design was a 3-time (pre, post, follow-up) by 2-group (control and intervention) field experiment, but was then changed due to changes in recruitment (see recruitment sub-section). The adapted design was a single group (experimental condition). Concurrent mixed methods (Leech & Onwuegbuzie, 2009) were used and the combination of quantitative and qualitative data supported the evaluation of the intervention. Both qualitative and quantitative data contributed equal importance to the study, yet they added varying degrees of evidence to each aspect of the reach, effectiveness, adoption, implementation and maintenance framework. For example, the effectiveness of the study was largely supported by qualitative data, whereas adoption was equally supported by both data types.

7.2.1.1 Recruitment: School level

The target population for the study was 15-18-year-olds in Stockholm, Sweden. The specific group of interest were first year high school classes (GY1), where participants were expected to be 15 years old. The use of an older age group than Study 1 (age 13-14 years) was threefold. Firstly, 15-year-olds in Sweden were able to provide informed consent (without parental consent) and this was an important aspect of streamlining recruitment. Secondly, this age group followed the same cohorts of participants from Study 1. Lastly, based on concerns about inclusion in Study 2, it was deemed that an older cohort would more likely be using social media and therefore more inclusive and relevant to participants (Swedish Media Advisory, 2023). The inclusion criteria for schools were (i) High schools (*gymnasieskolor)* in Stockholm county (*Stockholms län*). Schools excluded from recruitment did not have a language of instruction in Swedish or English or they were special schools (*särskolor*). These were excluded because it was not possible to provide study materials in a third language and special schools were excluded because some participants may not have been able to provide informed consent.

School recruitment took place over six weeks between May and June 2023. Headteachers and deputy headteachers were contacted by post and email. Schools and teachers were also made aware of the study through social media posts on LinkedIn which included a recruitment flyer. Schools were recruited from Stockholm City (Stockholm Stad) and from the wider Stockholm County (Stockholms Län). The aim was to recruit four schools with a total study population of 400 student participants which was in line with other school-based

feasibility trials (cluster-randomised), which include an average of 320 participants across 4 to 9 schools (Kitty Parker et al., 2022).

The initial sampling frame included 171 high schools. Of these, 24 schools had no publicly available email for school leadership, 10 were special schools and were excluded, and two schools were excluded because they did not deliver education in Swedish or English. The final sampling frame therefore included 135 schools and all these schools were contacted with study information. One school responded by declining the opportunity, and six schools (4.4%) showed interest in study participation. One of these schools then withdrew their interest, leaving five schools in the study sample. The five schools were assigned to control and intervention groups using random stratified sampling based on their school size, location, average grades for entry and main language spoken. However, it was decided that the study design would be adapted in response to an additional school dropping out and inadequate data collected at the first control school. The control school, which has been removed from the study, had smaller class sizes and attendance than expected (17 pupils instead of 45), as well as low response rates (9 participants in week 1), and low retention (2 participants with data for all three time points). Therefore, the remaining three schools were assigned to the intervention group.

7.2.1.2 Sampling: Class level

Class-level sampling was opportunistic, and all classes that were available and willing to participate in the study were accepted. Sampling at the class level occurred differently at

each school and was decided by the school based on availability of pupils and staff. A total of ten classes across the three schools were recruited (see Table 17).

Table 17: School Sample Characteristics in Study 3

	School 1	School 2	School 3
School Profile	Municipal, International	Municipal, Swedish	Independent Swedish/International
Admissions	Selective	Selective	Selective
Language of Instruction	English	Swedish	Swedish/English
Age Range	15-19	15-19	15-19
Student Population	200	1400	550
Participating classes (n)	3	1	5
Participating Staff (n)	6	2	9

Note. information generated are from the respective schools websites.

7.2.1.3 Sampling: Focus Group Interviews

Separate focus groups with adolescents and staff were conducted in week 4 and 5. Adolescent participants who had consented to be interviewed were chosen using simple random sampling (Noor et al., 2022). Mentors (also known as class tutors, class advisors or homeroom teachers in other international contexts) were invited to focus group interviews by email and during a time deemed suitable by the school leadership between the post-study questionnaires and the follow-up questionnaires.

7.2.1.4 Language of the Study

The study was conducted at Swedish speaking, English speaking and bi-lingual schools and all the study materials were available in both languages. This included the study information sheets, consent forms, intervention slides, intervention information, surveys and focus group topic guides. Translated and validated versions of questionnaires and surveys were used when they were available, and collaboration between JM and native Swedish speakers was used to translate questionnaires when they were not available. Both English and Swedish questionnaires were pilot tested with native speakers before the study.

7.2.2 The Intervention (Week 2)

Adolescent participants completed the intervention during the second week of data collection. The intervention was based on the cognitive theory of self-regulation (Bandura, 1991) and included four steps where participants (i) checked their screen time (ii) reflected on their use of social media (iii) shared how their social media use impacted their thoughts, feelings, and behaviours, and (iv) discussed how they would like to use social media in the future. Participants then accessed a goal-setting survey to outline how they intended to use social media over the next seven days. Appendix 5 shows how the cognitive theory of self-regulation was aligned with the intervention using direct quotes from Bandura (1991, pp. 250-251).

Mentors were provided with the slides via email in a pdf format. They were instructed to use these as a template for leading the intervention and were encouraged to organise groups and reflections in a way that they felt was suitable for their class and teaching style. The mentors were instructed that the class session was designed to last for 30 minutes and five to six minutes on each step. A key aspect of the instructions to mentors was to assume a neutral approach to social media, where the reflections from students were able to drive the narrative.

7.2.3 Data Collection

Forthcoming explanations of the intervention and the data collection measures will reference to when they were used in the six-week timeframe. A pre-post, follow-up design was chosen based on the feasibility measures within the design of study, where aspects of the of the RE-AIM framework such as effectiveness and maintenance required measures across multiple timepoints (Glasgow et al., 2019; Pearson et al., 2020). The design also used data collection across multiple time-points because this would likely be the design of a future large-scale definitive trial. Data collection took place over six weeks and included: pre-intervention questionnaire pack (week 1), the intervention and goal-setting survey (week 2), the post-intervention questionnaire pack (week 3), focus groups with mentors and student participants respectively (weeks 4 & 5), and follow-up questionnaire pack (week 6) (see Table 18).

Table 18: Data Collection Timeline across (Pre, Intervention, Post-intervention, Focus Groups, Post, Follow-up) in Study 3

Week 1	**Week 2**	**Week 3**	**Week 4 & 5**	**Week 6**
Pre-intervention questionnaire pack	Intervention: Social media reflection 7-day social media goals survey	**Post**-intervention questionnaire pack	Focus Groups: Student participants Focus Groups: Mentors	**Follow-up** Survey pack

The initial contact with each school included obtaining informed consent from school leaders and mentors. Each class was informed about the study by JM at least one week before the study. Student participants were encouraged to ask questions and were shown how to turn on their screen time tracking apps[12] if they intended to take part. JM was available to support data collection during all surveys except for the intervention (week 2). This was intentional, as the intervention was designed to be led independently by schools without interference from the researcher. All survey data collection (week 1, 3, 6) and the intervention (week 2) occurred during normally scheduled mentor time which lasted between 30 and 50 minutes.

[12] Both iPhone and Android smartphones have built in application which can track phone use. The iPhone application is called Screentime and the Android app is called Digital Wellbeing.
*Apple. (2024). *Use Screen Time on your iPhone or iPad*. https://support.apple.com/en-us/108806
*Android. (2024). *Digital Wellbeing: new ways to find balance for you and your family*. https://www.android.com/digital-wellbeing/

7.2.4 Data Collection Measures

The following data collection measures are categorised as, intervention measures, pre-post follow-up measures (see Table 19). In addition to the survey-based data collection measures shown in Table 19, focus group interviews were conducted with adolescent participants and teachers separately in week 4 and 5.

Table 19: Survey-Based Data Collection Measures in Week 1 (pre), Week 2 (intervention), Week 3 (post), and Week 6 (follow-up)

Outcome	Outcome measures	Timepoints(s) of evaluation (Week 1-6)
Intervention measures (one-time)		
Demographics	Age, sex, gender Family affluence/ Family Support Scale (adapted from: Inchley et al., 2018)	1
7-day social media goals	Four measures: (i) choice to: reduce, increase, or not change social media time, (ii) the size of the goal (hour/minutes) (iii) strategies to reduce time or justification for no change (iv) other intended changes to social media use	2
Student feedback	Underpinned by the RE-AIM framework, the questionnaire used closed and open open-ended responses to evaluate feasibility.	3
Mentor Feedback	Informed by the RE-AIM framework, a 5-point scale to evaluate intervention feasibility	3
Pre-post-follow-up measures		
Smartphone and social media use and duration	Five measures: (i) smartphone ownership, access and operating system, (ii) total screen time for last Sunday and last school day, (iii), frequency of phone pickups on last school day, (iv) time spent on specified social media apps, and (v) use of screen time controls or limits, with reasons if applicable. Data are self-reported using information from smartphones	1,3,6
Motives for social media use	Motives to use social media scale (adapted from: Bischof-Kastner et al., 2014)	1,3,6
Addictive use	Problematic Social media use Scale (adapted from: Caplan, 2010)	1,3,6
Wellbeing	Cantril ladder (Cantril, 1965)/Short-form Warwick-Edinburgh Mental Wellbeing Scales (SWEMWBS) (Stewart-Brown et al., 2009)/Positive and Negative Affect Schedule (Watson et al., 1988)	1,3,6
Physical activity	Physical Activity Questionnaire for Adolescents (PAQ-A) (Kowalski et al., 2004)	1,3,6
Self-regulation	Self-regulation scale (SRS) (Diehl et al., 2006)	1,3,6

7.2.5 Intervention Measures (One-Time)

7.2.5.1 7-day Social Media Goals (Week 2)

The social media goal-setting questionnaire aimed to support and measure personally relevant changes to social media use during the intervention (Week 2). Item 1 used a selected response item and asked whether participants aimed to (1) reduce, (2) increase or (3) not change their time on social media in the following seven days. The following items then used branching logic where questions were adapted based on the answer to Item 1. The following questions are shown in Table 20.

Table 20: The Questions in the Social Media Goal Setting Survey for Reduce and No Change Groups: Study 3

Reduce	No Change
'The strategies I will use to reduce my time on social media are…' (open ended response)	(2) 'I have chosen not to change the amount of time I spend on social media because...'. (open ended response)
'I aim to decrease my social media use by (Hours and Minutes) per day'	
A list of 16 different social media apps is then shown and participants are promoted to select the apps they aim to spend more/less time on	
Final questions for all: 'Do you plan to change your way of using social media in any way during the upcoming week? (Yes/No) 'If so, please explain how' (open ended response)	

Note. No participants chose to increase their social media time, however the questions are the same as reduce branch with the word 'reduce' changed to 'increase'.
* Social media apps were: (Snapchat, TikTok, Instagram, WhatsApp, Facebook, Facebook Messenger, Twitter (X), YouTube, Reddit, Discord, Pinterest, Tumblr, Lobby, Yubo, Twitch, BeReel, Other).

7.2.5.2 Intervention Feedback Questionnaire: Students (Week 3)

The post-student questionnaire (Appendix 6) was designed by the research team to assess the feasibility of the intervention. The 8-item survey was informed by the RE-AIM framework (Glasgow et al., 1999) and included statements which were answered using a five-point scale from 1 (strongly disagree), to 5 (strongly agree). The statements are shown in the results section and descriptive statistics for each item are used separately to assess feasibility.

7.2.5.3 Intervention Feedback Questionnaire: Mentors (Week 3)

The 9-item mentor self-report questionnaire (Appendix 7) was informed by the RE-AIM framework (Glasgow et al., 1999) and designed by the research team to assess the feasibility of the intervention. The survey includes five statements answered with a five-point scale from 1 (strongly disagree), to 5 (strongly agree). The statements are shown in the results section and descriptive statistics for each item are used separately to assess feasibility.
A further four items included questions answered using open-ended free-text responses: (6) 'Can you describe the lesson with your class?' (7) 'Can you explain what went according to plan?' (8) 'Can you explain what did not go according to plan?' (9) 'Can you describe how your students reacted to the lessons?'. These were used to assess implementation and were triangulated with the mentor focus group data.

7.2.6 Pre-Post-Follow-up Measures

7.2.6.1 Demographics (Week 1, 2, 3, 6)

The demographics questionnaire (Appendix 8) included background information, family affluence and family support. Background information included name, school, class, month and year of birth, birthplace, parents birthplaces, sex and gender. The questions were based on the 2017/2018 Health Behaviour in School-aged Children (HBSC) study with 11 to 15-year-olds from 42 different countries (Inchley et al., 2018). The validated third version of the Family Affluence Scale (Boyce et al., 2006) provided insight into the socioeconomic background of participants with six questions about family and living situation and tangible assets. Responses produced a score between 0 and 13 which was converted into a ridit-based score which divided participants into three quintiles (0-7: low, 8-11: middle-high, 12-13: high) which were based on a validated scale for Sweden (Swedish Public Healh Agency, 2022). The Family Support Scale used a four-item short form of the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988) and was originally modified by Inchley et al. (2018).

7.2.6.2 Smartphone and Social Media Use and Duration (Week 1, 3, 6)

The research team developed a social media use survey (Appendix 9) for the purpose of the study. The questions measured the frequency and type of social media use during the past week. Participants were prompted to access data stored on their mobile devices and branching logic was used to produce specific instructions for participants with apple iPhones, Android devices, and other devices. This helped participant access screentime data on their

specific smartphones. Through reference to data on smartphones, the questionnaire specifically aimed to collect a more objective self-report measure of adolescents social media use.

After providing specific instructions on how to access screen time data, participants reported their overall screen time for last Sunday and the most recent weekday. This data was used to conduct an exploratory analysis between overall screentime and social media time. They then reported the number of times they picked up their phone on the most recent weekday (called ‘pickups’ or ‘unlocks’). The social media-specific section then asked participants to report their time on 16 different social media apps or 'other' social media apps. Weekday time on social media was calculated by adding the time on all social media apps. The final section used an operating system specific matrix and asked participants if they use specific controls or limits they use on their phone (e.g., do not disturb/sleep/app limits) using ‘yes/no’ responses. If they answered yes they were prompted to state why they used those limits. It is important to note that phone control limits and pickups were not used in the data analysis due to inconsistent reporting.

7.4.6.3 Motives for Social Media Use (Week 1, 3, 6)

An adapted version of the validated 16-item internet motive questionnaire for adolescents (IMQ-A: Appendix 10) (Bischof-Kastner et al., 2014) was completed by all participants. In a validation study with adolescents by Marino et al. (2018) the word internet was replaced by Facebook. Similar to Musetti et al. (2022), the word internet/Facebook was replaced with social media in this study. There were four questions answered using a 5-point scale for each

of the four sub-scales which included: Positive internal valence: *enhancement* (e.g., aiming for positive feelings through social media), positive external valence: *social* (e.g., seeking improved relationships with friends on social media), negative internal valence: *coping* (e.g., alleviating bad feelings using social media), negative external valence: *conformity* (e.g., using social media due to peer pressure). An average score was calculated for each of the four sub-categories and a higher score is indicative of higher motives.

7.2.6.4 Addictive Use (Week 1, 3, 6)

The problematic social media use scale (Appendix 11) is an adapted version of the validated 15-item Generalized Problematic Internet Use Scale 2 (GPIUS2; Caplan, 2010). It had been previously adapted and validated to consider Facebook with adolescents (Assunção & Matos, 2017; Marino et al., 2017). Similar to Musetti et al. (2022), the word internet/Facebook was replaced with social media in this study. The scale supported a theory-driven model and where the sub-scales included cascading symptoms of problematic social media use. These were: (i) Preference for Online Social Interaction (POSI), (ii) mood regulation (iii) cognitive preoccupation (iv) compulsive use, and (v) negative outcomes. There were three questions for each subscale which were answered using an 8-point scale. An average score was calculated for all 15 items and higher scores indicated higher levels of problematic social media use.

7.2.6.5 Mental Wellbeing: Cantril ladder (Week 1, 3, 6)

The Cantril ladder broadly assessed wellbeing and measured eudaimonic dimensions of wellbeing through participants' overall life satisfaction (Cantril, 1965). A one-item survey (Appendix 12) used the image of a ladder, where the top of the ladder corresponds to the best life you can imagine '10' and the bottom '0' the worst life you can imagine. Participants were asked 'If you think about your life in general, where do you think you are right now?'. A higher score was indicative of higher life satisfaction. The scale is validated and widely used to assess wellbeing and life satisfaction (Inchley et al., 2018).

7.2.6.6 Mental Wellbeing: Short-form Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS) (Week 1, 3, 6)

General wellbeing was assessed using the 7-item Short-Form Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS: Appendix 13). The conceptual framework behind SWEMWBS intersects with eudaimonic (emotions such as pleasure/pain), hedonic aspects of wellbeing (meaning, functioning, self-actualisation) and subjective/psychological approaches to wellbeing (Clarke et al., 2011). Statements were answered on a five-point scale ranging from 1 (none of the time), to 5 (all of the time), and related to how participants had been feeling over the last two weeks. In order to compare the results of the short-form questionnaire to normative data, raw total scores (between 0-35) were transformed using a pre-defined conversion table (Stewart-Brown et al., 2009). Higher scores were indicative of higher wellbeing. SWEMWEBS has been shown to generate valid and reliable scores of wellbeing and is validated (Haver et al., 2015; Stewart-Brown et al., 2009).

7.2.6.7 Mental Wellbeing: Positive and Negative Affect Schedule (PANAS) (Week 1, 3, 6)

Positive and negative affect were assessed using the Positive and Negative Affective Schedule (PANAS; Watson et al., 1988). The PANAS (Appendix 14) includes 20 items which separately assess positive affect (10 items, e.g., 'strong', 'proud', and 'interested') and negative affect (10 items, e.g., 'fear', 'shame', and 'nervousness'). For each feeling participants rated the extent to which they had experienced it in the last few weeks on a 5-point scale (1=very slightly or not at all, to 5=extremely). Responses were then averaged separately for each subscale such that higher scores reflected higher positive and negative affect. The PANAS has been used widely and shown to generate valid and reliable scores of positive and negative affect (Crawford & Henry, 2004) and with adolescents (Huebner & Dew, 1995).

7.2.6.8 Physical Activity Questionnaire for Adolescents (PAQ-A) (Week 1, 3, 6)

The Physical Activity Questionnaire for Adolescents (PAQ-A: Appendix 15) is a 9-item validated questionnaire which assessed general levels of physical activity and was designed for high school students aged 14-20 (Kowalski et al., 2004). The 7-day recall questionnaire had nine sub-sections where participants report the frequency, intensity, time and type of physical activity they have taken part in. Scores were calculated by calculating the average of the first 8 sub-scales, with higher scores indicating higher levels of physical activity.

7.2.6.9 Self-Regulation Scale (Week 1, 3, 6)

The 10-item self-regulation scale (Appendix 16) measures an individual's ability to control their behaviours and to focus their attention control in goal pursuit—which is a component of self-regulation (Diehl et al., 2006). Ten statements relating to positive and negative affect and attention control prompted responses on a 4-point scale from 1 (not at all true), to 4 (completely true). A higher score indicated higher levels of attention control and self-regulation.

7.2.7 Focus Group Interviews

7.2.7.1 Focus Group Interviews: Student Participants (Week 4 & 5)

The student focus group interviews included between four and five participants who took part in the intervention. A total of seven focus groups were conducted at the three schools and lasted between 17 and 36 minutes. The interview topic guides (Appendix 17) were developed using the logic model and the RE-AIM framework (Glasgow et al., 2019; Glasgow et al., 1999). Each focus group was facilitated by JM and 12 open-ended questions were used to understand the feasibility of the intervention. This included, what happened during the intervention, the mentors approach (e.g., positive, negative, critical, encouraging), how they responded, and the appropriateness of the intervention. Questions prompted each participant to share what their social media goals were, to provide insight into why they chose them and their strategies for change/reasons for not changing. The perceived effects of the intervention were sought and insights were provided into how students would change/adapt the intervention in the future.

7.2.7.2 Focus Group Interviews: Mentors (Week 4 & 5)

A total of four focus group interviews were conducted with class mentors at the three schools. Each focus group included between two and three participants and lasted between 18 and 34 minutes. Mentor focus groups were conducted at the school or online based on the preference of the school. The topic guide (Appendix 18) included 11 semi-structured open-ended questions. In-depth responses were sought to better understand why the mentors and schools took part in the intervention, what happened when they led the intervention, student responses and alignment with the intervention instructions. Participants were asked whether they had observed changes in student behaviour and were asked to provide insight into how they would change the intervention in the future.

7.2.8 Analysis

7.2.8.1 Survey Data Cleaning and Preparation

Multiple steps were taken to screen and transform the data before conducting the analysis and there were based on recommendations in the literature (see Tabachnick & Fidell, 2013). The initial screening and cleaning in Microsoft Excel included the categorisation of qualitative responses and removing data such as non-social media apps which were reported (e.g., Spotify, Games). In SPSS version 29, questionnaire scores were calculated and the data were screened to identify missing data. Unreliable data were removed in three instances when the same answer had been reported for multiple questionnaires and/or where inappropriate and multiple misleading responses were used.

The screening of data after transformation produced some contradictory findings for social media time, where the total reported was sometimes higher than total screen time for the same day. It was therefore decided that social media data would not be reported for all cases where this was apparent. A social media reliability filter was applied and participants who had social media time higher than total screen time were filtered out of the analysis of inferential and descriptive statistics. This resulted in the removal of social media data for 16 participants pre-intervention, 11 at post intervention and 10 at follow-up. This constituted 10.13%, 10.78% and 10.99% of all the social media data respectively.

Study participation/non-participation, questionnaire completion and attrition rates were calculated to examine the reach of the intervention. Participant characteristics were then examined as a whole sample and broken down for each school. The proportion of participants who chose to increase, decrease, or not change their social media time was then calculated. None of the participants chose to increase their time on social media and this means that two groups were used in the analysis, (i) the 'decrease' group and the 'no change' group. It is important to note is that these groups reflect the self-reported goals/intentions of the participants and not the actual changes in social media time.

One-way ANOVAs were run to examine whether there were any group differences between the two groups in age, social media time, problematic use, motives for social media use, wellbeing outcomes, and physical activity and self-regulation. A two-way chi-squared test was used to examine any difference in gender between both groups. Finally, reasons for not

wanting to change social media time and strategies for reducing social media were examined using pre-assigned codes which had been created in Microsoft Excel prior to the analysis in SPSS. For example, if a participant chose to reduce their time on social media by adding app limits this was coded as a phone-based strategy.

Data was analysed to compare the 'decrease group' and the 'no change groups' to understand the effectiveness of the intervention. First means and standard deviations of screen time, problematic social media use, four sub-scales of motives for social media use, SWEMWBS, both PANAS subscales, the Cantril ladder, PAQ-A and SRS were calculated at pre-intervention, post-intervention, and follow-up. Separate 3-time (pre, post, follow-up) x 2 group (decrease, no change) two-way mixed-design ANOVAs with repeated measures on the first factor were then run to examine any significant changes over time in any of the aforementioned variables, any group differences, and whether any changes over time or between groups were depending on group or time respectively; these analyses were also run to obtain effect sizes. For all ANOVAs the critical alpha level was set at .05 and partial eta squared was used as the measure of effect size. For the two-way ANOVAs with repeated measures, LSD post-hoc analysis was conducted to follow-up any of the significant main effects for time.

7.2.8.2 Qualitative Data: Preparation and Analysis

The qualitative survey data were translated and transcribed by a professional service. Interviews conducted in Swedish were transcribed in the original language and then translated to English. A hybrid deductive/inductive approach to qualitative analysis was

used. Fereday and Muir-Cochrane (2006) laid the groundwork for the future use and rigour of inductive/deductive hybrid thematic coding and further iterations have been applied to mixed methods research (Proudfoot, 2023). The application of the deductive/inductive approach in the current study was novel and applied similar principles to Fereday and Muir-Cochrane (2006) with some reverse sequencing and using reflexive thematic coding principles outlined by (Braun & Clarke, 2019). The decision to code deductively before inductive reflexive analysis was to focus individually on the five feasibility elements outlined in RE-AIM (Glasgow et al., 2019; Glasgow et al., 1999). While placing deductive coding before inductive analysis is not unique (see Blum et al., 2020), one potential disadvantage of this approach was a more rigid analysis with limited exploration of themes. It was therefore important to design the deductive coding frame to fully capture the research question, to actively engage with transparent and reflexive analysis and to explore cross-cutting themes later in the inductive part of the analysis. The following six reflexive and iterative steps were followed: (i) developing the coding manual using the RE-AIM framework (ii) testing the reliability of the codes (iii) deductive coding (Appendix 19) (iv) the deductive/inductive transition (v) searching for cross-cutting higher order themes (vi) writing up. The qualitative results for reach are presented as themes and the remaining sections are presented as codes. The reason for not presenting codes for effectiveness, adoption, implementation and maintenance was that some deductive coding categories did not fully extend across the deductive/inductive transition and did not produce adequate conceptual patterns to develop themes. One cross-cutting theme was developed; 'Social media as a Default Activity'. It was decided that the cross-cutting theme did not warrant a separate section and

it is evident across the result section. The following section presents the mixed methods results for reach, effectiveness, adoption, implementation and maintenance (RE-AIM).

7.3 Results

7.3.1 Reach

Reach is defined as,

> The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative, intervention, or program.
>
> (Glasgow et al., 2019, p. 3).

The following section presents data related to 'reach' such as levels of participation, sample characteristics, participant retention, baseline characteristics, reasons for participation and themes which relate to why the adolescent participants chose to take part in the 7-Day Social Media Detox.

7.3.1.1 Survey Completion

From a total of 200 unique participants, ongoing participation showed a steady decline from 165 participants in week one to 101 participants in week six. Table 21 shows the survey responses across the four data collection points in weeks one, two, three and six.

Table 21: The Number of Survey Responses, Retention of Participants and Attrition Rate in Study 3

School	Week 1	Week 2	Week 3	Week 6
Survey Responses (n)	165	146	131	101
Ongoing/Retained Participants (n)		123	90	65
Attrition of ongoing participants (%)		25%	45%	61%

Table 21 shows that 65 of 165 participants were retained throughout the study and they completed all four data collection points. A further exploratory analysis of the data shows that all classes across the three schools participated in weeks one, two and three. However, two of the ten participating classes did not participate in the follow-up surveys in week six.

7.3.1.2 Participant Characteristics

The mean age of participants was 15.7 years ±.50 and Table 22 uses the baseline date from week 1 (n=165) to show the representativeness of this population in relation to normative data for Sweden or Stockholm County.

Table 22: Pupil Sample Characteristics in Study 3

	Normative Data	All Schools (n = 165)	School 1	School 2	School 3
Gender					
Male	52%	72 (45%)	17 (38%)	17 (77%)	38 (41%)
Female	48%	87 (55%)	28 (62%)	5 (23%)	54 (59%)
Birthplace					
Sweden	86%	87 (53%)	4 (9%)	19 (86%)	64 (66%)
Outside of Sweden	14%	77 (47%)	41 (91%)	3 (14%)	33 (34%)
Family Affluence					
Low	15%	21 (13%)	9 (20%)	2 (10%)	10 (11%)
Middle-High	71%	111 (69%)	35 (78%)	13 (62%)	63 (66%)
High	14%	29 (18%)	1 (2%)	6 (29%)	22 (23%)
Family Support					
Low	24%	68 (42%)	16 (36%)	6 (27%)	46 (47%)
High	76%	95 (58%)	28 (64%)	16 (73%)	51 (53%)
Life Satisfaction	7.1/10	7.22 ±.1.5	N=44	N=22	N=98
			7.39 ±.1.51	7.27 ±.1.55	7.14 ±.1.51

Notes.

*Gender reported from SCB. Birthplace of 15-year-olds in Stockholm County 2022: https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/START__BE__BE0101__BE0101E/InrUtrFoddaRegAlKon/table/tableViewLayout1/
*Family Affluence reported from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-11968-2/tables/2
*Family Support reported from the proportions who scored 5.5 or more on the Multidimensional Scale of
*Perceived Social Support (categorised as high perceived family support): https://gateway.euro.who.int/en/indicators/hbsc_38-family-support/#id=27160
*Life Satisfaction reported from HBSC data for 15-year-olds in Sweden 2022: https://data-browser.hbsc.org.

The proportion of males and females was similar to the data from Stockholm. The birthplace of intervention participants included a significantly higher percentage of non-Swedish-born participants than the demographic data for 15-year old's in Stockholm County. Family

affluence scores were slightly higher than normative data for Sweden and the scores for family support were significantly lower. Self-reported quality of life was slightly higher than the normative population data for 15-year-olds in Sweden.

7.3.1.3 Participation in the Intervention

Table 23 provides insight into the reach of the intervention in week two, where schools reported the number of participants offered the intervention. This was compared with the number of participants who completed the social media goal setting survey.

Table 23: The Recruitment Rate of Participants in Study 3: The Proportion Participants and Non-Participants who were Offered the Intervention

	Total	School 1	School 2	School 4
Offered the intervention (n)	233	62	31	140
Intervention participants (n)	146	31	20	95
Participation in the intervention (%)	63%	50%	65%	68%

The participation rate in the study was 63% (146/233). School level participation ranged from 50-68% and class level participation was between 25% and 89%. Table 24 shows the reach of the intervention by reporting the proportion of adolescents who decided to increase, decrease or not change their social media behaviours over the coming week.

Table 24: The Number and Proportion of Participants who Chose to Increase, Decrease, or Not Change their Time on Social Media in Study 3

School	n	Increase n (%)	Decrease n (%)	No change n (%)
1	33	0 (0%)	13 (42%)	18 (58%)
2	20	0 (0%)	12 (60%)	8 (40%)
3	95	0 (0%)	70 (74%)	25 (26%)
Total	146	0 (0%)	95 (65%)	51 (35%)

None of the participants chose to increase their time on social media, and nearly two-thirds chose to decrease their time (65%). Just over a third of participants (35%) chose to not change their time on social media. When considering all of the potential participants

(including non-participants: see Table 21), 41% (95/233) chose to decrease their time on social media, and 22% (21/233) chose no change.

7.3.1.4 Baseline Characteristics between the decrease goals and the no change groups

Table 25 shows the mean and standard deviations of baseline variables for the groups that wanted to decrease their time on social media (decrease group) and those that did not want to change (no change group). One-way ANOVAs showed there were no significant differences between groups in any of these baseline characteristics.

Table 25: Baseline Means and Standard Deviations and One-Way ANOVA Results for the 'Decrease' and 'No Change' Groups' Social Media Time, Problematic Use, Four Motives for Social Media Use, Four Wellbeing Measures, Physical Activity, and Self-Regulation (Study 3).

Group	Decrease group (n = 71)		No change group (n = 36)		Main effect		
	M	SD±	M	SD±	F	p	ηp2
Age (years)	15.72	(.453)	15.64	(.543)	.641	.425	.006
Social Media							
Weekday Social Media Time (minutes/day)	229.68	(111)	205	(118)	1.105	.296	.010
Problematic use *(Scale: 1-5)*	3.41	(1.06)	3.22	(1.26)	.638	.426	.374
Motives for Social Media use							
Enhancement motive (Scale: 1-5)	3.44	(.67)	3.43	(.77)	.002	.961	.000
Social motive (Scale: 1-5)	3.89	(.69)	3.82	(.90)	.227	.635	.002
Coping motive (Scale: 1-5)	2.76	(.82)	2.73	(.96)	.039	.844	.000
Conformity motive (Scale: 1-5)	1.80	(.75)	1.66	(.75)	.847	.359	.008
Mental Wellbeing							
SWEMWBS *(Scale: 7-35)*	23.13	(4.63)	24.04	(4.44)	.923	.339	.009
PANAS: Positive affect *(Scale: 1-5)*	3.14	(.64)	3.21	(.64)	.193	.661	.002
PANAS: Negative affect *(Scale: 1-5)*	2.19	(.67)	2.11	(.63)	.229	.633	.002
Quality of life *(Scale: 0-10)*	6.93	(1.47)	7.39	(1.48)	2.329	.130	.022
Other measures							
Physical Activity (PAQ-A) *(Scale: 1-5)*	2.41	(.68)	2.56	(.74)	.954	.331	.010
Self-Regulation *(Scale: 1-4)*	2.69	(.52)	2.70	(.45)	.011	.918	.000

Note. Participants with valid data during week 1 and 2 n = 107

*13 participants were not included due to unreliable social media data

*Gender differences were calculated using a two-way chi-squared test X2(1,N=03) = 3.427, p= .0641.

*Missing values for the 'decrease' and 'no change' groups were:

Decrease group: Problematic use =2, Enhancement =1, Coping =1, Conformity =1, SWEMWBS =5, Positive affect =4, Negative affect =4, Physical activity n=11, Self-regulation =8

*Missing values for 'No change' group: Problematic use =2, Enhancement =1, conformity =1, SWEMWBS =1, Positive affect =2, Negative affect =3, Physical activity =3, Self-regulation =3

7.3.1.5 Reasons for Changing Social Media Time

An important aspect of assessing the reach of the intervention was to understand the 'no-change' participants. Responses to an open-ended question provided insight into why they did not want to change the time they spend on social media (see Table 26).

Table 26: Participant Rationale's for Not Changing Time Spent on Social Media in Study 3.

Reasons for choosing 'no change'	n	Percentage
Unproblematic use	35	63%
Low Usage	9	16%
Positive current usage	5	9%
Too hard to change	3	5%
Needed for work/study	2	4%
No reason	2	4%
Total	56	

Note. Participants: N=51

The main reason for not choosing to reduce time spent on social media was the perceived absence of negative effects, that participants were happy with their current engagement with social media, and they perceived their current uses of social media to be positive.

7.3.1.6 Qualitative Results: Reach

The results for 'reach' in the analysis of focus group data produced two overarching codes (i) Social Media: Self-managing a Default Pastime and Productivity; and (ii) Awareness and Apathy.

7.3.1.6.1 (i) Self-managing a Default Pastime and Productivity

Some of the participants situated social media as a default activity which they did when they had nothing else to do. This was sometimes associated with procrastination, guilt, distraction and a lack of productivity, and could result in behaviours which negatively impact mental wellbeing, such as reduced sleep.

> I sleep late when I'm scrolling more on TikTok because I don't realise how much time I'm spending. And I procrastinate more, to actually doing my work, instead I just use my social media.
>
> (Focus Group 8, Female, Student)

> If I sit and watch TikTok, I'm happy for 20 minutes, but then I feel bad afterwards. You think of what other things I could have done.
>
> (Focus Group 1, Male, Student)

Conversely, some participants felt that social media fulfilled certain functions in their lives and did not feel guilt. For these adolescents, social media was positioned as a valuable tool to stay connected and to relax.

> I understand why I use it so much because I need it for studying. I need it to relax or just to watch a film, yeah, just to chill.
>
> (Focus Group 4, Male, Student)

The data showed that social media use was a popular pastime and the self-management of social media use was framed in relation to other activities, such as the completion of homework. While some participants expressed a lack of concern over their social media use,

others framed it as something that they needed to manage to achieve other goals such as schoolwork.

7.3.1.6.2 (ii) Awareness and Apathy

The qualitative data showed that social media use was not negative, excessive or problematic for some participants. One mentor shared their observations on the reactions to the intervention:

> Ambitious students tended to be the ones who really thought, 'Oh, I need to change.' The ones who are very ambitious in my subject and other subjects. Class clowns as well, tended to be like, 'Oh, I need to change,' and they'd have very, very big plans, and I don't know how much of that was a performance. But then the students who are just plodding along a lot of the time, they tended to think, 'Well, this is the status quo, and I'm quite happy with it.
>
> (Focus Group 9, Mentor)

The findings show an interesting variation in student responses to the intervention. These support a potential connection between ambition to achieve well in school and motivation to reduce the time they spend on social media.

Some participants expressed that shock and insight into screen time attracted them to the intervention, whereas others had already developed an understanding of their digital habits. Overall, the social media reflection facilitated additional awareness and gave participants an opportunity to gain insight into their social media use and how it impacted them. This related to how much they used social media, when they used it and how it impacted their sleep.

> You're still a bit like sh**, am I really on Snapchat four hours a day? It feels like you log in, send a picture, log out maybe once a day, but it doesn't feel like four hours.
>
> (Male, Focus Group 1: Student)

> If you look at the screentime, sometimes, it's shocking.
>
> (Male, Focus Group 7: Student)

> I had pretty accurate knowledge…I have kept track of my screen time before.
>
> (Female, Focus Group 2: Student)

> I thought about when I used it, because I use it a lot before I went to bed or maybe I'm on the phone with someone, texting someone. And I feel like maybe that's not the best in terms of sleep because, the next morning, I always wake up really tired or someone has to shake me out of bed. So yeah, I realised that maybe I should figure out when to use it.
>
> (Focus Group 6, Female, Student)

Non-participation in the intervention (through not choosing to change social media use) was driven by aspects such as contentment and/or apathy. For example, one participant stated, 'I didn't care that much. I don't need to decrease or increase. I just feel yes, okay, this is the way I can have it' (Male, Focus Group 4, Student). In some cases, participants attachment with their smartphone and fear of missing out limited their willingness to change behaviours or they felt that it was too difficult to change.

> Without my phone I feel disconnected from talking with my friends, keeping up with everything new and stuff going on. So I just like using my phone. I wouldn't change.
>
> (Focus Group 8, Female, Student)

> I don't think anyone has control. Because it's like this, when you pick up your mobile phone it's still difficult to get rid of it, because it's a video, a video, a video and then you sit there for an hour, 'oh sh**, now an hour has passed.' So, I don't think anyone really has it.

(Focus Group 1, Male, Student)

A further aspect which motivated a lot of participants to take part in the Social Media Detox was a drive to use their time even more effectively, improve their sleep, their overall mental wellbeing and/or their productivity. This meant that some participants chose to reduce their time on social media regardless of any perceived negative impact on mental wellbeing, whereas others identified changes in their social media use as a need.

> I have chosen to decrease because, really, my life becomes dysfunctional. I cannot do schoolwork. I go to bed. I am late to school.

(Focus Group 7, Male, Student)

> I also felt that I wanted to scale down because it's always good to have as little screen time as possible. I can spend it on something better.

(Focus Group 7, Female, Student)

Overall, adolescents thought that social media use was a relevant and appropriate topic for their age and comparing their screen use with others was something that they enjoyed. When asked how they would change the intervention they expressed a desire for even more insight into normative uses of social media from their peers.

> It is appropriate, especially for this age, like a teenager, 17, 15, 16-year-olds, because we do keep up with social media and everything, so we could get a little carried away

(Focus Group 6, Student, Female)

> I would like more insight about my age group and how my friends spend their time on their phones.
>
> (Focus Group 5, Student, Male)

During the focus groups with adolescents and mentors It was also clear that the completion of surveys which took up to 30 minutes (Weeks 1,3 and 6) was long and repetitive. It was evident that participation in the intervention (week 2) was engaging, but an adaptation to the length of surveys was desired.

> Some were sighing a little bit – "Oh, is it another long questionnaire?
>
> (Focus Group 5, Mentor, Male)

7.3.2 Effectiveness

Effectiveness is defined as,

> The impact of an intervention on important outcomes, including potential negative effects... Heterogeneity of effects and reasons for success or lack of such.
>
> (Glasgow et al., 2019, p. 3)

In these results, the 'decrease goal' group are seen as the main intervention group because they were actively seeking to change their behaviours and they took part in the 7-Day Social Media Detox. However, the no change group who took part in the data collection and reflected on their social media use decided not to change their behaviours. Therefore, the no change group are an important comparator group who, could also be deemed as part of

the intervention group based on their participation in the reflection activity. Table 27 shows means and standard deviations of screen time, problematic social media use, motives for social media use, four wellbeing outcomes, physical activity and self-regulation reported by the ‘decrease group’ and the ‘no change’ groups’, at week one (pre), week three (post), and week 6 (follow-up), as well as the results of the two-way 3-time x 2 group mixed design ANOVAs.

Table 27: Main Effects Pre, Post and Follow-Up, of Weekend Screen Time, Problematic Social Media use, Motives for Social Media use, Physical Activity, Self-Regulation, and Wellbeing outcomes in Study 3

Measures	Decrease group				No change group				Main effect time			Main effect group			Time by group		
		Pre	Post	Follow-up		Pre	Post	Follow-up									
	n		M (SD)		n		M (SD)		F	p	ηp2	F	p	ηp2	F	p	ηp2
Weekday Social Media Time	26	235.73	203.35	258.46	20	199.75	188.60	188.10	.961	.386	.021	.476	.494	.011	2.265	.139	.049
(minutes/day)		(119.35)	(94.04)	(174.34)		(104.35)	(104.91)	(98.03)									
Problematic use (Scale: 1-5)	21	3.50 (1.24)	3.47 (1.19)	3.73 (1.17)	18	3.20 (1.19)	3.34 (1.24)	3.50 (1.31)	2.426	.095	.062	3.429	.072	.085	.363	.550	.010
Motives for Social Media use																	
Enhancement motive (Scale: 1-5)	25	3.34 (.71)	3.30 (.84)	3.35 (.69)	18	3.41 (.70)	3.38 (.58)	3.11 (.73)	1.271	.286	.030	2.441	.126	.056	.023	.881	.001
Social motive (Scale: 1-5)	25	3.60 (.65)	3.70 (.62)	3.52 (.60)	19	3.76 (.80)	3.70 (.75)	3.61 (.81)	1.304	.277	.030	.120	.731	.003	.197	.659	.005
Coping motive (Scale: 1-5)	25	2.69 (.88)	2.80 (.91)	2.83 (.67)	19	2.76 (1.05)	2.66 (.80)	2.89 (.83)	1.329	.270	.031	.002	.968	.000	.000	.995	.000
Conformity motive (Scale: 1-5)	26	1.81 (.77)	1.85 (.77)	1.82 (.80)	19	1.71 (.82)	2.21 (1.08)	2.24 (.95)	6.096	**.003**	.127	8.694	**.005**	.171	.889	.351	.021
Mental Wellbeing																	
SWEMWBS (Scale: 7-35)	22	23.10 (4.30)	21.97 (4.26)	21.61 (4.12)	19	24.03 (5.12)	23.55 (4.38)	21.76 (3.53)	7.542	**.001**	.162	.478	.493	.012	.521	.475	.013
PANAS: Positive affect (Scale: 1-5)	21	3.20 (.64)	3.14 (.56)	3.03 (.80)	17	3.11 (.67)	3.00 (.73)	2.78 (.82)	3.385	**.039**	.086	.495	.486	.109	.671	.418	.018
PANAS: Negative affect (Scale: 1-5)	20	2.03 (.58)	2.15 (.73)	2.28 (.71)	17	2.15 (.69)	2.39 (.95)	2.42 (.83)	2.236	.114	.060	.377	.543	.011	.415	.524	.012
Quality of life (Scale: 0-10)	25	7.04 (1.21)	6.96 (1.24)	6.40 (1.55)	19	7.58 (1.54)	7.63 (1.50)	7.11 (1.56)	5.273	**.007**	.112	.178	.675	.004	2.961	.093	.066
Other measures																	
Physical Activity (PAQ-A) (Scale: 1-5)	17	2.54 (.67)	2.36 (.85)	2.39 (.77)	13	2.33 (.78)	2.40 (.90)	2.44 (.97)	.205	.815	.007	2.225	.147	.074	.021	.887	.001
Self-Regulation (Scale: 1-4)	22	2.87 (.51)	2.86 (.52)	2.81 (.51)	16	2.78 (.50)	2.71 (.68)	2.55 (.59)	3.859	**.026**	.097	2.591	.116	.067	1.011	.321	.027

7.3.2.1 Social Media Time

There were no significant differences in social media usage from pre-intervention to follow-up between the 'reduce' group and the 'no change' group, and there was no significant time by group interaction.

7.3.2.2 Social Media Outcomes: Problematic use and Motivation to use social media

There were no significant main effects for time, group, or time by group interactions for problematic social media use and the four measures for motivations to use social media (enhancement, social, coping, conformity) with the exception that conformity motives, which showed significant main effects for time and group. The no change group reported significantly greater conformity (irrespective of time) compared to the decrease group. When interpreting the time effect, post-hoc analysis showed all participants had significantly higher conformity at post-intervention and follow-up compared to baseline.

7.3.2.3 Mental Wellbeing Outcomes

Mental Wellbeing related measures (SWEMWBS, PANAS, Cantril ladder) showed no significant main effect for group and no time by group interactions. There were significant effects for time for SWEMWBS, the Cantril ladder, positive affect (PANAS), and no time effect for negative affect (PANAS). Post-hoc analysis showed mean scores for SWEMWBS and positive affect were significantly lower at follow-up compared to baseline and post-intervention. Mean scores for the Cantril ladder were significantly lower at follow-up compared to times pre and post intervention.

7.3.2.4 Other Outcomes

Physical activity and self-regulation showed no significant main effects for group, or the time by group interactions. While physical activity did not show a significant main effect for time, post-hoc analysis demonstrated significantly lower self-regulation at follow-up compared to baseline and post-intervention.

7.3.2.5 Qualitative Results: Effectiveness

The overarching codes related to social media show how and why social media goals were (i) achieved or (ii) not achieved. The reasons for this varied and there was an insufficient indication of trends in the data to draw out higher order themes. The examples below provide an overview of why the intervention was effective and/or ineffective for participants.

Influences of the intervention were not observed by mentors, but all schools had a policy which did not permit smartphones to be used during lessons. The influences of the intervention reported by student participants were mostly related to time changes in social media use. This included, not understanding why they could not decrease their time on social media and the challenges with changing their social media habits. For example one participant wanted to decrease their social media time but it increased.

> It bl***y went up….I forgot, if you think like this: 'okay, now I'm going to reduce it,' but then you forget about it the next day, so you just continue. But it's also that it varies from week to week. Some weekends you might sit a little longer and some not, it depends on whether you go out or not.
>
> (Focus Group 1, Student)

Increased and decreases in social media use duration were often associated with other activities, such as homework, social activities with friends and physical activity. These were regardless of whether these were deemed to be participant initiated or outside of their control.

> I managed to study a bit more, managed to reduce everything on TikTok and Snapchat.
>
> (Focus Group 1, Male, Student)

> I decreased it a bit because I spend more time doing schoolwork now because we have more tests… So, naturally, it decreased.
>
> (Focus Group 7, Male, Student)

In one case there was evidence of spillover effect, where one participant who did not intend to reduce their time on social media was positively influenced by peers and inadvertently reduced their time.

> I've actually decreased my time... because I think, especially with the study, I know my friends that I live with who have taken part, they've tried filling up their schedule and then I've just kind of tagged along. I've been going to the gym more often, so that's an hour gone that I'm not spending on my phone during my free time. And then been joining clubs and doing more sports and stuff, so that's an hour, again, gone. And then meeting with people. So I've actually decreased my time.
>
> (Focus Group 1, Student)

Overall, the influence of the intervention in the qualitative data largely highlights reasons for changes (or non-changes) in social media use and how they were sought. While clear

actions to decrease use were evident, the main strategies (also evidenced in the quantitative data) were driven by participation in other activities.

7.3.3 Adoption

Adoption is defined as,

> The absolute number, proportion, and representativeness of settings and intervention agents (people who deliver the program) who are willing to initiate a program.
>
> (Glasgow et al., 2019, p. 3).

Adoption at the school level is reported in the recruitment section in the methods. Mentor level adoption was also assessed through their responses-to the mentor feedback surveys and mentor focus groups.

The survey response rate for mentors was 8/19 (42%) and focus group participation was 9/19 (47%). Most classes had two mentors, and intervention feedback was provided for 8 out of 10 classes through the surveys and/or participation in the focus groups. This shows a high level of engagement with the intervention, where staff not only adopted and delivered the intervention, but they engaged with the study over the six-week period.

7.3.3.1 Qualitative results

The main reasons for adopting the intervention were based on problems which the schools observed with social media within the school environment. As a result, they supported the

idea that students need to reflect on their own social media use to help them gain better understanding and self-regulate.

> I think we thought that the topic was interesting. It's something that we notice our students are spending a lot of time on social media, and we feel that… I guess it's part of what we hear in the news and stuff as well.
>
> (Focus Group 3, Mentor)

Some mentors stated that they had observed a decline in student focus over time and they associated tired students with night-time social media use. Feedback on the intervention was largely positive and a focus on social media was seen as relevant for students.

> I don't think it's, like, a quick fix. All kids, regarding to age, would benefit from this. And the sooner the better because they don't really reflect on how much time they spend on their phone.
>
> (Focus Group 5, Mentor)

There was some criticism that more information about social media and its effects might be needed, and the intervention would benefit from additional components to support ongoing use by the mentors. In turn, the observed effectiveness of the intervention could support further adoption by schools and mentors.

> It was surface level [and] they need to be presented with much more compelling evidence to make changes or to learn how to use social media in a school context or in life.
>
> (Focus Group 2, Mentor)

> Their own reflections will only take them so far and then they can make more-informed decisions about how they want to change or why they want to change their screen time.
>
> (Focus Group 5, Mentor)

> I don't think the impact of the intervention was enough to… like, they weren't supported. I feel like if we want them to really make a change, then we have to create a framework where it is not a personal choice.
>
> (Focus Group 6, Mentor)

Suggestion for change included more time for discussion, and to conduct the reflection 'more often and in a shorter format' (Focus Group 2, Mentor). More relatable peers was a further suggestion for people to lead the intervention. Not conducting the intervention in the first term of a school year was also suggested in Focus Group 4 because mentors had other priorities. Overall, the intervention was adopted because it was relevant for adolescents, but mentors had suggestions on how to provide additional support for behaviour change.

7.3.4 Implementation

Implementation is defined as,

> At the setting level… the intervention agents' fidelity to the various elements of an intervention's protocol, including consistency of delivery as intended… At the individual level, implementation refers to clients' use of the intervention strategies.
>
> (Glasgow et al., 2019, p. 4)

This section has two clear and distinct components which relate to how the intervention was delivered by mentors and the strategies used by adolescent participants. The mixed methods data has therefore been integrated to cover (i) School Level Implementation, and (ii) Participant level Implementation.

7.3.4.1 School Level Implementation

After mentors delivered the intervention in week two they were invited to complete a short feedback survey. Table 28 shows the individual survey responses from mentors using a five-point scale.

Table 28: Intervention Implementation Feedback from Mentors using 5-point scale (Study 3)

Question	M (SD)
When I delivered the social media lesson I emphasised the positive aspects of social media	2.75 (0.71)
When I delivered the social media lesson I emphasised the risks and dangers of social media	3.13 (0.64)
Pupils were generally engaged with the topic of social media	4.00 (0.00)
Pupils were generally motivated to change their social media behaviours	2.88 (0.64)
The social media lesson was delivered as planned	3.75 (0.71)

Note. n= 8 mentors from 7 classes.

Reponses to mentor feedback questionnaires in Table 28 show that the social media reflection and goal-setting lesson was delivered according to the instructions. Mentor feedback indicated their approach was quite neutral, and the negative aspects of social media were emphasised slightly more than the positive. Pupil engagement with the topic of social media was higher than their motivation to change their behaviours.

7.3.4.1.1 Teacher Implementation

The implementation of the intervention included a range of approaches ranging from low levels of engagement from mentors to high engagement shown through additional activities and conversations with students. The varying levels of implementation are shown below:

> They started the slide on the board and told us to go to the link and do what it said to do.
>
> (Focus Group 1, Male, Student)

> I followed the questions; we broke them down and gave a little bit of time for each. We allowed them five minutes to talk about and to share their findings of, I guess it was when they were looking at their screen-time usage for each app.
>
> (Focus Group 6, Mentor)

> We wrote the reflection questions up on the board, and we told them that the first thing they had to do was they had to write a reflection; they had to think about the questions themselves. And then they got to discuss with the others and see if that changed their opinion before they did their final reflection.
>
> (Focus Group 10, Mentor)

Mentor engagement from the perspective of students provided particular insight. For example student appreciated the fact that one mentor ‘was showing us her screen time and then we shared all of our screen times on the board’ (Focus Group 4, Female, Student). However, the overall impression was that mentors were 'in the background (Focus Group 10, Mentor). From a student perspective, there was a fine line between mentors being neutral in their opinions about social media and facilitating the reflection, and demonstrating a lack of engagement.

7.3.4.2 Participant Level Implementation

At a participant level, strategies to achieve the goal of reducing time on social media were open-ended and responses were into five categories. Overall, three participants had no strategy for reducing their time on social media, 21 participants had one strategy, 15 participants had two strategies and one participant had three strategies. Table 29 shows the number and proportion of strategies to reduce time on social media.

Table 29: The Number and Proportion of Strategies Participants used to Reduce their Time on Social Media in Study 3

	Participants n=	Phone based change	Other activities	Behaviour changes/self-discipline	Reflection	No strategy
n=	40	10	22	20	2	3
Percentage		18%	39%	35%	4%	5%

Note.
*Phone based change: Adaptations driven by settings on the phone such as app limits, removing apps and turning off notifications.
*Other Activities: Spending more time on other activities such a schoolwork, training, socialising and/or hobbies.
*Behaviour changes/self-discipline: Changing the way they interact with their phone such as where it is stored. This could include the use of specific and/or general behaviour changes such as, not looking at short-form content to not picking up their phone as often.
*Reflection: Using the screen time app to keep track of their social media use and to regulate.
*No strategy: Either no strategy written or the participants were unsure on what to do.

7.3.4.2.1 Strategies

Strategies to reduce time on social media reflected the data from surveys, particularly, phone-based changes, self-discipline and completing other activities. Phone based strategies included, for example, ‘avoiding short-form content, like don’t have TikTok on my phone’ (Focus Group 10, Male, Student) and moving ‘Snapchat into just my app library’ (Focus Group 7, Female, Student). Some strategies were specific to certain types of social media and based on participants observations of how they spent their time on social media ‘I was thinking “damn I'm on TikTok for so long,” so I've put a 30-minute block on TikTok’ (Focus Group 1, Male, Student). Even those who applied specific strategies shared how they could ‘relapse’ and the importance of self-discipline and self-motivated change was present in a cross section of the data.

> Sometimes I relapse, I download it to watch one video that my friend sent, and I get stuck on it for a while. So I make sure to delete it quick.
>
> (Focus Group 4, Male, Student)

> It's mostly about self-discipline, I need to understand myself that I need to start using my phone less. And I need reasons for it because if my family, or my friends tell me that they need to use my phone less, I will not care.
>
> (Focus Group 8, Female, Student)

While some strategies were less specific and there was a broad sentiment that developing the right habits was central to successfully changing their social media use to align with their goals. This generic approach did not mean they were less effective, for example, one participant had already established more control over their social media use. However, many participants aimed to achieve the reduction of social media use by adding other activities, and it was evident that some participants were aiming to keep themselves busy. As shown in earlier examples, the external factors which could reduce social media use could be international or incidental.

> It's a question of making a habit.
>
> (Focus Group 8, Male, Student)

> I got into the habit of not going for my phone as soon as I'm bored.
>
> (Focus Group 4, Male, Student)

> I was trying to do more things.
>
> (Focus Group 2, Female, Student)

7.3.5 Maintenance

Maintenance is defined as,

> The extent to which a program or policy becomes institutionalized or part of the routine organizational practices and policies. Within the RE-AIM framework, maintenance also applies at the individual level. At the individual level, maintenance has been defined as the long-term effects of a program on outcomes after 6 or more months after the most recent intervention contact.
>
> (Glasgow et al., 2019, p. 4)

There is a lack of evidence related to maintenance and this was grounded in the study design. The qualitative data provided little insight into the long-term effects, as there was no observed influence of the intervention observed by mentors. The following student participant feedback survey provides some insight into maintenance from adolescents perspectives, as well as reach, effectiveness and implementation.

7.3.6 Student Participant Feedback

The final piece of evidence in these results are the responses to the feedback questionnaire completed by student participants in week 3 of the study. Table 30 shows the means, standard deviations, and one-way ANOVAs for each question in the intervention feedback questionnaire and compares the decrease/no-change groups.

Table 30: Mean Scores and Standard Deviations for the Participant Intervention Feedback Surveys using a Five-Point Scale and One-Way ANOVA Results for the 'Decrease' and 'No change' groups' (Study 3)

	Total	Decrease Group (n=40)	No change group (n=25)	Main effect		
Feedback Questions		M (SD)		F	p	ηp2
Reach						
Q1: When I heard about the social media lesson I was excited to take part	3.52 (.836)	3.54 (.720)	3.48 (1.01)	.073	.787	.001
Effectiveness						
Q2: The social media lesson and task has impacted me positively	3.03 (.854)	3.03 (.811)	3.03 (.935)	.004	.948	.000
Q3: I achieved my social media goals	3.14 (.982)	3.13 (1.114)	3.16 (.746)	.019	.890	.000
Q4: I need more support to change my social media use	2.55 (.952)	2.60 (.955)	2.48 (.963)	.241	.625	.004
Implementation						
Q5: My teacher highlighted the positive aspects of social media	2.78 (.992)	2.63 (.952)	3.04 (1.020)	2.767	.101	.042
Q6: My teacher highlighted the negative aspects of social media	3.28 (1.053)	3.33 (1.071)	3.20 (1.041)	.214	.645	.003
Maintenance						
Q7: I would like to continue reflecting on my social media use	3.25 (1.061)	3.30 (.992)	3.16 (1.179)	.265	.609	.004
Q8: I would like to change my social media use in the future	3.40 (1.012)	3.70 (.853)	2.92 (1.077)	10.485	**.002**	.143

Table 30 shows that the anticipation for the intervention was quite neutral and there was no difference between the decrease and no change groups. The mentors approach to the intervention was quite neutral (in line with the instructions) but leaned slightly more towards a negative approach. The intervention showed little positive impact on both groups but there was some indication that participants wanted to continue reflecting on their social media use. indeed, the only significant difference between the 'decrease' and 'no change' groups was a motivation to make adaptations to their social media use in the future.

7.4 Discussion

The present study aimed to understand the feasibility of a 7-Day Social Media Detox for adolescents. While there is evidence of a range of Social Media Detox interventions in adult populations (Coyne & Woodruff, 2023; Radtke et al., 2022), this study had adressed an important gap in the literature and is the first to include adolescent populations and to be conducted in schools. The findings from those who delivered the intervention (mentors) and those who received it (adolescents) show that the 7-Day Social Media Detox showed strong aspects of feasibility (Reach and Acceptability), but other which require further investigation (Effectiveness, Implementation and Maintenance).

7.4.1 The Appeal of the Intervention

Results related to adoption elements of RE-AIM show that goals for recruitment were met, however the recruitment rate of schools based on email responses showing genuine interest was low (4.4%). Other school-based studies in Stockholm conducted by local universities

which provide reimbursement to participants have shown school adoption to be 15% (Helgadóttir et al., 2023; Kjellenberg et al., 2022). One potential reason for non-participation in the present study was a similar digital and social media related intervention being conducted in Stockholm by a local university at the same time (Nutley, 2024). This was partly promoted and funded through the local school municipality. Given that the research was conducted by a post-doctoral student at a university outside of Sweden and unfamiliar to most schools, school-level adoption of the intervention provides some promise. Future iterations of the intervention conducted with local universities on a larger scale and with incentives would be expected to show higher levels of adoption from schools.

Data related to the reach of the intervention showed that it was relevant for adolescents, with the proportion choosing to reduce their time on social media being in-line with expectations. Just over half of 13-18 year olds in Sweden report that they spend too much time on social media (Swedish Media Advisory, 2023). The qualitative results further illustrate how the time and timing of social media use was an important and personally relevant consideration for adolescents in relation to their mental wellbeing. For example, participants considered time on social media to hinder other activities such as completing their homework and getting adequate sleep. A continued focus on the timing of social media use in future interventions is supported by the literature and associations between high social media use and worsened sleep time and quality amongst adolescents (van den Eijnden et al., 2021).

The participant attrition rate in the present study (61%) was slightly higher than other school-based interventions which are between 31% and a range of up to 54% (Hynynen et

al., 2016). Nonetheless, the way attrition was recorded in the present study meant that one absence during any of the four data collection points was recorded as participant dropout. According to participants, one of the main factors contributing to attrition was the length and repetitiveness of the survey measures at pre, post and follow-up. Therefore, while the intervention showed good feasibility, the study measures could be shortened to support ongoing with the study and to reduce attrition bias. Overall, the Social Media for Wellbeing intervention was appealing to schools, teachers and adolescents. Nonetheless, the study design could be adapted to support higher levels of ongoing participation in data collection.

The flexibility of teachers to adapt and respond to their students' needs is a strength of the pedagogical encounter (Dewey, 1916) and a component of the intervention which should be seen as a strength. However, there were some variations in how the intervention was delivered and the flexibility within the protocol meant that intervention fidelity needed to be assessed closely. A further suggestion to support more consistent implementation in future trials could be the development of an online delivery platform, where pre-recorded videos guide adolescents through the intervention and mentors support adolescent participants when needed.

7.4.2 The Potential of a 7-Day Social Media Detox Intervention in Schools to Support Behaviour and Mental Wellbeing

Considering the effectiveness and maintenance aspects of RE-AIM, the study provided initial insights, but it cannot not fully assess effectiveness in the absence of a control arm. In relation the study measures (social media time, motivations for social media use, mental

wellbeing, physical activity and self-regulation), there were no significant time effects between the 'decrease' and 'no change' groups and a larger scale trial is needed to better understand the effectiveness of the intervention. An observed, yet non-significant rebound effect in social media time between post and intervention follow-up suggests that regular opportunities for self-regulation may be needed to support consistent changes in social media behaviour. While this suggestion was also supported by feedback from class mentors a fully powered randomised control trial is needed to confirm this.

There was a significant reduction in mental wellbeing scores across all participants (irrespective of intervention group) over time. This finding was surprising considering the aim of the intervention was to support mental wellbeing. The qualitative data indicates that this may have been due to the increased burden of schoolwork as the academic year commenced, and homework was referenced as a factor which contributed to decreased social media time during the intervention. The literature suggests that starting a new school is a time of significant change and where mental wellbeing can be affected due to psycho-social stressors and environmental changes (Kiuru et al., 2020). While there may be other causes for a decrease in mental wellbeing, the use of measures to assess factors likely to influence mental wellbeing such as school-related stress and/or workload may be important things to consider in future interventions. Validated measures of subjective school-wellbeing may be an additional measure to apply in a future trial (Konu & Rimpelä, 2002). A final consideration would be to ensure the research does not do harm, and this was a limitation of the current research and is something that should be further considered, particularly in the context of the MRC guidance (UK Research and Innovation, 2014).

There were also two significant time effects for social media conformity (motivations for use) which increased, and for self-regulation which decreased across the decrease and no change groups. Increases in conformity may be due to the timing of the study at the start of the school year where all participants had new peers at a new school who they were connecting with on social media. However, this is a mere speculation and future research should return to a fully powered randomised control trial to examine the effects of the intervention on these variables.

7.4.3 Theoretical Considerations and Strategies for Behaviour Change

From a theoretical standpoint, the core challenges that the intervention sought to tackle was to address individual differences in uses-of and responses-to social media as a means to support adolescent mental wellbeing (Boer et al., 2022; Orben, 2020b). The approach was grounded in autonomy and self-regulation, which relied on adolescents own self-identification of their needs. The application of self-regulation theory meant that 'self-monitoring' (checking social media use) and 'self-judgement' (reflection and discussion) were expected to align with and influence 'self-reaction' (social media goals) (Bandura, 1991). For example, those with higher social media time and/or higher problematic social media use were expected to be those who chose a Social Media Detox. However, there were no observed significant differences between the 'decrease' and 'no change' groups at baseline across all measures. This meant characteristics of the 'decrease' participants could not be observed based on their participation in the Social Media Detox. This could be based on a lack of statistical power and/or related to those without any perceived challenges with social media choosing to reduce their time. A future trial may therefore develop more concrete

reflective processes, such a problematic use scores as a means to help adolescents decide whether decreasing their time on social media will support their wellbeing.

The strategies adolescents used to reduce their time on social media provide important insights which can inform guidance on how a future Social Media Detox intervention can support behaviour change. The findings revealed how social media use was widely considered to be a default activity and the main strategy to reduce it was to engage in other activities. This evidence highlights a lack of perceived control amongst some adolescent participants and supports suggestions from Lee and Hancock (2024), who found that beliefs surrounding agency and valence significantly influence how people relate to social media. Specifically, they found that more positive and agentic mindsets towards social media use were associated with higher levels of mental wellbeing and vice versa (Lee & Hancock, 2024). This connection to agency also relates to the cognitive theory of self-regulation which underpinned the design of the intervention. Most notably, how self-efficacy is a key driver of self-regulation (Bandura, 1991) and where adolescents may require more support to develop stronger belief in their ability to change their social media use. Considering these insights in combination with the effectiveness screen-time reduction in previous Social Media Detox interventions (Coyne & Woodruff, 2023), guidance on the use of phone-based screen-time restrictions could be used in future iterations of the intervention. This could provide additional means to support self-efficacy by providing strategies for self-regulation.

7.4.4 Conclusion

The quantitative and qualitative data aligned with the RE-AIM framework show that conducting a 7-Day Social Media Detox is feasible in schools and the low number of resources needed to do this make future feasibility testing and evaluation realistic.

Drawing upon the development actions developed by O'Cathain et al. (2019) which were presented in the previous chapter (Chapter 6). This discussion has conducted primary data collection and provided insights which support an understanding of the intervention in context. By considering the future implementation of the intervention in the real world, the findings have produced numerous suggestions for the future implementation of the intervention. In summary these were, (i) an increased focus on self-efficacy, positive social media mindsets, and strategies to change behaviour such as phone limits, (ii) the use of additional measures to understand the mediating influence on school stress/workload and sleep on mental wellbeing and social media use, (iii) shorter questionnaires which support participant retention, (iv) a larger study sample with adequate statistical power, and (v) collaboration with local Swedish universities to support adoption of the intervention. Based on these suggestions to adapt the intervention and changes to the surveys length and measures, a future evaluation may benefit from a mid-scale effectiveness trial which can strengthen participant retention, develop the implementation of survey measures and provide further insight into effectiveness.

These are important considerations because there is no binary judgement of good or bad feasibility. However, based on the findings across the RE-AIM framework, implementing a mid-scale effectiveness trial to understand the impact of the Digital Detox on mental wellbeing is a priority in future work.

Chapter 8: Discussion

8.1 Introduction

The purpose of this chapter is to draw together the findings from Study 1, 2, and 3. The three sections of the discussion are titled; (i) What happened? (ii) So What?, and (iii) What Now? and they are based on a critical reflection model (Borton, 1970). Firstly, 'What happened?' will provide an overview of the key findings and what they add to current knowledge, evidencing how this thesis meets the criteria of originality. Secondly, 'So What?' will conceptualise the study's strengths and limitations, critically evaluating how rigour has been put forth in the thesis. This section will also explore the implications of the findings and how they inform current theory, research and practice, thus addressing the significance of the PhD. Finally, the 'What Now?' section, will explore the future research directions, and the next steps for me as an early career researcher navigating the public health and education sector.

8.2 What Happened?

The findings in thesis show how social media is a powerful source of influence on adolescents' health and wellbeing through the online content and affordances they engage with and use. Although adolescents identify that social media use supports their mental wellbeing many acknowledged that at times its use can become oppressive. Notably, many adolescents chose to take part in a Social Media Detox thereby reducing the time they spend on social media, as a means to positively influence their mental wellbeing.

The findings across the three studies provide new insights into how schools can approach social media use, through a focus on supporting adolescent autonomy and by developing adolescent capabilities in self-regulation. The data also provides new evidence about the ways in which adolescents' uses of social media informs physical activity engagement and mental wellbeing. Taken together, new evidence is provided on: (i) the time, affordances and content on social media that adolescents attend to and use; (ii) the role of schools in supporting adolescents' uses of social media; and (iii) the key features of a school-based social media intervention that are acceptable and feasible to adolescents and teachers in Sweden.

8.2.1 Social Media Content, Affordances and Time

The findings re-emphasise the enduring interest-driven nature of adolescent social media use in the context of health and wellbeing, where adolescents engage with social media content related to sports, fitness, diet, sleep and overall healthy lifestyle behaviours (boyd, 2008; Goodyear et al., 2019c). The findings also complement previous work where the affordances of social media, such as likes, peers and suggested content, inform and inspire adolescents physical activity engagements (Goodyear et al., 2019c). This thesis signposts emerging and new affordances of social media that adolescents engage with, such as GPS tracking and endless scrolling. There was evidence in the data set that these latter functions influence adolescents' social interactions, experiences of peer-pressure and sense of control, impacting on their overall mental wellbeing. The findings show that the vast majority of adolescents want to reduce their time on social media and that specific affordances such as notification and endless scrolling interact with the time and timing of social media use. This

further underscores the importance of engaging in sustained conversations with adolescents to better understand the dynamic ways in which social media use influences their health and wellbeing and the most appropriate ways to help adolescents navigate social media (Goodyear & Armour, 2019; Goodyear & Armour, 2021).

8.2.2 The Role of Schools in Supporting Adolescents' Uses of Social Media

This thesis has illustrated that supporting adolescents' uses of social media will be challenging for some schools, staff, and adolescents. First, the presence of phones and social media in schools and classrooms poses a perceived risk to academic performance, through social media being a distraction to learning. Second, social media use within the school context has the potential to blur the personal/professional boundaries between school staff and adolescents, raising safeguarding issues and concerns for adolescent welfare. Third, it's reported that, in both Swedish and international contexts, many schools already have policies in place to prohibit the use of phones during the school day (Education, 2022; Wood et al., 2023). These challenges cannot be ignored in the design of school-based interventions using social media, and this study has identified key practices and uses of social media through which they can be navigated.

It was evident in the data set that autonomy supportive approaches with a holistic approach to social media use within schools were valued by adolescents, school staff and parents. Autonomy supportive approaches refer to methods which respect the privacy of adolescents' social media use while also encouraging them to self-regulate their social media in ways which support their mental wellbeing. The findings from this study can be further

applied to future school-based interventions, where schools have a strong capacity to develop self-regulation with children and adolescents (Pandey et al., 2018).

The participant led process in this thesis resulted in a broadening of focus from physical activity which was deemed to be too narrow. A holistic approach which focuses on lifestyle behaviours that impact mental wellbeing connects closely with school practices in Sweden, where systematic, preventative and wellbeing promoting initiatives are central in the schools role (Education, 2024). This is not to denigrate the importance of adolescent physical activity and the need for more adolescents to meet the World Health Organizations' recommendations of 60 minutes moderate to physical activity per day (World Health Organization, 2020). However, the finding in this thesis emphasises how mental wellbeing is currently a higher priority by schools in Sweden. Therefore, while strategies to engage more adolescents in daily physical activity are needed (Nyberg et al., 2020) and schools in Sweden have been mandated to support this (The Swedish National Agency for Education, 2019), the findings indicate that innovative approaches which use social media are more appropriately applied in organised sport settings outside of schools (see Goodyear et al., 2022).

8.2.3 The Key Features of a School-Based Social Media Intervention that is Acceptable and Feasible to Adolescents and Teachers in Sweden.

Adolescents mental health continues to decline, psychosomatic symptoms are increasing, and the use of digital media (including social media) is increasingly prevalent amongst adolescents (Authority, 2016; Swedish Public Health Agency, 2023). As a result, schools are in search of new ways to support contemporary adolescents. While the influence of social

media on adolescent health and wellbeing continues to be a central focus of research and public debate (Moreno & Radesky, 2023), schools are currently in need of evidence-based policies and practices to help adolescents navigate the influence of social media. There is also an evidence-based gap within school-based social media approaches and teachers lack appropriate knowledge and training in this area (Goodyear & Armour, 2021).

The findings from Study 1 and 2 were compared in chapter 6, and by synthesising the combined insights (e.g., autonomy, privacy, trust, outside of school) with current literature, they were operationalised to inform the design of a Social Media Detox (Study 3). The detox was conducted as a pastoral activity by class mentors and was grounded in trusting adolescents to make personally relevant choices for their mental wellbeing. At the time of writing, a similar school-based initiative which aims to support adolescents to take control over their digital media use to support their mental wellbeing has been reported to have good levels of feasibility in Sweden, and has been welcomed by schools (Nutley, 2024). This initiative is supported by an online platform with film-based modules and lesson plans; the social media and gaming specific module is based on Fogg's behavioural model (Fogg, 2019). It includes video resources, discussion prompts and activities based on taking back control of your time, removing obstacles to activities adolescents want to do, and developing a sustainable relationship with social media. The main similarities between this intervention and the Social Media Detox conducted in this thesis are: (i) the lack of reliance on teacher knowledge and competence about social media, (ii) respecting adolescents' privacy and autonomy on social media, and (iii) how both are facilitated by mentors as a pastoral activity. The main differences between these interventions is the complexity of the digital

resource in comparison to the Social Media Detox (this thesis) and how social media is framed more negatively (i.e. predominantly as a risk) in the online resource. While it may be challenging for teachers to understand the benefits of social media use, the findings with adolescents in Study 1 meant that it was important for the Social Media Detox Intervention to not be negatively value laden towards social media. The combined findings from these studies provides additional evidence of somewhat feasible ways to approach social media with adolescents in schools.

In summary, this thesis co-produced a school-based intervention focused on supporting adolescents' social media use to benefit their mental wellbeing, which was then evaluated to be partially feasible and acceptable in schools. The approach is support by previous work which has claimed that schools can support adolescents social media use by grounding their approach in showing empathy and being less driven by fear and risk (Goodyear & Armour, 2021; Quennerstedt, 2019). The findings from Study 1 and 2 show that supporting adolescents to navigate social media content and affordances has continued relevance. Study 3 extends upon content and affordances, showing that the time/timing of social media use is a valid and relevant area of focus. The following 'So What?' section firstly evaluates the strengths and weaknesses of the thesis as a means to examine rigour before putting forward the significance of the work in relation to research, theory and practice.

8.3 So What?

8.3.1 Rigour

8.3.1.1 Study 1, 2 and Intervention Design: Strengths and Limitations

This study used a complex intervention framework to co-produce a school-based social media intervention focused on adolescent mental wellbeing. The development phase of the complex intervention was grounded in Study 1 and 2 and culminated in the intervention designed and implemented in Study 3. The strengths of this approach are how Study 1 demonstrated credibility through engagement with adolescents over a sustained period of time and across two schools (Tracy, 2010). Multi-modal data was produced with a wide range of adolescents and relevant stakeholders in adolescents' lives (school staff and parents/guardians) and this added multivocality and triangulated insights to the data (Tracy, 2010). Through the analysis phases, reflexivity and deliberation were central practices to support rigour (Braun & Clarke, 2023; Goodyear, Andersson, et al., 2021). These practices supported an ongoing examination of researcher subjectivity and provided a rich description of the analytical process. The themes constructed across Study 1 and 2 produced a semantic level of understanding and facilitated the application of the findings to a novel intervention. The process of intervention design is laid out in depth, where the combination of findings, current literature and theory described the transition from development and co-production to feasibility testing (O'Cathain et al., 2019; Skivington et al., 2021a).

When considering the initial focus on physical activity, Study 1 could have used methods such as accelerometers, diaries and/or digital ethnography to gain more empirical insights

into between-person effects and the relationships between physical activity and social media engagement. Moreover, further participatory work could have facilitated collaboration between adolescents and school staff, seeking to manage tensions and reach consensus regarding school-based practices.

More concrete intervention ideas related to physical activity and social media were expected to be developed with adolescents and adult stakeholders in Study 1 and 2. A range of literature related to participatory methods, co-production and intervention development were reviewed to better understand why this did not happen (Bradbury-Huang, 2015; Chambers, 2018; O'Cathain et al., 2019). Based on this literature, a potential explanation relates to how this thesis framed physical activity and relationships to social media. Physical activity was framed as a pre-determined problem (inadequate levels of physical activity) and social media was largely framed as an opportunity to address sedentary behaviour. However, the participants across both studies did not always share this view on: (i) inadequate levels of physical activity in the adolescent population; (ii) how social media could be used to support adolescent physical activity engagement and (iii) how social media could be used within schools as part of an intervention to promote physical activity. Therefore, when the combined findings were reviewed through a lens of feasibility, the problem was adapted to address the relationship between social media and adolescent mental wellbeing, that was identified by participants themselves. This change in direction highlights some limitations in the development phase, where the framing of the problem could have been more participant driven than researcher-led in the initial phases of the workshops or in a pre-development phase. Equally, this also points to a strength in the

development process, where the collection and analysis of co-produced data provided conceptual insights from participants which then informed a change in the focus of the intervention. These co-produced insights on mental wellbeing were used to develop an intervention with satisfactory feasibility, thereby enhancing acceptability to the participants.

8.3.1.2 The Feasibility Phase: Strengths and Limitations

The 7-Day Social Media Detox study collected mixed methods data and produced knowledge which can be used to inform future application and adaptation. A specific strength of this study was the open-ended and flexible approach, where observations of context specific differences could inform adaptations to the study design. A further strength was attention to individual differences in the fundamental design of the intervention, where adolescents could choose to self-regulate their social media use based on a judgement of their needs. However, more work is needed to understand whether this autonomous self-regulatory process can adequately support adolescents in the short, medium, and longer-term. While beyond the scope of the study, more work is needed to understand whether this approach is effective, if adolescent require further support, how often it should occur and whether further support for behaviour change is needed.

Based on the identification of some inconsistencies in the self-reported social media time measures and the consequent removal of participant data, a future trial may consider how more objective measures such as screenshots from the screen-time application or purpose build detox applications can improve the reliability of data. In addition, the PANAS and WEMWBS wellbeing questionnaires used longer timeframes of reference than one week.

This should be addressed through further validation of these questionnaires which ask participants to refer to the past seven days.

8.3.2 Significance

The following sub-section will continue the focus on the 'So What?' question by outlining the significance of the thesis in relation to research, theory and practice. The significance to research is divided in methodological significance and significance of the findings.

8.3.2.1 Research

8.3.2.1.1 Methodological Significance

Complex intervention design in school contexts and it is still an emerging practice and has mostly been used to refine existing practices (Lindqvist et al., 2023; Maciver et al., 2021; R D Neill et al., 2022). This thesis contributes methodological insights about how to iteratively develop a school-based intervention using complex intervention design and co-production methods (O'Cathain et al., 2019; Skivington et al., 2021a; B. Smith et al., 2022). In Study 1 data were co-produced through engagement with adolescents across multiple schools during a sustained period and using workshops, visual methods, and interviews. In Study 2 data were produced through interviews with school staff and parents, and was informed by data collected in Study 1. A design-team then compared the thematic similarities and differences between the findings to inform the intervention design. By applying co-production in a way which has previously been defined and used within a public health context (H. Smith et al., 2022), the approach taken in this thesis supports the bridging of a

gap between school-based research and public health research. By advancing knowledge about how to co-produce school-based interventions, further research can build upon this process and apply them to other health related topics. The consequent application of qualitative and quantitative methods in Study 3 provides an additional contribution to the feasibility and intervention development literature where qualitative methods are often lacking (Holtrop et al., 2018). This was a natural extension of the prioritisation of participant voices and perspectives in Study 1 and 2, and where the findings not only informed the assessment of feasibility but provided concrete ideas for further intervention development and tailoring.

8.3.2.1.2 Significance of the Findings

Research into adolescents' uses of social media has predominantly focused on time spent on social media and negative associations with adolescent mental health and wellbeing (Ferguson, 2021). Professional organisations, such as American Academy of Paediatrics (AAP), have also previously focused on providing recommendations for schools and parents to limit screen and social media time to no more than 2 hours per day (Strasburger et al., 2013). However, homogenous thresholds of time spent on social media related to mental wellbeing have been difficult to determine and have often been criticised for providing simplistic understandings of the nature of adolescents' uses of social media (Kross et al., 2021). Furthermore, since the early 2000s professional organisations such as the AAP, and the Chief Medical Officers in the UK have reverted from providing guidelines on screen time limits, to a focus on screen time within the context of other wellbeing promoting activities, such as physical activity (Dickson et al., 2018). All of these points were acknowledged in this

thesis; Study 1 and 2 identified the importance of social media content and affordances, whereby social media use was situated within a mental wellbeing context, and within the remit of other lifestyle behaviours. In Study 3 adolescents prioritised a focus on time to help them manage social media use. This indicates that, despite calls for a reduced focus on social media time (Ferrari & Schick, 2020; Orben, 2022), adolescents themselves may prefer time as an overarching focus. In sum, while time is a simplistic measure it has continued relevance to adolescents.

The findings from this study on the significance of social media time in the context of other wellbeing promoting activities are similar to notions of the digital diet that have been proposed by Orben (2022). The key point is that there is a complex relationship between the frequency, intensity, time and type of digital engagements which can impact adolescent wellbeing (Orben, 2022). The findings in this thesis show that time (comparatively 'calories' in the analogy of the digital diet) is an import aspect of social media use which adolescents can use to reflect on in relation to their wellbeing. Future research can draw further upon this work and examine social media time as it relates to more specific aspects of the digital diet and wellbeing needs. For example, the type of use (e.g., active/passive, affordances) and the frequency/time of use, such as balance with other activities such as sleep, physical activity, homework, socialising (face-to face/online). The approach employed by Radesky et al. (2023) provide a promising method to pursue this, where adolescents digital engagements are mapped across 24-hour cycles. If adolescents can develop a holistic understanding of their social media use as it relates to other behaviours, such methods may help them develop further insights into where and how social media supports and inhibits

their mental wellbeing. This could be supported by wellbeing frameworks such as the healthy mind platter, which have shown to be feasible in schools and they provide a scientific grounding for reflection on the balance of activities which support wellbeing (Nutley, 2024; Poelmans et al., 2012).

8.3.2.2 Theory

Theories of displacement were discussed in the review of literature and there was little empirical support for the idea that screen use such as social media replaces time otherwise spent in physical activity (Lizandra et al., 2019). The data in this thesis does not support or oppose the displacement hypothesis, however, there were examples of physical activity being used as a strategy to reduce social media time. Moreover, there was some evidence to suggest that social media can displace other important mental wellbeing supportive activities such as sleep. As social media was often presented as a default activity often done when there was little else to do, it is plausible to suggest that other social media is displacing health and wellbeing related behaviours in some cases. Nonetheless, while displacement was observed in this thesis, other theories which seek to understand the reasons and mechanisms which drive and inhibit social media use provide more promise as a means to support adolescents.

Another theoretical approaches to social media in the literature is addictive/problematic use, where symptoms of addiction are manifested and measured cognitively and behaviourally (Marino et al., 2017). The theoretical grounding of this approach comes from internet addiction research and a cognitive behavioural model (Caplan, 2010). Within this

model a preference for online interaction is the first of five cascading symptoms which indicate problematic use (mood regulation, cognitive pre-occupation, compulsive use, negative outcomes) (Marino et al., 2017). The preference for social communication online has been associated with a number of characteristics such as loneliness, poor social skills and social anxiety (Caplan, 2003; Kim & Davis, 2009). Within this model deficient self-regulation is a key component that can be manifested cognitively (cognitive pre-occupation) and/or behaviourally (compulsive use, negative outcomes). A focus on the thoughts, motives and behaviours behind social media use is an important component of the theoretical progress made in social media research and one which adds important nuance to measures of time (Bischof-Kastner et al., 2014; Marino et al., 2017). This is particularly important in Sweden where intense social media use (defined as being in touch with people online almost all of the time) amongst adolescents is not associated with problematic use and can support aspects of mental wellbeing (Boer et al., 2020). However problematic use is associated with worsened mental wellbeing (Boer et al., 2020) and studies in neighbouring Finland show that nearly half of adolescents have or are at risk for social media addiction/problematic use (Paakkari et al., 2021).

The theoretical approaches to supporting problematic use include social, personal and social media-specific aspects which drive or inhibit problematic use (Mahapatra, 2019; Reinecke et al., 2022; Valkenburg et al., 2022). For example, interventions which strengthen social support could target a reduction in the preference for online interaction, or interventions which supports coping skills may reduce the use of social media for mood regulation. The Social Media Detox Intervention (Study 3) was designed to facilitate behaviour change by

supporting self-regulation and conscious control of social media use. Specifically, key processes of self-regulation; (i) self-monitoring, (ii) self-judgement and (iii) self-reaction outlined by Bandura (1991) were applied in the intervention

When considering the findings of Study 3, it was clear that supporting the three self-regulation steps worked in practice and was feasible with adolescents in a class advisory/mentor setting in schools. However, adolescent self-efficacy specific to social media was identified an area where they would benefit from more support. For example, some adolescents felt that they could not change their social media use and a general lack of perceived agency in relation to time on social media was a clear theme in the findings. When further considering the theoretical implications of the intervention, social factors (e.g., friend groups choosing similar social media goals) were evident when the intervention was delivered, suggesting that the influence of peers may be an additional mechanism of behaviour change that should be considered in the logic model. Therefore, while Study 3 supports the practical application of self-regulation theory, a future trial should further consider the theoretical mechanisms of change which include self-efficacy, peer motivation and peer influence.

The contribution of this thesis to theory is grounded in one of the main challenges in social media and mental wellbeing research, where within-person effects are not well understood and often overlooked (Boer et al., 2022). In the Social Media Detox, one assumption was the reliance on adolescents to self-diagnose their needs as they relate to social media use and their mental wellbeing. The lack of significant differences across all measures (e.g., wellbeing, problematic social media use, motivations for social media use) at baseline

between the 'decrease' and 'no change' groups indicates that further methods may be needed to support self-judgement. Therefore, a future direction as it relates to theory is the development of evidence-based reflective tools which can support social media self-regulation.

8.3.2.3 Practice

Previous evidence shows that teachers lack the knowledge to engage and support young people's uses of social media and there is a gap in their understanding of how young people are learning through social media (Goodyear & Armour, 2021). The participatory work conducted in Study 1 can inform future practices in schools, where the workshop activities provided engaging ways for adolescents to discuss social media, physical activity and school-based practices. Specifically, the use of visual methods and representative collages provided an engaging and insightful stimulus which facilitated discussion around social media content and their influence. Teachers can draw upon these methods in their pedagogical practices to better understand adolescents' needs and to provide opportunities for them to demonstrate their critical engagement with social media. These suggestions are supported by calls for more empathetic and pedagogical uses of social media, where adolescents informal learning experiences online can shape and inform learning in schools (Goodyear, 2022; Goodyear & Armour, 2021; Greenhow & Lewin, 2015). This may have particular resonance within Swedish physical and health education, where evidence shows that approaches to health in the curriculum need to be reconsidered and to embrace a more holistic approach to health, including mental wellbeing (Korp et al., 2023).

Study 3 provides a novel contribution to research related to adolescents engagement with social media. Specifically, it contributes to a gap in the literature where (at the time of writing) there is a lack of Social Media Detox studies conducted with adolescents (Radtke et al., 2022). This also navigates some of the contextual barriers to social media use in schools, such as how phones bans and practices of digital dissociation are increasingly common despite little evidence of positive outcomes (Education, 2022; Kessel et al., 2020; Selwyn & Aagaard, 2021; Wood et al., 2023). Specifically, this study provides a new and feasible whole-school approach to supporting adolescents uses of social media and their mental wellbeing regardless of teacher social media competencies and school technology policies. The findings also have the capacity to influence future practice in schools because the data shows the high proportion of adolescents who want to reduce their time on social media and the strategies they use to achieve their goals. The intervention itself was simple, easy to implement and can be readily applied in schools and tailored to suit context.

8.3.3 Conclusion

The 'So What'? section has provided an overview of the strengths and limitations of the research. The strengths were grounded in the rigorous processes used to develop and feasibility test the intervention, where adolescents, school staff and parents provided wide and in-depth insights which were analysed to produce conceptual understandings. The limitations were largely grounded in other methodological approaches which could have supported the process further, such as extended engagement with stakeholders throughout the intervention development process.

Significance was reviewed through the lens of research, theory and practice. Methodological significance was related to the contribution this thesis can have towards future work which applies public health frameworks in a school context. Significance from the findings was grounded in the ways individual differences and within person effects can be approached in future research and where a focus on the time and timing of social media use has continued significance. The theoretical contributions highlights how self-regulation is a practically relevant theory for a social media intervention but a continued focus on social media self-efficacy and peer influence will support future work. Practical significance was situated in schools, where the approaches used throughout the thesis provide evidence on what works in a school context and how social media content, affordances and time can be approached. The following section will address the 'What Now?' question, and where the impact of the significance highlighted in this section will be largely grounded in the actions and practices which are pursued in the future.

8.4 What now?

My initial interest in the topic of adolescents, social media and physical activity was grounded in my experience as a physical and health education teacher and my engagement with research related to new digital technologies as part of my Masters study. Specifically, my interactions with students and with emerging research (see Goodyear & Armour, 2019) highlighted how the adolescents I was teaching and mentoring were growing up and learning about health and physical activity in new ways, which were vastly different from my own experiences and my knowledge. This sparked a genuine interest in understanding the

influence of social media in adolescents lives and in relation to their engagement with physical activity; a springboard for the work conducted in this thesis.

Since the start of this PhD in 2020 my understanding of these topics has changed significantly. One of the main drivers of the changes in my knowledge is how I started this journey with a single disciplinary lens (pedagogy), but I have adopted a multi-disciplinary approach which intersects with the fields of public health and psychology. The use of multiple disciplines which extend beyond pedagogy has been put forward as a key mechanism to understand complex challenges in schools and to bridge gaps between knowing and doing (Armour, 2017). I have developed an understanding and appreciation of these fields, particularly public health, and my historical advocation for student-centred pedagogy remains, and is reflected in the theory, methods and frameworks used in this thesis (e.g., co-production and self-regulation). As I pursue early career research I will continue work within wider fields with colleagues in multidisciplinary ways and apply newly developed skills within quantitative research methods. Reflecting on how I have developed as a researcher over the past three years, statistical methods will be a continued area of interest and growth while I will also continue to advocate for people centred approaches to research drawing upon my background in qualitative methods.

The findings through each study have further informed my knowledge of adolescents, social media and physical activity. These can be summarised across two overarching points which will influence my future work; (i) holistic health and wellbeing, and (ii) participatory methods. Firstly, one of the most striking findings in this thesis, which I have also observed in wider research within physical and health education (Korp et al., 2023) is the holistic

approach to health and wellbeing valued by the participants. Through engagement with a wide range of stakeholder it became clear that mental wellbeing and mental health were the central lens through which lifestyle behaviours are viewed. A holistic approach is something I will continue to consider as I progress as a researcher, seeking to understand how lifestyle behaviours such as physical activity and social media use can be optimised to support mental wellbeing and health. Secondly, the collective findings have re-emphasised the capacity adolescents have to be critical users of social media (Goodyear & Armour, 2019). Their ability to reflect on their own experiences and to critically appraise their social media use as it relates to physical activity and mental wellbeing has provided me with continued energy to embrace participatory methods. The use of participatory methods also has renewed importance in Sweden where the UN rights of the child was recently written into law ("Incorporating the UN Rights of the Child into Swedish Law," 2020; UN General Assembly, 1989). As a researcher in Sweden I will continue to support children's right to express their opinions and be listened to when I design future studies (UN General Assembly, 1989). Simultaneously, working with key stakeholders such as parents, teachers and school leaders has highlighted the considerable competencies many of these people have in their roles and where they would be better supported with high quality research which they can apply in their work.

To strengthen the impact of this thesis I have presented the finding from Study 1 at the British Educational Research Association (BERA) Conference in Birmingham, UK (2023), and at the Leading Teaching (Leda Lärande) Conference in Stockholm, Sweden (2022). I will also be presenting and discussing the co-production methods used in this thesis in a panel

discussion at the Qualitative Research in Sport and Exercise (QRSE) Conference in Bath, UK (2024). I intend on further presenting the findings at international conferences such as the European Educational Research Association (EERA) (2025), and the International Association for Physical Education in Higher Education (AIESEP) (2025). I will also engage with local stakeholders in Swedish universities such as the Karolinska Institute and the Swedish School of Sport and Health Sciences.

The work in this thesis will also contribute to publishing three peer reviewed papers. Paper one will draw together the methods, results and findings from Study 1 and 2 and I will seek to publish in Sport, Education and Society. The second paper will draw from Study 3 and I will seek to publish in BMC Public Health. The third and final paper will focus on the methods, where co-production and complex intervention design were used to develop school-based practices. I will look to publish this paper in the International Journal of Qualitative Methods (IJQM).

- Paper 1: Social Media and Physical Activity: Adolescent's, School Staff and Parent's Perspectives of School-Based Practices
- Paper 2: A 7-day Social Media Detox Intervention in Schools: A feasibility Study
- Paper 3: Intervention Development for Health and Wellbeing in Schools: A Case Study of Social Media

The final part of answering the 'What Now?' question in relation to the research in this thesis will involve working towards large-scale randomised control trial. I will continue my path as an early career researcher in Sweden at a Swedish institution and I will apply for

grants from organisations such as KK Stiftelsen for forthcoming studies, where the findings in this thesis can move beyond answering the question 'can it work' (feasibility) (Orsmond & Cohn, 2015) and further understand the effectiveness and efficacy of a Social Media Detox.

8.4.1 Chapter Conclusion

This chapter has discussed this thesis within the framework of; (i) What happened? (ii) So What?, and (iii) What Now? The use of co-production and intervention development in this thesis had provided new knowledge related to school-based interventions and adolescents uses of social media in relation to their wellbeing and physical activity. The originality, rigour and significance of this work foreground directions for future work. A key theme across the points in the discussion was how the complexity of adolescents, their uses of social media and how it impacts their wellbeing provides challenges for research. The findings in this thesis highlight how an increased reliance on adolescents' autonomous voices, reflections and competencies is a valid and powerful future direction for research. This may also act as a key mechanism to develop knowledge and affect change, narrowing the gap between what we know about adolescents and what we do to support them.

Appendices

Appendix 1: Workshop Schedule Outline

Workshop 1

Introduction (10 minutes): The workshop begins with an overview of expectations, focusing on principled and open-minded communication. These are chosen for their relevance to the workshop goals and their familiarity within the participants' curriculum.

Physical Activity Discussion (15 minutes): Physical activity guidelines from the WHO are presented. Participants then share and discuss their personal physical activity behaviours and the benefits of being active.

Social Media Discussion (20 minutes): The facilitator introduces the concept and definition of social media. Participants discuss their understanding of social media and begin exploring their engagement with various platforms.

Workshop 2

Introduction to Social Media and Physical Activity (10 minutes): Participants briefly share the types of physical activity content they encounter on social media.

Image Collage Activity (25 minutes): Participants work in pairs or small groups to create image collages representing the physical activity content they engage with on social media. This activity utilizes photo-elicitation techniques to facilitate deeper discussion.

Group Discussion (10 minutes): Participants are invited to share and discuss their collages with the group.

Workshop 3

Impact of Social Media on Physical Activity (20 minutes): Participants discuss and document how social media content influences their knowledge, attitudes, and behaviours towards physical activity. Graphic organisers are used to categorise the positive and negative impacts.

Schools and Social Media Discussion (15 minutes): Participants discuss how their school approaches social media, specifically its use for promoting physical activity.

Policy Creation Task (10 minutes): Participants complete a 'fill in the blanks' task to create a draft social media and physical activity policy for schools.

Workshop 4

Content Review (5 minutes): The workshop begins with a quick recap of the material covered in the previous workshops to ensure participants have a solid understanding before moving forward.

Intervention Development (30 minutes): Participants work in pairs or small groups to brainstorm and develop school-based intervention ideas aimed at supporting adolescents aged 13-15. The focus is on:

- Behaviours: Encouraging physical activity.
- Attitudes: Increasing enjoyment and appreciation of physical activity.
- Knowledge: Enhancing learning about physical activity.

Closing Discussion (10 minutes): Participants discuss how social media could be effectively used as a resource to support their proposed interventions.

Appendix 2: Topic Guide Study 1: Adolescent Participants

Introduction

1. Ask them to introduce themselves (What are their interests? What is it like to go to school?)

2. In the workshops, we talked about social media

i. Can you tell me a little bit about how and why you use social media?
ii. How are your uses of social media supported in school and by your teachers? (do they mirror how you use social media outside of school, is social media used in lessons, should social media be used)
iii. Can you explain how social media plays a role in your health and your physical activity (e.g., what does, or doesn't it help you to do, and why)?

3. In the first workshop we talked about the type of content you engage with on social media [show mind maps from workshop one] Can you explain which content you thought was:

i. relevant in your life – why?
ii. not relevant in your life-why?

4. In the workshops, we discuss behaviours, attitudes, and knowledge related to physical activity. Which area do you feel social media affects:

i. Most positively (Behaviours/Attitudes/Knowledge)? Why? Can you give an example?
ii. Most negatively (Behaviours/Attitudes/Knowledge)? Why? Can you give an example?

5. In the workshops, we started to look at interventions that can support physical activity. Did you discuss any ways social media can support:

i. Your behaviours (how and when you are active)
ii. Your attitudes (How you feel about physical activity)
iii. Knowledge (What you know/learn about physical activity)

6. In the workshop, you began designing an intervention for a problem you identified.

i. What was the problem/issue/challenge?
ii. How did you choose this problem/issue/challenge?
iii. Did you have any initial ideas which you didn't use? – why?
iv. Can you explain your intervention briefly?

v. Why do you think this will work?
vi. What are the challenges/what would stop it from working?

7. In the workshops, we also talked about well-being.
i. How do you think your intervention will impact your wellbeing?

8. In the last workshop, each group presented their interventions.
i. Which interventions did you find most interesting? Why?
ii. Were there any interventions that would not work for you? Why?

9. When designing the interventions these were school based.
i. How can teachers support these interventions?
ii. How could parents support these interventions?
iii. How could the school support these interventions?

10. Do you have any other comments about what we have covered in the workshops?

Appendix 3: Topic Guide Study 2: School Staff

SECTION 1 PHYSICAL ACTIVITY PROMOTION

We firstly want to know about your school and how your school promotes physical activity engagement for your pupils:

1. How do pupils in your school engage with physical activity? (Probe: what types, when, with who, when and why)
2. What are the main influences on pupils in your school's engagement with physical activity? Prompts:
    a. Pupil characteristics (motivation, attitude, interests, confidence)
    b. Social aspects (friendship groups, family)
    c. School resources (PE lessons, sports clubs, facilities, equipment)
    d. Community resources (Sports clubs, urban environment, where student live)
    e. Digital Resources (Access to information, device/Wi-Fi access)
    f. Public policy (City or government level initiatives)

3. What is your school's vision or perspective on physical activity promotion and why? (probe: role: educative, physical/mental health, need: pupil characteristics; external factors: obesity, inspections: internal factors: school culture)
4. How does your school support/promote physical activity (probe: key policies, strategies, support staff, activities, curriculum, before/after school, breaks, lunchtimes, active travel, active classrooms; spaces, equipment, staff training, number of staff to support physical activity)

SECTION 2 SOCIAL MEDIA

As part of this research, we are interested in how social media might be used in schools to promote pupil engagement with physical activity. In thinking firstly about your school and social media:

5. How does your school perceive the role of social media in young people's lives (e.g., educative, health)
6. How does or doesn't the school support or manage young people's uses of social media during the school day (school policy, curriculum activities)
7. What are the main opportunities/enablers for your school in relation to pupils' uses of social media? (probe: educational activities/use during lessons, media/promotional activities, distractions, social issues)
8. What are the main challenges/limitation for your school in relation to pupils' uses of social media? (Probe: How can they/are they overcome?)

We want to delve into a little further about how social media might be used in schools for physical activity promotion:

9. What are your initial thoughts on how schools could use social media to promote physical activity?
10. In which areas of the school or the curriculum could the social media be used to promote physical activity?
    Prompts:
    a. Physical & Health Education lessons
    b. Other lessons
    c. Afterschool Initiatives or clubs
    d. Break/Lunch time activity
    e. Parent communication
    f. Homeroom/advisory time
    g. Other?

11. If schools were to use social media for physical activity promotion, which staff & students would be most appropriate? Why? (year groups/ages, which teachers, parental involvement)

12. If schools were to use social media to promote physical activity. Which topics or content would be important to include?

    Prompts:
    a. Connecting to school sports clubs/school activities
    b. Signposting local sports clubs
    c. Motivational content
    d. Wellbeing related content (sleep, diet, routines)
    e. Sharing physical activity guidelines & benefits
    f. Myth busting/fact checking physical activity content
    g. Entertaining content
    h. Live content at school events
    i. Strategies to reduce sedentary time
    j. Content connected to the curriculum

13. How could schools use social media to promote physical activity?
    Prompts:
    a. Social media to share information (e.g., the topic we discussed previously)
    b. Interactive social media groups/chats to support students (access to school counsellor, access to groups with similar interests, student-led activities and discussions)

    c. Social Media challenges/games (challenges, competitions, rewards, point systems)

14. If schools were to use social media for physical activity promotion what else could we do to make it a success? (staff training, WIFI support, parent engagement)
15. Do you have any other thoughts on this topic about how schools could use social media for physical activity promotion?

Appendix 4: Topic Guide Study 2: Parents

Background Information

1. Age, Gender, Profession, Career, Age of the children their children.
2. What aspects of social media are you:
    i. Knowledgeable of?
    ii. Confident addressing with adolescents?
3. Can you describe how your children use social media on a normal day?
    i. How does this impact their wellbeing?
4. How is adolescents' knowledge surrounding physical activity impacted by social media?
5. How are adolescents' attitudes surrounding physical activity impacted by social media?
6. How are adolescents' behaviours surrounding physical activity impacted by social media?
7. In our workshops with young people, we discussed the connection between social media and physical activity (behaviours, attitudes, and knowledge). They identified as influential on their physical activity [summarise and explain the data from workshops one and two].
    i. What are your initial thoughts on this?
    ii. Do you observe these behaviours, attitudes, and knowledge at home?
8. In our workshops with young people the issues they chose to address were [summarise and explain the data from workshops one and two]
    i. Are you aware of these challenges?
    ii. Do you take action to support these challenges in any way?
    iii. Would you take further action to support these challenges?
    iv. How do you see the school's role in supporting these challenges?
9. In our workshops groups also designed interventions using social media to improve the behaviours, attitudes, and knowledge related to physical activity [show the interventions].
    i. What are your thoughts on the interventions?
    ii. Can each person rank their top two interventions and explain why they chose them.
    iii. What is missing from the interventions?
    iv. Would you support these interventions?
    v. Is there a particular topic or intervention which you find relevant to your child? Why?
    vi. What do you think an effective intervention would be?
10. Do you have any further comments on school-based interventions which use social media to improve physical activity?

Appendix 5: Instructions for Adolescents in the Social Media Detox (Study 3) and how they Align with Self-Regulation Theory (Bandura, 1991)

Step	Instruction	Direct quotes regarding self-regulation from Bandura (1991, pp. 250-251)
1	Open your screentime app (apple) or digital wellbeing app (android)	**'Self-observation** serves at least two important functions in the process of self-regulation. It provides the information needed for setting realistic goals and for evaluating one's progress toward them. But there are additional dynamic ways in which paying close attention to one's thought patterns and actions in different social contexts can contribute to self- directed change.'
2	Individually reflect upon how you use social media	
3	Share with another person how your use of social media impacts your (i) thoughts (ii) feelings, and (iii) behaviours.	'**Self-diagnostic function**. Systematic self-observation can provide important self-diagnostic information. When people observe their thought patterns, emotional reactions, and behavior and the conditions under which these reactions occur, they begin to notice recurrent patterns. By analyzing regularities in the covariation between situations and their thought and actions, people can identify the psychologically significant features of their social environment that lead them to behave in certain ways. For those who know how to alter their behavior and modifiable aspects of their environment, the self-insights so gained can set in motion a process of corrective change.'
4	Discuss how you would like to use social media in the future	
5	Use the link to set goals for the next 7 days	**'Self-motivating function**. When people attend closely to their performances they are inclined to set themselves goals of progressive improvement, even though they have not been encouraged to do so. Goal setting enlists evaluative self-reactions that mobilize efforts toward goal attainment. The directive and motivational effects of self-monitoring have been found to be quite variable. It sometimes increases the behavior being observed, sometimes reduces it, and oftentimes has no effect. One can bring some order to this variability by considering the intervening mechanism of self-directedness. Knowledge of how one is doing alters one's subsequent behavior to the extent that it activates self-reactive influences in the form of personal goal setting and self-evaluative reactions.'

Appendix 6: Post Student Questionnaire: Feasibility

We are interested in how you feel about the following statements
Please show how much you agree or disagree with each one.
Please tick mark one for each line.

	Strongly disagree	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
When I heard about the social media lesson I was excited to take part	❑	❑	❑	❑	❑
The social media lesson and task has impacted me positively	❑	❑	❑	❑	❑
I achieved my social media goals	❑	❑	❑	❑	❑
I need more support to change my social media use	❑	❑	❑	❑	❑
My teacher highlighted the positive aspects of social media	❑	❑	❑	❑	❑
My teacher highlighted the negative aspects of social media	❑	❑	❑	❑	❑
I would like to continue reflecting on my social media use	❑	❑	❑	❑	❑
I would like to change my social media use in the future	❑	❑	❑	❑	❑

Appendix 7: Teacher Feedback Questionnaire

We are interested in your experiences of the lesson on social media last week
Please show how much you agree or disagree with each of the following statements

	Strongly disagree	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
When I delivered the social media lesson I emphasised the positive aspects of social media	❑	❑	❑	❑	❑
When I delivered the social media lesson I emphasized the risk and the dangers of social media	❑	❑	❑	❑	❑
Pupils were generally engaged with the topic of social media	❑	❑	❑	❑	❑
The social media lesson was delivered as planned	❑	❑	❑	❑	❑
Can you describe the lesson with your class?					
Can you explain what went according to plan?					
Can you explain what did not go according to plan?					

Appendix 8: Demographics

This questionnaire asks questions about your background. Please let the researcher know if you have any questions. Your answers will be kept confidential and if you do not wish to answer certain questions, you do not have to.

1. **What is your name?**
   (first & last name)

_____

2. **What is your schools name?**

_____

3. **What class are you in?**

_____

4. **Which month were you born in?** *(Select one box only)*

☐ January
☐ February
☐ March
☐ April
☐ May
☐ June
☐ July
☐ August
☐ September
☐ October
☐ November
☐ December

5. **Which year were you born in?** *(Select one box only)*

☐ 2004
☐ 2005
☐ 2006
☐ 2007
☐ 2008
☐ 2009

6. **Which country were…**
   Please mark one per line

	Sweden	Norway, Finland, Denmark or Iceland	Another country in Europe	Another country outside of Europe	Don't know
a)…you born in?	❑	❑	❑	❑	❑
b)…your mother born in?	❑	❑	❑	❑	❑
c)…your father born in?	❑	❑	❑	❑	❑

7. **Is the gender you identify with the same as your sex registered at birth?**
   (Select one box only)

□ Yes
□ No
If no, please enter gender identity_____
□ I would rather not say

8. **What is your gender?**

□ Female
□ Male
□ I would rather not say

The following questions are related to you family and living situation.

9. **Does your family own a car or another motorized vehicle?**
   □ No
   □ Yes one
   □ Yes, two

10. **Do you have your own bedroom?**
    □ No
    □ Yes

11. **How many computers (including laptops and tablets, not including game consoles and smartphones) does your family own?**
    □ None
    □ One
    □ Two
    □ More than two

12. **How many bathrooms (room with a bath/shower or both) are there in your home?**
    - ☐ None
    - ☐ One
    - ☐ Two
    - ☐ More than two

13. **Does your family have a dishwasher?**
    - ☐ No
    - ☐ Yes

14. **How many times did you and your family travel out of Sweden for holiday/vacation last year?**
    - ☐ Never
    - ☐ Once
    - ☐ Twice
    - ☐ More than twice

15. Family support

We are interested in how you feel about the following statements which relate to how well supported you feel.
Please show how much you agree or disagree with each one.
Please mark one per line

	1 Very Strongly Disagree	2	3	4	5	6	7 Very Strongly Agree
a) My family really tries to help me	❑	❑	❑	❑	❑	❑	❑
b) I get the emotional help and support I need from my family	❑	❑	❑	❑	❑	❑	❑
c) I can talk about my problems with my family	❑	❑	❑	❑	❑	❑	❑
d) My family is willing to help me make decisions	❑	❑	❑	❑	❑	❑	❑

Appendix 9: 7-Day Social Media Use

This section is about how much you use social media during an average week. In order to answer the following questions, you will need to access data from your phone.

1) **Do you have your own smartphone?** *(Please circle one option)*

   Yes / No

2) **Do you have access to a smartphone today?** *(Please circle one option)*

   Yes / No

3) Please select which type of smartphone you have (*Please mark one option)***:**

□ Android: *Open Settings. Tap on Digital Wellbeing and Parental Controls. Then, tap on Dashboard and scroll down to view different used apps.*

□ IOS: *Open Settings > Screen Time. Tap on See All Activity and then tap on Week if you want to see a summary of your usage per week, or Day if you want to see a summary of your usage per day. (If you have multiple iOS devices, make sure your iPhone is selected.)*

□ Other: *Please answer the following questions to the best of your ability*

□ I don't have access to my mobile phone or I don't have a smartphone : *Please answer the following questions to the best of your ability*

**If you have your phone you will need it to answer the following questions*

4) **What was your screentime on Sunday?** (look at the most recent weekend day)

_____hours _____minutes

5) What was your screen time on the last weekday (not today)?

- *If today is Monday report screen time from Friday*
- *If today is Tuesday, Wednesday, Thursday or Friday report screen time from yesterday*

_____hours _____minutes

6) **Looking at the last weekday (not today), how many times did you open your phone? (***On iphone this is call 'pick ups' / On android this is call 'unlocks')*

_____

7) **Looking at the last weekday (not today) how much time did you spend on different social media apps?**

**You will need to scroll down on your phone and list the different time spent on social media*

Snapchat: _____hours _____minutes

TikTok**:** _____hours _____minutes

Instagram: _____hours _____minutes

WhatsApp: _____hours _____minutes

Facebook: _____hours _____minutes

Messenger: _____hours _____minutes

Twitter (X): _____hours _____minutes

YouTube: _____hours _____minutes

Reddit: _____hours _____minutes

Discord: _____hours _____minutes

Pinterest: _____hours _____minutes

Tumblr: _____hours _____minutes

Lobby: _____hours _____minutes

Yubo: _____hours _____minutes

Twitch: _____hours _____minutes

BeReel: _____hours _____minutes

Other: (Please specify) _____hours _____minutes

Other: (Please specify)… _____hours _____minutes

8) Do you currently use any of the following limits on your social media apps?

Please complete the table related to iphone or Android. If you do not have either of these please move to the next section.

iPhone

1) Start here ↓

Limits	Yes/No
Do not Disturb	Y / N
Work	Y / N
Sleep	Y / N
Downtime	Y / N
App Limits	Y / N
Communication limits	Y / N
Always Allowed	Y / N
Content & Privacy Restrictions	Y / N
Screen time for Family	Y / N

2) If yes answer the following also →

Which apps or entire phone	Why do you use this?

Android

1) Start here ↓

Limits	Yes/No
Screentime goals	Y / N
Focus	Y / N
Sleep time	Y / N
Parent controls/ Screen time for	Y / N

2) If yes answer the following also →

Which apps or entire phone	Why do you use this?

Appendix 10: Motives to use Social Media

The following question lists different reasons for using social media. Thinking of all of the times you have been on social media in the last 12 months, please rate on a scale from 'never' to 'always', how often you have logged onto social media for each of these following reasons

(select only one answer for each statement)
How often do you use social media…

	Never	Almost Never	Occasionally	Almost always	Always
a). To forget your worries?	❑	❑	❑	❑	❑
b). Because your friends pressurised you to do it?	❑	❑	❑	❑	❑
c). Because it helps you when you feel depressed or irritated?	❑	❑	❑	❑	❑
d). To come into contact with others?	❑	❑	❑	❑	❑
e). To cheer yourself up when you are in a bad mood?	❑	❑	❑	❑	❑
f). Because it gives you a pleasant feeling?	❑	❑	❑	❑	❑
g). Because it is exciting?	❑	❑	❑	❑	❑
h). To experience a feeling of exaltation? (e.g., happiness)	❑	❑	❑	❑	❑
i). Because it is fun to be in contact with others?	❑	❑	❑	❑	❑
j). Because you would like to belong to a certain circle of friends?	❑	❑	❑	❑	❑
k). To improve your contact with friends and acquaintances?	❑	❑	❑	❑	❑
l). To share a special occasion with friends?	❑	❑	❑	❑	❑
m). To forget about your problems?	❑	❑	❑	❑	❑
n). Simply because it is fun?	❑	❑	❑	❑	❑
o). To be liked by others?	❑	❑	❑	❑	❑
p). To not feel excluded?	❑	❑	❑	❑	❑

Appendix 11: Problematic Social Media Use

Please rate the extent to which you agree with the following statements, on a scale from *'definitely disagree'* to '*definitely agree*' *(select only one answer per statement)*

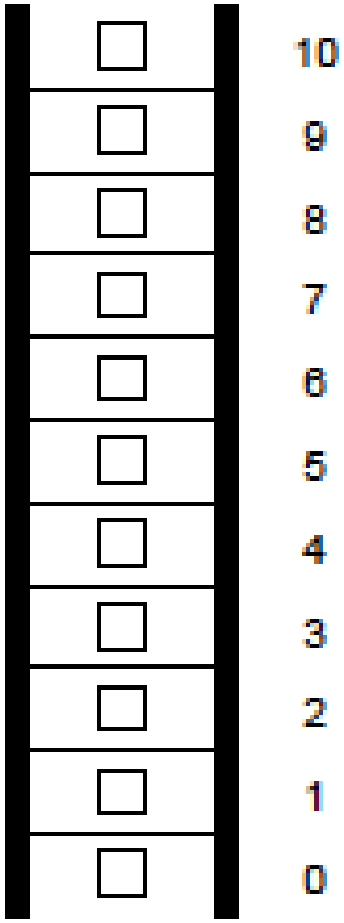
	Definitely Disagree							Definitely Agree
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Online social interaction is more comfortable for me than face-to-face interaction	❑	❑	❑	❑	❑	❑	❑	❑
2. When I haven't been on social media for some time, I become preoccupied with the thought of going on social media	❑	❑	❑	❑	❑	❑	❑	❑
3. I prefer communicating with people online rather than face-to-face	❑	❑	❑	❑	❑	❑	❑	❑
4. I have used social media to make myself feeling better when I was down	❑	❑	❑	❑	❑	❑	❑	❑
5. I have used social media to talk with others when I was feeling isolated	❑	❑	❑	❑	❑	❑	❑	❑
6. I have difficulty controlling the amount of time I spend on social media	❑	❑	❑	❑	❑	❑	❑	❑
7. I have missed social engagements or activities because of my social media use	❑	❑	❑	❑	❑	❑	❑	❑
8. I have used social media to make myself feel better when I've felt upset	❑	❑	❑	❑	❑	❑	❑	❑
9. I would fell lost if I was unable to go on social media	❑	❑	❑	❑	❑	❑	❑	❑
10. I find it difficult to control my social media use	❑	❑	❑	❑	❑	❑	❑	❑
11. I think obsessively about going on social media when I am offline	❑	❑	❑	❑	❑	❑	❑	❑
12. When offline, I have a hard time trying to resist the urge to go on social media	❑	❑	❑	❑	❑	❑	❑	❑
13. I prefer online social interaction over face-to-face communication	❑	❑	❑	❑	❑	❑	❑	❑
14. My social media use has created problems for me in my life	❑	❑	❑	❑	❑	❑	❑	❑
15. My social media use has made it difficult for me to manage my life	❑	❑	❑	❑	❑	❑	❑	❑

Appendix 12: Quality of Life (Cantril ladder)

1. Quality of Life

This is a picture of a ladder.
The top of the scale '10' corresponds to the best life you can imagine and the bottom '0' the worst life you can imagine.
If you think about your life in general, where do you think you are right now?
Check the box next to the number that best suits you.

10 The Best Possible Life



0 The Worst Possible Life

Appendix 13: Mental Wellbeing (SWEMWBS)

Below are some statements about feelings and thoughts. Please tick the box that best describes your experience of each over the last 2 weeks. (*please select only one option for each statement)*

	None of the time	Rarely	Some of the time	Often	All of the time
a). I've been feeling optimistic about the future	❑	❑	❑	❑	❑
b). I've been feeling useful	❑	❑	❑	❑	❑
c). I've been feeling relaxed	❑	❑	❑	❑	❑
e). I've been dealing with problems well	❑	❑	❑	❑	❑
f). I've been thinking clearly	❑	❑	❑	❑	❑
h). I've been feeling close to other people	❑	❑	❑	❑	❑
j). I've been able to make up my own mind about things	❑	❑	❑	❑	❑

Appendix 14: Positive & Negative Affect (PANAS)

This scale consists of a number of words that describe different feeling and emotions. Read each item and then mark the appropriate space next to the word. Indicate to what extent you have felt these in the past week. (*Mark only one per row.)*

	Very Slightly or not at all	**A little**	**Moderately**	**Quite a bit**	**Extremely**
1. Interest	❑	❑	❑	❑	❑
2. Distressed	❑	❑	❑	❑	❑
3. Excited	❑	❑	❑	❑	❑
4. Upset	❑	❑	❑	❑	❑
5. Strong	❑	❑	❑	❑	❑
6. Guilty	❑	❑	❑	❑	❑
7. Scared	❑	❑	❑	❑	❑
8. Hostile	❑	❑	❑	❑	❑
9. Enthusiastic	❑	❑	❑	❑	❑
10. Proud	❑	❑	❑	❑	❑
11. Irritable	❑	❑	❑	❑	❑
12. Alert	❑	❑	❑	❑	❑
13. Ashamed	❑	❑	❑	❑	❑
14. Inspired	❑	❑	❑	❑	❑
15. Nervous	❑	❑	❑	❑	❑
16. Determined	❑	❑	❑	❑	❑
17.Attentive	❑	❑	❑	❑	❑
18. Jittery	❑	❑	❑	❑	❑
19. Active	❑	❑	❑	❑	❑
20. Afraid	❑	❑	❑	❑	❑

Appendix 15: Physical Activity (PAQ-A)

We are trying to find out about your level of physical activity from ***the last 7 days*** (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

Remember:

1. There are no right and wrong answers — this is not a test.
2. Please answer all the questions as honestly and accurately as you can — this is very important.

---

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? *(Mark only one per row.)*

	No	**1-2**	**3-4**	**5-6**	**7 times or more**
Skipping	❑	❑	❑	❑	❑
Rowing/Canoeing	❑	❑	❑	❑	❑
In-line skating	❑	❑	❑	❑	❑
Tag	❑	❑	❑	❑	❑
Walking for exercise	❑	❑	❑	❑	❑
Bicycling	❑	❑	❑	❑	❑
Jogging or running	❑	❑	❑	❑	❑
Aerobics	❑	❑	❑	❑	❑
Swimming	❑	❑	❑	❑	❑
Baseball/softball	❑	❑	❑	❑	❑
Dance	❑	❑	❑	❑	❑
Football	❑	❑	❑	❑	❑
Badminton	❑	❑	❑	❑	❑
Skateboarding	❑	❑	❑	❑	❑
Soccer	❑	❑	❑	❑	❑
Street Hockey	❑	❑	❑	❑	❑
Volleyball	❑	❑	❑	❑	❑
Floor Hockey	❑	❑	❑	❑	❑
Basketball	❑	❑	❑	❑	❑
Ice Skating	❑	❑	❑	❑	❑
Cross-country skiing	❑	❑	❑	❑	❑
Ice hockey/ringette	❑	❑	❑	❑	❑
Other: _____	❑	❑	❑	❑	❑
Other: _____	❑	❑	❑	❑	❑

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? *(Check one only.)*

- I don't do PE ❑
- Hardly ever ❑
- Sometimes ❑
- Quite often ❑
- Always ❑

3. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? *(Check one only.)*

- Sat down (talking, reading, doing schoolwork). ❑
- Stood around or walked around ❑
- Ran or played a little bit ❑
- Ran around and played quite a bit ❑
- Ran and played hard most of the time ❑

4. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? *(Check one only.)*

- None ❑
- 1 time last week ❑
- 2 or 3 times last week ❑
- 4 times last week ❑
- 5 times last week ❑

5. In the last 7 days, on how many *evenings* did you do sports, dance, or play games in which you were very active? *(Check one only.)*

- None ❑
- 1 time last week ❑
- 2 or 3 times last week ❑
- 4 or 5 times last week ❑
- 6 or 7 times last week ❑

6. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? *(Check one only.)*

- None ❑
- 1 time ❑
- 2 or 3 times ❑
- 4 or 5 times ❑
- 6 or more times ❑

7. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that describes you.

A. All or most of my free time was spent doing things that involve little physical effort ❑

B. I sometimes (1 — 2 times last week) did physical things in my free time (e.g., played sports, went running, swimming, bike riding, did aerobics) ❑

C. I often (3 — 4 times last week) did physical things in my free time ❑

D. I quite often (5 — 6 times last week) did physical things in my free time ❑

E. I very often (7 or more times last week) did physical things in my free time ❑

8. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

	None	Little bit	Medium	Often	Very Often
Monday	❑	❑	❑	❑	❑
Tuesday	❑	❑	❑	❑	❑
Wednesday	❑	❑	❑	❑	❑
Thursday	❑	❑	❑	❑	❑
Friday	❑	❑	❑	❑	❑
Saturday	❑	❑	❑	❑	❑
Sunday	❑	❑	❑	❑	❑

9. Were you sick last week, or did anything prevent you from doing your normal physical activities? *(Check one.)*

Yes ❑

No ❑

If Yes, what prevented you? _____

Appendix 16: Self-Regulation Scale (SRS)

We are interested in how you feel about the following statements which relate to how well supported you feel.
Please show how much you agree or disagree with each one.
Please tick one circle for each line.

	Not at all true	Barely true	Somewhat true	Completely true
1) I can concentrate on one activity for a long time, if necessary.	❑	❑	❑	❑
2) If I am distracted from an activity, I don't have any problem coming back to the topic quickly.	❑	❑	❑	❑
3) If an activity arouses my feelings too much, I can calm myself down so that I can continue with the activity soon.	❑	❑	❑	❑
4) If an activity requires a problem-oriented attitude, I can control my feelings.	❑	❑	❑	❑
5) It is difficult for me to suppress thoughts that interfere with what I need to do.	❑	❑	❑	❑
6) I can control my thoughts from distracting me from the task at hand.	❑	❑	❑	❑
7) When I worry about something, I cannot concentrate on an activity.	❑	❑	❑	❑
8) After an interruption, I don't have any problem resuming my concentrated style of working.	❑	❑	❑	❑
9) I usually have a whole bunch of thoughts and feelings that interfere with my ability to work in a focused way.	❑	❑	❑	❑
10) I stay focused on my goal and don't allow anything to distract me from my plan of action.	❑	❑	❑	❑

Appendix 17: Topic Guide Study 3: Adolescents

SECTION 1: Reach & Retention

We firstly want to know about how you engaged with the study.

1. Can you explain the social media activities your teacher did with you?
    I. Did you feel that these were appropriate for you? (Why? Why not?)
    II. How engaged were you with the activities? (Why?)

SECTION 2: Implementation

We would like to know more about your teacher and how they presented the social media intervention.

2. What do you know about social media and how it can impact well-being positively & negatively?
3. During the mentor lesson, what did you consider about your previous ways in which you use social media?
4. What was the main message you received from your teacher before you were asked to set social media goals?
    I. Do you agree/disagree with their opinion (why/why not?)

SECTION 3: Adoption

In this section, we are interested in how you engaged with the intervention and whether you were able to achieve your goals.

5. What did you choose to change with your social media use and why? (Probe: time, type, content)
6. Were you able to achieve your social media goals? If so, why? If not, why not?

SECTION 4: Effectiveness

As part of this research, we are interested in supporting your wellbeing by helping you reflect upon and regulate your uses of social media. *Offer participants the opportunity to share their social media goals and explain why they chose them.

7. If you changed your social media use, how did this impact other activities in your take part in during the day?
8. Can you explain if the changes in your social media changed your well-being?

Section 5: Potential Confounders

9. What are the main factors which helped you to/ made it easier to achieve your social media goal? (e.g., family, friends, rules at home, self-discipline, friends, teachers)

10. What are the main factors which made it harder for you to achieve your social media goal? (e.g., family, friends, rules at home, self-discipline, friends, teachers)

SECTION 6: Maintenance

In this final section, we are interested in how the changes in social media use are being maintained and the longer-term impact of the social media task.

11. If you have made changes to your social media use, how long do you think they will last, and why?
12. If your teachers would do the social media task again, what would you change? (more time, less time, better support)
13. Do you have any other thoughts on this topic about how schools could address social media to support your well-being?
14. Does anyone have any questions?

Appendix 18: Topic Guide Study 3: School Staff

Interview Questions

SECTION 1: Reach & Retention

We firstly want to know about your school and the reasons for taking part in the study.

1. Can you explain why your school chose to take part in the intervention? (Probe: School/national policy, pupil behaviours e.g., mental health, disruptive behaviours, bullying)

SECTION 2: Implementation

In this section, we are interested in how you delivered the intervention

2. Firstly, we would like to know more about when you delivered the social media lesson. Can you describe what happened and the extent to which you followed the plan?
3. How did students respond during and after the lesson?
4. How well did you meet the objectives of the lessons?

SECTION 3: Adoption

In this section, we are interested the extent to which pupils engaged with the intervention

5. Have you observed any changes in student uses and/or engagement with social media?
6. Have you had any conversations with students regarding their social media use and/or changes they made as part of the intervention? (Probe: the content of those conversations)
7. Were there certain pupils who engaged with the intervention more or less than others? (If so, what attributes did they have?) (Probe: self-regulation, autonomy support)

SECTION 4: Effectiveness

As part of this research we are interested in supporting young people's well-being by helping them to regulate their uses of social media:

8. Have you observed any changes in student behaviours as a result of the intervention? (Probe: examples of behaviours: phone use, concentration, interactions with peers and reasons why)
9. Have you observed any impact of the intervention on students' physical activity (If so, what were they? E.g., break times, between lessons)
10. After delivering the intervention, was the intervention an effective method to support student wellbeing? (Probe: why, specific examples)

SECTION 5: Maintenance

In this final section, we are interested in how the changes in social media use are being maintained and the longer-term impact of the intervention.

11. If we continue to develop this intervention what else could we do to make it a success? (staff training, parent engagement)
12. Do you have any other thoughts on this topic about how schools could address social media use to support student well-being?
13. Does anyone have any questions?

Appendix 19: Coding Frame Study 3

Code label	Definition RE-AIM	How to know when the theme occurs	Sub-codes and justification: The deductive/inducive transition
Reach	'The absolute number, proportion, and representativeness of individuals who are willing to participate in a given initiative, intervention, or program.'	Talking about… • the characteristics of the school, teachers and students, such as how the students use social media • participant engagement/lack of engagement/response to the intervention, such as, if/why they liked/disliked the intervention • If/why participants did NOT want to change their time on social media Student level • Student participants suggestions for changing/improving the intervention	**1) SM uses/relationship with SM** The main characteristic which was present and rich in the data was the relationship participants had with social media. It's justification within 'reach' is underpinned by how participants may be willing to take part in an intervention based on their views of their social media use. **2) Participant responses to/views of the intervention** This code included participant engagement from both their own and teachers' perspective. Thoughts on the intervention were included, including how they would change the intervention. **2a) Reasons for change/no change** The reasons for changing or not changing social media use were largely underpinned by the participants views on their currents use of social media and their views on how it integrates with their life. In short, their willingness to take part in the intervention. **2b) Study (non)participation reasons** Here specific reasons for not taking part in the study are coded. This includes those who did not complete the surveys. **2c) Student Suggestions for Change** This code speaks to how attractive future iterations could be to student participants through their suggestions for change. **4) Repetitive Surveys**

			This code was more inductive. It related to the reach of the intervention because it was reoccurring feedback about the study which seemed to influence dropout.
Efficacy	'The impact of an intervention on important outcomes, including potential negative effects... Heterogeneity of effects and reasons for success or lack of such'	• Talking about observed/perceived impact(s)/lack of impact of the intervention and reasons why	**1) Social Media changes (non-changes)** This code includes participant feedback on whether their time on social media changed. Some reasons for the changes are included because they add context, but other strategies are included in 'implementation'. **2) Wellbeing effect** Participant feedback on changes or lack of change in their wellbeing are included. **3) Other outcomes** Other unexpected outcomes from the intervention/study are included.
Adoption	'The absolute number, proportion, and representativeness of settings and intervention agents (people who deliver the program) who are willing to initiate a program.'	Setting level: Talking about… • why the school/teachers took part in the intervention • if/why the school/teachers liked/disliked the intervention • what the school/teachers would change about the intervention	There are 18 codes here. They are quite long, but the density of the data does not require additional codes in step 4 (the deductive/inductive transition). **1) Reasons for Joining** Reasons for joining align with why the school had adopted the study. The data shows that the key decision makers were not always present (i.e. school leadership). Nonetheless, there are some key insights related to school policy and teacher observations of students which underpin teacher motivations to engage with the study. **2) Teacher suggestions for Change** Teacher suggestion for change provide insight into aspects which might need consideration in a large-scale definitive trial. **3) Study/Intervention Feedback** This includes general feedback on the intervention, including what teachers liked about the intervention.
Implementation	'At the setting level… the intervention agents' fidelity to	Talking about… Setting level:	Overall, these codes reflect the initial outline from the deductive coding. **1) Mentor Implementation**

	the various elements of an intervention's protocol, including consistency of delivery as intended… At the individual level, implementation refers to clients' use of the intervention strategies.'	• how the intervention was conducted Student level: • why participants wanted to change their social media use • use of intervention strategies	What happened speaks to what happened during the intervention. This supports alignment with the intervention protocol and provides more depth and insight into how the intervention was led. **2) Participant Implementation: Strategies** Strategies to reduce time on social media is considered to be 'intervention strategies'
Maintenance	The extent to which a program or policy becomes institutionalized or part of the routine organizational practices and policies. Within the RE-AIM framework, maintenance also applies at the individual level. At the individual level, maintenance has been defined as the long-term effects of a program on outcomes after 6 or more months after the most recent intervention contact'	Setting level: • the wider implications of the intervention, including suggestions/ideas/actions for wider school practices Student level: • the perceived long-term effects on the setting and the individuals or lack-of	These categories largely align with the initial deductive approach. **1) Whole-school practices** Whole-school practices include teacher opinions on what the school can do further in this area. Connections to the intervention vary. **2) Long terms effects** This category only produced three samples of text. The absence of evidence here could be worth discussing.

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