University of Southampton

Faculty of Environmental and Life Sciences

School of Psychology

Social Media Activity, Number of Friends, and Relationship Quality: The Effects on Young People's Sense of Belonging and Wellbeing

by

Lindsay Elder

Thesis for the degree of Doctorate in Educational Psychology

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Abstract

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Positive relationships are essential in meeting the fundamental need to belong. In adolescence, peer relationships become increasingly important for belonging as the risk of experiencing loneliness increases. However, the rising popularity of social media has added to the complexity of adolescents' peer experiences, as it presents a number of interpersonal challenges and opportunities. In this thesis, I (1) introduce the thesis research and present a rationale for the chosen topic area, (2) explore the relationship between friendship quantity and quality and young people's sense of belonging, and (3) consider how social media can be used to enhance wellbeing and belonging during adolescence.

The first chapter is an introduction to my thesis research. In this chapter, I summarise my thesis journey; I explain how my personal experiences inspired my chosen research area, what questions I wanted to answer, how I chose to answer them, and what I learned from the process. In the second chapter, I present the findings of a systematic literature review investigating the evidence for relationships between friendship quantity and quality and adolescents' sense of belonging over time. The results of the 13 reviewed studies suggest that having more friends indirectly reduces loneliness by giving teenagers more opportunities to develop high quality friendships. However, more rigorous longitudinal research needs to be conducted to make reliable conclusions about these complex associations. In the third chapter, I present the findings of my empirical research, where I investigated how social media can be used to promote adolescents' sense of belonging and wellbeing. In this research, 49 11- 18-year-olds took part in a randomised controlled study, where they were asked to either (1) interact on social media, (2) lurk passively without interacting on social media, or (3) interact face-to-face. The results show that changes in belonging and wellbeing did not differ significantly between the groups. However, the findings do suggest that using social media to maintain existing relationships positively predicts later belonging. Conversely, using social media to pass time predicts lower belonging and wellbeing. Overall, the study provides some preliminary evidence to suggest that using social media to interact with friends and family is more beneficial for adolescents than passive use. However, repeating the research after the coronavirus pandemic and with a larger sample size will be important to make more reliable conclusions and recommendations for practice.

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Research Thesis: Declaration of Authorship

Print name: Lindsay Elder

Title of thesis: Social media activity, number of friends, and relationship quality: The effects on young people's sense of belonging and wellbeing.

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

This work was done wholly or mainly while in candidature for a research degree at this University;

Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;

Where I have consulted the published work of others, this is always clearly attributed;

Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;

I have acknowledged all main sources of help;

Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

None of this work has been published before submission

Signature: .....Date: 3rd September 2021

Acknowledgements

As most of my readers will know, completing a thesis is challenging. These challenges have only been exacerbated by the pandemic, and there have been many times where I have almost quit. Yet, I did not; I persevered. This perseverance would not have been possible without the support of a few key people, for whom I am eternally grateful.

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Definitions and Abbreviations

ANOVA ..... Analysis of variance

B ..... Unstandardised beta

CASP..... Critical Appraisal Skills Programme

CFI ..... Comparative fit index

CI..... Confidence interval

D/d..... Effect size; Cohen's *d*

df..... Degrees of freedom

EP ..... Educational psychologist

F/f ..... *F* ratio

FQ..... Friendship quality

FQQ..... Friendship quality questionnaire; Parker & Asher, 1993

FQS ..... Friendship Qualities Scale; Bukowski et al., 1994

FTF..... Face-to-face active interaction; Group 3 in the empirical study

FUAS ..... Facebook Usage Aim Scale; Horzum (2016)

GBS..... General Belongingness Scale; Malone et al. (2012)

INTERACT..... Interacting actively on social media; Group 1 in the empirical study

LL..... Like/liked least

LM..... Like/liked most

LURK ..... Lurking passively on social media; Group 2 in the empirical study

M ..... Mean

M1 ..... Model 1

M2 ..... Model 2

M3 ..... Model 3

M*age* ..... Mean age

MANOVA ..... Multivariate analysis of variance

MF ..... Mutual friend(s)/friendship(s)

N/n ..... Total number of cases

NORC ..... National Opinion Research Centre

NR ..... Not reported

OfCom ..... Office of Communications

ONS ..... Office for National Statistics

P/p ..... *P* value significance statistic

P/Ps ..... Participant/participants

PRISMA ..... Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher et al., 2009)

R/r ..... Estimate of Pearson correlation coefficient

R^2/r^2 ..... The proportion of variance in the dependent variable that can be explained by the independent variable(s) in a regression model

RMSEA ..... Root mean square error of approximation

RPD ..... Reciprocal peer dislike

SD ..... Standard deviation

SEND ..... Special educational needs and/or disabilities

SM ..... Social media

SMUA(s)/SMUAS ..... Social Media Usage Aim(s)/ Social Media Usage Aim Scale; Kircaburun et al. (2018)

SNS ..... Social networking site

SoB ..... Sense of belonging

SP ..... Social preference

t ..... The sample value of the *t*-test statistic

T1 ..... Time 1

T2 ..... Time 2

T3 ..... Time 3

T4 ..... Time 4

T5 ..... Time 5

T6 ..... Time 6

T7 ..... Time 7

UK ..... United Kingdom

USA ..... United States of America

V/v ..... Pillai's trace *V* statistic

WEMWBS ..... Warwick Edinburgh Mental Wellbeing Scale; Tennant et al. (2007)

α ..... Alpha coefficient; Cronbach's index of internal consistency

β ..... Standardised beta

ΔCFI..... Change in CFI statistic

ΔR^2 ..... Change in the R^2 value

ΔRMSEA ..... Change in RMSEA statistic

Δχ2 ..... Change in chi-square statistic

η2 ..... Partial eta squared

χ2..... Chi-square statistic

Chapter 1 Introduction

1.1 Research questions

I was never a 'popular' teenager; I did not have lots of friends, I was not invited to every party, and I was almost always chosen last for team sports. What I did have, however, was a handful of close friendships. These friendships made me feel like I was valued and respected; they made me feel like I belonged. However, the social world of myself and many other adolescent millennials was complicated by the launch of Facebook in 2004. Before social media, I merely imagined the fun people had at parties without me or how much more popular my peers were compared to me, but now I could see all of this online in black and white. Yet, social media also circumvented the common restrictions to interaction, allowing me to interact more frequently with my existing friends and experience an ever-present sense of connectedness. So for me, social media was like a see-saw, constantly oscillating between these highs and lows.

These experiences significantly influenced my chosen research area for the current thesis. Namely, I wanted to learn more about how adolescents could experience a sense of belonging while navigating the complexities of their online and offline social worlds. By studying the existing literature in my systematic review, I wanted to answer the question, 'What is the relationship between the quality and quantity of friendships and belonging in typically developing young people?' For my empirical paper, I chose to conduct some research to help me answer the question, 'How can social media enhance adolescents' sense of belonging and wellbeing?' Together, the results from these studies would not only allow me to reflect more informatively about my own social experiences, but it would also help me to become more effective in supporting the social and emotional wellbeing of the young people I work with in my role as an educational psychologist.

1.2 My thesis

We can apply much of what we know about offline relationships to the digital world (Subrahmanyam et al., 2008). Thus, in my systematic literature review, I first wanted to develop a greater understanding of how offline peer experiences can contribute to adolescents' sense of belonging. I then wanted to consider how belonging and wellbeing could be further enhanced through the use of social media, a place where adolescents spend an increasing amount of their time interacting with peers and seeking social connection (Blair et al., 2013; Davis, 2012; Reich, 2010; Reich & Espinoza, 2012). The findings from both of my papers will therefore help us understand more about how friendship experiences facilitate adolescents' sense of belonging and wellbeing, and how these can be further supported via social media. The results will also have implications for educational psychologists, teachers, parents, and adolescents by contributing to a more informed understanding about how young people can be supported to safely navigate the challenges and opportunities of their increasingly multi-faceted social worlds to meet their psychological and developmental needs.

1.3 Research paradigm

Like all research, my research was governed by a paradigm. Paradigms consist of ontology, epistemology, methodology, and methods (Scotland, 2012). Crotty (1998) defined each of these phenomena and the relationships between them. He stated that ontology is the study of being, and is concerned with what constitutes reality. A researcher's ontological position then influences their epistemology, which refers to the theory of how knowledge can be created, acquired, and shared. This then inspires a chosen methodology, which reflects the process of enquiry and strategies underpinning the use of particular research methods. Finally, methods refer to the specific procedures used to

collect and analyse the data. Crotty maintained that all research methods can be traced back, through methodology, epistemology, and ontology, to a paradigmatic position.

Positivism is a scientific paradigm, which is associated with a realist ontological position. Realism is based on the assumption that truth exists independent of the knower (Cohen et al., 2007). Researchers with a realist ontology typically have an objectivist epistemology, which is based on the assumption that truth and reality exist independent of consciousness and experience; a tree is a tree regardless of whether anyone is there to observe it (Crotty, 1998). Objectivist researchers therefore aim to formulate laws as a basis for prediction and generalisation (Creswell & Creswell, 2018). Conversely, an interpretive paradigm is based on a relativist ontology, which views reality as person- and context-specific (Guba & Lincoln, 1994). Relativists typically adopt a subjectivist epistemology, in the belief that all meaning is unique to individuals and researchers therefore make no attempt to generalise the findings from one person to another (Crotty, 1998). Finally, researchers adopting a critical paradigm have a constructionist epistemology and hold that all knowledge and truth is socially constructed via interactions between the individual and the object (Scotland, 2012).

In the 20th century, a post-positivism paradigm emerged from positivism (Popper, 1959). In contrast to positivism, post-positivism holds that the knowledge we find in research is simply our belief in the truth based on our current hypotheses. That is, no theory or hypothesis can be deemed to be true until all attempts to refute them fail (Ernest, 1994). In this view, all knowledge is fallible, changing, and tentative (Popper, 1959). This was the paradigm adopted in the current thesis and informed my theoretical position, which was that of a critical realist. Critical realism emerged from Bhaskar's (1975) notion of transcendental realism, and draws on elements of positivist and social constructionist accounts of science. This position maintains that while knowledge is of things that are

independent of the knower, it is also influenced by those who construct it (Bhaskar, 1975). This position also admits a degree of relativism, in the belief that knowledge is context-specific and it is possible that competing theories about the same phenomenon may both be 'true' depending on the framework used to judge them (Collier, 1994). Moreover, critical realism emphasises the replicability of research, and is based on the assumption that knowledge is inter-subjectively testable (Cook & Campbell, 1979; Popper, 1959).

Thus, by adopting a critical realist position in my research, I endeavoured to identify regularities and causal mechanisms that would allow me to understand how different elements in the online and offline social world influence adolescent belonging and wellbeing. I then wanted to use these findings to make predictions and generalisations about my own experiences and those of the young people I work with. However, I also recognised that as the researcher, I would not only be observing knowledge but I would also be constructing it. That is, whether the hypotheses that I set out to test may or may not be disproven, other researchers may later find evidence to support competing hypotheses using different research paradigms. Thus, although I was searching for regularities in my research, I also recognised that truth can never be known with certainty and that all of our knowledge is tentative; it is context- and theory-dependent (Bhaskar, 1975).

1.4 Ethical challenges

Prior to conducting the research, ethical approval was sought and received from the University of Southampton Ethics Committee and the Research Governance Office (Appendix A). Procedures for setting and parental consent, along with participant assent, were established at research onset. While participants aged 16-18 years-old had capacity to consent for themselves, I also sought parental consent as I was aware that some of the

prospective participants in this age group may have special educational needs and/or disabilities (SEND), which may limit their capacity to give fully informed consent.

Although all participants were required to have access to social media for the duration of the study, I did not want the adolescents' participation in the research to detract from their usual daily routine. I was therefore very clear that participants would be emailed after school hours at 17:30 and would be given 24 hours to complete their activity so it did not disrupt engagement in extra-curricular activities, learning, and sleep. As research indicates that passive use of social media may be more negatively associated with wellbeing, mood repair activities were also provided post-activity for participants engaging in this type of online activity. Participants and their parents were also given access to the research team during and after the study, and were signposted to websites and resources should they wish to seek additional support. Moreover, although the aim of my research was to identify belonging- and wellbeing-enhancing social media activities, research indicates that for some people and in some contexts, social media can be associated with negative emotions, e.g., loneliness, anxiety, and depression (Barthorpe et al., 2020; Richards et al., 2015; Twenge et al., 2018; Twenge &Campbell, 2019). This meant that it was especially important that all young people (and their parents) were given the opportunity to withdraw from the research during their participation.

There were, however, some ethical issues that I did not anticipate. Firstly, the tightness of my ethics application meant that I had to complete a number of resubmissions for minor changes to the recruitment process, which delayed the data collection period. While I recognised the importance of demonstrating a high level of precision in my application to ensure that the ethics board had sufficient detail to make a decision, this level of precision also meant that I could not make minor adjustments even though I felt these would not have altered the experienced risks. Secondly, I also remember feeling very

exposed during conversations with my supervisors when I needed to make my own ethical decisions about the research. For example, nearing the end of my research, there were a number of participants whose parents had consented but who had not yet started the study. While I did not have ethical approval to notify them that the study would soon be closing, I also recognised that it was unethical for them to begin taking part in a seven-day study if their data would not be used. To overcome this, I looked back over the data collection period and calculated the average amount of time it took participants to start the research following contact from the research team to ensure that the remaining participants had at least this amount of time to respond. This experience, and other similar experiences, taught me to accept that there is not always an 'ethical cookbook' that can tell me what to do and enabled me to practise making balanced ethical decisions where the risk of harm is reduced at all times. I know that with my strong ethical compass, this is always something I will strive to do in my future practice as an educational psychologist.

1.5 Reflective learning

My thesis journey also facilitated an invaluable process of personal and professional self-reflection. For as long as I can remember I have been a creature of habit. I feel content when things are certain and predictable, which has always led me to exercise a certain level of control over my life. On reflection, I believe that this need for control was born from my childhood family experiences, where I felt powerless to some of the things that were happening around me. So, as an adolescent, I began to exercise discipline over the things I believed I had control over. If I worked hard in school, I knew I would see results; if I ran most days, I knew my split pace would improve; if I practised my violin every day, I knew I would become first chair in the orchestra (and all of these things, I did). For many years, this mindset worked for me; it helped me get to where I am today.

Yet, my journey on the doctorate, and my thesis in particular, has taught me that some things cannot and will never be in my control. Completing my thesis in the midst of a global pandemic only made this a more testing lesson. At the start of my journey I formulated a research timeline, which mapped out the milestones I needed to reach and when I intended to meet them. Of course, when England went into lockdown in March 2020, this timeline became almost impossible to adhere to. This meant extending deadlines for recruitment, data collection, data analysis, and draft submissions. While I recognised that all of these things were associated with global events far bigger than me and outside of my control, this did not stop me feeling like I had let myself and my supervisors down; it did not stop me feeling like I had failed. There have also been many occasions on this journey where my actions have been independent of the outcomes, occasions where I have needed to learn to trust the process and rely on others for support. Whether that be waiting for responses from the ethics committee, schools, parents, and participants, or depending on my supervisors, friends, and colleagues for emotional support along the way. These experiences forced me to exercise a degree of flexibility during the research process, and to accept that self-sufficiency is not always possible, nor is it the most optimal road to success.

The lessons of the thesis journey can also be applied to my professional practice. As a trainee educational psychologist, I often tell service users that all human behaviour is not only a product of the person, but also of the environment (Lewin, 1931). While a builder may have the skills to build a house, their company may not grant them the planning permission. While a child may want to learn, they may not be given the necessary tools to do so. While a researcher may know how to conduct an experiment, they may be restricted by the impact of a global pandemic. A person's potential is not limited to their own actions, but it is also influenced by the freedoms and constraints of the political and

social systems within which they exist (Bronfenbrenner, 1979). So, although I endeavour to empower individuals to exercise autonomy and take actions towards their goals, I now recognise how important it is that they develop realistic attributions of control and a toolkit of strategies to use when they feel powerless to change. Drawing on my own experiences of the thesis journey, these strategies have included connecting with friends and family, mastering new skills, recognising my achievements, and focusing on things within my control. It is no coincidence that all of these factors are widely recognised as some of the key 'building blocks' of resilience (Hart et al., 2007; Masten, 2014; Rutter, 2013).

This leads nicely on to a personal lesson I have learned on my research journey that, for me, feels the most pertinent of all. All of the challenges I have listed above, while difficult to manage, have led to a journey of self-reflection and personal growth. Yet, I believe I have not only grown *in spite of* these challenges, I have grown *because* of them. The difficulties I have experienced have helped me to learn how to seek and accept help from others, how to adapt to change, and how to exercise flexibility in my practice; three lessons I would not have learned had I not been on this journey. Over the past 18 months I have observed a level of resilience in myself that I did not know I had. Although there have been moments where I have wondered if I should (or even, could) carry on, I did. I persevered. And while I have learned there are many things in life that cannot be controlled, my stubbornness to continue in spite of these is not one of them.

Chapter 2 What is the relationship between the quality and quantity of friendships and belonging in typically developing young people?

2.1 Abstract

Young people experience many changes during adolescence that put them at an increased risk of experiencing loneliness. Peer relationships are therefore thought to be essential during this life stage by helping teenagers connect with others and experience a sense of belonging. However, the term 'peer relationships' encompasses different aspects of peer experiences. These experiences reflect how well-liked a person is and how many friends they have (friendship quantity), as well as how strong and positive these relationships are (friendship quality). While previous research has highlighted positive associations between these peer experiences and belonging, much of this research has been cross-sectional, making it difficult to determine the direction of these effects. In this systematic literature review, 13 longitudinal studies were examined to explore the relationship between belonging and friendship quality and quantity over time. Together, the findings indicate that being well-liked by peers increases adolescents' opportunities to form mutual friendships. Adolescents with more mutual friendships are then more likely to develop high quality relationships, which are thought to facilitate belonging and reduce feelings of loneliness. These findings suggest that young people at risk of loneliness may need to be supported to develop their social skills so that they can form long-lasting and high quality peer relationships. The results also a highlight a need for more rigorous longitudinal research, where the impact of age and gender on the strength of the relationships are explored.

Keywords: belonging, loneliness, adolescence, relationships, friendship, quality, quantity

Chapter 2

2.2 Introduction

2.2.1 Relationships from a social needs perspective

Positive relationships are one of the most important factors contributing to personal wellbeing (Office for National Statistics; ONS, 2019). Relationships that are voluntary, intimate, reciprocal, and caring are thought to be essential for positive adjustment (Berndt & McCandless, 2009) through the provision of social and emotional support and access to instrumental resources (Asher & Parker, 1989).

The development of positive interpersonal relationships has long been recognised as a fundamental human need (e.g., Bowlby, 1973; Donne, 1975; Freud, 1930; Maslow, 1968). Baumeister and Leary's (1995) belongingness hypothesis states that all humans have a pervasive drive to develop positive and lasting relationships with others, and that these interpersonal relationships are essential for health and wellbeing. As a result, feeling a sense of belonging (SoB) has often been reported to enhance meaning in life, facilitate academic success, and promote positive social, emotional, and behavioural outcomes (Freeman et al., 2007; Lam et al., 2015; Lambert et al., 2013; Pittman & Richmond, 2007; Rubin et al., 2011).

Baumeister and Leary (1995) assert that when an individual's belonging needs have not been sufficiently met, they are likely to experience loneliness. Loneliness is defined as a negative emotional response that is experienced when an individual's desired quantity and quality of social relations is different to that which they perceive to be true (Perlman & Peplau, 1981). It is recognised by researchers and policy makers to be a subjective consequence of perceived inadequate social connectedness (ONS, 2019; Galanaki & Vassilopoulou, 2007). Thus, loneliness is not simply a response to a change in social contact, but about a person's perception of whether their social network is typical for their

life stage (Victor & Yang, 2012). Consequently, loneliness is thought to fluctuate depending on an individual's needs at different ages and stages of development (Barreto et al., 2021).

2.2.2 A life course perspective

Relationships exist in many forms, typically consisting of those with parents, siblings, peers, and romantic partners (Flynn et al., 2017). The impact of each of these relationships on wellbeing is thought to change across the lifespan (Lansford, 2000). During infancy and early childhood, the parent-child relationship is considered the most critical for social and emotional development (Bowlby, 1973). As children transition into early adolescence, peer relationships become more pertinent as young people begin to spend more time with peers and less time with parents and siblings (Larson & Verma, 1999; Parkhurst & Hopmeyer, 1998). Intimate and romantic relationships then become more important for wellbeing during adulthood (Sullivan, 1953).

In addition to changes in the salience of different relationships, loneliness also changes across the lifespan. Loneliness is considered to be most prevalent during adolescence (Heinrich & Gullone, 2006) and has been found to increase just before children enter this developmental period (e.g., Harris et al., 2013; Qualter et al., 2013). This is unsurprising given the many social, biological, environmental, and cognitive changes associated with the transition from childhood to adolescence (Steinberg, 2008). Children move from small schools with self-contained classrooms and close relationships, to larger and more impersonal school environments (Eccles et al., 1991). This, along with physical changes associated with puberty (Laursen & Hartl, 2013) and increased sensitivity towards rejection (Nesdale et al., 2014), puts pre-adolescents and adolescents at greater risk of loneliness. It is therefore unsurprising that gaining acceptance and developing peer

relationships becomes increasingly important during this stage in life as children begin to spend more time with their peers (Sullivan, 1953).

2.2.3 Peer relationship experiences

Peer relationship experiences are often separated into those at the group- and dyad-level (Newcomb & Bagwell, 1995). Group-level peer experiences reflect an individual's level of social preference or perceived popularity within the group. The former refers to how well-liked a person is within their social group and is typically measured through sociometry, where children nominate members of their group who they like most and/or least, with higher numbers of positive nominations indicating higher social preference. Perceived popularity, on the other hand, refers to the degree to which a person is viewed as popular among their peer group (Stotsky & Bowker, 2018). Although these constructs are strongly and positively related during childhood (LaFontana & Cillessen, 2002) they become less significantly, and even negatively, related during adolescence (Cillessen & Borch, 2006). Researchers suggest that this may be due to changes in peer-valued behaviours as children move into adolescence, when authority-defying, socially dominant, and aggressive behaviours become more admired (Bukowski et al., 2000; Lease et al., 2002). While these behaviours may make a person more well-known and increase their level of perceived popularity, they are likely to decrease levels of social preference or likeability (Stotsky & Bowker, 2018). Given that gaining peer acceptance becomes increasingly valued during adolescence (LaFontana & Cillessen, 2010; Parkhurst & Hopmeyer, 1998), it is unsurprising that research has highlighted the importance of both social preference and popularity in facilitating teenagers' SoB (Bukowski et al., 1993; Ferguson & Ryan, 2019).

Dyadic experiences relate specifically to mutual friendships and friendship quality (FQ; Bukowksi et al., 1993). Like social preference, mutual friendship is also measured using sociometry by calculating the number of reciprocated positive nominations a child receives, thus yielding a quantitative index of children's peer experiences (e.g., Parker & Asher, 1993). FQ is another measure of dyadic peer experiences, which refers to the qualitative aspects of relationships, such as the extent to which they provide individuals with resources and support (Gifford-Smith & Brownell, 2003). Bukowski et al.'s (1994) Friendship Qualities Scale (FQS) is commonly used in the literature to measure FQ. This scale has five subscales, which reflect different friendship characteristics, including: (1) companionship (voluntary time spent with friends); (2) help (helping each other); (3) security (trusting that problems can be overcome together); (4) closeness (emotional connectedness); and (5) conflict (frequency of disagreements). Like group-level peer experiences, mutual friendship and FQ have also been associated with psychosocial outcomes during adolescence e.g., reduced feelings of loneliness (Asher & Paquette, 2003; Lodder et al., 2017; Van Gilder, 1996) and increased school liking (Antonopoulou et al., 2019).

While all of these constructs have been found to have a unique influence on adolescents' psychosocial outcomes, research suggests that social preference, mutual friendship, and FQ are likely to impact children's loneliness experiences simultaneously (e.g., Vanhalst et al., 2014). These constructs have also been found to moderate the influence of one another. For example, research conducted in Western and Eastern cultures indicates that how sociable and accepted a child is at the group level influences how many friendships they form with peers as well as the quality of these relationships (Bullock et al., 2019; Shin et al., 2007). This suggests that these constructs need to be examined simultaneously when considering their impact on adolescent adjustment (Ladd et al., 1997;

Vanhalst et al., 2014). The relationship between these variables will therefore be explored in this literature review and discussed in more detail in the discussion section of this paper.

Although schools are considered the most opportunistic setting for friendship formation (Witkow & Fulgini, 2010), many adolescents also form relationships with peers outside of school e.g., in clubs, sports groups, and the wider community (Newman & Newman, 1976). However, compared with school-based friendships, out-of-school friendships have received little attention in the literature (Jose et al., 2021). Witkow and Fulgini (2010) suggest that this is due to the practical and methodological challenges of measuring and assessing the impact of friendships in the community and, conversely, the ease at which friendships can be investigated in the closed context of school settings. As a result, all but one of the studies in this review explored the impact of school-based friendships. Although many friendships are likely to be formed in school due to the large portion of time adolescents spend in this setting, the role of the wider network of interpersonal relationships is a significant limitation of the existing literature (Flynn et al., 2017).

2.2.4 The cultural context of relationships

Most research on children's loneliness has been conducted in Western cultures, which are individualistic in nature. These cultures value autonomy and individualism, in contrast to collectivistic cultures (e.g., China), where group cohesion and relational bonds are prioritised (Chen, 2000; Heine, 2001; Oyserman et al., 2002). In addition to these ideological differences, variations in school structures, community activities and opportunities, and socioeconomic factors also impact adolescents' friendship experiences (Borner et al., 2015). The nature of children's peer experiences and their psychosocial

consequences may therefore be influenced by the socio-cultural context in which they develop (Chen et al., 2004).

However, research indicates that friendships are universally significant for all children (Borner et al., 2015). This is supported by cross-cultural research in the field, where the social and emotional influence of peer relationships has been reported concurrently and over time in both Western and Chinese cultures (Bean et al., 2019). Similarly, research suggests that loneliness exists in both individualistic and collectivistic cultures (Dykstra, 2009). This may be because people in collectivist cultures have high social needs and those in individualistic societies have low social contact, both of which are likely to impact the discrepancy between perceived and actual relationships (Johnson & Mullins, 1987). Thus, despite ideological and structural differences between Western and Eastern cultures, research suggests that patterns and generalisations can still be made, albeit considerately and cautiously, regarding the significance and impact of adolescents' peer experiences and loneliness cross-culturally.

2.2.5 Aims and objectives of the current review

While many researchers have found that the quantitative and qualitative aspects of peer experience are significantly related to SoB and loneliness, much of this research has been cross-sectional, making it difficult to determine direction and causality. Thus, while loneliness and SoB are often considered the outcome of poor friendship, they may also predict certain behaviours and relationship experiences (Vanhalst et al., 2014). This review will therefore examine the longitudinal relationship between friendship quantity and quality and SoB during pre-adolescence and adolescence in an effort to determine the temporal sequence and direction of effects.

2.3 Method

2.3.1 Search strategy

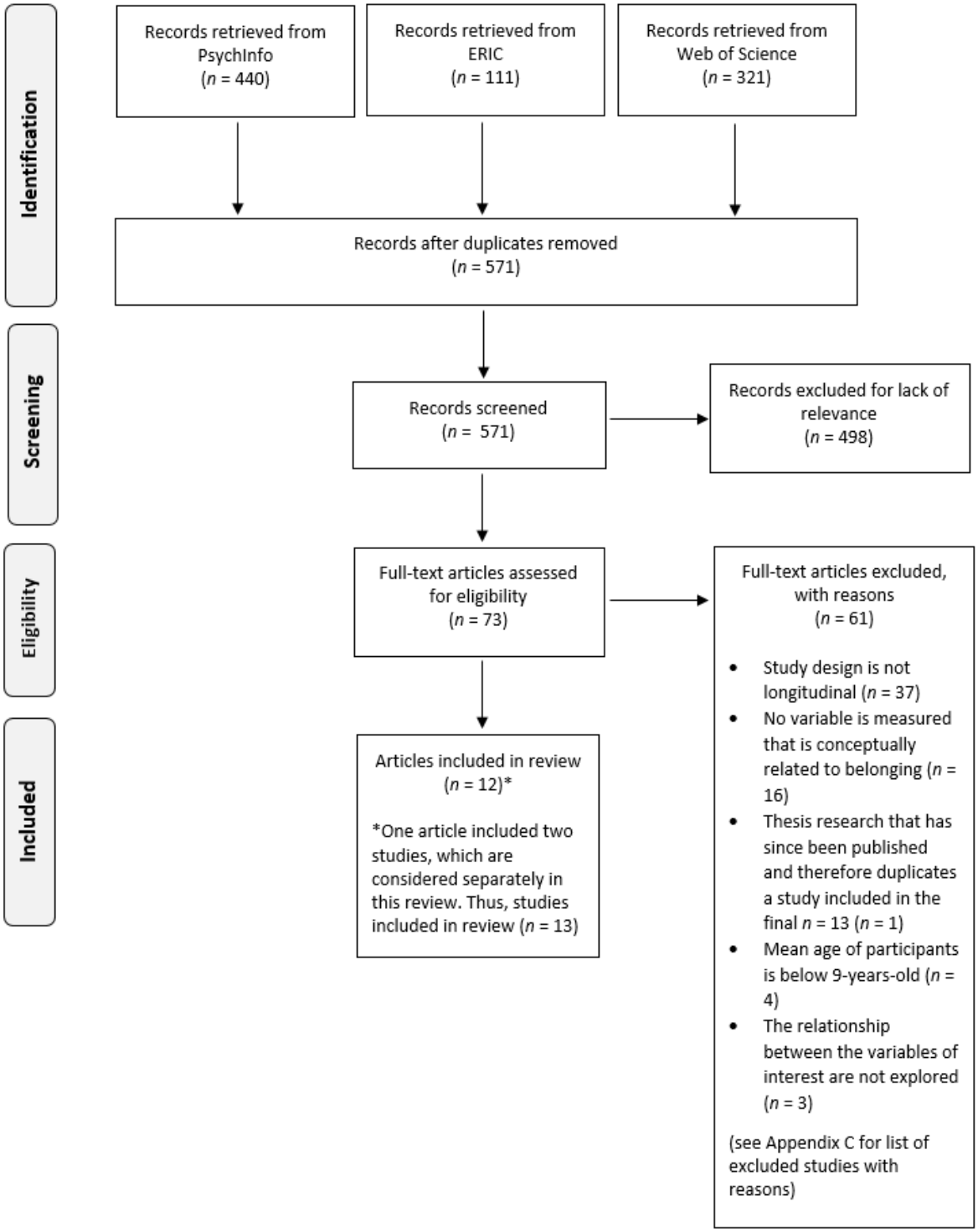
Initial scoping searches were carried out between March and May 2020 to identify the breadth of literature related to the review. The first searches were conducted between June 2020 and August 2020 on three electronic databases: PsycINFO, ERIC, and Web of Science (see Appendix B for the search terms). Database searches were limited to papers written or published between 1995 and 2020. A final search was done on all three databases in May 2021 to check for additional relevant papers written or published in the last year, which identified one further relevant paper for final inclusion.

After removing duplicates, the titles and abstracts of 571 papers were screened for suitability. Seventy-three were relevant to the review question and the full texts were assessed for eligibility (see Table 2.1 for inclusion and exclusion criteria). Fifteen papers had an English abstract available but the full text was written in another language: Chinese (12), Portuguese (2), and Croatian (1). All 15 papers were initially translated using Google Translate and 11 were subsequently excluded. The four remaining papers, in Mandarin (3) and Croatian (1), required further exploration via manual translation. Two independent translators, who were native Chinese and Croatian speakers, used the inclusion and exclusion criteria to identify that all papers should be included. They translated the method and results sections manually and emailed the text to the researcher.

Of the 73 records selected for full text review, 12 papers were selected for inclusion. One paper included two studies, which were both selected for inclusion and treated separately, leaving a total of 13 included studies. See Figure 2.1 for a Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Moher et al., 2009)

diagram of the search process. Excluded studies, along with reasons for exclusion, are listed in Appendix C.

Figure 2.1 *Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Moher et al., 2009) flowchart outlining the final search process, where 'n' refers to the number of articles*



2.3.2 Inclusion and exclusion criteria

Inclusion and exclusion criteria are shown in Table 2.1, and will be discussed in more detail below. For the remainder of this review, studies will mostly be referenced by number. Each study number can be found next to the named author(s) in the data extraction table in Appendix D. The number of items or studies will be reported in brackets, where '*n*' represents frequency. Measurement points in each study will be represented by T, where T1 = time one.

Table 2.1 *Inclusion and exclusion criteria*

Include	Exclude
Studies including participants between 9- and 18-years-old at study onset	Studies where the mean age and/or age range of participants is above 18-years-old at study onset
Studies where the sample mean age is between 9 and 18 years-old at study onset	Studies where the mean age and/or age range of participants is below 9-years-old at study onset
Studies including typically developing participants	Studies including participants who have been identified as having special educational needs and/or disabilities (SEND)

	Studies focusing on participants with an identified condition and/or disorder e.g., Autism Spectrum Condition or Attention Deficit Hyperactivity Disorder
Studies focusing on face-to-face friendships and communication	Studies focusing on online friendships
Studies using quantitative research designs	Studies using qualitative research designs
Longitudinal studies i.e., assessing the relationship between the variables in the same group of people at more than one time point	Cross-sectional studies i.e., assessing the relationship between the variables at a single point in time
Studies measuring the relationship between friendship quality or friendship quantity and belonging or loneliness	Studies measuring friendship quality or quantity and belonging or loneliness but do not measure the relationship between them
	Studies using other measures only e.g., depression, anxiety, self-esteem
	Studies measuring only family relationships e.g., parent and child, siblings etc.
Articles published as full texts in peer reviewed journals	Chapters in books
Published or unpublished theses*	Grey literature

Studies written in English and/or with an

English language abstract available

Studies published between 1995 and 2021 Studies published before 1995

Note. Where an unpublished thesis has been published at a later date in a peer-reviewed journal, the peer-reviewed article was used.

Participants. Studies were included if any participants were 9- to 18-years-old, and where the mean age was also within this range at study onset. Participants also had to be typically developing. Research focusing on friendships in particular subgroups of young people with identified special educational needs and/or disabilities (SEND) was excluded.

Study design. Longitudinal studies were included in the review, where the researcher(s) measured relationships between variables across two or more time points. Cross-sectional studies were excluded. Studies generating quantitative data were included. Qualitative studies were excluded as the aim of the review was not to elicit information regarding the lived experiences of adolescents, but to identify patterns and make generalisations regarding the impact of peer relationship experiences on belonging over time.

Variables. Studies measuring the relationship between friendship quantity and/or quality in relation to either belonging or loneliness were included in the review. The reason for including studies that measured loneliness was twofold: (1) very few studies examined the relationship between these friendship variables and belonging and (2) in the belongingness hypothesis, Baumeister and Leary (1995) state that when the universal need to belong is not met, loneliness is experienced. Thus, while belonging is the social need, loneliness is the psychosocial outcome experienced when that need is not met.

Publication requirements. Published studies and unpublished theses were included. Studies published in any country or language were also included, where an English abstract was available. Papers published between 1995 and 2021 were included. The rationale for using 1995 as a cut-off point was twofold: (1) this was when Baumeister and Leary (1995) published their Belongingness Hypothesis and thus, there was an expectation that studies published after this date would be more likely to examine the relationship between this psychosocial outcome and peer experiences and (2) the time-limited nature of the research meant that a restricted period of publication needed to be adopted. Book chapters and studies published before 1995 were excluded.

2.3.3 Quality assessment

Study quality was assessed using the Critical Appraisal Skills Programme (CASP; 2019) cohort study checklist. This checklist was chosen as the items support the appraisal of longitudinal research. As each study involved measuring the exposure and outcome variables in the same group of participants at different intervals over time, this tool was considered suitable. See Appendix E for a summary of the quality assessment of each study. Each criterion in the table was based on the items in the CASP checklist. Studies were not ranked based on how many criteria were met or not met, as I believe that it is reductionist to assume that the contribution to the overall quality of a study made by achieving one particular criterion is identical to that made by achieving a different criterion. Voss and Rehfuess (2013) support this argument against using summary scores, contending that it may lead to "false reassurance" by rating a study as moderate quality based on the number of met criteria when it has a serious flaw that compromises the validity and/or reliability of the results. Thus, the findings of the assessment process will now be qualitatively discussed.

2.3.3.1 Aims

Authors of all 13 studies defined a clearly focused issue, outlining the specific outcome and risk factors explored. While all researchers clearly referenced the population of interest as children and/or young people, only five studies (4, 6, 10, 11, and 12) presented a clear rationale for the age ranges of the chosen samples.

2.3.3.2 Cohort

While no study was generalisable to all pre-adolescents and adolescents due to homogeneity in one or more demographic factors, 11 studies were considered to employ acceptable recruitment procedures with sufficient care taken to reduce selection bias. The remaining two studies employed recruitment measures which either explored friendships in very unique circumstances (7) or excluded participants with certain types of friendships from the analysis (10) and thus, generalisability was limited.

2.3.3.3 Measures

Loneliness was measured reliably in all studies, with researchers reporting Cronbach's alpha coefficients ranging from .78 to .93. All researchers used subjective loneliness measures, which is considered appropriate given the aforementioned subjective nature of this phenomenon. Participants in each study were assessed using the same loneliness scale as their co-participants.

The exposure variables reflecting friendship experiences were measured accurately and reliably in five studies (1, 4, 5, 11, and 13). While Rotenberg et al.'s (2004) two studies (8 and 9) employed sufficiently accurate measures of friendship, the measures and methods of standardisation varied between the studies. This makes it difficult for them to reliably and accurately fulfil their aim of comparing the results between the United

Kingdom (UK) and Canadian samples. The remaining six studies employed measurements of friendship experiences that were not an accurate measure of the phenomenon (2 and 12), grouped different friendship experiences together in a reductionist way (3), or introduced bias by excluding certain types of friendship from analysis (6, 7 and 10) e.g., friendships with other-sex peers and peers outside of their grade or 'team'. One study (6) also failed to employ standardisation procedures, so children in larger grades or classes were more likely to score higher on measures of mutual friendship.

2.3.3.4 Analysis

All 13 studies failed to identify all possible confounding factors in their analysis, although the authors of four studies (7, 10, 11 and 12) recognised some. The identified confounding factors were used as covariates in the analysis in three of these four studies (7, 11, and 12). Overall, the identification for and control of confounding factors was a significant limitation of the papers included in this review.

2.3.3.5 Follow-up

Participant follow-up was considered complete in six studies (1, 2, 4, 10, 11, and 12). Two studies did not include a complete follow-up; one excluded certain grade groups (5) and the other reported a significant difference in T1 variables for participants who were not included at follow-up (6). Follow-up completion could not be assessed in the remaining studies; three did not report attrition rates (3, 7 and 13) and two did not examine for significant differences between those who dropped out and those who remained in the study (8 and 9).

2.3.3.6 Results

Research results were assessed for precision, reliability, generalisability, and level of concurrence with previous research. No study included in this review reported confidence intervals for the reported statistics, thus limiting the practical interpretation of the findings (Field, 2013). The results of eight studies were considered unreliable due to flaws in the method and/or analysis (1, 2, 3, 5, 6, 10, 12, and 13). Two studies reported reliable correlations, but regression results were deemed unreliable due to a lack of consideration and control of confounds (8 and 9). One study (4) used sophisticated statistical techniques, but failed to control for covariates in analysis, thus increasing the likelihood of confounding bias (Skelly et al., 2012). The design and method of the remaining two studies were considered sufficiently rigorous to be reliable (7 and 11).

The results of two studies were applicable to the local population (8 and 9), with the remaining 11 limited in generalisability due to homogeneity of sample characteristics. Three studies reported findings consistent with previous research (4, 6, and 7), and seven studies' findings were partially consistent (2, 3, 8, 9, 11, 12, and 13). The results of the remaining three studies were considered inconsistent with previous research (1, 5, and 10).

2.4 **Description of data extraction**

2.4.1 General characteristics

The included studies were conducted in the United States of America (USA; *n* = 4), the UK (*n* = 3), China (*n* = 3), Croatia (*n* = 1), Canada (*n* = 1), and Belgium (*n* = 1). Participants were aged 8- to 15-years-old. The mean participant age was reported inconsistently, but typically fell between nine years one month and 13 years five months at study onset. Sample sizes ranged between 146 and 884 participants.

All reviewed studies were longitudinal, with either two (*n* = 10; studies 1, 2, 3, 5, 6, 8, 9, 10, 12, and 13), three (*n* = 2; studies 7 and 11), or four (*n* = 1; study 4) time points. The period between time points ranged from one week to two years, and overall study length ranged from four weeks to four years. Twelve studies were conducted in schools and one study was conducted at a summer camp.

The psychosocial outcome measured in all studies was loneliness, with no study measuring belonging specifically. Friendship quantity and quality were measured in a number of different ways. The studies will be grouped and discussed according to group- and dyad-level peer experiences, as outlined in Appendix F.

2.4.2 Group-level peer experiences

The longitudinal relationship between group-level peer experiences and loneliness was explored on 10 occasions in nine studies. Sociometric methods were used to measure these experiences in nine of the reviewed studies, where individuals were asked to rate or nominate children based on how much they liked and/or disliked them (Bukowski et al., 2017). These methods yield information about children's positive and/or negative social ties within groups, which can either be considered separate indicators of social preference or combined to create one holistic measure. One study (11) also used a measure of perceived popularity to supplement this sociometric data.

The findings will be discussed in relation to the three types of methods used to explore this phenomenon: unitary measures of social preference (*n* = 5; studies 1, 2, 4, 6, and 13), combined measures of social preference (*n* = 4; studies 3, 8, 9, and 11), and perceived popularity (*n* = 1; study 11).

2.4.2.1 Unitary measures of social preference

Newman-Kingery et al. (2011) asked pupils in fifth (T1) and sixth (T2) grade to rate how much they liked to spend time with their classmates on a scale of one to five, with higher ratings indicating greater social preference. Results indicated a significant and negative correlation between T1 peer acceptance and T2 loneliness, $r = .28$, $p < .01$. In the regression analyses, the model predicting loneliness highlighted peer acceptance as a unique predictor ($\beta = -.20$, $p < .01$). However, when baseline loneliness levels were controlled for in the hierarchical regression, peer acceptance was not a significant predictor of loneliness.

Zongkui et al. (2006) reported similar results with Chinese pupils in third to sixth grade over a two year period. They measured social preference by asking students to nominate peers they liked most (LM) and liked least (LL). Cross-lagged panel analyses revealed that when T1 loneliness was controlled for, neither LM ($\beta = -.037$, $p > .05$) nor LL ($\beta = -.01$, $p > .05$) nominations at T1 predicted T2 loneliness. Taken together, the findings of these two studies suggest that while a relationship exists between group-level peer experiences and loneliness, this relationship may not be direct nor causal.

However, in studies where loneliness change scores were used, social preference was found to be a significant predictor. Jobe-Shields et al. (2011) used the same social preference measure as Zongkui et al. (2006) but examined changes in loneliness over time in nine- to 11-year-olds. After measuring loneliness at all three time points using The Loneliness Questionnaire (Asher & Wheeler, 1985) researchers used latent growth-mixture modelling (Muthén & Muthén, 2010) to identify subgroups of children with unique loneliness trajectories from third to fifth grade. Three groups were identified: the ‘stable low’ group represented individuals with constant low levels of loneliness, the ‘decreasers’ experienced a sharp decline in loneliness, and the ‘increasers’ had moderate level of

loneliness that increased over time. Multivariate analysis of variance (MANOVA) tests indicated significant differences between the loneliness groups in terms of LM and LL nominations. In third grade, the stable low group received significantly more LM nominations than the increasers. In grades four and five, both the stable low and the decreasers groups had significantly more LM nominations than the increasers, indicating that these indicators of peer acceptance improved in line with a reported decline in loneliness. These findings suggest that when loneliness scores are used to calculate loneliness trajectories over time, significant differences exist between children with different levels of social preference.

The above findings do not, however, give information about the direction of the relationship between group-level peer experiences and loneliness. Betts and Stiller (2014a) examined the reverse causality by using loneliness as a predictor variable. Using social network analysis (Wey et al., 2008), they asked participants aged nine- to 11-years-old to identify best friends from a class list and used this data to calculate three indicators of centrality (Borgatti, 2005): node degree, share, and betweenness. Node degree refers to the total number of friendship nominations a child makes and receives, regardless of whether these are reciprocated. Share refers to the proportion of these connections relative to class size, and betweenness is a child's propensity to make links between different subgroups within the class. Results of the multi-group path analysis indicated that T1 loneliness did not predict any of the centrality measures at T2.

Betts and Stiller (2014b) also examined whether loneliness predicted later group-level peer experiences in the same age group. They asked participants to report how much they liked to spend time with each person in their class on a scale of one to five. If two children both gave each other a rating of one, this was recorded as reciprocal peer dislike (RPD). Regression analysis indicated that T1 loneliness failed to predict changes in RPD

($p > .05$). However, when the direction of causality was reversed, subsequent analyses indicated that T1 quadratic RPD significantly predicted changes in loneliness, $\beta = .38$, $t(6150) = 2.19$, $p = .03$, $\Delta R^2 = .019$; higher or lower RPD predicted higher levels of loneliness. Taken together, the findings from both studies suggest that group-level peer experiences are likely to precede changes in loneliness, rather than the other way around.

Nonetheless, the finding that low levels of RPD predicted an increase in loneliness is not in line with previous research. Betts and Stiller (2014b) explain this finding by suggesting that children with low levels of RPD may experience a rise in loneliness if their social connections are not at their desired level. However, this argument seems somewhat unsubstantiated as individuals with medium levels of RPD could also experience the same discrepancy between their perceived and actual level of social connections, but their loneliness levels were found to be stable in this research.

In addition to this critique, the validity of the RPD measure could also be disputed; although two people may not want to spend time with each other we cannot assume that this means they also dislike each other. Children may not want to spend time with children for reasons other than dislike. For example, they may not know each other well, have different friendship circles, and/or not be in the same learning group/set. Moreover, the assumption that low levels of RPD are positive may not always be the case; some children may not be actively disliked by their peers perhaps because they are not noticed at all. Children in this group, sometimes characterised as ‘neglected’, are not well-known by their peers and may be particularly vulnerable to loneliness experiences (Newcomb et al., 1993). Thus, exploring multiple measures of social preference and considering different profiles of social status may be important when considering the impact on children’s loneliness.

2.4.2.2 Multiple measures of social preference

Many researchers are in favour of using multiple measures of social preference, stating that exploring levels of acceptance and rejection in isolation is reductionist. This is because of research findings indicating that a child's level of likeability is not correlated highly with the extent to which they are disliked (Parkurst & Asher, 1992). Coie et al. (1982) therefore argue that social preference scores should be calculated by combining measures of peer dislike and peer acceptance. Dongmei and Zongkui (2006) calculated social preference in this way by subtracting children's LL scores from their LM scores. These scores were then used to determine participants' social status, which was either popular, rejected, neglected, controversial, or general (i.e., all those who were not grouped into one of the other categories). They then combined children of 'similar' social status into the socially advantaged (popular and controversial), socially disadvantaged (rejected and neglected) and the general group. Participants were then separated into either a rising, declining or stable social status group depending on how their social status changed between T1 and T2. A 3 (changes in social status) x 2 (measurement time of loneliness) repeated measures analysis of variance (ANOVA) indicated no significant difference between the three social status change groups on loneliness scores among children in grades three to six over a two-year period.

However, these non-significant findings may be somewhat related to the arguably reductionist decision to combine individuals from two distinct sociometric groups into either a socially advantaged or disadvantaged category. This is supported by Newbomb et al.'s (1993) findings from their meta-analysis, which highlighted the distinct social, emotional, and behavioural characteristics of individuals within these groups. They reported that while popular and controversial children share similar levels of sociability, popular children present with lower levels of disruptive behaviour and loneliness.

Similarly, rejected children typically present with more aggressive behaviours than neglected children, which can influence their psychosocial outcomes. Thus, the finding that changes in social status did not lead to a significant difference in loneliness may be partly explained by the fact that the social and emotional impact of changing from the advantaged to the disadvantaged group, or vice versa, is likely to depend on which of the two sociometric groups a child is moving from and to.

Rotenberg et al. (2004) subtracted LL from LM scores to calculate peer preference for nine to 11-year-olds. However, unlike Dongmei and Zongkui (2006) they did not use these scores to categorise children into groups. Correlational analyses in both of their studies indicated that T1 peer preference was significantly and negatively correlated with T2 loneliness; *r* values and significance levels were reported to be the same in both studies ($r = -.11$, $p < .05$). In the UK sample, T1 loneliness was also significantly and negatively correlated with T2 peer preference, $r = -.11$, $p < .05$, but this relationship was not significant in the Canadian sample. However, when Thomas (2014) used the same technique to measure social preference among early adolescents in the USA (M*age* = 11.54 years), growth curve analyses indicated that T1 social preference did not predict changes in loneliness over time. This suggests that while these variables may be related, other predictors may better account for changes in loneliness over time, e.g., those associated with dyadic peer experiences.

2.4.2.3 Perceived popularity

Some researchers contend that individuals who are well-liked within their social group may not actually be perceived as popular by their peers and vice versa (e.g., LaFontana & Cillessen, 1999; Lease et al., 2002; Parkhurst & Hopmeyer, 1998). Thus, group-level peer experiences have also been measured using indicators of perceived popularity, which refers to an individual's belief about their own and others' level of social

preference within the group (Parkhurst & Hopmeyer, 1998). Research has indicated that social preference (being well-liked) and popularity (being well-known) are distinct constructs that impact psychosocial and behavioural outcomes differently (e.g., LaFontana & Cillessen, 2002; Litwack et al., 2012; Mayeux et al., 2011; Mayeux et al., 2008).

Thus, in addition to social preference, Thomas (2014) measured perceived popularity by asking early adolescents to nominate peers they thought were popular and not popular. Each child's popularity score was then calculated by subtracting their not popular nominations from their popular ones. Growth curve analyses indicated that T1 popularity did not significantly predict changes in loneliness between T1 and T3. However, T1 popularity was a significant predictor of changes in loneliness over the summer break; a one unit increase in popularity at T1 was associated with a 9.44 decrease in loneliness growth between T2 and T3, $t = -2.05$, $p < .05$. These results suggest that being perceived as popular by peers can protect against feelings of loneliness during the school holidays, perhaps by increasing adolescents' social invitations and contact with peers over the summer break. However, during term time, other school-related confounding factors may have a more significant impact on loneliness experiences. For example, young people have more opportunities to interact with peers and teachers in school, which co-exists with an increased likelihood of experiencing rejection and/or isolation for those who are not well-integrated and have a poor sense of school belonging (Krause-Parello, 2008).

Further analyses in Thomas' (2014) research indicated that T1 loneliness was a significant predictor of the popularity intercept; a one unit increase in loneliness was associated with a 0.01 lower popularity score, $t = -2.64$, $p < .05$. This suggests that lonely individuals experience lower levels of perceived popularity over time. This is different to the findings regarding the relationship between loneliness and sociometric indicators of social preference, where loneliness was not found to be a significant predictor in the

reviewed studies (1, 2, and 11). These results further emphasise the complexity of the relationship between group-level peer experiences and loneliness and highlight the, perhaps crucial, impact of measurement and research timing on the results.

2.4.2.4 Summary of group-level peer experiences

Overall, these results suggest that group-level peer experiences may be indirectly related to loneliness, perhaps via the opportunities they provide to young people with higher social preference and popularity. They also highlight the potential impact of moderating variables, such as time of year, on the significance of this relationship.

2.4.3 Dyad-level peer experiences

The relationship between loneliness and dyad-level peer experiences was examined on thirteen occasions in the reviewed studies. These have been separated into measures of mutual friendship and FQ and will be discussed below.

2.4.3.1 Mutual friendship

Eight studies (4, 5, 6, 7, 8, 9, 11, and 13) explored the relationship between loneliness and mutual friendship. All studies used sociometry to measure mutual friendships, where individuals were asked to nominate either a limited or unlimited number of friends. If a nomination was reciprocated, this friendship was considered mutual (Bukowski et al., 1993; Parker & Asher, 1993).

Klarin (2004) asked Croatian pupils aged 10- to 14-years-old to choose one best friend in their class, with reciprocated nominations indicating a mutual best friendship. Correlational analyses indicated that T1 loneliness was not significantly associated with T2 mutual best friendships, $r(149) = .02$, $p > .05$, nor was T2 loneliness associated with T1 mutual best friendships, $r(149) = -.12$, $p > .05$. However, asking students to nominate only

one friend reduces the likelihood of reciprocation. As a result, the absence of a significant correlation may be due to the fact that some students had mutual friendships that were not accounted for.

When Jobe-Shields et al. (2011) asked pupils to make unlimited nominations, they found evidence to support the cumulative effect of increasing numbers of mutual friendships on loneliness trajectories over time. After classifying children into loneliness groups as described above in section 2.4.2.1, researchers found significant differences in number of mutual friendships between the groups. In third grade, the stable low loneliness group had significantly more mutual friends than the increasers and decreasers, $F(2, 156) = 4.48$, $p < .05$. Moreover, in fifth grade, the increasers group had significantly fewer mutual friendships than those in the stable low and decreaser groups, $F(2, 157) = 8.05$, $p < .001$. This suggests that adolescents with more reciprocated friendships will be more likely to experience consistently low or declining levels of loneliness over time.

However, research by Thomas (2014) indicated that having one mutual friendship is sufficient to protect against loneliness. They asked students to nominate same-sex best and second best friends, and three other same- or other-sex friends. Correlational analyses indicated that T1 friendship was negatively associated with loneliness at all three time points.

However, none of the results discussed thus far indicate the direction or causal nature of this relationship. In order to determine directionality, Zongkui et al. (2006) conducted cross-lagged panel analyses and found that T1 mutual friendships significantly and negatively predicted T2 loneliness, $\beta = -0.149$, $p < .05$, but T1 loneliness did not significantly predict T2 mutual friendships, $\beta = -0.114$, $p < .05$. This suggests that the more mutual friends a young person has the less lonely they will feel, rather than the other way around. Newman-Kingery et al. (2011) also assessed the contribution of different peer

variables (peer acceptance, number of mutual friendships, and friendship quality) to adolescent loneliness outcomes using simultaneous regression analyses. Similar to Zongkui et al., they found that the number of mutual friends a child had in elementary school uniquely predicted their loneliness in middle school ($\beta = -.18$, $p < .01$). However, further hierarchical regression analyses indicated that when baseline loneliness was controlled for, mutual friendship in elementary school was not predictive of loneliness in middle school. This suggests that a direct relationship may not exist between these variables.

Rotenberg et al. (2004) reported similar findings in both of their studies, where they explored the relationship between mutual friendship and loneliness in the UK (8) and Canada (9). Although they found a significant and negative correlation between T1 mutual friendship and T2 loneliness in both studies, subsequent hierarchical regression analyses indicated that when baseline loneliness levels were controlled for, the number of mutual friends a child had at T1 did not significantly predict changes across time in loneliness. Once again, these results indicate that the mere presence of mutual friendships may not be enough to directly reduce loneliness levels.

Parker and Seal (1996) considered a time-dependent covariate in their analysis when they measured not only the presence of mutual friendships, but also the development and preservation of these relationships over time among eight- to 15-year-olds. They tracked friendships over the course of a four-week summer camp to examine how the formation and maintenance of mutual friendships influenced loneliness. To measure loneliness, authors used Williams and Asher's (1992) loneliness questionnaire. They replaced the word "school" with "camp" in the questionnaire items and reported good internal consistency at all assessment points (.80, .78, and .82, respectively). In line with the results discussed above, hierarchical multiple regression analyses indicated that the overall number of mutual friends did not significantly predict loneliness. However, the

addition of two temporal variables strengthened the inverse relationship between mutual friends and loneliness, leading to a marginally significant increase in R^2, $F(1, 174) = 2.85$, $p < .06$; campmates who developed more new friendships or renewed more old friendships had lower loneliness over time than those who did not. This led researchers to conclude that it is the budding of new relationships and not the presence of many friends that reduces loneliness. They also found a significant Formation x Durability interaction, $F(1, 173) = -4.37$, $p < .05$; the negative relationship between forming friendships and loneliness held only for campmates who maintained the friendships they formed.

However, it must be noted that this research represents a unique context for friendships, and we cannot assume that the features and social parameters of a four-week summer camp would be generalisable to other contexts. For example, children have more opportunities to form new friendships with unfamiliar peers for a short period of time in camps, whereas classroom-based friendships are typically longer-term and involve more realignment of relationships with familiar peers (Değirmencioğlu et al., 1998; Parker & Seal, 1996). Thus, the influence of friendship experiences on loneliness are likely to vary in these different contexts. Nonetheless, although the generalisation of these findings is limited, this research provides some support for the argument that the mere presence of a mutual friendship may not be enough to protect against feelings of loneliness. Thus, as with group-level peer experiences, the results of the reviewed studies suggest that mutual friendship may be indirectly and negatively related to loneliness via its association with other friendship variables.

2.4.3.2 Friendship quality

One variable that may facilitate long-lasting mutual friendships is the quality of the relationship. Of the seven studies that measured FQ, four (3, 5, 6, and 13) used a version of the Friendship Quality Questionnaire (FQQ; Parker & Asher, 1993) and one (10) used the

Friendship Qualities Scale (Bukowski et al., 1994). Three studies also used questionnaires or individual subscales of questionnaires to measure specific qualities within best friendships to either supplement their chosen FQ scale (5) or as a standalone measure (8 and 12). The findings of all seven studies will now be discussed.

Spithoven et al. (2018) used an Actor-Partner Interdependence Model (Kenny et al., 2006) to draw correlations between within-person (actor) effects as well as between-person (partner) effects among pupils with a mean age of 13.51 years. Actor effects showed that self-reported loneliness did not predict self-reported FQ one year later or vice versa. Partner effects also indicated that the self-reported loneliness and FQ of one dyad member did not predict the self-reported loneliness or FQ as reported by their best friend 12 months later. However, researchers excluded 62.22% of participants who did not have a reciprocated same-sex best friendship within the study sample and attrition analyses indicated that these adolescents reported more loneliness and lower FQ. This, along with the researchers' finding that lonely individuals were more likely to nominate a best friend outside of school, mean the results are not representative of opposite-sex friendships or more lonely individuals.

As an indicator of FQ, Rotenberg et al. (2004) measured trustworthiness in best friendships by asking participants to rate how often this friend kept secrets and promises. As above, hierarchical regression analyses indicated that best friend trustworthiness was not a significant predictor of changes in loneliness over time. In further correlational analyses, researchers found that T1 best friend trustworthiness was not significantly correlated with T2 loneliness or vice versa. However, the absence of a significant relationship between these variables may be due to the fact that there could be other relationship qualities that influence loneliness, so to consider only one could be somewhat reductionist.

This critique is supported by Klarin's (2004) research, where both an individual and a multi-component measure of FQ were used. Reciprocity was measured using the Reciprocity Questionnaire (Buunk & Prins, 1998), which involved asking participants to rate the degree of giving and receiving in their best friendships. Overall FQ was measured using the FQQ. The results indicated that while T1 loneliness was not significantly associated with T2 reciprocity ($r(149) = -.04$, $p > .05$) or T2 FQ ($r(149) = -.16$, $p > .05$), FQQ scores at T1 were significantly and negatively associated with T2 loneliness, $r(149) = -.24$, $p < .001$. This suggests that the overall quality of a best friendship is negatively related to later feelings of loneliness among adolescents. However, these results are only correlational and, as a result, do not tell us anything about the direction or causal nature of this relationship.

Wang et al. (2020) attempted to investigate this further when they used more sophisticated statistical methods to explore the relationship between FQ and loneliness over a six month period. Cross-lagged panel analyses indicated that T1 loneliness significantly and negatively predicted T2 FQ ($\beta = -.11$, $t = -2.67$, $p < .01$, $d = .14$) but that T1 FQ did not significantly predict T2 loneliness ($\beta = -.05$, $t = -1.40$, $p > .05$). However, the three items used to measure FQ in this study were deemed unreliable as they only measured time spent and information shared with friends. Moreover, the generalisability of these findings is limited due to the study's unique sample characteristics; Wang et al. described their adolescent participants as "left-behind" i.e., young people whose parents had migrated from rural to urban areas of China, often leaving them in the care of their extended family. When Zongkui et al. (2006) used the same statistical techniques to explore this relationship in a more representative sample of adolescents and using the FQQ, they found that T1 FQ significantly and negatively predicted T2 loneliness, $\beta = -$

0.133, $p < .05$, and vice versa, $\beta = 0.175$, $p < .05$. These results therefore suggest that a bi-directional relationship may exist between loneliness and FQ.

A significant relationship was also found in Newman-Kingery et al.'s (2011) research, where they explored the impact of FQ on pre-adolescents' experience of loneliness following school transition. Results indicated that FQ in elementary school was significantly and negatively correlated with loneliness levels six months later following transition, $r = .30$, $p < .01$. Simultaneous regression analyses further highlighted T1 FQ as a unique predictor of T2 loneliness, $\beta = -.11$, $p < .05$. However, as with other aspects of peer experiences discussed above, when baseline loneliness levels were controlled for, hierarchical regression analyses indicated that T1 FQ did not significantly predict T2 loneliness. What is perhaps noteworthy in this research is that girls reported significantly higher FQ than boys at both time points. Research has historically indicated that girls' friendships tend to be more intense, close, exclusive, and intimate than boys' (Maccoby, 1998; Daniels-Beirness, 1989; Hallinan, 1980), thus highlighting the importance of considering gender as a possible moderator in this relationship.

Dongmei and Zongkui (2006) attempted to explore gender-dependent effects of changes in FQ on loneliness among Chinese pre-adolescents. They classified students into increasing, decreasing or stable FQ groups based on changes between the two time points. A 3 (changes in FQ) x 2 (measurement time of loneliness) repeated measures ANOVA indicated no main effect of changes in FQ but a main effect for loneliness time. Simple main effects analyses showed that T2 loneliness ($M = 2.142$, $SD = 0.100$) was significantly lower than T1 loneliness ($M = 1.847$, $SD = 0.115$) for the male group with increasing FQ, $F(1, 215) = 8.41$, $p = .004$, but not females. This supports the notion that the strength and significance of the relationship between FQ and loneliness may be somewhat determined by gender.

2.5 **Discussion**

2.5.1 Summary and discussion of findings

In this systematic review, the relationship between young people's sense of belonging and the quantity and quality of their friendships was explored. A general consensus was present across the 13 included studies that the number and quality of peer relationships is negatively associated with loneliness, the psychosocial outcome experienced when belonging needs are not met (Baumeister & Leary, 1995). The key findings, strengths, limitations, and implications of this review will now be discussed.

The results of each study were grouped according to group- and dyad-level peer experiences. For the purpose of this review, measures of social preference, perceived popularity, and mutual friendship were considered to reflect friendship quantity. Tools used to assess particular characteristics of the friendship relationship (e.g., companionship and trustworthiness) were considered indicative of FQ and were discussed under this subheading.

Collectively, the findings of all nine reviewed studies that examined the relationship between group-level peer experiences and loneliness indicate that being well-liked by many peers is associated with lower self-reported loneliness over time. Research exploring the bidirectional nature of this relationship suggests that while loneliness may not predict how well-liked a person is (social preference), it can influence how well-known they are within their social group (perceived popularity). Thomas (2014) proposes that adolescents with lower levels of loneliness are likely to be more content with their social life, thus appearing more confident in social situations, which then leads to higher perceived popularity among their peer group. Conversely, being less lonely and more confident may not necessarily make others like you more (i.e., increase your social

preference), particularly if this confidence is expressed through assertive, powerful, and aggressive behaviours (Bukowski et al., 2000).

Nonetheless, when baseline loneliness levels are controlled for, social preference is not consistently predictive of later loneliness levels or vice versa. However, the quality assessment process showed that there were measurement limitations associated with the two studies that reported a non-significant relationship; one study used a measure of dislike with poor construct validity (Betts & Stiller, 2014b) and another grouped distinctly different social categories together (Dongmei & Zongkui, 2006).). Thus, considering the results of all nine studies alongside the quality assurance information leads one to conclude that a significant and negative relationship is likely to exist between these variables, but it may not be direct nor causal. This is supported by cross-sectional research in the field, which suggests that social status may indirectly influence belonging and loneliness via its association with friendship experiences (Ferguson & Ryan, 2019; Nangle et al., 2003).

In this view, mutual friendship may mediate the relationship between group-level peer experiences and loneliness. There is general agreement in eight of the reviewed studies that mutual friendship and loneliness are negatively correlated. Although Klarin (2004) found a non-significant relationship, the measurement of mutual friendship was considered unreliable as participants were only allowed to nominate one other peer, increasing the likelihood that some reciprocated friendships were unaccounted for. Nonetheless, as with group-level peer experiences, results indicate that when baseline loneliness levels are controlled for, mutual friendship is not a unique predictor. However, the inclusion of temporal variables in one study indicated that mutual friendship is only predictive of lower loneliness experiences when these friendships are sustained (Parker & Seal, 1996). This suggests that the mere presence of a mutual friendship is not sufficient to protect against feelings of loneliness in the absence of friendship longevity. While the

application of these research findings to longer-term friendships is limited, the results align nicely with Baumeister and Leary's (1995, p. 497) assertion that the fundamental need to belong is met via "a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships". Thus, friendships that are reciprocal and long-lasting are likely to be beneficial for optimal psychosocial outcomes in adolescence (Prince & Hadwin, 2013). Nonetheless, more longitudinal research on the impact of friendship formation and durability on loneliness in adolescents' longer-term friendships is required before reliable conclusions can be made.

That being said, mutual and sustained friendships may not necessarily enhance belonging if they are not high in quality (Vanhalst et al., 2014). Cumulatively, the results of the reviewed studies indicate that mutual friendships high in quality are associated with lower self-reported loneliness. Although not all studies supported this conclusion, those that reported non-significant findings used measures that were either not representative of other-sex relationships and more lonely individuals (Spithoven et al., 2018) or denoted only one quality of a friendship relationship, i.e., reciprocity (Klarin, 2004) or trustworthiness (Rotenberg et al., 2004). Thus, in the context of good quality research design and methodology, a significant and negative relationship between FQ and loneliness exists. These findings are supported by qualitative research in the field, indicating that mutual friendships can provide adolescents with benefits that increase feelings of security and acceptance, thus contributing to a SoB (Hamm & Faircloth, 2005). The findings of this review also suggest that the strength and significance of this relationship may be different for males and females. Nonetheless, further exploration is required to fully understand the role of gender and other potential moderating variables.

2.5.2 Strengths and limitations of reviewed literature

This systematic review included 13 studies, which all outlined clear aims and rationale. Heterogeneity was present between the studies in terms of culture, participant age, study length, number of time points, measures used, and methods of analysis. Heterogeneity can be advantageous in systematic reviews as variability can help to identify patterns across different cultures, populations, and contexts. However, pooling heterogeneous studies in literature reviews can also be a risk if the effects are neither consistent nor robust (Esterhuizen & Thabane, 2016). Given that variability existed in a number of domains between the studies, it is important to interpret the findings of this review with some caution and with particular reference to the cultures and age groups to which particular findings refer.

The research was conducted in four different countries, thus allowing cross-cultural comparisons to be made. This is particularly beneficial given research indicating societal conditions that affect the symmetry and characteristics of friendships (Keller, 2004). Nonetheless, studies conducted in non-western countries used instruments that were originally constructed for use in one language and culture (e.g., Zongkui et al., 2006; Wang et al., 2020). Although researchers reported good reliability coefficients when the scales were standardised for use with pupils in their sample, culture-specific representations of friendships may still have been present within the test items (Zurcher, 1998).

Moreover, scales such as the FQQ and FQS typically measure self-focused features of friendships, i.e., what benefits the individual receives from the relationship. As a result, other-focused aspects of friendship e.g., collaboration, empathy, and perspective taking, which are thought to develop during adolescence (Sullivan, 1953) tend to be missed. A more sophisticated exploration into the relationship between these constructs in

adolescence may benefit from the development of new and more developmentally appropriate measures.

All researchers explored naturally occurring peer experiences, making the exploration of authentic social behaviour possible. This increases the external validity of the results, and the subsequent capacity to draw conclusions about the relationship processes of young people in similar age groups and settings. Nonetheless, a primary difficulty in naturalistic research is the ability to anticipate and control for all possible confounding variables. This was a significant shortcoming in the reviewed studies, with very few researchers considering time-dependent and independent covariates in their research design and analysis. Although it is not possible to anticipate all possible confounds in naturalistic research, it is important to control for those considered to be fundamentally involved in the relationship under exploration (Allison, 1990). The appraisal of the reviewed studies suggested that the presence and significance of covariates may depend largely on the design and timing of the research. For example, the finding that mutual friendships in elementary school did not predict loneliness levels following school transition may not be surprising given research indicating that the overall size of a child's social network and the number of reciprocated friendships declines at school transitions (Felmlee et al., 2018; Hardy et al., 2002). Research also indicates that loneliness and friendship experiences are contingent on age and gender (Barreto et al., 2021), two variables that were not always considered in the reviewed studies. This highlights the importance of predicting, measuring, and controlling for time-dependent and independent covariates in research of this kind (Song et al., 2012).

2.5.3 Implications for future research

Most studies in this review examined the relationship between friendship experiences and loneliness in isolation, which is thought to further exacerbate the issue of confounds described above (Bukowski et al., 1993). In their review, Stotsky and Bowker (2018) noted that they could only locate seven studies that studied popularity, preference, and an index of friendship simultaneously. Future research may therefore wish to consider path analysis when examining friendship and adjustment relationships because it produces an index of the adequacy of the whole model, indicates the strength of each individual path, and assesses the direct and indirect link between variables (Bukowski et al., 1993). Moderation and mediation models including these variables have been investigated cross-sectionally, but further exploration is needed in longitudinal research in order to advance understanding regarding the direction and causal nature of these relationships over time. It will also be important for future researchers to anticipate, measure, and control for salient covariates, which are likely to vary in significance depending on sample characteristics and research design.

None of the included studies accounted for friendships outside of the study sample. Given research indicating that unpopular and lonely children are more likely to have friendships outside of school rather than in school (George & Hartmann, 1996; Spithoven et al., 2018), it seems important to account for these relationships in future research. More attention must also be given to the cyclical relationship between psychosocial outcomes and friendship experiences, given findings indicating that adolescents who are lonely and have a poor SoB might lack the skills necessary to form high quality friendships, thus further exacerbating their feelings of loneliness (Lodder et al., 2017; Tsai & Reis, 2009).

A final recommendation for future research relates to the absence of any belonging measure in the 13 reviewed studies. Although assumptions can be made about the

relationship between quantity and quality of friendship and belonging on the basis of this review, further research is needed in order to understand the specific mechanisms by which group acceptance and high quality mutual friendships contribute to young people's SoB over time.

2.5.4 Implications for practice

The results of this systematic review have highlighted the importance of high quality mutual friendships to protect adolescents from feelings of loneliness. Nonetheless, lonely individuals are also likely to be those that lack the social skills necessary to initiate and maintain these relationships (Schinka et al., 2013). Consequently, educational psychologists (EPs) and other practitioners working with children should consider interventions that provide adolescents with the skills necessary to form healthy, positive, and long-lasting friendships. Given that children with few or no friendships are likely to also be rejected at the group level (Gorman et al., 2011), using a range of different sociometric assessments, (e.g., asking adolescents to nominate peers who are friends, non-friends, popular, shy etc.) to capture the different characteristics of peer relationships will be important to help identify young people in need of support. Eliciting children's views about their own perceived feelings of loneliness and SoB will also be important, given the subjective nature of these psychosocial phenomena. Interventions should then be focused on developing children's acceptance at the group level, such as Circle of Friends (Newton et al., 1996) and Nurture Groups (Boxall, 2002). However, the results of this review indicate that even if successful, these interventions would only indirectly improve children's psychosocial outcomes through their impact on dyadic processes.

Interventions can, and should, extend beyond the adolescent to wider school and community practices. This is because individual outcomes are influenced by the many

interrelated systems in which they exist (Bronfenbrenner, 1979). EPs could therefore help schools implement whole-school pedagogical practices that remove barriers to social equality for underrepresented groups of youth. For example, implementing the 'No Outsiders' project (Harvey, 1990) that was created to challenge heteronormativity and create inclusive communities within schools by educating students about the protected characteristics outlined in the Equality Act (2010). Creating an ethos where all young people feel accepted through the mantra 'everyone different, everyone welcome' (Moffat, 2020) will increase adolescents' tolerance and openness to forming friendships with all peers, regardless of their race, religion, sexual orientation, and/or SEND. This will give youth who may have otherwise been 'rejected' or 'neglected' more opportunities to develop positive peer relationships, thus facilitating a SoB and reducing the risk of experiencing loneliness. Working within multi-disciplinary teams in local authorities, EPs also have contact with other professionals who work with adolescents e.g., youth offending team staff, youth group leaders, careers advisors etc. This gives them an opportunity to contribute to and advocate for the development of youth groups for adolescents with various strengths, needs, and interests. This would give young people opportunities to develop relationships with like-minded peers outside of school, and thus, experience a sense of community belonging.

2.6 **Conclusion**

Overall, the findings of this review indicate that being well-liked by many peers and having good quality friendships is likely to enhance belonging, and thus reduce feelings of loneliness. Triangulation with other research in the field suggests that a moderated mediation model is likely to best represent the relationship between variables (e.g., Nangle et al., 2003; Zhou et al., 2009). That is, social preference at the group level is likely to influence loneliness through its association with mutual friendship and FQ

(Bullock et al., 2019; Shin, 2007; Vanhalst et al., 2014). However, the significance and strength of these relationships may depend on a number of moderating factors, such as age and gender, which require further attention in future longitudinal research. Future systematic reviews would also benefit from examining the relationship between these variables in a more homogeneous sample of studies to give a clearer indication of culture-, age-, and time-dependent effects.

Chapter 3 When the world stayed apart, we stayed connected: How can social media enhance young people's sense of belonging and wellbeing?

3.1 Abstract

The rise in adolescent social media (SM) use over the past two decades has led to widespread interest regarding its effects on wellbeing. However, the nature and direction of the relationship between SM use and adolescent outcomes over time is still not clear. In this research, 49 11- to 18-year-olds took part in a seven-day study using a randomised controlled experimental design to compare the impact of different activities on adolescents' sense of belonging and wellbeing. Each participant was randomly allocated to one of three activity groups: (1) interacting with a friend/family member online; (2) lurking online; (3) interacting with a friend/family member face-to-face. For seven consecutive days, participants were asked to do their activity and answer questions about their wellbeing and belonging. Participants also completed a questionnaire about their usual SM use at the start and end of the study. Changes in belonging and wellbeing did not differ significantly between the groups. However, using SM to pass time negatively predicted belonging and wellbeing. The results also suggested that using SM to maintain existing relationships predicted later belonging. These preliminary findings suggest that adolescents would benefit from developing SM habits that are focused around interaction and social connection, while reducing SM habits that are more passive in nature. However, repeating the study after the coronavirus pandemic and with a larger sample will be important so that more reliable conclusions can be made.

Keywords: social media, belonging, wellbeing, adolescence, relationships, lurk, interact

3.2 Introduction

Social media (SM) is a group of internet-based applications that are publicly available and "allow the creation and exchange of user-generated content" (Kaplan & Haenlein, 2010). Global statistics indicate that SM is now used by more than half of the world's population. This figure is also thought to be increasing exponentially, with 490 million new SM users recorded in 2020 (Data Reportal, 2021). Adolescents are thought to account for a larger percentage of these users than any other age group, with 94% of American teens and 71% of British 12- to 15-year-olds using SM (NORC for Public Affairs Research, 2017; OfCom, 2019). These figures are also likely to be an underrepresentation of adolescents' current SM use, with recent research highlighting a surge in teens' overall screen time during the coronavirus pandemic (Cauberghe et al., 2020; Hamilton et al., 2020; Nagata et al., 2020).

3.2.1 Screen time

Two decades ago, the rapid popularisation of internet technologies was paralleled with trepidations regarding the harmful effects this could have on personal relationships and mental health. These concerns are central to the social displacement hypothesis, which is based on the assumption that time spent online reduces the amount of time available for face-to-face interactions with friends and family, thus negatively impacting social and emotional wellbeing (Kraut et al., 1998; Nie, 2001). In the last decade, researchers have found some evidence to support this hypothesis, revealing negative associations between SM use and outcomes such as self-esteem, anxiety, depression, sleep, and cognitive function (Barthorpe et al., 2020; Richards et al., 2015; Sarmiento et al., 2020; Twenge et al., 2018; Twenge & Campbell, 2019; Vannucci et al., 2017; Woods & Scott, 2016; Wright et al., 2013, Xanidis & Brignell, 2016). Given the widespread recognition that adolescents

are already at an increased risk of experiencing internalising symptoms (Beesdo et al., 2009; Victor & Yang, 2012), these findings have only amplified existing concerns regarding the impact of SM on adolescent mental health (Best et al., 2014; Sampasa-Kanyinga & Lewis, 2015). This has led many researchers to advocate for reduced screen time to lessen the potential negative impact of SM on individuals from a population already considered at risk (e.g., Maras et al., 2015; Page et al., 2010).

3.2.2 Active versus passive social media use

It could, however, be considered reductionist to assume that time spent on SM is the most accurate and comprehensive representation of its use. This is because activities on and between social networking sites (SNSs) vary considerably, from instant messaging with friends, to playing games, posting photos or statuses, and scrolling through others' newsfeeds (López et al., 2019). Researchers have categorised these different activities into active and passive SM use; while the former involves actively posting, sharing, and interacting online, the latter involves viewing others' profiles without commenting, posting, or liking (Frison & Eggermont, 2016; Swirsky et al., 2021). A developing body of research seems to suggest that this passive form of SM use, sometimes referred to as 'lurking', can reduce adolescents' sense of belonging (SoB), and increase feelings of loneliness and emotional distress (Thorisdottir et al., 2020; Carpenter et al., 2011; Tobin et al., 2015). Conversely, using SM actively to communicate with existing friends and family members has been found to strengthen relationships and increase overall wellbeing (Clark et al., 2018; Valkenburg & Peter, 2009). Other research has also emphasised the beneficial effects active SM can have by facilitating social connectedness (Ahn & Shin, 2013; Clark et al., 2018; Cornejo et al., 2013; Grieve et al., 2013; Neubaum & Kramer, 2015; O'Reilly, 2020). Together, these findings support the stimulation hypothesis, which is based on the assumption that time spent online enhances psychosocial outcomes by increasing the

amount of time individuals can spend interacting with friends and family, thus improving the quality of these relationships (Bryant et al., 2006).

3.2.3 Social media from a social needs perspective

The stimulation hypothesis is consistent with the social needs perspective of human behaviour; SNSs that provide interaction opportunities appeal to users because humans are social creatures who have a fundamental need to connect with others and experience a SoB (Bauemeister & Leary, 1995; Maslow, 1968). In this view, SNSs allow individuals to spend more time interacting with their offline friends in online environments, making it easier to satisfy their need to belong (Ross et al., 2009; Gardner et al., 2005). This is especially important during adolescence, where peer relationships become increasingly important for mental health (Ferguson & Ryan, 2019; LaFontana & Cillessen, 2010; Lodder et al., 2017; Sullivan, 1953) and, as previously mentioned, the risk of experiencing loneliness and other internalising symptoms increases (Heinrich & Gullone, 2006).

It is therefore unsurprising that adolescents are considered the most likely population to be affected by the sudden and prolonged restriction to physical contact with peers during the coronavirus pandemic (Hamilton et al., 2020; Kilford et al., 2016). Nonetheless, adolescents' online literacy skills are likely to provide them with the tools to stay socially connected while remaining physically distant from their friends (Anderson & Jiang, 2018; Hamilton et al., 2020; Nagata et al., 2020; Swirsky et al., 2021). However, despite the fluency with which teenagers are able to use SNSs, qualitative research has highlighted that they lack expertise in safely navigating the online world (O'Reilly et al., 2018). Overall, these findings support the adoption of a strengths-based, person-centred, and positive psychological perspective in research in order to identify ways adolescents

can use SM to protect their wellbeing, rather than advocating for a reduction in its use among a population that both need and wish to use it.

3.2.4 Research aims, questions, and hypotheses

Although empirical evidence exists to support a significant relationship between different types of SM activity and aspects of wellbeing during adolescence, much of this research is cross-sectional (e.g., Allen et al., 2014; Gangadharbatla, 2008; Grieve et al., 2013; Quinn & Oldmeadow, 2013). This has made it difficult to determine the temporal sequence and direction of effects; although it may be hypothesised that using SM to connect with others promotes a SoB, individuals who feel more connected to their friends may use SM more frequently to interact with them. Findings from a recent systematic narrative review also highlight this gap in the research, stating that the lack of rigorous experimental research in this field has limited the capacity to make inferences about any causal relationships between the variables of interest (Sarmiento et al., 2020). This, along with the complexity of the relationship between SM use and mental health (Orben, 2020; Sarmiento et al., 2020), has resulted in uncertainty regarding the link between different online activities and psychosocial outcomes.

Thus, this research will use an experimental and longitudinal research design to attempt to elucidate the nature and direction of the relationship between different SM activities, SoB, and wellbeing among adolescents. The research will also be conducted in the United Kingdom (UK) during the period of school closure in response to the coronavirus pandemic, helping to explicate the potential benefits of SM activity during a period where most adolescents have reduced physical contact with their peers and wider family networks.

Chapter 3

Through this research, I will aim to answer two related questions. Firstly, to what extent can using SM to interact with existing friends and/or family enhance adolescents' SoB and wellbeing, and secondly, how does this compare to other online and offline activities? The hypotheses are:

- (H1) using SM to maintain existing relationships will be positively associated with belonging and wellbeing at study onset;
- (H2a) participants who actively interact on SM will experience a greater increase in belonging and wellbeing over the seven-day study period than participants who lurk;
- (H2b) participants who interact in person will experience a greater increase in belonging and wellbeing over the seven-day study period than participants who lurk;
- (H3a) participants who actively interact on SM will experience greater increases in their feelings of connectedness and mood immediately after their activity than participants who lurk;
- (H3b) participants who interact in person will experience greater increases in their feelings of connectedness and mood immediately after their activity than participants who lurk;
- (H4a) using SM to maintain existing relationships will predict belonging seven days later; and
- (H4b) belonging will not predict adolescents' use of SM to maintain existing relationships seven days later.

3.3 **Method**

3.3.1 Design

A randomised controlled experimental design was used to assess the immediate and mid-term impact of different activities on young people's SoB and wellbeing. Data were collected using the Lifeguide programme. A Lifeguide website was designed by the researcher, which included the measures, consent, and debrief procedures. Each participant took part in the study over seven consecutive days during term time. For the remainder of this paper, T1 will be used to denote day/time one, T2 for day/time two etc.

At T1, the Lifeguide server randomly assigned participants to one of three groups, which determined their daily activity for the remainder of the study: (1) interacting with a friend and/or family member on SM; (2) lurking on SM; and (3) interacting with a friend or family member face-to-face. From this point onwards these groups will be referred to as INTERACT, LURK, and FTF, respectively. Participants were aware that there were other groups, but did not know what these were.

At two time points (T1 and T7) participants' SoB, wellbeing, and reasons for using SM were measured. Once a day for seven consecutive days (T1,…T7) participants were asked to complete their daily activity and self-report measures of their feelings of connection and general mood pre- and post-activity, as delineated in Figure 3.1.

3.3.2 Participants

Young people in the United Kingdom (UK) were recruited from schools, colleges, and through personal contacts of the research team. Eligible participants had to be aged 11- to 18-years old and have daily access to one or more SNSs. Forty-nine 11- to 18-years-olds took part in the research, (M*age* = 14.02, SD = 1.797). Of these, 55.1% were female,

42.9% were male, and 2% chose not to disclose their gender. Participants identified as British (77.6%), White and Black Caribbean (8.2%), Indian (6.1%), White and Asian (6.1%), and Other White Background (2%).

3.3.3 Measures

Intake survey: At the start of the research, participants were asked to complete an intake survey, including questions eliciting demographic information (e.g., age, gender, and ethnicity) and Likert-scale questions assessing factors that could impact participants' SoB and wellbeing. For example, "How well do you feel you're doing at school?" and "On a typical/normal week day, how often do you and your family spend quality time together?"

Belonging. The General Belongingness Scale (GBS; Malone et al., 2012) was used to measure participants' global SoB at T1 and T7. Participants responded to the 12 items on a seven-point Likert scale, ranging from "strongly disagree" to "strongly agree". Six items assessed inclusion, e.g., "When I am with other people, I feel included", while the others measured exclusion, e.g., "I feel like an outsider". The latter items were reverse scored before calculating an overall GBS score, with total scores ranging from one to 84. Cronbach's alpha coefficients indicated good reliability of the total scale, as well as the inclusion and exclusion subscales at both time points; T1 = .86, .81, and .77; T7 = .86, .83, and .78, respectively.

Wellbeing. The Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS; Tennant et al., 2007) was used to measure participants' wellbeing at T1 and T7. This scale has 14 items, each responded to on a five-point Likert scale ranging from "none of the time" to "all of the time". Example items include "I've been feeling useful" and "I've had energy to

spare". Total scores ranged from one to 70. This scale had good reliability at T1 (α = .88) and T7 (α = .87).

SM use. Participants' motives for using SM were also assessed at T1 and T7. An adapted version of the Facebook Usage Aims Scale (FUAS; Horzum, 2016) was used, by replacing the word 'Facebook' with 'social media'. No other adaptations were made as no items in the FUAS are specifically related to Facebook use. Kircaburun et al. (2018) adapted the measure in the same way and renamed it the Social Media Usage Aims Scale (SMUAS). The 30-item scale consists of seven subscales, each related to a different motive for using SM: (1) maintaining existing relationships (MER) e.g., "I use social media to stay in touch with friends or people I know"; (2) meeting new people and socialising (MNPS) e.g., "I use social media to meet new friends"; (3) making, expressing, or presenting a more popular oneself (MEPO) e.g., "I use social media to be cool"; (4) passing time (PT) e.g., "I use social media to distract myself"; (5) as a task management tool (ATMT) e.g., "I use social media to create an activity group"; (6) entertainment (E) e.g., "I use social media to play games"; (7) educational and informational (EI) e.g., "I use social media to join an educational or instructional group". Participants responded to the questionnaire on a five-point Likert scale ranging from "strongly disagree" to "strongly agree". A mean score was calculated for each subscale, with scores ranging from one to five. At T1, the Cronbach's alpha coefficients for the total scale and subscales were: .90, .65, .59, .73, .92, .63, .65, and .60, respectively. Compared to T1, the coefficients at T7 indicated higher reliability for the total scale and most of the subscales: .92, .87, .64, .80, .88, .72, .67, and .74, respectively. George and Mallery's (2003) cut-off scores indicate that some of the subscales have "questionable" (α < .7) and "poor" (α < .6) reliability. This is likely due to the small number of items in the scale, possibly contributing to the instability in internal consistency observed between the two time points (Thanasegaran, 2009). Nonetheless,

more satisfactory alpha coefficients were reported for the total scale and subscales in the original scale development (FUAS; Horzum, 2016) and in its adaptation (SMUAS; Kircaburun et al., 2018).

Pre- and post-activity measures. Each day, both pre- and post-activity, participants were asked to rate their mood, feelings of connectedness (SoB), and how well they felt they succeeded in satisfying their parents with their schoolwork using an eleven-point Likert scale, ranging from 0 to 10. For example, for mood, participants were asked to rate how they currently felt, where 0 = "very sad" and 10 = "very happy". Post-activity, participants were also asked to report how long they spent on their activity and how well they felt they adhered to it. The schoolwork question was used to distract participants from the purpose of the study, but the mood and SoB scores were used to assess changes in participants' wellbeing and belonging in response to their daily activity. Average daily change scores were calculated by subtracting the pre-activity ratings from the post-activity ratings, and calculating a mean for each participant by adding them together and dividing by the total number of days the participant had completed. An increase in daily change score implies the participant's mood and SoB increased over the course of their activity.

As belonging and wellbeing were measured pre- and post-activity, but also through the validated scales at T1 and T7, different terms will be used to reference these measures for clarity. The terms 'SoB' and 'mood' will be used to reference the daily change measures, and 'GBS' and 'WEMWBS' will be used for the T1 and T7 measures.

3.3.4 Procedure

All participants completed the research between November 2020 and February 2021 during a period of local and national physical and social restrictions associated with the coronavirus pandemic. Prior to study onset, ethical approval was granted by the

University of Southampton ethics committee (Ergo number = 54820; Appendix A). To recruit participants, the researcher contacted schools in the South of England through her placement as a trainee educational psychologist. Interested schools were then asked to complete the online setting consent form, before distributing the parent information and the online parental consent link via their parent mail system. Other UK-based youth settings (e.g., youth groups, schools, and colleges) and parents of 11- to 18-year-olds who were known to the research team were also contacted and, if interested, were sent the relevant information.

Following parental consent, the researcher emailed participants to invite them to set up a study account on the Lifeguide website. Once participants had created an account, they were asked to complete the intake and baseline surveys and were randomly allocated to their daily activity group. Participants then answered the pre-activity questions, completed their daily activity, and subsequently answered the post-activity questions for T1. Thereafter, participants were sent daily automated emails by the Lifeguide website at 17:30 for the next six consecutive days to remind them to log on to the website to answer the questions and complete their daily activity. Participants had 24 hours from the time of the email to complete that day's activity. If participants missed a day (e.g., T4), this was logged as missing data, and the participant would still be emailed the following day to do their next activity (e.g., T5). At T7, participants completed their daily activity, and then answered the GBS, WEMWBS, and SMUAS for a second time in the end surveys. After completing the end surveys, the participants were debriefed and informed that they had one month to withdraw their data, at which point their data would be anonymised for data analysis. A visual representation of data collection can be found in Figure 3.1.

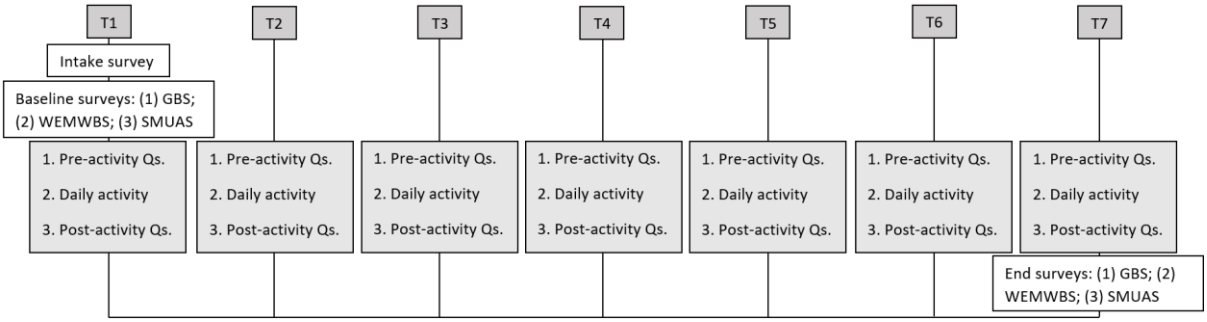
3.3.4.1 Daily activity groups

Participants were allocated to one of three activity groups: (1) INTERACT; (2) LURK; and (3) FTF. Participants in the INTERACT group were asked to interact with a friend and/or family member on SM. Participants in this group were told that the person(s) they interact with should be someone they have met in real life, and that the interaction should involve a conversation where both/all parties take turns to discuss something together. This could be on either an instant messaging application (e.g., WhatsApp) or a conversation that starts by commenting on e.g., a photo upload or status update.

Participants in the LURK group were instructed to engage passively on one or more of their SM platforms e.g., scrolling through their newsfeeds, watching videos, looking at others' photos etc. Lurkers were asked to refrain from any active engagement e.g., posting their own content, commenting or liking others' content, and using any of their SNSs to engage in conversations with others.

Finally, participants in the FTF group were asked to interact with a friend and/or family member(s) face-to-face. They were instructed to have a conversation, where they take turns to talk about something together. Participants were instructed that it did not matter where the conversation took place, as long as it was face-to-face. Participants in all three groups were given flexibility in terms of how long they spent on their activity, but approximately five to 10 minutes was suggested as an appropriate amount of time. All participants were also encouraged to make their activities as natural as possible i.e., talking about things they would normally talk about with people they would normally interact with (INTERACT and FTF) and viewing their usual content (LURK). Instructions given to participants in each daily activity group can be found in Appendix G.

Figure 3.1 *A visual representation of the study procedure*



3.4 Results

3.4.1 Preliminary analyses

Twenty-five participants completed both the baseline and end surveys at T1 and T7, respectively, indicating a 49% attrition rate. Table 3.1 shows the number of participants who completed each session. As there were only four participants in the INTERACT group who completed both the baseline and end surveys, single case analyses were conducted to explore changes in SoB and mood in response to their daily activity, with each participant acting as their own control. These will not be discussed in the main results as the research was not designed as a single case design study, but are instead presented in Appendix H as a supplement to the main analyses.

Descriptive statistics highlighted that individuals in all three groups were roughly similar on the control variables (Tables 3.2 and 3.3). Independent samples *t*-tests were also conducted to assess whether those who completed the end survey at T7 (n = 25) differed significantly on any of the baseline measures from those who did not (n = 22). Participants who were not present at T7 (M = 4.01, SD = .913) were more likely to use SM to pass time than participants who were present at both time points (M = 3.31, SD = 1.09). This difference, .708, 95% CI [.121, 1.29] was significant, $t(46) = 2.43$, p = .019, with an

associated small effect size, $d = 1.01$. All other differences (i.e., in GBS, WEMWBS, MER, MNPS, MEPO, ATMT, E, and EI) were non-significant.

Table 3.1 *The rate of participant completion in each group for the different sessions*

Session	Number of participants		
	INTERACT	LURK	FTF
Baseline survey	12	21	14
T1	8	19	13
T2	6	16	9
T3	7	14	8
T4	7	17	10
T5	6	15	6
T6	5	14	8
T7	4	14	8
End survey	4	14	8

Note. Two of the 49 participants did not complete the baseline measures so were not allocated a group.

Table 3.2 *Gender and ethnicity percentages in each experimental group*

Group	Gender (%)			Ethnicity (%)					
	Female	Male	Not disclosed	White British	White and Black Caribbean	White and Asian	Indian	Any other White Background	
INTERACT	50	42	8	58.3	0	8.3	25	8.3	
LURK	43	57	0	76.2	14.3	9.5	0	0	
FTF	36	64	0	93	7	0	0	0	

Table 3.3 *Means (M) and Standard Deviations (SD) of control variables in each experimental group. All variables (except age) were rated on a Likert scale from 0 (low) to 10 (high)*

Variables	Group					
	INTERACT		LURK		FTF	
	M	*SD*	*M*	*SD*	*M*	*SD*
Age	14.08	1.31	14.05	1.91	14.07	2.13
Perceived school success	3.50	0.80	3.33	1.16	3.36	1.15
Time spent with friends offline	3.17	1.27	2.71	1.15	2.50	1.23
Time spent with friends online	4.08	1.08	3.43	1.36	3.07	1.27
Weekday quality time spent with family	3.25	1.14	3.14	1.11	3.14	1.03
Weekend quality time spent with family	3.75	0.97	3.62	1.20	3.71	0.99

3.4.2 Cross-sectional analyses

Correlational analyses were initially conducted to explore the relationship between all the variables measured at baseline (Table 3.4). Using SM to pass time was significantly and negatively correlated with WEMWBS, r = -.346, p = .017, and GBS, r = -.398, p = .005. Other reasons for using SM were not significantly associated with GBS or WEMWBS at T1.

Table 3.4 *Pearson product-moment correlations between baseline variables*

Variables	1	2	3	4	5	6	7	8	9
Wellbeing (WEMWBS)	1.0								
Belonging (GBS)	.581**	1.0							
Maintain existing relationships (MER)	.256	.217	1.0						
Meet new people and socialising (MNPS)	-.092	-.028	.626**	1.0					
Making, expressing or presenting a more popular oneself (MEPO)	-.211	-.078	.411**	.570**	1.0				

Table 3.4 (continued).

Variables	1	2	3	4	5	6	7	8	9
Passing time (PT)	-.346*	-.398**	.261	.460**	.509**	1.0			
As a task management tool (ATMT)	.277	.160	.681**	.537**	.418**	.342*	1.0		
Entertainment (E)	.034	-.004	.384**	.391**	.347**	.502**	.599*	1.0	
Educational and informational (EI)	.247	.245	.675**	.529**	.396**	.365*	.705**	.446**	1.0

** $p < .01$ * $p < .05$

Table 3.5 *Time 1 (T1) regression results showing how each social media usage aim (SMUA) predicted General Belongingness Scale (GBS) scores and the Warwick Edinburgh Mental Wellbeing Scale (WEMWBS) scores*

Model		Unstandardised Beta *(B)*	Standard error	Standardised Beta (β)	*t*	Sig.	Upper 95% CI	Lower 95% CI
T1 GBS	(Constant)	61.0	8.05		7.58*	.000	44.72	77.25
	T1 MER	1.95	2.93	.136	.663	.511	-3.98	7.87
	T1 MNPS	-1.09	2.34	-.087	-.465	.645	-5.82	3.65
	T1 MEPO	.452	1.79	.042	.253	.801	-3.16	4.06
	T1 PT	-5.26	1.47	-.597	-3.58*	.001	-8.23	-2.29
	T1 ATMT	-.358	2.81	-.028	-.127	.899	-6.04	5.33
	T1 Ent	1.32	2.02	.114	.656	.516	-2.75	5.40
	T1 EI	5.48	2.93	.369	1.87*	.069	-.438	11.4

Table 3.5 (continued)

Model		Unstandardised Beta *(B)*	Standard error	Standardised Beta (β)	*t*	Sig.	Upper 95% CI	Lower 95% CI
T1 WEMWBS	(Constant)	39.1	7.30		5.35*	.000	24.3	53.8
	T1 MER	2.93	2.66	.220	1.10	.277	-2.44	8.30
	T1 MNPS	-2.37	2.13	-.205	-1.11	.272	-6.68	1.93
	T1 MEPO	-2.0	1.63	-.202	-1.23	.228	-5.29	1.30
	T1 PT	-3.25	1.33	-.399	-2.44*	.019	-5.94	-.553
	T1 ATMT	3.43	2.61	.283	1.32	.196	-1.84	8.70
	T1 Ent	.449	1.83	.042	.246	.807	-3.25	4.15
	T1 EI	2.90	2.68	.212	1.08	.286	-2.52	8.31

Note. SMUAs: (1) maintaining existing relationships (MER); (2) meet new people and socialising (MNPS); (3) make and express more popular oneself (MEPO); (4) pass time (PT); (5) as a task management tool (ATMT); (5) entertainment (Ent); and (6) educational and informational (EI). $p < .05$.

Multiple regression analyses were also conducted on participants' T1 data to assess whether any of the SMUAs significantly predicted participants' GBS and WEMWBS at T1 (Table 3.5). The overall regression model for T1 GBS was significant, $F(7, 40) = 3.10$, $p = .010$. This model had a large effect size, accounting for 35.2% of the variance in T1 GBS. GBS was negatively predicted by using SM to pass time, $\beta = -0.597$, $p = .001$, 95% CI [-8.23, -2.29]. Using SM for educational and informational reasons was approaching significance, $\beta = .369$, $p = .069$, 95% CI [-4.38, 11.4], suggesting that this type of SM use positively predicts belonging. The overall regression model for T1 WEMWBS accounted for 39% of the variance and was also significant, $F(7, 39) = 3.53$, $p = .005$. As with the GBS model, using SM to pass time also negatively predicted wellbeing at T1, $\beta = -0.399$, $p = .019$, 95% CI [-5.94, -.553].

Table 3.6 *Means (M) and Standard Deviations (SD) for General Belongingness Scale (GBS), Warwick Edinburgh Mental Wellbeing Scale (WEMWBS), average daily sense of belonging (SoB) changes, and average daily mood changes*

Measure	Group					
	INTERACT		LURK		FTF	
	M	*SD*	*M*	*SD*	*M*	*SD*
T1 GBS	70.75	5.74	68.00	6.49	69.50	6.12
T7 GBS	65.50	5.51	61.85	7.21	62.56	7.34
T1 WEMWBS	50.0	9.63	48.38	9.67	49.25	6.32
T7 WEMWBS	51.25	5.06	48.46	7.98	46.63	6.72
Average daily change in SoB	0.56	1.15	0.04	1.64	0.95	1.69
Average daily change in mood	0.35	1.00	0.12	0.88	0.91	0.95

3.4.3 Longitudinal analyses

The differences between the groups in terms of changes in GBS and WEMWBS scores, and average daily changes in SoB and mood will be discussed first. Table 3.6 summarises the scores for each of these measures. Finally, the results of a path analysis will be presented.

3.4.3.1 Changes in GBS and WEMWBS

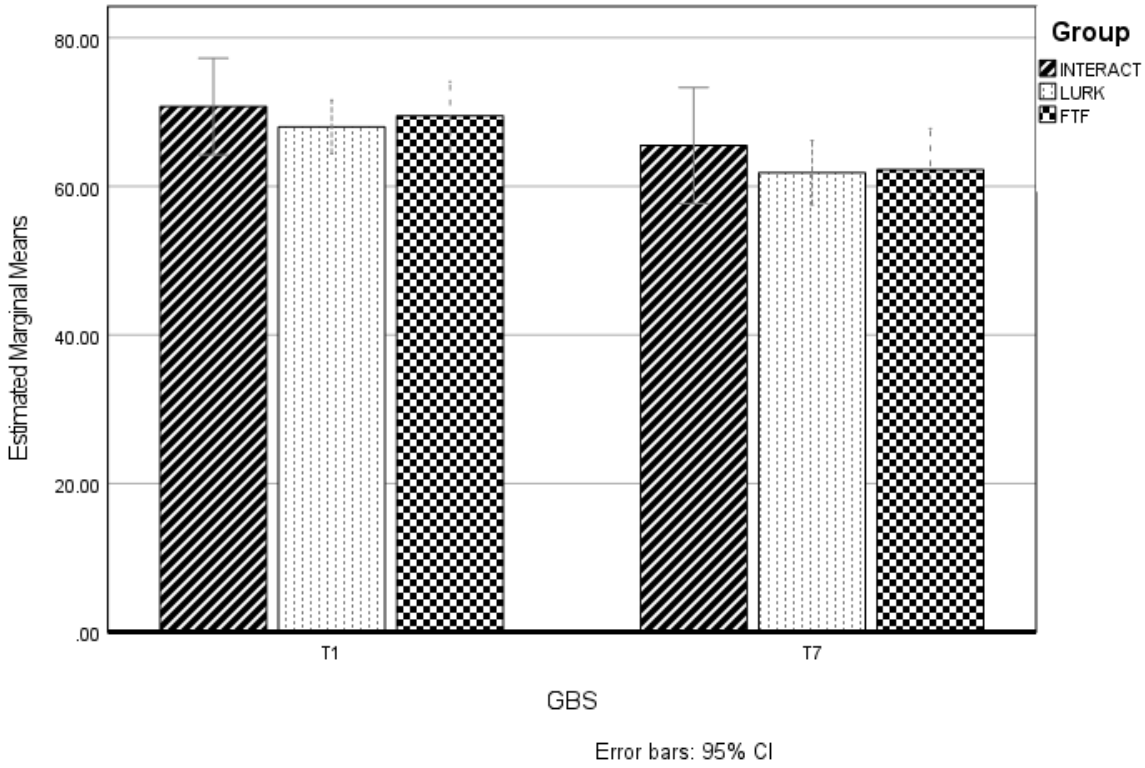
To test the first two hypotheses, a 3 x 2 repeated measures multivariate analysis of variance (MANOVA) was conducted to assess whether there was a significant effect of group and time on participants' GBS and WEMWBS scores. The between-subjects independent variable of group had three levels (INTERACT, LURK, FTF). The within subjects independent variable of time had two levels (T1 and T7). GBS and WEMWBS were the two dependent variables, measured at both time points.

Box's test indicated that the covariance matrices were roughly equal across groups, $F(10, 1011.62) = 0.648$, $p = .773$. A visual inspection of the data showed that participants' GBS and WEMWBS scores at both time points were roughly normally distributed for the LURK and FTF groups. For the INTERACT group, GBS scores had a slight positive skew at T1 and were not normally distributed at T7 due to the low participant number in this group ($n = 4$). However, given that MANOVA tests are considered robust to violations of normality, (O'Brien & Kaiser, 1985), this test was deemed appropriate for use in this context.

The Time x Group interaction was not significant, $V = 0.91$, $F(4, 44) = .527$, $p = .717$, $\eta_p^2 = .046$ suggesting that the study manipulations did not differentially affect belonging and wellbeing. The main effect of group was not significant, $V = 0.04$, $F(4, 44) = 0.27$, $p = .922$, $\eta_p^2 = .020$; participants' overall GBS and WEMWBS scores did not

significantly differ across groups. However, the main effect of time was significant, V = 0.63, $F(2, 21) = 17.86$, $p = < .001$, $\eta_p^2 = .630$. Univariate analysis of variance (ANOVA) results show that there was a significant effect of time on GBS, $F(1, 22) = 33.88$, $p < .001$, $\eta_p^2 = .606$, but not WEMWBS, $F(1, 22) = 0.15$, $p = .699$, $\eta_p^2 = .007$. Figure 3.2 shows that participants in all three groups experienced a decline in their GBS between T1 and T7.

Figure 3.2 *Mean (95% CI) General Belongingness Scale (GBS) scores for each group at Time 1 (T1) and Time 7 (T7*)



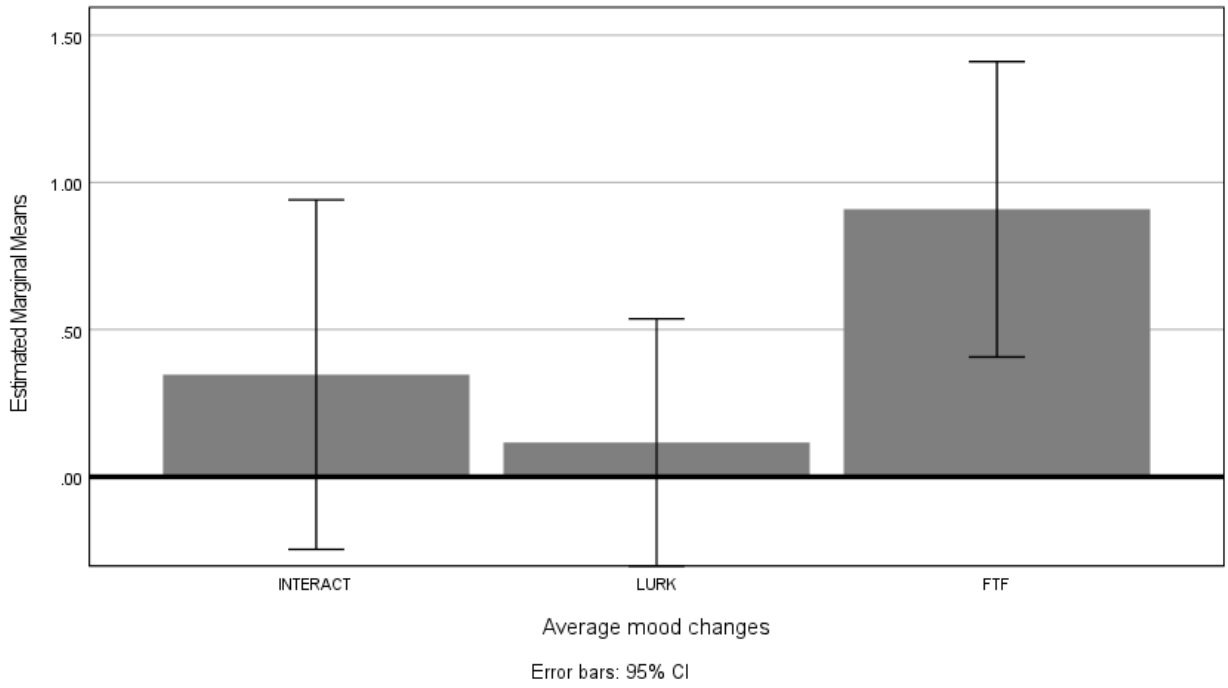
1.3.1.1 Average daily changes in SoB and mood

To test the second two hypotheses, a one-way MANOVA was conducted to assess whether there were any significant differences between the groups in terms of their average daily changes in SoB and mood. Positive scores indicate that participants' SoB and mood increased while they were doing their activity, while negative scores indicate a decrease. Box's test indicated that the covariance matrices were roughly equal across groups, $F(6, 11217.86) = 0.641$, $p = .697$. A visual inspection of histograms showed a slight positive

skew for the INTERACT group's changes in SoB, and slight negative skews in daily SoB and mood changes for the LURK and FTF groups. However, as stated above, MANOVA tests are robust to these violations.

Results indicated that the main effect of group was not significant for average daily change in SoB, $F(2, 41) = 1.42$, $p = .254$, $\eta_p^2 = .065$, and was approaching significance for average daily changes in mood, $F(2, 41) = 3.03$, $p = .059$, $\eta_p^2 = .129$. Inspection of means and plots (Figure 3.3) indicated that participants in the FTF group experienced the greatest increase in mood ($M = .909$, $SD = .947$) followed by participants in the INTERACT group ($M = .347$, $SD = .997$) and then participants in the LURK group ($M = .117$, $SD = .884$).

Figure 3.3 *Mean (95% CI) daily increase in mood for each group*



3.4.3.2 Path analysis

Path analysis was also used to test the theory that using SM to maintain existing relationships (MER) positively predicts later belonging. More specifically, it was hypothesised that this relationship is unidirectional; MER SM use predicts later GBS

scores, but GBS scores do not predict later MER SM use. A path analysis was conducted using only the observed variables to test the hypothesised longitudinal causal relationships between MER and GBS.

In addition to the hypothesised causal paths, disturbance terms were estimated for each of the endogenous variables, as it is assumed that dependent variables are always measured with some error (Norman & Streiner, 2003). It was also predicted that these disturbance terms would be correlated at each time point. The rationale for specifying correlations between the error terms in the models is because disturbances are rarely independent of one another (Kline, 2010). Although the post-hoc addition of correlated error terms has been previously criticised when it is used for the sole purpose of improving model fit (Gerbing & Anderson, 1984), specifying covariance between error terms is encouraged when there is a strong theoretical justification (Cole et al., 2007). In this context, the rationale for correlating error terms was because measurement errors were assumed to be similar for both scales. Specifically, both scales used Likert-scale responses, which could have biased answers in similar ways. Moreover, the impact of the Lifeguide system, acquiescence, social desirability, culture, and time-varying covariates were thought to be similar for both Likert scale measures.

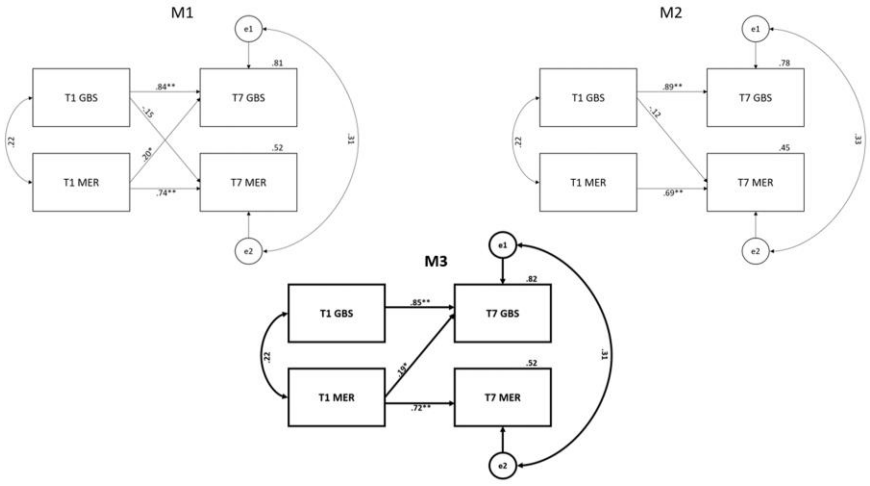
The bidirectional model was created first (M1). This model did not produce a chi-square as the model was saturated. Although saturated models have an overall perfect fit to the data, this does not mean that the model is capable of reproducing the raw data satisfactorily as it is possible that the model has some misspecifications (Raykov et al., 2013). This assertion is supported by the contradictory fit indices; an excellent comparative fit index (CFI) of 1.0 and a poor root mean square error of approximation (RMSEA)

of .291[1]. Nonetheless, M1 provided some preliminary evidence of the unidirectional relationship between SM use and belonging; T1 MER significantly predicted T7 GBS, but T1 GBS did not predict T7 MER.

A second model (M2) was created to test the alternate hypothesis by removing the significant path between T1 MER and T7 GBS to check whether this provided a more satisfactory model fit. This revised model was not a good fit to the data, $\chi 2 = 4.46$, $df = 1$, $p = .035$, $\chi 2/df = 4.46$, CFI = .915, RMSEA = .268.

Finally, the theoretical model (M3) was created with the hypothesised path between T1 MER and T7 GBS. This revised model produced the most satisfactory fit to the data, $\chi 2 = .453$, $df = 1$, $p = .501$, $\chi 2/df = .453$, CFI = .10, RMSEA = .00. All three models, with their standardised regression weights and squared multiple correlations are presented in Figure 3.4. Table 3.7 also shows the fit indices change scores between each of the models.

Figure 3.4 *Three path models used to explore the longitudinal relationship between using social media to maintain existing relationships (MER) and belonging (GBS); Model 3 (M3) is the final model with the most satisfactory fit to the data. * p < .05 ** p < .001*



[1] CFIs range from 0 to 1, with 1 denoting perfect fit and 0 denoting no fit. RMSEAs range from 0 to 1, with 0 denoting perfect fit and 1 denoting no fit.

Table 3.7 *Fit indices and their associated change scores for all three models examining the relationship between maintaining existing relationships (MER) and general belongingness scale (GBS) scores. The final model (M3) is in bold.*

Model	χ2	CFI	RMSEA	Δχ2	ΔCFI	ΔRMSEA
Bidirectional model (M1)	.000	1.00	.291	-	-	-
T1 GBS predicting T7 MER (M2)	4.66	.915	.268	+4.66	-.085	-.023
T1 MER predicting T7 GBS (M3)	**.453**	**1.00**	**.00**	**+.453**	**0**	**-.291**

Note. χ2 = chi-square statistic; CFI = comparative fit index; RMSEA = root mean square error of approximation; Δχ2 = change in chi-square from M1; ΔCFI = change in CFI from M1; ΔRMSEA = change in RMSEA from M1.

3.5 Discussion

The purpose of this research was to investigate the nature and direction of the relationships between SM use, SoB, and wellbeing. More specifically, the aim was to identify if using SM to interact with friends and/or family could enhance SoB and wellbeing, and if so, how this compared with face-to-face interactions and other SM activities. To do this, a randomised controlled experimental design was used, where participants were asked to either interact on SM, lurk on SM, or interact face-to-face once a day for seven consecutive days. Overall, the results indicated that whether SM use is positively or negatively associated with belonging and wellbeing is likely to depend on how it is used. The research provided some preliminary evidence to suggest that using SM to maintain existing relationships promotes a SoB over time; and that use of SM to 'pass time' is associated with poorer SoB and wellbeing. The results also underscore the importance of face-to-face interactions during adolescence. The findings will now be

discussed in more detail, along with the study's strengths, limitations, and implications for future research and practice.

3.5.1 Summary and discussion of findings

Correlational and regression analyses were conducted on the data collected before the study manipulations were introduced to test the first hypothesis that using SM to maintain existing relationships would be positively associated with belonging and wellbeing at study onset. Although the results did not indicate that using SM for this purpose was significantly associated with or predictive of belonging and wellbeing, they revealed something interesting about using SM to pass time. Namely, passing time on SM was significantly and negatively associated with and predictive of GBS and WEMWBS scores. The purpose of this type of SM use is to relieve boredom and occupy time (Whiting and Williams, 2013) and has been previously associated with problematic use, i.e., compulsion to use SM and difficulties withdrawing from it (Kircaburun et al., 2018; Süral et al., 2019). In the context of the pandemic, using SM to relieve boredom is unlikely to facilitate synchronous and intimate social interactions, but instead may exacerbate social anxieties, create a sense of helplessness about the current situation, and negatively impact overall mood (Hamilton et al., 2020). Moreover, adolescents who use SM to appease boredom may be more likely to experience low wellbeing and connectedness as they are also more likely to communicate with strangers and have limited social skills (e.g., Dienlin & Johannes, 2020; Subrahmanyam & Greenfield, 2008).

The results of this study also suggested that using SM for educational and information purposes may be predictive of belonging. Although these results were only approaching significance and should therefore be treated as preliminary findings that require further study, this suggests that adolescents may experience feelings of connection

when they are able to interact with peers in an educational online context. This is particularly pertinent in the context of the global pandemic, where for many adolescents, opportunities to interact with peers has been limited to online learning. Nonetheless, all of these findings are correlational, so the temporal sequence of effects cannot be inferred. That is, it could be the case that adolescents whose life is lacking in social contact may be more likely to use SM to pass time. Similarly, individuals who feel more connected to their peers may be more likely to engage in educational activities with them online.

Contrary to the hypotheses, the results indicated that changes in the GBS and WEMWBS scores between T1 and T7 were not significantly impacted by the group activity condition. Interestingly, however, all participants' GBS scores significantly decreased during the study period. This could possibly be explained by the social context in which the research was conducted. That is, in the absence of physical contact with peers, adolescents may experience a decline in their general SoB that cannot be fully restored via online social interaction. Moreover, as participants were only asked to engage in their activity once per day, they were free to resume their chosen online activities outside of this period. Researchers have suggested that during the pandemic, adolescents were more likely to use SNSs to pass time in the absence of usual school routines and daily activities (Hamilton et al., 2020), a type of SM use that was negatively associated with belonging and wellbeing in the current study. Although this explanation should be interpreted cautiously and was not empirically tested, it seems sensible to hypothesise that adolescents' restricted physical contact during the study period and an increased use of SM to procrastinate and pass time may have contributed to the observed general decline in their SoB. Given the reduction in SoB and other pressures of the pandemic it is interesting that wellbeing did not significantly reduce over the course of the study. This may be explained by considering the two different types of wellbeing outlined by Ryan and Deci (2001),

hedonic (experiencing positive affect) and eudaimonic (experiencing a sense of purpose and fulfilling one's potential). Given that 84% of participants considered themselves to be performing either at the same level as their peers or above their peers academically at study onset, their experience of school success may have meant that their eudaimonic wellbeing may have been less affected during the study period.

The analysis of the short term change data also indicated that the group activity condition did not have a significant impact on daily changes in SoB, but there was a significant trend to an effect on daily changes in mood. It is possible that with a larger sample size, these mood changes would have been significant, and thus an inspection of means was conducted to explore the differences between groups. As predicted, INTERACT and FTF participants experienced greater increases in mood than LURK participants, with FTF experiencing the greatest increase of all. This suggests that although interacting online has a more positive effect on mood than lurking online, communicating with friends and/or family face-to-face has the biggest immediate and positive impact. These results were found despite participants in the FTF group being mostly restricted to interactions with members of their household.

Interestingly, however, individuals who lurked online experienced, on average, a small improvement in their mood following their activity. This is inconsistent with previous research in the field, which suggests that passive SM use has a negative impact on wellbeing (Kim et al., 2020; Krasnova et al., 2013; Lup et al., 2015; Sommer, 2020; Steers et al., 2014; Thorisdottir et al., 2020; Underwood & Ehrenreich, 2017). However, as the study was conducted during a pandemic, some of the dangers associated with lurking are likely to have been significantly reduced, for example, the risk that adolescents may experience social exclusion if they see photos of friends gathering at social events without them (Underwood and Ehrenreich, 2017). Thus, in the current study, lurking may have

improved participants' mood in the short term by reminding them of their interpersonal relationships at a time of reduced physical and social contact (Gardner et al., 2005). However, it did not improve mood as much as actively interacting with friends and family online, thus providing support for the argument that compared to active SM use, passive use is less beneficial for wellbeing (Carpenter et al., 2011; Green et al., 2005; Tobin et al., 2015).

Finally, a path analysis was conducted on the T1 and T7 data to test the final two hypotheses regarding the direction of the relationship between using SM to maintain existing relationships and belonging. As hypothesised, the results indicated that using SM to maintain existing relationships predicted belonging, but belonging did not predict this type of SM use seven days later. However, caution must be taken when interpreting these results; without controlling for a number of potentially confounding variables we cannot infer that using SM in this way causes an increase in belonging. Nonetheless, the results of this path analysis do refute the alternate hypotheses that the relationship may be bi-directional, or that the reverse causality is true (Norman & Streiner, 2003) and provide some preliminary evidence to suggest that using SM in this way can promote feelings of social connectedness and meet adolescents' need to belong.

3.5.2 Strengths and limitations

To the researcher's knowledge, this was the first experimental study conducted to examine the impact of different SM activities (i.e., interacting and lurking) on adolescents' SoB and wellbeing, in both an immediate and mid-term period. This study was also unique as it included a third group who were asked to interact face-to-face, enabling a comparison to be made between the impact of these different online and offline activities under experimental conditions. As much of the previous research in the field has been cross-

sectional, the path analysis in this study provided some preliminary evidence regarding the temporal sequence of effects between using SM to maintain existing relationships and belonging. Conducting the research during the coronavirus pandemic also provided a unique insight into the impact of SM activities on belonging and wellbeing at a time when face-to-face interactions, particularly with peers, was limited.

Nonetheless, this study was not without its limitations. Firstly, the design of the study was such that participants were free to engage in their usual online and offline activities outside of their daily activity and activity compliance could not be guaranteed, increasing the likelihood of research bias (Orben, 2020). Bias could also have been introduced through the use of the term 'lurking', which may have negative connotations and thus impact the way in which participants in the LURK group responded to the post-activity questions. In addition to these limitations, the assumption that active engagement with others on SM would always be positive was also a drawback of this study as participants in the INTERACT group may have had an unpleasant interaction that negatively impacted their mood and SoB. Future research using a similar research design would therefore benefit from including a post-activity item to measure how positively the adolescents rated their interactions and use this as a covariate in subsequent analyses.

Secondly, the UK lockdown restrictions meant that participants in the FTF group were restricted in whom they could interact with face-to-face, thus reducing the generalisability of the findings. Moreover, as the study was longitudinal and required a considerable level of commitment from adolescents, 49% dropped out before T7. An attrition analysis revealed that participants who remained in the study were significantly less likely to use SM to pass time at the start of the study than those who did not. Given that this type of SM was negatively associated with belonging and wellbeing, the final study sample may be less representative of individuals with more difficulties.Finally, and

perhaps most significantly, contact with schools, parents, and adolescents was more challenging in the context of a pandemic, resulting in a much smaller sample size than intended. This reduced the statistical power of the research and thus, the likelihood of type I and type II errors (Button et al., 2013). As a result, the findings of this research can only be treated as preliminary and further research is required with a larger sample size to make more reliable conclusions. The small sample size also meant that the covariate data (i.e., age, gender, ethnicity, perceptions of school success etc.) could not be controlled for as intended as this would have lowered the degrees of freedom and further reduced the power of the research. This is a significant drawback of the current study, as an expanding body of research suggests that there are many factors that can impact and, in some cases, explain the nature of the relationship between SM use and psychosocial outcomes (e.g., Beyens et al., 2020; Sarmiento et al., 2020; Weinstein, 2018; Swirsky et al., 2021; Valkenburg et al., 2021; Yang, 2016). The absence of control variables in the current study also reduced the possibility that causality could be reliably inferred.

3.5.3 Implications for future research

The above limitations highlight important implications for future research. Firstly, repeating the study with a larger sample size would address some of the main shortcomings by building on these preliminary findings and enabling more sophisticated analyses to be conducted, where potential confounding variables could be controlled for and the role of mediating variables could be explored. Given that a large body of research has also suggested that SM poses more risks for females than for males (e.g., Barthorpe et al., 2020; Booker et al., 2018; Devine & Lloyd, 2012; Frison & Eggermont, 2016; Sommer, 2020; Thorisdottir et al., 2020), future studies would also benefit from considering gender as a potential moderating variable. Using a similar research design to investigate the longitudinal relationship between using SM to pass time and psychosocial outcomes would

also help to extend the cross-sectional research findings of this research by elucidating the direction of effects between these variables.

The small sample size in this study also meant that a structural equation modelling (SEM) approach using confirmatory factor analysis to assess how well the measured variables (i.e., the items on the scales) reflected the latent variables (i.e., belonging and using SM to maintain existing relationships) was not possible. As a result, the model was not specified before running the path analysis by eliminating any items that did not accurately measure the latent variables of interest (Streiner, 2006). It would therefore be valuable to repeat this research with a larger sample and using SEM to specify the model before testing so that the relationships between the latent variables are not contaminated by measurement error and thus, more accurately reflect the true correlations.

The extraordinary social context of this research provided a unique insight into the lives of adolescents during a time of reduced physical and social contact with peers. As the results suggest, contextual factors such as these significantly shape participants' online behaviours and emotional experiences (Sarmiento et al., 2020). While this exceptional context allowed inferences to be made about the impact of reduced face-to-face interaction with peers, repeating this research in the absence of any restrictions will be important in future research to investigate the immediate and longer-term effects of adolescents' SM use in a more typical social context. Consideration also needs to be given to the fact that adolescents are not solely at the mercy of their digital world, but instead, they are actively co-creating it through social interaction (Subrahmanyam et al., 2006). Thus, their experiences of SM are likely to be much more complex than can be observed through standardised measures of outcomes. Future research may therefore benefit from eliciting information regarding the lived experiences of adolescents using qualitative techniques and triangulating this with what we know from quantitative research in the field.

The complexity of SM research calls for the derivation of a more cohesive framework that clearly identifies best practices in the selection and triangulation of appropriate methods and statistical techniques for SM research (Snelson, 2016). Researchers should also be mindful that the online world is just as multifaceted as the offline world, and we therefore need to integrate the basic principles of developmental, computer-mediated, and clinical models of human behaviour in order to develop a more informed understanding of the complex relationships at play (Sarmiento et al., 2020). Through research, these established theories can be tested in a digital context, new ones can be developed, and existing methodological expertise can be used to further elucidate the online world of the adolescent (Underwood & Ehrenreich, 2017).

3.5.4 Implications for practice

This research highlights the positive impact that SM can have on adolescent outcomes. While we need to interpret the findings cautiously in light of the limitations discussed above, the research highlights the positive impact that using SM to interact with friends and family can have on adolescent outcomes. In order to encourage young people to use SNSs to enhance their existing relationships, we can apply what we know about habit formation. In his book, Atomic Habits, Clear (2018) talks about the four laws of behaviour change that are key to forming new habits: (1) make it obvious, (2) make it attractive, (3) make it easy, and (4) make it satisfying. To make interacting on SM obvious, adolescents could put instant messaging applications on the home screen of their smartphones so they are reminded of them every time they use their device. Milkman et al.'s (2014) notion of temptation bundling (i.e., pairing a new behaviour with an already enjoyed activity) can then be used to make this type of SM activity more attractive e.g., only looking at others' photos on Facebook while chatting to a friend. Parents and teachers can also make it easier for adolescents to use SM to interact by incorporating SM into

school- and family-based activities e.g., asking young people to do an online project with their peers or creating a family WhatsApp group. Finally, making a new behaviour satisfying acts as a reward and increases the likelihood that we will repeat that behaviour in the future. In the context of SM use, feeling more connected with peers, being invited to more social events, and experiencing a SoB through online interaction will make social interaction on SM satisfying and thus, increase the likelihood that the behaviour is repeated in the future. The design of SNSs already levers the first three of these laws of behaviour change, but the fourth may require more room for improvement by making adolescents more aware of how interacting on SM can be positive and rewarding.

Identifying adolescents who may be more likely to use SM to alleviate boredom and occupy their time will also be important, given the findings indicating the negative effects this can have on SoB and wellbeing. If adolescents with poor social skills are more likely to use SM in this way (Dienlin & Johannes, 2020; Subrahmanyam & Greenfield, 2008), teachers and educational psychologists (EPs) would benefit from teaching these young people important social skills using evidence-based programmes to reduce the likelihood of them engaging in this type of online behaviour. The inverse of the four laws of behaviour change outlined by Clear (2018) can also be used to eliminate unwanted habits: (1) make it invisible, (2) make it unattractive, (3) make it difficult, and (4) make it unsatisfying. In practice, this might mean helping adolescents think more carefully about the SNSs they use, associating ‘lurking’ with feelings of social isolation, and restricting phone use at times when passive use may be most harmful e.g., during social events and/or in school.

It is also important to remember that adolescents are faced with the same developmental issues online as they are offline e.g., identity, self-esteem, sexuality, and bullying (Subrahmanyam et al., 2006). Furthermore, research reviews have indicated that

adolescents' online behaviours tend to closely mirror their offline activities, interests, and self-presentations (George & Odgers, 2015). EPs could therefore apply their existing knowledge of psychological theories in an online context and use this to deliver training to parents, teachers, and young people around the key challenges and opportunities that SM can present for adolescent development and the benefits of positive use. Sharing this knowledge within multi-disciplinary teams will also be important so that all professionals working with adolescents can develop an understanding of the benefits of certain SM activities, and how to encourage this type of use. EPs could also support schools to create more opportunities for online educational activities, where SM is used positively to promote learning and positive relationships. Research suggests that opportunities to connect with teachers and peers and developing trusting relationships in supportive online educational spaces can facilitate a sense of belonging, and have positive impacts on learning and motivation (Peacock et al., 2020).

On a wider scale, researchers and academics in the field could work with app-developers to support the revision of existing apps and the development of new ones, with functions primarily designed to facilitate social connectedness. EPs are also in an optimal position to contribute to the production of guidelines and policies, on both a local and national level, regarding healthy SM use for young people, for example, contributing to a social and emotional learning curriculum regarding SM literacy and healthy online behaviours for use in schools (Sommer, 2020).

3.6 Conclusion

Overall, the results of this study provide some preliminary evidence to suggest that what adolescents do online matters; while using SM to pass time was negatively associated with belonging and wellbeing in the cross-sectional analysis, using SM to maintain

existing relationships positively predicted adolescents' future SoB. The unique social context of this research also indicated that while using SM to maintain existing relationships may be positive and superior to passive use, face-to-face interactions may be the most beneficial of all. Future studies should repeat this research with a larger sample of adolescents, using more sophisticated analytical techniques, and taking into consideration the various confounding, mediating, and moderating variables at play. Eliciting adolescents' views will also be important to gain a more in-depth understanding about their lived experiences of SM. However, much like the offline world, the online world is complex and multifaceted. Thus, utilising existing knowledge and theory to guide future research and practice will provide a lens through which adolescents' online behaviour can be understood as SM continuously evolves. Parents, teachers, and psychologists therefore need to utilise their existing expertise and work collaboratively with adolescents to educate them about the challenges and opportunities of SM.

Appendix A Ethical approval

54820.A3 - COVID-19 non-substantial amendment: How can young people use social media in a positive way? (Amendment 3)

Submission Overview | Submission Questionnaire | Attachments | History

Details

Status	Approved
Category	Category A
Submitter's Faculty	Faculty of Environmental and Life Sciences (FELS)

Appendix B Search terms

Concept	Search terms
Friendship	S1 friends
	S2 friend
	S3 friendship*
	S4 S1 OR S2
Quality/quantity	S5 popular*
	S6 sociometr*
	S7 quality NEAR/1 (friendship*)
	S8 quantity NEAR/1 (friendship* OR friends)
	S9 number NEAR/1 (friendship* OR friends)
	S10 S5 OR S6 OR S7 OR S8 OR S9
Belonging	S11 exclusion OR excluded
	S12 rejection* OR rejected*
	S13 lonely OR loneliness
	S14 isolat*
	S15 connect*
	S16 belong*
	S17 S11 OR S12 OR S13 OR S14 OR S15 OR S16
Child/young person	S18 child*

	S19 teen*
	S20 adolescen*
	S21 youth*
	S22 young N1 (person* OR people*)
	S23 S18 OR S19 OR S20 OR S21 OR S22
Friendship Quality Quantity Belonging Child/young person	*S24* TI (S4 AND S10 AND S17 AND S23) *S25* AB (S4 AND S10 AND S17 AND S23)
Final search	S24 OR S25

Appendix C Excluded studies

Study	Reference	Rationale for exclusion
1	Antonopoulou, K., Chaidemenou, A., & Kouvava, S. (2019). Peer acceptance and friendships among primary school pupils: associations with loneliness, self-esteem and school engagement. *Educational Psychology in Practice*, *35*(3), 339–351. https://doi.org/10.1080/02667363.2019.1604324	Study design was not longitudinal
2	Badaly, D., Schwartz, D., & Gorman, A. H. (2012). Social status, perceived social reputations, and perceived dyadic relationships in early adolescence. *Social Development*, *21*(3), 482–500. https://doi.org/10.1111/j.1467-9507.2011.00646.x	Sense of belonging or loneliness was not measured
3	Bullock, A., Xiao, B., Xu, G., Liu, J., Coplan, R., & Chen, X. (2019). Unsociability, peer relations, and psychological maladjustment among	Study design was not longitudinal

	children: A moderated-mediated model. *Social Development*, *29*, https://doi.org/10.1111/sode.12444	
4	Chunfeng, C., & Zongkui, Z. (2006). The relationship of peer relationship and self-perceived peer relationship with psychological and behavioral adjustment in middle childhood. *Psychological Science (China), 29*(5), 1086–1090. https://doi.org/10.1017/CBO9781107415324.004	Mean age of participants is below 9-years-old
5	Correia, J., Santos, A. J., Freitas, M., Ribeiro, O., & Rubin, K. (2014). Relations between pairs of socially withdrawn adolescents. *Analise Psicologica*, *32*(4), 467–481. https://doi.org/10.14417/ap.870	Study design was not longitudinal
6	Corsano, P., Grazia, V., & Molinari, L. (2019). Solitude and loneliness profiles in early adolescents: A person-centred approach. *Journal of Child and Family Studies*, *28*, 3374–3384. https://doi.org/10.1007/s10826-019-01518-1	Study design was not longitudinal

7	Etkin, R. G. (2019). *Bidirectional associations between friend overprotection and psychosocial difficulties during early adolescence*. [Doctoral dissertation, University of Buffalo]. https://ubir.buffalo.edu/xmlui/bitstream/handle/10477/80835/Etkin_buffalo_0656A_16555.pdf?sequence=1	Sense of belonging or loneliness was not measured
8	Ferguson, S. M., & Ryan, A. M. (2019). It's lonely at the top: Adolescent students' peer-perceived popularity and self-perceived social contentment. *Journal of Youth and Adolescence*, *48*, 341–358. https://doi.org/10.1007/s10964-018-0970-y	Study design was not longitudinal
9	Flynn, H. K., Felmlee, D. H., & Conger, R. D. (2017). The social context of adolescent friendships: Parents, peers, and romantic partners. *Youth & Society*, *49*(5), 679–705. https://doi.org/10.1177/0044118X14559900	Sense of belonging or loneliness was not measured
10	Freitas, M., Santos, A. J., Ribeiro, O., Pimenta, M., & Rubin, K. H. (2018). Friendship quality in adolescence and social adjustment in the peer	Study design was not longitudinal

	group. *Analise Psicologica*, *2*(36), 219–234. https://doi.org/10.14417/ap.1551	
11	Gest, S. D., Graham-Bermann, S. A., & Hartup, W. W. (2001). Peer experience: Common and unique features of number of friendships, social network centrality, and sociometric status. *Social Development*, *10*(1), 23–40. https://doi.org/10.1111/1467-9507.00146	Sense of belonging or loneliness was not measured
12	Goldstein, K., & Golan-Cook, P. (2016). The dilemma of deviant subcultures for immigrant youth integration: An analysis of popularity attainment in Israeli schools. *Sociological Studies of Children and Youth*, *21*, 113–141. https://doi.org/10.1108/S1537-466120160000021007	Sense of belonging or loneliness was not measured
13	Gorman, A. H., Schwartz, D., Nakamoto, J., & Mayeux, L. (2011). Unpopularity and disliking among peers: Partially distinct dimensions of adolescents' social experiences. *Journal of Applied Developmental*	Study design was not longitudinal

	Psychology, *32*(4), 208–217. https://doi.org/10.1016/j.appdev.2011.05.001	
14	Guacci-Franco, N. (1994). Peer acceptance and friendship quality during middle childhood: Family influences and links to well-being [Doctoral dissertation, Florida International University]. Digital commons. https://digitalcommons.fiu.edu/etd/4082/	Study design was not longitudinal
15	Howe, T. R., Flyr, M., Welsh, M., & Parke, R. D. (1996, June). *Friendship quality, sociometric status, and loneliness in abused and non-abused children* [Poster presentation].3rd Annual Head Start Research Conference, Washington D.C.	Mean age of participants is below 9-years-old
16	Howe, T. R., & Parke, R. D. (2001). Friendship quality and sociometric status: Between-group differences and links to loneliness in severely abused and nonabused children. *Child Abuse & Neglect*, *25*(5), 585–606. https://doi.org/10.1016/S0145-2134(01)00230-7	Mean age of participants is below 9-years-old

17	Kornilaki, E. (2013, September 3-7). *Peer acceptance of obese preschool children* [Conference paper]. 16th European Conference on Developmental Psychology, Switzerland.	Sense of belonging or loneliness was not measured
18	Laninga-Wijnen, L., Gremmen, M. C., Dijkstra, J. K., Veenstra, R., Vollebergh, W. A. M., & Harakeh, Z. (2019). The role of academic status norms in friendship selection and influence processes related to academic achievement. *Developmental Psychology*, *55*(2), 337–350. https://doi.org/10.1037/dev0000611	Sense of belonging or loneliness was not measured
19	Lansford, J. E. (2000). *Family relationships, friendships, and well-being in the United States and Japan* [Doctoral dissertation, University of Michigan]. ProQuest. *https://www.proquest.com/docview/304610403*	Sense of belonging or loneliness was not measured
20	Larson, S. L. (2001). *The mediating effects of coping on the peer status to psychological outcomes relationship in young adolescents* [Doctoral	The relationships between the variables of interest were not explored

	dissertation, Loyola University, Chicago]. ProQuest. https://doi.org/10.12775/EQUIL.2013.029	
21	Lease, A. M., & Axelrod, J. L. (2001). Position in the peer group's perceived organizational structure: Relation to social status and friendship. *Journal of Early Adolescence*, *21*(4), 377–404.	Sense of belonging or loneliness was not measured
22	Ling, H., Fu, E., & Zhang, J.-R. (2017). Peer relationships of left-behind children in China moderate their loneliness. *Social Behavior and Personality: An International Journal*, *45*(6), 901–913. https://doi.org/10.2224/sbp.6021	Study design was not longitudinal
23	Ling, H., Zhang, J., Zhong, N., & Yi, Y. (2012). The relationships between the left-home-kids' loneliness, friendship quality and social status. *Chinese Journal of Clinical Psychology*, *20*(6), 826–830. https://doi.org/10.1080/01902140390229800	Study design was not longitudinal

24	Liu, H., & Wang, H.-L. (2009). Relationship between loneliness, friendship quality and peer acceptance of 209 elementary school children. *Chinese Mental Health Journal*, *23*(1), 44–47.	Study design was not longitudinal
25	Locke, J., Ishijima, E. H., Kasari, C., & London, N. (2010). Loneliness, friendship quality and the social networks of adolescents with high-functioning autism in an inclusive school setting. *Journal of Research in Special Educational Needs*, *10*(2), 74–81. https://doi.org/10.1111/j.1471-3802.2010.01148.x	The relationships between the variables of interest were not explored
26	Lodder, G. M. A., Scholte, R. H. J., Goossens, L., & Verhagen, M. (2017). Loneliness in early adolescence: Friendship quantity, friendship quality, and dyadic processes. *Journal of Clinical Child and Adolescent Psychology*, *46*(5), 709–720. https://doi.org/10.1080/15374416.2015.1070352	Study design was not longitudinal

27	Mounts, N. S., Valentiner, D. P., Anderson, K. L., & Boswell, M. K. (2006). Shyness, sociability, and parental support for the college transition: Relation to adolescents' adjustment. *Journal of Youth and Adolescence*, *35*(1), 71–80. https://doi.org/10.1007/s10964-005-9002-9	Study design was not longitudinal
28	Musetti, A., Eboli, G., Cavallini, F., & Corsano, P. (2019). Social relationships, self-esteem, and loneliness in adolescents with learning disabilities. *Clinical Neuropsychiatry: Journal of Treatment Evaluation*, *16*(4), 165–172. *EBSCO.* http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2020-27307-002&site=ehost-live	The relationships between the variables of interest were not explored
29	Nangle, D. W., Erdley, C. A., Newman, J. E., Mason, C. A., & Carpenter, E. M. (2003). Popularity, friendship quantity, and friendship quality: Interactive influences on children's loneliness and depression. *Journal of*	Study design was not longitudinal

	Clinical Child and Adolescent Psychology, *32*(4), 546–555. https://doi.org/10.1207/S15374424JCCP3204_7	
30	Newman, J. E. (2003). *Exploring early adolescents' adjustment across the middle school transition: The role of peer experiences and social-cognitive factors*. Digital Commons. http://digitalcommons.library.umaine.edu/etd/51	Thesis research that has since been published (published article included in the review)
31	Nowland, R. A., Balmer, D., & Qualter, P. (2019). When friends behave badly: Loneliness and children's expectations of friends and responses to transgressions. *British Journal of Developmental Psychology 37*(4), 551–570. https://doi.org/10.1111/bjdp.12296	Study design was not longitudinal
32	Peairs, K. F. (2010). *The social world of gifted adolescents: Sociometric status, friendship and social network centrality*. [Doctoral dissertation, Duke University]. Duke space.	Sense of belonging or loneliness was not measured

	https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/5628/Peairs_duke_0066D_10583.pdf?sequence=1	
33	Popa, I. S., & Pomohaci, M. (2014). *Developing cohesion in sportive group through the socializing means of motor activities* [Conference paper]. 4th International Congress of Physical Education, Sport and Kinetotherapy, Romania.	Sense of belonging or loneliness was not measured
34	Preveaux, N. E., Ray, G. E., Lobello, S. G., & Mehta, S. (2004). Peer relationships among institutionalized juvenile boys. *Journal of Adolescent Research*, *19*(3), 284–302. https://doi.org/10.1177/0743558403258833	Sense of belonging or loneliness was not measured
35	Qualter, P., Rouncefield-Swales, A., Bray, L., Blake, L., Allen, A., Probert, C., Crook, K., & Bernie, C. (2020). Depression, anxiety, and loneliness among adolescents and young adults with IBD in the UK: The role of	Study design was not longitudinal

	disease severity, age of onset, and embarrassment of the condition. *Quality of Life Research, 30,* 497-506.	
36	Ralph, L. E. R., & Epkins, C. C. (2015). Aspects of girls' friendships: Practice implications for internalizing problems. *Child & Youth Care Forum*, *44*, 395–417. https://doi.org/10.1007/s10566-014-9284-8	Study design was not longitudinal
37	Rapee, R. M., Forbes, M. K., Oar, E. L., Richardson, C. E., Johnco, C. J., Magson, N. R., & Fardouly, J. (2020). Testing a concurrent model of social anxiety in preadolescence. *International Journal of Behavioral Development*, *44*(6), 505-514.	Study design was not longitudinal
38	Ray, G. E., Washington, R., Cohen, R., Hsueh, Y., & Zhou, Z. (2018). The relation of reciprocated and nonreciprocated friendship nominations to peer social competence for Chinese elementary school children. *Journal of Genetic Psychology*, *179*(6), 385–398. https://doi.org/10.1080/00221325.2018.1532954	Study design was not longitudinal

39	Reynolds, A. D., & Crea, T. M. (2017). The integration of immigrant youth in schools and friendship networks. *Population Research and Policy Review*, *36*(4), 501–529. https://doi.org/10.1007/s11113-017-9434-4	Sense of belonging or loneliness was not measured
40	Sanderson, J. A., & Siegal, M. (1995). Loneliness and stable friendship in rejected and nonrejected preschoolers. *Journal of Applied Developmental Psychology*, *16*(4), 555–567. https://doi.org/10.1016/0193-3973(95)90004-7	Mean age of participants was below 9-years-old
41	Scharphorn, L. (2012). Between- and within-child associations of friendship quality and social functioning and academic achievement throughout middle childhood. [Doctoral disseration, University of Pittsburgh]. http://d-scholarship.pitt.edu/16919/1/Scharphorn_etd.pdf	Sense of belonging or loneliness was not measured
42	Shin, Y. (2007). Peer relationships, social behaviours, academic performance and loneliness in Korean primary school children. *School Psychology International*, *28*, 220–236. https://doi.org/10.1177/0143034307078103	Study design was not longitudinal

43	Soenens, B., Vansteenkiste, M., Goossens, L., Duriez, B., & Niemiec, C. P. (2008). The intervening role of relational aggression between psychological control and friendship quality. *Social Development*, *17*(3), 661–681. https://doi.org/10.1111/j.1467-9507.2007.00454.x	Study design was not longitudinal
44	Spithoven, A. W. M., Lodder, G. M. A., Goossens, L., Bijttebier, P., Bastin, M., Verhagen, M., & Scholte, R. H. J. (2006). Adolescents' loneliness and depression associated with friendship experiences and well-being: A person-centered approach. *Journal of Youth and Adolescence*, *46*, 429–441. https://doi.org/10.1007/s10964-016-0478-2	Study design was not longitudinal
45	Tian, L., Zhang, W., & Chen, G. (2014). Effects of parental support, friendship quality on loneliness and depression: To test an indirect effect model. *Acta Psychologica Sinica*, *46*(2), 238. https://doi.org/10.3724/sp.j.1041.2014.00238	Study design was not longitudinal

46	Ueno, K. (2005). The effects of friendship networks on adolescent depressive symptoms. *Social Science Research*, *34*(3), 484–510. https://doi.org/10.1016/j.ssresearch.2004.03.002	Study design was not longitudinal
47	Valdivia, I. A., Schneider, B., Chavez, K. L., & Chen, X. (2005). Social withdrawal and maladjustment in a very group-oriented society. *International Journal of Behavioral Development*, *29*(3), 219–228. https://doi.org/10.1080/01650250544000008	Study design was not longitudinal
48	Van Den Oord, E. J. C. G., Rispens, J., Goudena, P. P., & Vermande, M. (2000). Some developmental implications of structural aspects of preschoolers' relations with classmates. *Journal of Applied Developmental Psychology*, *21*(6), 619–639. https://doi.org/10.1016/S0193-3973(00)00057-5	Sense of belonging or loneliness was not measured
49	Van Gilder, T. S. (1996). *Examining the predictors of loneliness in fifth and sixth grade females: Friendship type, friendship quality, and number of*	Study design was not longitudinal

	friends [Doctoral dissertation, California School of Professional Psychology, San Diego]. ProQuest. https://www.proquest.com/docview/304299618?pq-origsite=gscholar&fromopenview=true	
50	Vanhalst, J., Luyckx, K., & Goossens, L. (2014). Experiencing loneliness in adolescence: A matter of individual characteristics, negative peer experiences, or both? *Social Development*, *23*(1), 100–118. https://doi.org/10.1111/sode.12019	Study design was not longitudinal
51	Wang, X., Hu, X., & Shen, J. (2011). Affection of left children's friendship quality on loneliness and depression. *Chinese Journal of Clinical Psychology*, *19*(2), 252–254. http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2011-10111-035&site=ehost-live	Study design was not longitudinal

52	Wei, H., Fan, C., Zhou, Z., Tian, Y., & Qi, Y. (2011). Relationships of relationships of relational aggression, friendship quality and loneliness in children of different gender. *Chinese Journal of Clinical Psychology*, *19*(5), 681–683. https://doi.org/10.16128/j.cnki.1005-3611.2011.05.027	Study design was not longitudinal
53	Williams, G. A. (1998). *Peer relationship processes and children's loneliness at school* [Doctoral dissertation, University of Illinois].Ideals. https://www.ideals.illinois.edu/handle/2142/82247	Study design was not longitudinal
54	Woods, S., Done, J., & Kalsi, H. (2009). Peer victimisation and internalising difficulties: The moderating role of friendship quality. *Journal of Adolescence*, *32*(2), 293–308. https://doi.org/10.1016/j.adolescence.2008.03.005	Study design was not longitudinal
55	Xiaojun, S., Zongkui, Z., Cuiying, F., & Shanyu, K. (2009). Loneliness in middle childhood and its relation to multi-level peer experience.	Study design was not longitudinal

	Psychological Science, *32*(3), 567–570. https://doi.org/10.1017/CBO9781107415324.004	
56	Zhang, F., You, Z., Fan, C., Gao, C., Cohen, R., Hsueh, Y., & Zhou, Z. (2014). Friendship quality, social preference, proximity prestige, and self-perceived social competence: Interactive influences on children's loneliness. *Journal of School Psychology*, *52*(5), 511–526. https://doi.org/10.1016/j.jsp.2014.06.001	Study design was not longitudinal
57	Zhang, L., He, G., Chen, Y., & Shi, A. (2020). Migration status, emotional engagement, and social exclusion in Chinese schools. *Journal of Adolescence*, *80*, 192–203. https://doi.org/10.1016/j.adolescence.2020.02.013	Sense of belonging or loneliness was not measured
58	Zhang, X., Chen, F., Wu, Y., Yuan, C., & Wang, Y. (2015). Quality of friendship and school-based loneliness: The mediating effects of self-	Study design was not longitudinal

	concept. *Chinese Journal of Clinical Psychology*, *23*(1), 147–153. https://doi.org/10.16128/j.cnki.1005-3611.2015.01.033	
59	Zhongkui, Z., Tingting, Z., Xiaojun, S., & Jiujun, L. (2006). A study of the relation among social withdrawal type, friendship and loneliness in middle childhood. *Psychological Science (China)*, *29*(3), 536–540. https://doi.org/10.1017/CBO9781107415324.004	Study design was not longitudinal
60	Zhou, Z., Sun, X., Chen, X., Fan, C., & Pan, Q. (2009, June 11-13). *The relation between different constructs in middle childhood peer interaction and loneliness: A mediational model* [Conference paper]. In 3rd International Conference on Bioinformatics and Biomedical Engineering, iCBBE 2009. https://doi.org/10.1109/ICBBE.2009.5163650	Study design was not longitudinal

61	Zongkui, Z., Xiaojun, S., Dongmei, Z., & Yeh, H. (2005). The test of the mediator variable between peer relationship and loneliness in middle childhood. Acta Psychologica Sinica, 37(6), 776–783	Study design was not longitudinal

Appendix D **Data extraction for studies included in the review**

Study number	Author(s) and year	Participants *N* (% male) Age (M*age* = Mean Age)	Setting	Design	Measures T1 = Time 1, T2 = Time 2 etc.	Analysis and main findings
1	Betts and Stiller (2014a)	**N:** 146 (48%) **Age:** 9 to 11-year-olds T1 M*age* = 9.95 years;	**Country:** United Kingdom (UK) **Location:** 8 classrooms in	**Type:** Longitudinal **Length:** 3 months **Time points:** 2 (time of year NR)	**Best friend nominations** (T1 and T2)**:** Ps were given a list of classmates and asked to nominate unlimited number of best friends. Nominations used to calculate the three indicators of centrality:	**Analysis:** Multi-group path analysis **Main findings:** T1 loneliness did not predict any of the centrality measures (degree, betweenness, and share) at T2.

		T2 M*age* = NR	5 primary schools	**Frequency:** Time points separated by 3 months	degree, betweenness, and share. **Loneliness** (T1 and T2): A four-item pure measure of loneliness derived from the Loneliness and Social Dissatisfaction Questionnaire (LSDQ; Asher, Hymel, & Renshaw, 1984)	Statistics and confidence intervals for these findings NR.
2	Betts and Stiller (2014b)	**N*:*** 151 (46%) **Age:** 9- to 11-years-old	**Country:** UK **Location:** 8 classrooms in 5 primary schools	**Type:** Longitudinal **Length:** 3 months	**Peer dislike** (T1 and T2): Ps reported "How much time do [they] like to spend with each person" in their class on 1 to 5 rating scale. Ratings of 1 that	**Analysis:** Regression **Main findings:** Quadratic reciprocal peer dislike at T1 predicted changes in loneliness

		T1 M*age* = 9.95 years, T2 M*age* = NR)	**Time points:** 2 (time of year NR) **Frequency:** Time points separated by 3 months	children awarded to and received from were used to indicate children's peer dislike. **Loneliness** (T1 and T2): A four-item pure measure of loneliness derived from the LSDQ (Asher et al., 1984).	at T2, β = .38, $t(6150) = -2.19$, $p = .02$, $\Delta R^2 = .019$. When the direction of inferred causality was reversed, loneliness did not significantly predict reciprocal peer dislike, $p > .05$.
3	Dongmei and Zongkui (2006)	**N:** 412 (53%) **Age:** T1 = grades 3, 4, and 5; M*age* = 9.1, 10.0,	**Country:** China, Wuhan **Location:** Primary school	**Type:** Longitudinal **Length:** 12 months	**Peer nomination** (T1 and T2)**:** Ps chose 3 LM and 3 LL classmates from a class list. Ps then classified into 5 social status groups: popular, rejected, neglected,	**Analysis:** Repeated measures analysis of variance (ANOVA) **Main findings:** 3 (changes in social status) x 2 (measurement time of loneliness) repeated measured ANOVA

	and 11.1 years, respectively T2 = grades 4, 5, and 6, M*age* NR	**Time points:** 2 (June 2002 and June 2003) **Frequency:** Time points separated by 12 months	controversial and general. These 5 types of social status were grouped into the socially advantaged (popular and controversial), socially disadvantaged (rejected and neglected), and the general group (general). Ps were then classified into rising, declining, or stable social status groups based on the change between their T1 and T2 social status.	indicated no significant main effect of social status. Main effect of measurement time of loneliness was close to significance in males ($F(1,215) = 3.858$, $p = .051$) and significant in females ($F(1, 186) = 17.857$, $p = .000$). Simple main effects analyses indicated that T2 loneliness ($M = 1.66$, $SD = 0.058$) was significantly lower than T1 loneliness ($M = 1.5$, $SD = 0.050$) in females.

	Friendship Quality (FQ) (T1 and T2)**:** Shortened (18-item) version of 40-item Friendship Quality Questionnaire (FQQ; Parker & Asher, 1993). Mean FQ score used. Ps classified into increasing, decreasing or stable FQ groups based on the change between their T1 and T2 FQ. **Loneliness** (T1 and T2): The CLS (Asher et al., 1984).	The interaction between loneliness measurement time and social status change was not significant. 3 (changes in FQ) x 2 (measurement time of loneliness) repeated measures ANOVA indicated no main effect of changes in FQ. The main effect of measurement time of loneliness was not significant in males, but significant in females ($F(1, 185) = 9.339$, $p = .003$). The interaction between loneliness measurement time and changes in FQ was not significant for girls,

	but significant for boys ($F(2, 215) = 6.593$, $p = .002$). Simple main effects analyses showed that T2 loneliness ($M = 2.143$, $SD = 0.100$) was significantly lower than T1 loneliness ($M = 1.847$, $SD = 0.115$), $F(1, 215) = 8.41$, $p = .004$) for the male group with increasing FQ. There was no significant difference in loneliness for the group with stable FQ.

4	Jobe-Shields et al. (2011)	**N:** 170 (48%) **Age:** 9- to 11-years-old at all time points, M*age* NR.	**Country:** United States of America (USA) **Location:** Elementary school classrooms	**Type:** Longitudinal **Length:** 4 years **Time points:** 4 (the spring of each year) **Frequency:** Time points separated by 12 months	**Loneliness** (T1-T3)**:** The Loneliness Questionnaire (Asher & Wheeler, 1985). **MFs** (T1-T3)**:** Ps nominated as many friends as they wanted from a class list and number of MFs was calculated. **LM nominations** (T1-T3)**:** Ps circled names of classmates they "liked most", with unlimited nominations. **LL nominations** (T1-T3): Ps circled names of classmates	**Analysis:** Latent Growth-Mixture Modelling (LGMM) was used to examine whether there were distinct loneliness trajectory subgroups from third through fifth grades. Three 3 (Loneliness class) x 2 (Sex) Multivariate Analysis of Variance (MANOVA) conducted (one per grade), with MFs, LM and LL scores as some of the dependent variables. **Main findings:** <u>LGMM:</u>

		they “liked least”, with unlimited nominations.	Three loneliness classes: Stable Low (65%), Decreasers (12%), and Increasers (23%) <u>MANOVAs:</u> *Third grade:* Significant main effect for loneliness class $F(12, 302) = 4.43$, $p < .001$, Wilks’s = .72. Univariate *F*-tests indicated that the Stable Low group had significantly more MFs than Increasers and Decreasers, $F(2, 156) = 4.48$, $p < .05$, and received significantly more LM nominations

	than the Increasers, $F(2, 156) = 3.12$, $p < .05$. *Fourth grade:* Significant main effect for loneliness class, $F(12, 306) = 3.66$, Wilks's = .76, $p > .001$. Univariate *F*-tests indicated that the Stable Low group and Decreasers group had significantly more LM nominations than the Increasers, $F(2, 156) = 3.15$, $p < .05$. *Fifth grade:* Significant main effect for loneliness class, $F(12, 304) = 7.67$, Wilks's = .59, $p < .001$. Univariate *F*-tests indicated

						that the Increasers had fewer MFs, $F(2, 157) = 8.05$, $p < .001$, and LM nominations, $F(2, 157) = 4.01$, $p < .05$, than the Stable Low and Decreasers.
5	Klarin (2004)	**N:** 151 (Gender NR) **Age:** T1 = 10- and 12-years-old, M*age* = NR. T2 = 12- and 14-years-	**Country:** Croatia **Location:** Elementary school	**Type:** Longitudinal **Length:** 2 years **Time point:** 2 (second semester of the school years) **Frequency:** Time points	**Loneliness** (T1 and T2): The Loneliness Questionnaire (Asher et al., 1984) **FQ** (T1 and T2)**:** FQQ (Parker & Asher, 1993). Mean FQ score used. **Reciprocity** (T1 and T2)**:** The Reciprocity Questionnaire (Buunk & Prins, 1998) to	**Analysis:** Correlational analysis **Main findings:** T1 loneliness was not significantly associated with T2 reciprocity, $r(149) = -.04$, $p > .05$ T1 loneliness was not significantly associated with T2 mutuality, $r(149) = .02$, $p > .05$)

	old, M*age* = NR.	separated by 2 years	assess the degree of giving and receiving in the best friendship. **Mutuality** (T1 and T2)**:** Ps chose their best friend in the class, best friendships that were reciprocated were characterised as mutual.	T1 loneliness was not significantly associated with T2 FQ, $r(149)= -.16$, $p > .05$) T1 mutuality was not significantly associated with T2 loneliness. $r(149)= -.12$, $p > .05$) T1 reciprocity was not significantly associated with T2 loneliness, $r(149)= .08$, $p > .05$) T1 FQ was significantly and negatively associated with T2 loneliness, $r(149) = -.24$, $p < .001$)

6	Newman-Kingery et al. (2011)	**N:** 365 (48%) **Age:** T1 M age = 11 years 2 months years; T2 M*age* = 11 years 8 months	**Country:** USA, Northern New England **Location:** Elementary schools (T1) and middle schools (T2)	**Type:** Longitudinal **Length:** 6 months **Time points:** 2 (T1 = spring of fifth-grade, T2 = autumn of sixth-grade) **Frequency:** Time points separated by 6 months	**Peer acceptance** (T1 and T2)**:** Ps asked to rate how much they liked to spend time with peers from 1 to 5. Mean rating received from all Ps in the classroom = Ps' peer acceptance score. **Friendship nomination** (T1 and T2)**:** Ps circled name of best friends with unlimited nominations and asked to indicate their one best friend, number of MFs calculated for each Ps	**Analysis:** Correlational analysis and simultaneous and hierarchical regression analyses **Main findings:** Correlational analyses indicated that T1 peer acceptance was significantly and negatively correlated with T2 loneliness, $r(363) = -.28$, $p < .01$. T1 MFs was significantly and negatively correlated with T2 loneliness, $r(363) = -.30$, $p < .01$. T1 FQ was significantly and negatively correlated with

	FQ (T2)**:** FQQ-Revised (FQQ-R; Parker & Asher, 1993). Mean FQ score used. **Loneliness** (T1 and T2)**:** LSDQ (Asher & Wheeler, 1985)	loneliness at T2, $r(363) = -.18$, $p < .01$. Simultaneous regression analyses indicated that T1 peer acceptance ($\beta = -.20$, $p < .01$), MFs ($\beta = -.18$, $p < .01$) and FQ ($\beta = -.11$, $p < .05$) were all unique predictors of T2 loneliness. Hierarchical regression analyses indicated that when T1 loneliness was controlled for, none of the other variables significantly predicted T2 loneliness, statistics NR.

7	Parker and Seal (1996)	**N:** 216 (58%) **Age:** 8- to 15-years-old, M*age* = 11.5 years	**Country:** USA, Michigan **Location:** Summer camp	**Type:** Longitudinal **Length:** Two 4-week sessions **Time points:** 3 time points in each 4-week session **Frequency:** Time points separate by approximately 1 week	**Acquaintance prior to camp** (first day of camp; covariate): Ps circled names of same-sex campers they knew before camp and asterisked any best friends. **Identification and tracking of camp friendships** (T1-T3): Ps listed as many same-sex best friends at camp, not including siblings. Children who listed each other as friends at a given assessment were considered friends at that	**Analysis:** Hierarchical multiple regression analyses **Main findings:** With age and initial loneliness controlled, number of MFs did not add significantly to the prediction of later loneliness, $F(1, 176) = 0.3$, p = NR. The addition of the two temporal variables resulted in a "marginally significant" increase in R^2, $F(1, 174) = 2.85$, $p < .06$. Friendship formation was significantly and negatively related to later

	point. Temporal course of every friendship was then charted for every Ps over the study period.	loneliness, $F(1, 176) = 5.71$, $p < .05$. Ps who developed more new friendships or renewed more old friendships had lower loneliness over time than Ps who did not. Authors infer that it is the budding of new relationships and not the presence of many friends per se that reduced later loneliness.
	Acceptance-rejection by same-sex peers (T1-T3): Ps rated how much they liked each same-sex camper on a scale of 1 to 5. Analyses were based only on final ratings to ensure they reflected children's judgements after the maximum amount of time together.	Significant formation x durability interaction, $F(1, 173) = –4.37$, $p < .05$. The negative relation between forming friendships and eventual loneliness held only for Ps

					Loneliness (T1-T3): Loneliness questionnaire developed by Williams and Asher (1992)	who maintained the friendships they formed.
8	Rotenberg et al (2004) *Study 1*	**N:** 475 (genders of final sample NR) **Age:** T1 = 9- to 11-year-olds, M*age* = 9 years and 9	**Country:** UK **Location:** 4 primary schools and 18 classrooms	**Type:** Longitudinal **Time points:** 2 (T1 = December, T2 = July) **Frequency:** Time points separated by 7 months	**Number of friendships:** Ps identified classmates who were their best friends and then identified their very best friend. MFs and mutual best friendships were calculated for each Ps. **Peer preference:** Ps nominated 3 LM and 3 LL	**Analysis:** Correlations and hierarchical regression analyses **Main findings:** *NB. Degrees of freedom varied by measure and were NR for each analysis.* Correlational analyses indicated that T1 best friend trustworthiness was not significantly correlated with T2 loneliness, statistics NR.

	months. T2 = NR.	classmates. LM-LL=peer preference score. **Very best friend trustworthiness:** Ps rated on a 5-point scale how often their best friend kept secrets and promises. **Loneliness:** Loneliness and Social Satisfaction Scale (LSSS; Asher, Hymel, & Renshaw, 1984).	T1 MFs was significantly and negatively correlated with T2 loneliness, r = -.14, p < .05. T1 peer preference was significantly and negatively correlated with T2 loneliness, r = -.11, p < .05. T1 loneliness was significantly and negatively correlated with T2 peer preference, r = -.11, p < .05, but not T2 best friend trustworthiness or T2 MFs. Hierarchical regression analyses indicated that number of MFs did

						not significantly predict changes across time in loneliness, statistics NR. Very best friend trustworthiness did not significantly predict changes across time in loneliness, statistics NR.
9	Rotenberg et al. (2004) *Study 2*	**N**: 310 (50%) **Age:** T1 = 11 years 5 months to 14 years 10 months, M*age* = 12	**Country:** Canada **Location:** 5 elementary schools and 1 high school	**Type:** Longitudinal **Time points:** 2 (May and the following May) **Frequency:** Time points	**Number of friendships:** Ps listed same-sex friends in their grade and number of MFs was computed **Peer preference:** Ps nominated as many same- and cross-sex LM and LL peers.	**Analysis:** Correlation and hierarchical regression analyses **Main findings:** *NB. Degrees varied by measure and were NR for each analysis.* Correlation analyses indicated that T1 loneliness was significantly and negatively correlated with T2 MFs,

	years 11 months T2 = NR.	separated by 12 months.	LM-LL = peer preference score. **Loneliness:** LSSS (Asher, Hymel, & Renshaw, 1984)	r = -.17, p < .01. T1 loneliness was significantly and negatively correlated with T2 peer preference, r = .14, p < .05. T2 loneliness was significantly and negatively correlated with T1 MFs, r = -.14, p < .05 but not peer preference. Hierarchical regression analyses indicated that the number of MFs did not significantly predict changes across time in loneliness, statistics NR.

10	Spithoven et al. (2018)	**N:** 884 (42%), representing 37.78% of the original sample as Ps without a reciprocated best friend were excluded from analysis	**Country:** Belgium (Participants were either Belgian (92.4%), from another European country (4.54%) or non-European (2.54%) **Location:** 7 schools in	**Type:** Longitudinal **Length:** 12 months **Time points:** 2, time of year NR. **Frequency:** Time points separated by 12 months	**Best friend nomination** (T1 and T2)**:** Participants nominated their best, same-sex friend without any restrictions. Number of best MFs was calculated. Only participants with MFs then completed subsequent measures of FQ. **FQ** (T1 and T2): Friendship Qualities Scale (FQS; Bukowski et al., 1994). Mean FQ score used. **Loneliness** (T1 and T2)**:** Peer-related loneliness subscale of	**Analysis:** Actor-Partner Independence Models (APIM; Kenny et al., 2006) **Main findings:** Self-reported loneliness did not predict self-reported FQ one year later, or vice versa. Statistics NR. Self-reported did not predict best friend-reported FQ one year later, or vice versa. Statistics NR.

		Age: M*age* = 13.51 years, time point M*age* calculated NR	Dutch-speaking part of Belgium		the Loneliness and Aloneness Scale for Children and Adolescents (Goossens, 2016)	
11	Thomas (2014)	**N:** 254 (gender of final sample NR) **Age:** M*age* = 11.54 years	**Country:** USA, New York **Location:** Two public middle school classrooms or cafeterias	**Type:** Longitudinal **Length:** 7 months **Time points:** 3 (February, May/June, and September)	**Friendship nominations** (T1, used as a covariate in regression analyses): Ps nominated same-sex very best friend and second best friend. They then nominated 3 same- or other-sex friends. Number of MFs calculated for each P.	**Analysis:** Growth curve analyses and correlational analyses **Main findings:** T1 mutual friendship was negatively correlated with T1 – T3 loneliness. Neither T1 popularity nor T1 social preference predicted changes on loneliness over time

	Frequency: Time points separated by 3 months	**Social preference** (SP) (T1-T3): Ps nominated peers they liked to be with "most" and "least". LM – LL = SP score for each Ps **Popularity** (T1-T3): Ps nominated peers they thought were "popular" and "not popular". Popularity score = "very popular" scores subtract "not popular" scores. **Loneliness** (T1-T3): The LSDQ (Asher, Hymel, & Renshaw, 1984)	T1 loneliness was not a significant predictor of the intercept of social preference, t = -0.2, p = .177 T1 loneliness was a significant predictor of the popularity intercept; a 1 unit increase in loneliness was associated with a 0.01 lower popularity score, t = -2.64, p < .05 T1 popularity was a significant predictor of the slope of loneliness from T2 to T3 (over the summer break); a 1 unit increase in popularity at T1 was associated

						with a 9.44 decrease in loneliness growth over the summer,), t = -2.05, p < .05
12	Wang et al. (2020)	**N:** 539 (44%) *NB. This is a sub-sample of the whole study sample (N = 1013) as the relevant data only came from*	**Country:** China, Guizhou **Location:** Four public junior high schools	**Type:** Longitudinal **Length:** 6 months **Time points:** 2 (December 2017 and June 2018) **Frequency:** Time points	**Loneliness** (T1 and T2): Li, Zou, and Liu's (2014) revised version of the Child Loneliness Scale developed by Asher, Hymel, and Renshaw (1984). **FQ** (T1 and T2): One subscale of the Chinese version of the Network of Relationships Inventory (Fan & Fang, 2004; Furman &	**Analysis:** Cross-lagged panel analysis **Main findings:** For left-behind adolescents, T1 loneliness significantly and negatively predicted T2 FQ, β = -.11, t = -2.67, p < .01, d = .14. However, T1 FQ did not significantly predict T2 loneliness for left-behind adolescents, β = -.05, t = -1.40, p > .05.

		this sub-pool (left-behind children) **Age:** M*age* = 13.51 years		separated by 6 months	Buhrmester, 1985). Participants answered 3 questions assessing intimacy and companionship.	
13	Zongkui et al. (2006)	**N:** 274 (52%) **Age:** T1 = grade 3 and 4, M*age* 9.1 and 10.1, respectively. T2 = grade 5	**Country:** China, Wuhan **Location:** Primary school	**Type:** Longitudinal **Length:** 2 years **Time points:** 2 (June 2002 and June 2004) **Frequency:** Time points	**Peer nomination** (T1 and T2)**:** Ps nominated 3 LM and 3 LL classmates from a class list. **Friend nomination** (T1 and T2): Ps nominated as many friends as they wanted.	**Analysis:** Cross-lagged regression analyses **Main findings:** T1 LM nominations did not predict T2 loneliness, β = -0.037, $p > .05$ T1 LL nominations did not predict T2 loneliness, β = -0.01, $p > .05$

	and 6, M*age* 11.1 and 12.1, respectively.	separated by 2 years	Number of MFs calculated for each Ps. **FQ** (T1 and T2)**:** FQQ (Parker & Asher, 1993). Mean FQ score used. **Loneliness:** The CLS (Asher et al., 1984)	T1 mutual friendships significantly and negatively predicted T2 loneliness, β = -0.149, $p < .05$ T1 FQ significantly and negatively predicted T2 loneliness, β = -0.133, $p < .05$ T1 loneliness significantly and negatively predicted T2 FQ, β = 0.175, $p < .05$ T1 loneliness did not significantly predict T2 mutual friendships, β = -0.114, $p > .05$)

Appendix E **Quality assessment of included studies**

		Aims	Cohort	Measures		Analysis		Follow-up		Results			
		Clearly focused issue	Acceptable recruitment	Exposure accurately measured	Outcome accurately measured	Confounding factors identified	Confounding factors controlled	Complete enough	Long enough	Precise	Reliable	Generalisable	In line with previous research
Study number	**Authors and year**												
1	Betts and Stiller (2014a)	✓	✓	✓	✓	×	×	✓	✓	×	×	×	×
2	Betts and Stiller (2014b)	✓	✓	×	✓	×	×	✓	✓	×	×	×	✓×

3	Dongmei and Zongkui (2006)	✓	✓	×	✓	×	×	NR	✓	×	×	×	✓×
4	Jobe-Shields et al. (2011)	✓	×	✓	✓	×	×	✓	✓	×	✓×	×	✓
5	Klarin (2004)	✓	✓	✓	✓	×	×	×	✓	×	×	×	×
6	Newman-Kingery et al. (2011)	✓	✓	×	✓	×	×	×	✓	×	×	×	✓
7	Parker and Seal (1996)	✓	×	×	✓	✓×	✓	NR	×	×	✓	×	✓
8	Rotenberg et al. (2004) *Study 1*	✓	✓	✓×	✓	×	×	NR	✓	×	✓×	✓	✓×

9	Rotenberg et al. (2004) *Study 2*	✓	✓	✓×	✓	×	×	NR	✓	×	✓×	✓	✓×
10	Spithoven et al. (2018)	✓	×	×	✓	✓×	×	✓	✓	×	×	×	×
11	Thomas (2014)	✓	✓	✓	✓	✓×	✓	✓	✓	×	✓	×	✓×
12	Wang et al. (2020)	✓	✓	×	✓	✓×	✓	✓	✓	×	×	×	✓×
13	Zongkui et al. (2006)	✓	✓	✓	✓	×	×	NR	✓	×	×	×	✓×

✓ Yes (item adequately addressed); × no (item not adequately addressed); ✓× partially (item partially addressed); NR not reported

Appendix F Groupings of studies according to measures of peer experiences

Frequency of measurement	Grouping criteria	Included papers
5	*Group-level peer experiences:* Unitary measure of social preference	Betts and Stiller (2014a) Betts and Stiller (2014b) Jobe-Shields et al. (2011) Newman-Kingery et al. (2011) Zongkui et al. (2006)
4	*Group-level peer experiences:* Combined measures of social preference	Dongmei and Zongkui (2006) Rotenberg et al. (2004) *study 1* Rotenberg et al. (2004) *study 2* Thomas (2014)
1	*Group-level peer experiences:* Perceived popularity	Thomas (2014)
8	*Dyadic-level peer experiences:* Mutual friendship	Jobe-Shield et al. (2011) Klarin (2004) Newman-Kingery et al. (2011) Parker and Seal (1996) Rotenberg et al. (2004) *study 1* Rotenberg et al. (2004) *study 2* Thomas (2014) Zongkui et al. (2006)
7	*Dyadic-level peer experiences:* Friendship quality	Dongmei and Zongkui (2006) Klarin (2004) Newman-Kingery et al. (2011) Rotenberg et al. (2004) *study 1* Spithoven et al. (2018) Wang et al. (2020) Zongkui et al. (2006)

Appendix G Daily activity group instructions

Group 1: Interacting with a friend or a family member on social media

Thank you for agreeing to take part in this research! To help you take part, here are some instructions about what we would like you to do when you receive your daily email reminder from us.

At 5:30pm for the next seven days, you will receive an email with a web link to a survey online. When you click on this link it will take you to a website where you will be asked to answer **four** short questions. This will not take you more than one or two minutes to complete. As soon as you have answered those four questions, the survey will tell you to do your daily activity - try to do it straight after you've answered the questions if you can!

As you are in **group 1** your daily activity will involve speaking to a friend or a member of your family on one of your social media platforms. This should be somebody that you know in real life i.e., somebody that you have met in person. You should have a conversation where both you and your friend/family member take turns to speak and talk about something together. This can be on an instant messaging app like WhatsApp or Facebook messenger, or it can be a conversation that starts by commenting on one of your friend/family members' photos, statuses, tweets etc. online. It doesn't matter how/where you have the conversation as long as both of you have the opportunity to say something in the conversation and as long as it is on one of your social media platforms. Try to make the conversation as natural as possible – speak to people about something real that you want/need to speak to them about! For example, you might want to speak to a friend about some school work or speak to a member of your family about what you will be having for dinner.

Appendix G

It is okay to message more than one person or message a group of people at the same time (e.g. on WhatsApp group chat). It doesn't matter too much how long you spend on this task, as long as you have had a chance to do it. But we think about 5 to 10 minutes is probably about right.

If you message someone and they do not reply straight away, don't worry – they might be busy or not near their phone, tablet or computer. When you receive your email reminder from us, you can start a conversation with as many people as you like and hopefully one of them will be available to chat with you!

Once you have finished having your conversation, you will then go back onto the survey website and press the button to say you have finished your activity. You will then be asked to complete **seven** more short questions. These will only take you one or two minutes to complete.

If you are busy when we send you the email and can't get to your phone or a computer, don't worry. You don't have to complete them as soon as we send you the reminder, you will have until the next day (when we send you the next email reminder) to complete them.

You will be asked to do the same thing for seven days in a row. Each day you will be:

- Sent an email with the web link to the survey
- Asked to answer **four** short questions
- Asked to do your daily activity (interact with a friend and/or family member on social media)
- Asked to answer **seven** questions after your activity

On the seventh day, after you have finished your seven questions, you will be asked to complete a longer survey with some more questions. This will take you about 15 minutes to complete. Once you have finished answering these questions, you will have finished taking part in the research.

Group 2: 'Lurking' on social media

Thank you for agreeing to take part in this research! To help you take part, here are some instructions about what we would like you to do when you receive your daily email reminder from us.

At 5:30pm for the next seven days, you will receive an email with a web link to a survey online. When you click on this link it will take you to a website where you will be asked to answer **four** short questions. This will not take you more than one or two minutes to complete. As soon as you have answered those four questions, the survey will tell you to do your daily activity - try to do it straight after you've answered the questions if you can!

As you are in **group 2** your daily activity will involve 'lurking' on social media. Lurking is when people go on social media but do **not** post anything (e.g. a photo, a tweet, a comment, a status), do **not** reply to something somebody else has posted, and do **not** speak to anyone online. When people lurk they look at other people's feeds, photos, statuses, tweets, videos etc. but they do not speak to people or comment on any of these things.

You can lurk on anybody's profiles. For example, it can be a friend or a family member, a celebrity, or an influencer – it doesn't matter as long as you are not commenting, posting, or speaking to anybody while looking at what they have posted.

Some examples of lurking might be: scrolling through your Facebook feed, scrolling through Instagram, looking at people's Snapchat stories/photos, looking at videos on YouTube, and scrolling through tweets on Twitter.

It is okay to lurk on lots of different social media platforms and look at lots of different people's accounts when you are asked to do your activity. Also - try to look at people's accounts that you would usually look at, like your favourite celebrities or your friends. It doesn't matter too much how long you spend on this task, as long as you have had a chance to do it. But we think about 5 to 10 minutes is probably about right.

When you are lurking, try not to read messages that people send to you on instant messaging apps (e.g., WhatsApp or Facebook messenger) or read and reply to any comments that people put on your own social media accounts (e.g., a photo comment on Instagram). This might be difficult so don't worry if you struggle to do this, just try your best! If you get interrupted by somebody trying to speak to you on social media, that's okay – just try to go back to your lurking activity as soon as possible and try to engage in it without being interrupted.

Once you have finished lurking, you will then go back onto the survey website and press the button to say you've finished your activity. You will then be asked to complete **seven** more short questions. These will only take you one or two minutes to complete.

If you are busy when we send you the email and can't get to your phone or a computer, don't worry. You don't have to complete them as soon as we send you the reminder, you will have until the next day (when we send you the next email reminder) to complete them.

You will be asked to do the same thing for seven days in a row. Each day you will be:

- Sent an email with the web link to the survey
- Asked to answer **four** short questions
- Asked to do your daily activity (lurk on social media)
- Asked to answer **seven** questions after your activity
- Given a one or two minute "calming" activity to complete

On the seventh day, after you have finished your seven questions, you will be asked to complete a longer survey with some more questions. This will take you about 15 minutes to complete. Once you have finished answering these questions, you will have finished taking part in the research.

Group 3: Interacting with a friend or a family member face-to-face

Thank you for agreeing to take part in this research! To help you take part, here are some instructions about what we would like you to do when you receive your daily email reminder from us.

At 5:30pm for the next seven days, you will receive an email with a web link to a survey online. When you click on this link it will take you to a website where you will be asked to answer **four** short questions. This will not take you more than one or two minutes to complete. As soon as you have answered those four questions, the survey will tell you to do your daily activity - try to do it straight after you've answered the questions if you can!

As you are in **group 3** your daily activity will involve speaking to a friend or a member of your family face-to-face. You should have a conversation where both you and your friend/family member take turns to speak and talk about something together. It

doesn't matter how/where you have the conversation as long as both of you have the opportunity to say something in the conversation and that you have it face-to-face (so, **not** over the phone, over text, or on social media).

It is okay to speak to more than one person or speak to a group of people at the same time. It doesn't matter too much how long you spend on this task, as long as you have had a chance to do it. But we think about 5 to 10 minutes is probably about right.

You might be alone when you get the email reminder, so you might not be able to find someone to speak to face-to-face straight away. If this happens, don't worry – just wait until you see someone that you can speak to. Try to make the conversation as natural as possible – speak to people about something real that you want/need to speak to them about! For example, you might want to speak to a friend about some school work or speak to a member of your family about what you will be having for dinner.

If you are busy when we send you the email (e.g. if you're doing your homework, running outside, or watching a movie) - don't worry! You don't have to complete the surveys and your activity as soon as we send you the reminder, you will have until the next day (when we send you the next email reminder) to complete them.

Once you have finished having your conversation, you will then go back onto the survey website and press the button to say you've finished your activity. You will then be asked to complete **six** more short questions. These will only take you one or two minutes to complete.

You will be asked to do the same thing for seven days in a row. Each day you will be:

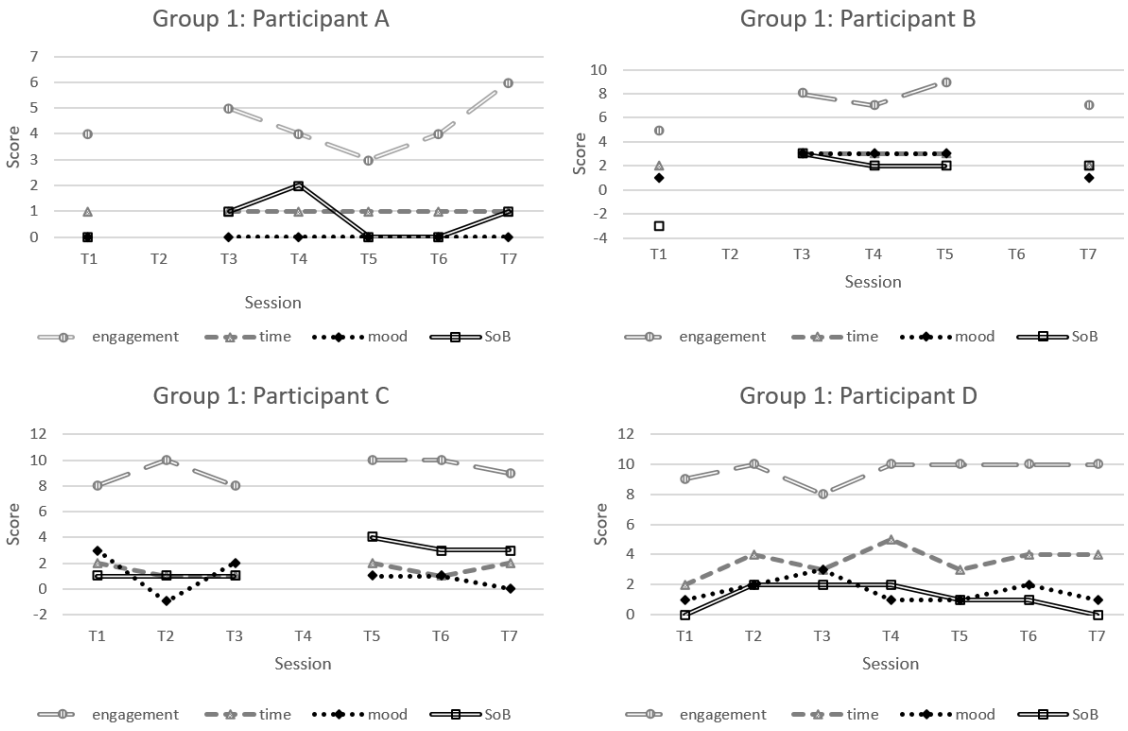
- Sent an email with the web link to the survey
- Asked to answer **four** short questions

- Asked to do your daily activity (interact with a friend and/or family member face-to-face)
- Asked to answer **six** questions after your activity

On the seventh day, after you have finished your six questions, you will be asked to complete a longer survey with some more questions. This will take you about 15 minutes to complete. Once you have finished answering these questions, you will have finished taking part in the research.

Appendix H Single case analysis of group one (INTERACT) data

To explore the immediate impact of using SM to maintain existing relationships, a single case analysis was conducted on the data from the four participants in the INTERACT group who were present at both T1 and T7. Single case analyses allow for changes in response to an intervention/condition to be evaluated over time, with each participant acting as their own control. Visual analysis of line graphs, where data are plotted for each session, is considered the standard method for analysing single case data (Ledford et al., 2018). The figure below shows the four single cases, with each participant's changes in SoB and mood plotted against the time they spent doing their activity (time) and their self-reported ratings of activity adherence (engagement). These plots show that self-reported engagement and time spent on the activity do not seem to be meaningfully related to changes in SoB and mood for participants in the INTERACT group.



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