

**Motivations for social media use in adolescents and their association with mental health
during the COVID-19 pandemic**

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:



Name: Maya Bowri

Date: 18th June 2021

Overview

This thesis is concerned with motivations for social media use and their association with mental health in adolescents.

Part One: Literature Review. Part one is a systematic review of scales used to measure motivations for social network site use and their psychometric properties.

Part Two: Empirical Paper. Part two is a quantitative, empirical study exploring adolescents' motivations for social media use and their association with mental health during the COVID-19 pandemic. It was completed as a joint project with another UCL Clinical Psychology Doctorate student (Green, 2021). Regression analyses were used to explore associations between motivations for social media use and symptoms of depression, generalised anxiety and social anxiety. Latent profile analysis (LPA) was used to empirically group adolescent social media users into homogenous profiles based on patterns of use motives, and multinomial logistic regression used to explore associations between these profiles and symptoms of depression, generalised anxiety and social anxiety.

Part Three: Critical Appraisal. Part three is a critical appraisal of the process of undertaking the systematic review and empirical project described in parts one and two. It includes reflections on stages of the research process and consideration of broader questions and issues it posed.

Impact Statement

It has been reported that 70% of British teenagers have a profile on social media and that social media use increased considerably since the start of the COVID-19 pandemic, including amongst children and young people. Given the ubiquity of social media use in young people, researchers have become increasingly concerned about the impact of use on child and adolescent mental health, with controversy in the literature around its putative positive and negative effects. Individual motivations for use have been identified as a key variable in the relationship between social media use and mental health, but their investigation is sparse amongst adolescents and few thoroughly validated measurement tools for social media use motives are available.

The systematic review identified 38 scales used to measure motivations for social network site (SNS) use and investigated the psychometric properties of these. Most scales were based upon one theoretical framework (uses and gratifications) and validated with university students, with only three scales having been developed for use in adolescents. The scales generally scored poorly on content validity, structural validity, external validity and cross-cultural validity. The review will be of use to future researchers interested in studying motivations for social media use and may be used as a guide to help researchers identify an appropriate scale for their study, as well as those wishing to develop or further validate an existing scale. The findings from the review highlight measurement issues within the study of motivations for social media use and emphasise the need for greater methodological rigour within the field.

The empirical study explored associations between adolescents' motivations for social media use and symptoms of depression, generalised anxiety and social anxiety amongst a sample of British secondary school students during the COVID-19 pandemic. Latent profile

analysis (LPA) was used to empirically identify homogenous subgroups of adolescent social media users based on motivations for use. Findings showed that motivation to use social media for entertainment was associated with all three mental health categories, suggesting that entertainment motivation may be a *trans*-diagnostic or general feature of common mental health difficulties among adolescents. Young people who rely on social media to pass the time or improve their mood might be doing so at the expense of engagement in healthier coping strategies offline such as spending time with friends and family or participation in physical activity. Findings also suggested that greater motivation to use social media to fulfil interpersonal motives (e.g. social connectedness, following and monitoring others) is associated with more symptoms of social anxiety in adolescents.

These findings have clinical implications for potential interventions designed to modify adolescents' relationship with social media and/or identify individuals who may be at increased risk of developing mental health difficulties based upon their social media use. Within academia, the study's contextual approach to exploring inter-individual patterns of social media use and mental health represents a step away from reductionist approaches to exploring the association between young people's social media use and their psychological wellbeing.

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Part One: Literature Review

**A systematic review of scales used to measure motivations for social network site use
and their psychometric properties**

Abstract

Aims: Motivations for social network sites (SNS) use are an emerging area of study and have been shown to be associated with individual differences in psychological outcomes related to SNS use including self-esteem and life satisfaction, yet few tools for assessing motivations for SNS use are available and many of them have not received rigorous psychometric assessment. This systematic review aimed to locate scales used to measure motivations for using SNS and evaluate their psychometric properties.

Method: Keyword and thesaurus-based searches were conducted across four electronic databases, along with reference list searches. This resulted in 38 scales, validated among 16,544 SNS users of a broad range of platforms including Facebook, Instagram, YouTube, Twitter, Pinterest, Weibo and WeChat, across 16 countries. Scales were rated on methodological quality using an adapted version of the COSMIN standards for content validity, structural validity, internal consistency, cross-cultural validity / measurement invariance, test-retest reliability and associations with other variables including criterion and construct validity.

Results: Methodological quality ratings varied across studies for different validity and reliability tests. Some scales had been validated more thoroughly among multiple samples and others had not been validated rigorously. In particular, scales scored poorly with regards to content validity, structural validity, external validity and cross-cultural validity.

Conclusions: This review serves as a guide for future scholars who wish to study SNS use motivations and may assist them in selecting an appropriate tool. The review provides an evaluation of and helps to improve the scientific and methodological bases of SNS research.

1. Introduction

1.1. Social network sites

The use of social network sites (SNS) has increased rapidly over the course of the 21st century, particularly among young people, which has prompted a surge in research interest in order to improve understanding of young people's behaviour on SNS, their patterns of use, and the impacts of use (Trifiro & Gerson, 2019), including both positive and negative consequences with respect to mental health and psychological wellbeing (Ahn, 2011).

Boyd and Ellison (2007) define SNS as: “web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system” (p.211). However, there remains much controversy in the literature around what constitutes a SNS and the distinction between SNS and other social media platforms, and furthermore the terms SNS and social media are often used interchangeably. For example, whereas Facebook and Instagram are clear examples of SNS within the literature and are among the top five most popular SNS globally (Kocak et al., 2020), some researchers have categorised the microblogging service Twitter as an informational platform rather than a SNS (Kwak et al., 2010), while the Chinese platform Weibo which has many similarities to Twitter (Pang, 2018), is referred to as both a microblogging and SNS (Gan, 2018). Similarly, WeChat combines both functions of an instant messaging platform and a SNS (Wen et al., 2016; Gan, 2018). Furthermore, while Kaplan and Haenlein (2010) classify YouTube as a content community distinct from SNS, reasons for use may be widening, with the site appearing to function not only for entertainment but increasingly as a means for social interaction (Khan, 2017).

1.2. Motivations for SNS use

It is clear that there are significant inter-individual differences in the way in which SNS are used (Sigerson & Cheng, 2018), and that varying patterns of SNS use relate to different psychological outcomes. In recent years, researchers have become interested in not only objective aspects of SNS use, including time spent or frequency of use, but also in more psychological components of use, such as online social comparisons (Vogel et al., 2014), “fear of missing out” (FoMO; Alt, 2015), SNS “intrusion” (Blachnio, Przepiorka, Benvenuti, et al., 2016), and addictive patterns of use (Busalim et al., 2019). Amongst these psychological facets of SNS use and with a growing body of associated research is the study of motivations for use. Motivations can be defined as an individual’s reasons for or purposes of SNS use, as distinct from (although related to) attitudes towards (e.g. Krishnan & Hunt, 2015) and behavioural intentions to use SNS (e.g. Liu et al., 2010). It has been suggested that motives for using SNS can be broadly grouped into four distinct categories: relational, informational, entertainment and self-expression (e.g. Krasnova et al., 2017), although as research in the field grows and our understanding becomes more nuanced, more categories emerge.

Whilst a number of different theoretical frameworks have been applied and implicated in the study of motivations for SNS use, the Uses and Gratifications Theory (UGT; Katz, 1959) appears to have been the main driver for this research. Initially developed to explain mass communication media adoption behaviours, UGT is concerned with “what people do with the media” as opposed to “what the media do to people” (Katz, 1959, p. 2). The theory has been extended to the application of a variety of technological uses including the domain of social media and SNS (Ku et al., 2013), and when applied in this context proposes that individuals use applications or SNS because they anticipate particular gratifications from the service, such as strengthening social relationships or passing the time, which in turn reinforce

future use (Pertegal et al., 2019). Within UGT, gratifications can be distinguished in terms of those sought versus those obtained (Palmgreen et al., 1980). When applied to the field of social media, gratifications sought are measured as individuals' reasons for using particular applications or websites, whereas gratifications obtained are measured by ascertaining what individuals get out of using these platforms (Sheldon, 2008).

Motivations for using SNS are likely to be influenced by the psychological and social contexts in which use occurs (Rubin, 2002). For instance, it has been proposed that people with less opportunity for social interaction in their day-to-day lives (i.e. offline) may use the Internet for purposes including to seek companionship and social activity (Papacharissi & Rubin, 2000), a concept commonly referred to within the social media literature as the social compensation or "poor-get-richer" model (e.g. Bergagna & Tartaglia, 2018). In a similar vein, motives for using SNS range from personal or private use to professional and commercial use depending on contextual or environmental factors (Pertegal et al., 2019).

There is also evidence that demographic factors influence individual motives for SNS use. For example, with respect to gender, studies have found that females are more likely to use SNS for relational motives (Hunt et al., 2012) and self-disclosure (Sheldon, 2013), while more nuanced findings show that females more often use SNS for bonding social capital purposes (i.e. to follow and maintain connections with existing friends), whereas males may be more likely to use them for bridging purposes, including to build new friendships and pursue romantic relationships (Pertegal et al., 2019). It has also been found that females may more frequently use SNS for entertainment, social recognition and access to social information (Pertegal et al., 2019), although findings concerning gender differences in motives for SNS use are often insignificant or contradictory and thus should be interpreted with caution. It is also important to consider age as a potential predictor of motives for SNS use; there is some evidence to suggest that older people are more likely to use SNS for

reasons concerning bonding social capital, and for informational and academic purposes, while younger users tend to gravitate towards SNS for bridging social capital, to obtain social recognition and feel part of an online community, and for entertainment purposes (Pertegal et al., 2019). However, the magnitude of these differences tends to be small and there is a lack of data from samples covering an appropriate age range from adolescence to adulthood.

Other antecedents of SNS use motives which have been widely studied are individual personality traits or dimensions, most commonly in accordance with the Five Factor model (Costa & McCrae, 1985), for example as measured using the Big Five Inventory (John et al., 1991). Such research has found extraversion to be positively correlated with motives related to establishing new relationships (e.g. Jackson & Wang, 2013), seeking social recognition (e.g. Horzum, 2016), and entertainment (Orchard et al., 2014), while neuroticism is negatively correlated with building new relationships (Bibby, 2008) and rather is linked to surveillance or “lurking” on SNS (passive following of others) (Hughes et al., 2012; Seidman, 2013), informational motives (Hughes et al., 2012; Seidman, 2013), seeking social approval on SNS (Horzum, 2016) and escapism (Timmermans & De Caluwé, 2017).

Research demonstrates that individual motives for SNS use are associated with a variety of both positive and adverse psychosocial outcomes, including with respect to social capital (Ahmad et al., 2016; Jin, 2014), self-esteem (Blachnio, Przepiorka & Rudnicka, 2016; Ouwerkerk & Johnson, 2016), life satisfaction (Wang et al., 2016) and subjective well-being (Jung et al., 2012). Furthermore, relational motives such as maintaining contact with and following friends have been found to be positively correlated with higher levels of perceived social support and lower levels of loneliness (Wright et al., 2013).

1.3. Scales in SNS research

Psychological variables in the study of SNS use, including motivations, are typically measured using self-report questionnaires or scales, which in spite of their issues concerning social desirability and acquiescence biases are appropriate given that these variables reflect internal experiences which cannot be observed (Sigerson & Cheng, 2018). A systematic review of every article and scale which had been published prior to July 2014 (Volume 17, Issue 7) in the popular journal *Cyberpsychology, Behavior, and Social Networking*, which included 1478 articles and 921 scales spanning a period of 17 years, found that 64% of extant articles in 2012 had used the simple survey design (Howard & Jayne, 2015).

Given the heavy reliance on self-report measures in the social media research field, it is imperative that the scales employed are both valid and reliable (Howard & Jayne, 2015). However, since the study of social media and SNS is relatively speaking still in its infancy and continuously evolving, it has been suggested that researchers have had limited opportunity to develop reliable and valid scales for constructs of interest to the field (Howard & Jayne, 2015). Conversely, researchers often seem to employ self-created scales which typically and unfortunately lack rigorous investigation of their psychometric properties (Howard & Jayne, 2015), and the study of motivations for SNS use appears to be no exception. This is problematic because the use of scales which have not been subjected to such investigation may not sufficiently measure constructs which they intend to measure (Howard & Jayne, 2015). Whilst the review by Howard and Jayne (2015) found that the reporting of scales has got better in time as the use of the survey design has increased, there remains a substantial deficiency within the field in relation to the validated measurement of usage patterns of SNS including motivations for SNS use.

It has been reported that existing scales used to measure motives for SNS use differ significantly from each other in the motives they include, and that studies often identify use motives without exploring the relationships between these individual motives and psychological outcomes (Pertegal et al., 2019). Further, many studies have not tested the measurement invariance of the scale, for example in relation to gender or age (Pertegal et al., 2019). Scales designed to measure motivations for using a specific SNS (e.g. Facebook) are often adapted for use with other platforms, and in this case may not retain their validity given that different SNS have different features, affordances and audiences (Trifiro & Gerson, 2019). Furthermore, specific SNS evolve rapidly in response to competition with other platforms and changing needs of users, such that scales created for specific services can rapidly become redundant (Trifiro & Gerson, 2019). This highlights the need for universal scales measuring motivations for use across multiple platforms which have been validated in several contexts (Sigerson & Cheng, 2018; Trifiro & Gerson, 2019).

1.4. Previous systematic reviews of scales in SNS research

In order to address methodological issues concerning the reliability and validity of scales in SNS research, Sigerson and Cheng (2018) conducted a systematic review of the psychometric properties of scales measuring user engagement with SNS. This included 12 scales and the authors provided a broad definition of SNS engagement as an umbrella concept which included usage and activity counts (e.g. time spent), action and participation, self-presentation, social context (e.g. subjective norms), positive experiences which maintain engagement, and motivations for SNS use as conceptualised by uses and gratifications (McCay-Peet & Quan-Haase, 2016). None of the 12 scales included in the review measured motivations only (i.e. gratifications sought), and rather motivations or uses and gratifications were included as part of broader measures of SNS engagement in only four of the scales. However, given the recent surge in interest in motivations for SNS use and the wealth of

studies which have been published in this area, particularly during the past five years, it makes sense to review scales used to measure motivations for SNS use in their own right. Furthermore, Sigerson and Cheng's (2018) review included only articles aiming to establish a new scale or validate a previous scale measuring engagement with SNS, and therefore may be biased in terms of having only reviewed scales which have been sufficiently validated. This is unlikely to capture the reality of the state of measurement of SNS use motives given the aforementioned issues discussed. Finally, the scales in this review were almost exclusively developed for Facebook use, and is thus not useful for researchers who may be interested in other platforms which are gaining popularity (e.g. Instagram), or those who are based in locations where Facebook is not used (i.e. China) or less accepted (Sigerson & Cheng, 2018).

As part of the development of a new scale to measure motives for SNS use in adolescents and youths, Pertegal et al. (2019) completed a review of 18 previous studies which had developed scales to assess motives for using SNS. However, the focus was on identifying which motives tended to be included in order to pinpoint gaps in their coverage, rather than a thorough investigation of their psychometric properties. Furthermore, given that this was not a published systematic review in its own right, the authors provided only limited details on their inclusion/exclusion criteria and search strategy, and it is likely that they may have missed some important papers and scales in the field. In addition, it should be noted that this review is now two years out of date, and therefore does not include studies which have been published since. Finally, and as with the previous review, more than 60% of the scales focused on Facebook use.

1.5. Aims

The primary aims of this review were to:

(i) identify scales which had been created to measure motivations for SNS use and to systematically investigate their psychometric properties; and

(ii) establish with respect to *status quo*, measurement issues within the study of motivations of SNS use,

with a view to assist future researchers in the field by providing a guide which identifies future foci for scale development and validation and helps researchers to ascertain whether a motivations scale is valid and reliable when conducting research in the future. This is particularly important in light of current concern about the impact of SNS use and motivations for use on mental health.

2. Method

2.1. Selection criteria

Boyd and Ellison's (2007) popular definition of SNS, as cited in the Introduction, was used to select papers for inclusion in this review, although given the aforementioned issues discussed concerning lack of consensus on the definition of SNS, this conceptualisation was taken loosely, as reflected within the search terms used (Appendix A). The review included not only more conventional SNS such as Facebook (Kaplan & Haenlein, 2010), but also content communities (YouTube) and microblogging sites (Twitter and Weibo). However, the review excluded studies on blogging motivations (e.g. Fullwood et al., 2015; Hollenbaugh, 2011), motivations for using instant messaging (IM) services such as WhatsApp, Messenger or ICQ (e.g. Leung, 2001), and motivations for virtual social and game worlds such as Second Life or World of Warcraft (e.g. Fuster et al., 2014; Li et al., 2013) since these forms of social

media were considered to substantially deviate from the definition of SNS provided by Boyd and Ellison (2007).

Articles were included in the review if they used a simple survey design, whereas qualitative studies were excluded. In order to capture the reality of the state of SNS motivations measurement, the review included papers whose main aim was to assess a scale's psychometric properties, as well as papers where scale validation was a secondary aim or those which contributed comparatively limited information on psychometric properties. However, studies were excluded if they did not provide scale data on both reliability and validity, including structural validity as explored using factor analysis. Scales were included if they consisted of at least two dimensions or different motives. Single-item measures were excluded from the review, as well as those obtaining qualitative responses.

The review focused on scales measuring personal or private use motivations rather than commercial or professional use motives and therefore excluded SNS such as LinkedIn which are oriented towards business, employment and professional advancement, as well as studies on commerce motives among consumers (e.g. Akman & Mishra, 2017; Bazi et al., 2020). It also excluded studies on motivations to use dating websites/applications such as Tinder (e.g. Timmermans & De Caluwé), which although are often characterised as SNS, may be associated with distinct motivations when compared to more general SNS. The review included scales measuring motivations to use either a specific SNS (e.g. Facebook or Instagram) or SNS use in general. It excluded scales designed to measure motivations to use specific features or engage in specific behaviours on SNS, such as Facebook groups (Park et al., 2009), photo-tagging (Dhir et al., 2017) and "checking in" (Kim, 2016).

In order to be of use to a broad audience, the review excluded scales developed for highly specific samples, such as medical (e.g. AlFaris et al., 2018) and nursing students (e.g.

Duke et al., 2017). Searches were limited to articles published from the year 2000 onwards since the first recognisable SNS was created in 2002 (Future Marketing, 2021). Searches were also limited to articles published in English.

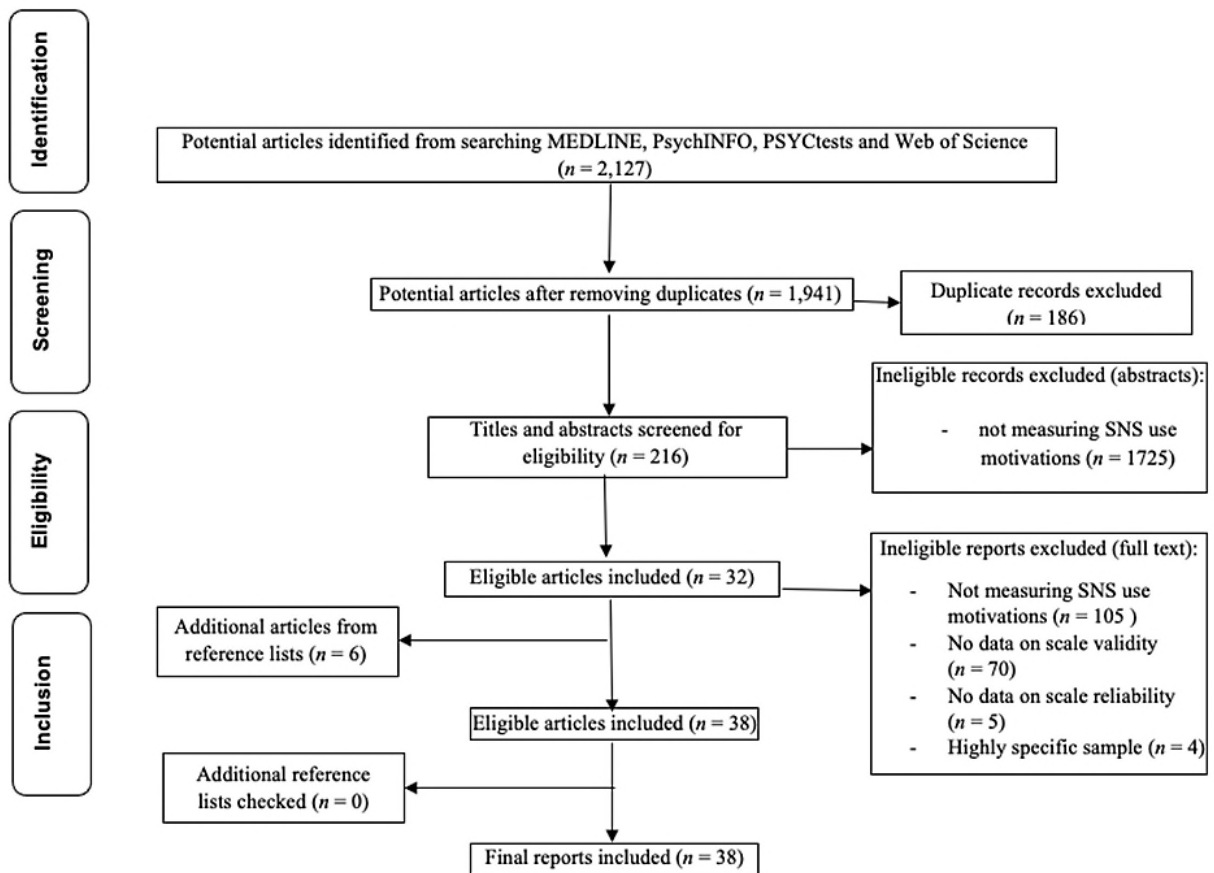
2.2. Literature search and study selection

Literature searches were completed in November 2020 across three electronic databases via the Ovid Interface (MEDLINE, PsychINFO, PSYCtests), as well as the Web of Science Core Collection. These four databases span social sciences, health and medical sciences, and arts and humanities. To ensure a comprehensive search, keywords and thesaurus terms were searched in titles, abstracts and keywords in the three databases available via the Ovid interface. The search strategy combined a set of SNS-related terms, terms related to scale development and assessment, and a set of terms related to motivations for use (Appendix A), which were chosen based on the search strategy of a previous systematic review (Sigerson & Cheng, 2018), as well as keywords from relevant papers on SNS use motives previously identified by the author (e.g. Pertegal et al., 2019).

From the search strategy, the author obtained 195 potentially relevant results from MEDLINE, 206 from PsychINFO, 271 from PSYCtests, and 1455 from Web of Science, yielding a total of 2127 results which were exported into Mendeley. Duplicates were deleted using Mendeley Desktop Software (version 1.19.6). Following this, 1941 titles and abstracts were screened to identify reports to review, leaving 216 papers (see Figure 1). After examining these reports in more detail, 184 reports were omitted which did not meet the selection criteria, leaving 32 eligible articles for review. In the final step, the reference lists of these 32 articles were checked for additional papers, yielding six more articles for review. The reference lists of these additional papers were checked but no further eligible papers were found, thus a total of 38 articles were included in this review.

Figure 1

Prisma flow diagram of systematic selection process (adapted from Moher et al., 2009)



2.3. Psychometric properties assessed in this review

Psychometric properties of the 38 scales identified for this review were evaluated according to the COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) checklist (Mokkink, Terwee, Knol, et al., 2010; Mokkink, Terwee, Patrick, et al., 2010; Terwee et al., 2012), a tool used increasingly in systematic reviews of scale psychometric properties. The COSMIN checklist covers nine domains, each of which assesses a specific psychometric property. These are content validity, structural validity, internal consistency, cross-cultural validity/measurement invariance, reliability, measurement

error, criterion validity, construct validity, and responsiveness. Each domain has 5-18 items which are used to ascertain whether a particular measurement property achieves the standard for good methodological quality. Each item is rated as ‘very good’, ‘adequate’, ‘doubtful’, ‘inadequate’ or ‘N/A’. A methodological quality score for each domain is calculated using the lowest rating of any item in that domain (i.e. the “worst score counts” principle) (Terwee et al., 2012).

Whilst the COSMIN methodology focuses on outcome measures with an evaluative application, it can also be used for other types of measurement instruments including those with predictive application, although the authors suggest that in this case the methodology should be adapted for these other purposes (Mokkink et al., 2017; Prinsen et al., 2018). In light of this, the COSMIN methodology was used as a guide only, and where specific domains or checklist standards were not relevant for the scale/study in question (e.g. test-retest reliability, measurement error, criterion validity, responsiveness), these were omitted from the quality rating process.

2.3.1. Content validity

Content validity is the extent to which an instrument’s content is a true reflection of the variable to be measured (Terwee et al., 2017). A scale’s content validity is based on its items, and therefore adhering to good standards when developing scale items is pivotal (Sigerson & Cheng, 2018). The UGT uses a preliminary list of items to function as potential gratifications (Ku et al., 2013). These are typically inspired by previous research in order to increase concurrent validity (Orchard et al., 2014) since it has been proposed that individual gratifications are consistent across media and communication mediums (Becker, 1979). Content validity is considered to be the most important psychometric property, since items should be relevant, comprehensive and comprehensible with respect to the construct of

interest and study population, but is often the most challenging type of validity to assess (Terwee et al., 2017).

Following COSMIN methodology guidelines (Terwee et al., 2017), content validity was evaluated by considering the quality of the scale's development, which consisted of aspects of the scale's general design and concept elicitation to ensure its relevance and comprehensiveness, including findings from cognitive interview studies or pilot tests if these were performed, along with findings from any additional content validity studies (e.g. asking professionals about relevance/comprehensiveness). In addition, the reviewer rated the content of the scales herself to ensure concordance between scale items and SNS use motives.

2.3.2. Structural validity

Structural validity is defined as the way that different dimensions of a scale are associated with one another and the extent to which scores on the measure are an adequate reflection of the dimensionality of the construct to be measured, and is concerned with the associations between items and latent variables, and typically assessed using factor analysis (Furr & Bacharach, 2013; Mokkink et al., 2017; Prinsen et al., 2018). Different types of factor analysis commonly performed to measure structural validity include exploratory factor analysis (EFA) and principal components analysis (PCA). Whilst it has been suggested that both PCA and EFA will yield similar results, some studies have shown that PCA can negatively affect the scale's structural validity (Sigerson & Cheng, 2018). For example, one study found that PCA removed particular items from the scale that EFA would have kept (Costello & Osborne, 2005). However, the COSMIN methodology does not distinguish between PCA and common factor analysis, with both of these being considered as types of EFA (Mokkink et al., 2017; Prinsen et al., 2018). Following EFA, it is recommended that

additional validation of the factor structure is performed using confirmatory factor analysis (CFA) given that EFA may not produce stable results (DiStefano et al., 2009).

2.3.3. Internal consistency

Internal consistency refers to the degree of association among scale items and is typically measured using Cronbach's alpha (Mokkink et al., 2017; Prinsen et al., 2018). A Cronbach's alpha value below .70 is commonly considered suboptimal (e.g. Streiner, 2003).

2.3.4. Cross-cultural validity / Measurement invariance

Cross-cultural validity is the degree to which a scale is valid in more than one sample or context (Messick, 1995). In order to assess cross-cultural validity, the scale needs to be used with at least two different groups (Mokkink et al., 2017; Prinsen et al., 2018). This term is interpreted broadly within the COSMIN methodology to include not only different ethnic or language groups as culturally distinct samples, but also different gender and age groups (Mokkink et al., 2017; Prinsen et al., 2018). Cross-cultural validity is assessed using measurement invariance (MI) tests, which show that scores on the scale are not affected by demographic factors (Sigerson & Cheng, 2018).

2.3.5. Reliability

While internal consistency as measured by Cronbach's alpha is a measure of the average inter-correlation among scale items, the COSMIN methodology defines reliability as the consistency of an individual's score on the questionnaire over time (Mokkink et al., 2017; Prinsen et al., 2018), also known as test-retest reliability.

2.3.6. Associations with other variables

To demonstrate criterion and construct validity, studies tend to rely on a previously established association between the variable being measured and a target variable grounded

in theory or empirical work, which is typically explored using bivariate correlation analysis or regression analysis (Sigerson & Cheng, 2018).

2.3.6.1. Criterion validity

Criterion validity is defined as the extent to which scale scores are a true reflection of a ‘gold standard’ measure and is assessed in terms of the degree of association between the scale and the gold standard measure (Mokkink et al., 2017; Prinsen et al., 2018). Given that the field of social media still represents a relatively new area of study, the reviewer hypothesised that there would be limited evidence of criterion validity of the scales identified given the lack of ‘gold standard’ measures.

2.3.6.2. Construct validity

Construct validity includes convergent validity and discriminant/divergent validity and is assessed in terms of the scale’s association with other variables (not gold standard measures) (Mokkink et al., 2017; Prinsen et al., 2018). Convergent validity is the extent to which theoretically similar constructs are related to one another (Liu et al., 2010). In order to show convergent validity, researchers establish a significant association between SNS use motivation (as measured by the scale) and another theoretically or conceptually similar variable (Sigerson & Cheng, 2018). Convergent validity can be measured using composite reliability values and the average variance extracted (AVE), with composite reliability values of .70 or above and an AVE of greater than .50 being acceptable (Fornell & Larcker, 1987).

In contrast, divergent or discriminant validity is the extent to which theoretically dissimilar measures are unrelated to one other (Anderson & Gerbing, 1988). Criteria for testing sufficient discriminant validity includes correlations between two variables not greater than .60 (Campbell & Fiske, 1959), and the AVE being greater than the average shared variance and the maximum shared variance (Barclay et al., 1995). In order to show

discriminant validity, SNS use motivation should not show a strong correlation with theoretically or conceptually distinct constructs (Sigerson & Cheng, 2018).

3. Results

3.1. Scale characteristics

Scale characteristics, including publication information and sample demographics for the 38 scales identified are summarised in Table 1. Studies were published between 2008 and 2020. Only four development and validation studies were identified (Hou et al., 2020; Pertegal et al., 2019; Rodgers et al., 2020; Shin & Lim, 2018), i.e. studies whose primary aim was to develop a new scale and evaluate several psychometric properties of that scale, while one study (Schaffer & Debb, 2020) aimed to evaluate cross-cultural validity of an existing scale. The vast majority of studies ($n = 34$, 89.47%) employed a SNS motivations scale which had been developed by the author(s) for the purpose of the study and provided only partial evidence of the scale's validity.

The majority of studies ($n = 25$, 65.79%) validated the scales in student-only samples, and most scales were validated in samples consisting of a higher ratio of females to males ($n = 30$, 78.95%). Approximately one third of scales were validated in the U.S. ($n = 13$, 34.21%), four in China (10.53%), three in Turkey (7.89%), two in Korea (5.26%), two in Taiwan (5.26%), and one in the UK (2.63%), Italy (2.63%), Spain (2.63%), Croatia (2.63%), Greece (2.63%), Kuwait (2.63%), Jordan (2.63%), India (2.63%), Hong Kong (2.63%), Malaysia (2.63%) and Argentina (2.63%). Only four studies validated the scale in more than one sample (Dhir & Tsai, 2017; Gan, 2018; Schaffer & Debb, 2020; Sheldon et al., 2017). Three studies included samples comprised of adolescents (Dhir & Tsai, 2017; Pertegal et al., 2019; Rodgers et al., 2020).

Scales had a mean (M) number of items of 23 ($SD = 7.7$) and mean number of factors was five ($SD = 1.9$). Sample sizes for the studies ranged from 106 to 1327 participants ($M = 404$; $SD = 296.1$). The majority of scales ($n = 29$, 76.32%) were platform-specific, with 15 scales measuring motivations for Facebook use (39.47%), followed by Instagram ($n = 6$, 15.79%), YouTube ($n = 2$, 5.26%), Twitter ($n = 2$, 5.26%), WeChat ($n = 2$, 5.26%), Weibo ($n = 2$, 5.26%) and Pinterest ($n = 1$, 2.63%). Only one study (Gan, 2018) validated the scale in two different platforms. Six scales (15.79%) were developed to measure motivations for SNS use more generally. With the exception of one scale (Marino et al., 2016) which was based on Cox and Klinger's (1988) motivational model of addictive behaviour, one scale (Wen et al., 2016) based on self-determination theory (SDT; Deci & Ryan, 1985) and one scale (Kocak et al., 2020) based upon the technology acceptance model (TAM; Davis, 1989), all of the scales identified were founded in UGT ($n = 35$, 92.11%). One study (Hou et al., 2020) developed a multi-motive grid questionnaire comprised of both written statements and images designed to measure implicit SNS use motivation, built upon both UGT and TAM.

Table 1*Scale characteristics and sample demographics for reviewed studies*

Scale (name / description)	Publication information			Scale characteristics				Sample demographics				
	Author(s)	Year	Number of citations	Number of items	Number of factors	SNS	Theoretical framework	Sample size	Country	Students only	Gender (% Female)	Mean age (SD)
Motivation for using YouTube	Hanson & Haridakis	2008	204	34	4	YT	UGT	291	U.S.	Yes	66.1	19.8 (0.5)
Facebook Gratifications	Sheldon	2008	724	26	6	FB	UGT	160	U.S.	Yes	57	19.9 (1.23)
Gratifications for Twitter usage	Liu et al.	2010	176	22	4	TW	UGT	124	Hong Kong	No	45.97	19-28*
Motives for Facebook use	Papacharissi & Mendelson	2011	528	30	8	FB	UGT	344	U.S.	Yes	64.3	18-25*
Motives for Facebook Use	Tosun	2012	401	27	10	FB	UGT	143	Turkey	Yes	74	22.6 (3.6)
Facebook gratifications	Giannakos et al.	2013	128	14	4	FB	UGT	222	Greece	No	44.1	25-34*
Gratifications for using SNS	Ku et al.	2013	225	22	6	SNS (general)	UGT	122	Taiwan	No	56.56	21-25*
Motives for Facebook use	Yang & Brown	2013	348	12	2	FB	UGT	193	U.S.	Yes	54	20.32
SNS Motivations	Orchard et al.	2014	110	40	10	SNS (general)	UGT	220	UK	Yes	74	20.0 (5.6)
Motives for using Facebook	Chang & Hoo	2014	163	16	4	FB	UGT	192	U.S.	Yes	68.2	-
Motivations for Facebook use	Park & Lee	2014	1986	16	5	FB	UGT	246	U.S.	Yes	59.8	21.4 (4.2)
Pinterest U&G	Mull & Lee	2014	95	27	5	Pinterest	UGT	243	U.S.	Yes	100	21.4 (1.7)
Motivations of Twitter use	Lee & Kim	2014	40	14	4	TW		461	Korea	No	36.7	33.2 (7.8)
Facebook motives	Hollenbaugh & Ferris	2014	381	24	5	FB	UGT	301	U.S.	No	77.1	31.9 (12.9)
Facebook usage motivation	Hong & Chiu	2014	36	16	2	FB	UGT	206	Taiwan	Yes	30.2	18-22*
Facebook motivation	Adnan & Mavi	2015	16	20	6	FB	UGT	798	Malaysia	Yes	56.7	21.4 (1.8)
SNS motives	Krishnan & Hunt	2015	29	21	4	SNS (general)	UGT	674	U.S.	Yes	55.5	19.6 (1.3)

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Table 1
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Scale (name / description)	Publication information			Scale characteristics				Sample demographics				
	Author(s)	Year	Number of citations	Number of items	Number of factors	SNS	Theoretical framework	Sample size	Country	Students only	Gender (% Female)	Mean age (SD)
Motives for using social media	Al-Menayes	2015	61	18	5	SM (general)	UGT	1327	Kuwait	Yes	70.2	21.9
Motivation to use Instagram	Lee et al.	2015	462	28	5	IG	UGT	212	Korea	No	52	28.8 (5.3)
Motives for Instagram	Sheldon & Bryant	2016	765	20	4	IG	UGT	163	U.S.	Yes	67	22.6 (5.3)
FAU Scale	Horzum	2016	31	30	7	FB	UGT	673	Turkey	Yes		
Motives for using Facebook	Marino et al.	2016	50	16	4	FB	Motivational model of addiction	815	Italy	Yes	77.1	21.2 (2.2)
WeChat Using Motivation Questionnaire	Wen et al.	2016	40	12	4	WeChat	SDT	339	China	Yes		20.7 (2.1)
Facebook U&G	Dhir & Tsai	2017	63	18	(1) 4	FB	UGT	(1) 373	India	No	33.8	13-17*
					(2) 5			(2) 107		No	35.2	14-18*
					(3) 3			(3) 106		Yes	29.9	19-21*
YouTube use motivations	Khan	2017	436	21	5	YT	UGT	1143	U.S.	No	63	24.3 (7.5)
Instagram U&G	Sheldon et al.	2017	92	15	5	IG	UGT	(1) 253	U.S.	Yes	58	(1) 20.1 (2.9)
								(2) 149	Croatia	Yes	95	(2) 24.6 (5.4)
SUMS	Shin & Lim	2018	5	30	4	SNS (general)		481	Korea	Yes	66.3	21.1 (1.9)
Facebook gratifications	Leiner et al.	2018	39	35	5	FB	UGT	482	Germany; Austria; Switzerland	No	69	28.0 (6.4)
Facebook motives	Alzougool	2018	16	36	6	FB		358	Jordan	No	38.5	34.0
Gratifications for using Weibo and WeChat	Gan	2018	20	18	4	Weibo	UGT	183	China	Yes	57.4	18-22*
						WeChat		185	China	Yes	56.8	18-22*
Motives for Instagram use	Huang & Su	2018	80	27	5	IG	UGT	307	Taiwan	Yes	56.7	-
Weibo use motivations	Pang	2018	13	17	4	Weibo	UGT	426	China	No	42	21-25*
SMU-SNS	Pertegal et al.	2019	3	27	9	SNS (general)	UGT	1102	Spain	No	53	16.9 (2.5)

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Table 1
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Scale (name / description)	Publication information			Scale characteristics				Sample demographics				
	Author(s)	Year	Number of citations	Number of items	Number of factors	SNS	Theoretical framework	Sample size	Country	Students only	Gender (% Female)	Mean age (SD)
IWBQ Item 14	Schaffer & Debb	2020	1	40	3	IG	UGT	520	U.S.	Yes	81.7	22.5 (6.2)
MSMU	Rodgers et al.	2020	1	18	4	SM (general)	UGT	770	Australia	No	49	12.8 (0.7)
SNSU-MMG	Hou et al.	2020	0	13	4	SNS (general)	UGT TAM	203	China	Yes	66.5	21.1 (1.7)
Instagram usage motives	Kocak et al.	2020	2	24	6	IG	TAM	507	Turkey	No	69	24-29*
Motives for SMSs use	Perugini & Solano	2020	1	28	3	SM sites (general)	UGT	420	Argentina	No	49.8	40.3 (14.9)

Note: *Where mean age unavailable, the largest age group of the sample is reported instead. – Insufficient or no age data reported. FB = Facebook, YT = YouTube, IG = Instagram, SM = social media, UGT = Uses and Gratifications Theory, SDT = self-determination theory, TAM = Technology Acceptance Model, FAU = Facebook usage aim, SUMS = Social Network Site Use Motives Scale, SMU-SNS = Scale of Motives for Using Social Networking Sites, IWBQ = Instagram and Wellbeing Questionnaire, MSMU = Motivations for Social Media Use Scale, SNSU-MMG = Social Networking Sites Use Multi-Motive Grid Questionnaire, SMSs – social media sites.

3.2. Content validity

3.2.1. Scale development

While studies generally performed well on scale development ratings with regards to general design requirements (see Appendix B), including providing a clear description of the construct to be measured (i.e. SNS use motives/gratifications), origin of the construct being clear (i.e. UGT), and clear context of use (i.e. discriminative), some studies were rated as inadequate on the basis of the target population for which the scale was developed not being described adequately; for example, no information reported concerning typical demographic characteristics of users of the relevant SNS (e.g. Lee & Kim, 2014; Liu et al., 2010; Papacharissi & Mendelson, 2011).

With regards to concept elicitation, the majority of studies were adapted from past research ($n = 29$, 76.32%) and involved gleaning statements from previous literature to serve as potential gratifications (Supplementary Table 1). For the purpose of the COSMIN methodology, these studies were rated as very good on the basis of an appropriate data collection method used to identify relevant items for a new scale, given the widely acknowledged acceptability of this method within the field of UGT research (e.g. Ku et al., 2013; Orchard et al., 2014). Four studies (10.53%) employed focus groups to identify new items in addition to (Hanson & Haridakis, 2008; Yang & Brown, 2013) or instead of (Pertegal et al., 2019; Sheldon & Bryant, 2016) gleaning past literature, while three studies (7.89%) used a quantitative (survey) method to identify new items in addition to (Giannakos et al., 2013; Hong & Chiu, 2014) or instead of (Mull & Lee, 2014) gleaning past literature.

Only five studies (13.16%) conducted a cognitive interview or pilot in order to test the new scale for comprehensibility and comprehensiveness (Gan, 2018; Ku et al., 2013; Orchard et al., 2014; Pertegal et al., 2019; Yang & Brown, 2013). Given the importance of this step in terms of the COSMIN risk of bias, all studies which did not perform either a cognitive interview or pilot test automatically received total ratings of inadequate for quality of scale development. However, due to falling short on other items (e.g. doubts about skills of group moderators/interviewers), none of the studies achieved total development quality ratings above doubtful (Supplementary Table 3).

3.2.1. Content validity

Only four studies (10.53%) reported findings from additional content validity studies which involved asking SNS users about relevance (Lee et al., 2015) and comprehensiveness (Pertegal et al., 2019), and asking professionals about relevance (Horzum, 2016; Shin & Lim, 2018) and comprehensiveness (Horzum, 2016). These studies were all rated as doubtful on

the quality of these additional content validity studies, for reasons including consulting only a small number of SNS users via a survey method (Lee et al., 2015), limited information on the method used to consult SNS users and analyse the data (Pertegal et al., 2019), and consulting professionals from only one discipline (Horzum, 2016; Shin & Lim, 2018).

In the final stage of assessing content validity, the reviewer screened all scale items (where available) and subjectively rated these on the basis of relevance, comprehensiveness and comprehensibility (Supplementary Table 2). The majority of studies were rated as sufficient on this basis ($n = 23$, 60.53%), 11 studies were rated as inconsistent (28.95%), and four studies were indeterminate (10.53%) as the full list of items was not included in the paper. Where studies were rated as inconsistent, the reviewer noted issues with wording which were likely due to poor translation (e.g. Liu et al., 2010), doubts about items not being relevant for the study's target population (e.g. items concerned with using Instagram for business/marketing purposes in a study of undergraduate students; Schaffer & Debb, 2020), and some scales not covering what the reviewer considered to be key SNS use motives based on previous literature.

Table 2 displays the motives/dimensions that were included in each of the reviewed scales. The vast majority of studies ($n = 35$, 92.11%) included items pertaining to social connection/interaction and companionship, including relationship maintenance (bonding social capital) and/or building new relationships (bridging social capital). Three studies did not include a dimension based on social connection (Al-Menayes, 2015; Dhir & Tsai, 2017; Wen et al., 2016). The majority of studies also included items concerning entertainment / recreation or relaxation ($n = 32$, 84.21%), with only six scales not including such items (Hollenbaugh & Ferris, 2014; Lee & Kim, 2014; Perugini & Solano, 2020; Rodgers et al., 2020; Schaffer & Debb, 2020; Yang & Brown, 2013). While some scales included items pertaining to entertainment and relaxation as part of a broader dimension of 'passing time', it

is possible that using SNS out of habit or to pass the time, escapism or diversion represents a psychologically distinct motivation since seeking entertainment gratifications might be considered a form of positive reinforcement, while the latter might be considered a form of negative reinforcement. Six scales (15.79%) did not include items related to escapism/passing time (Mull & Lee, 2014; Rodgers et al., 2020; Schaffer & Debb, 2020; Sheldon & Bryant, 2016; Wen et al., 2016; Yang & Brown, 2013).

Most scales included items concerned with knowledge/information seeking ($n = 26$, 76.32%), with 12 scales not including such items (Chang & Heo, 2014; Giannakos et al., 2013; Hollenbaugh & Ferris, 2014; Kocak et al., 2020; Lee et al., 2015; Marino et al., 2016; Park & Lee, 2014; Rodgers et al., 2020; Sheldon, 2008; Sheldon et al., 2017; Tosun, 2012; Yang & Brown, 2013).

The reviewer noted some more specific motives included in some of the reviewed scales. In some cases, these appeared to be platform specific. For example, all of the Instagram use motives scales included a dimension concerned with archiving or documenting information (Huang & Su, 2018; Kocak et al., 2020; Lee et al., 2015; Schaffer & Debb, 2020; Sheldon & Bryant, 2016; Sheldon et al., 2017), and most of the Instagram scales and the Pinterest use motives scale included a creativity motive (Huang & Su, 2018; Kocak et al., 2020; Mull & Lee, 2014; Sheldon & Bryant, 2016; Sheldon et al., 2017). The Pinterest use motives scale included other highly specific dimensions including fashion and cuisine (Mull & Lee, 2014). Two scales which were validated in university students included items pertaining to professional advancement (Papacharissi & Mendelson, 2011; Park & Lee, 2014), while one scale validated in adolescents/young adults included an academic motive (Pertegal et al., 2019). Another scale developed for use in adolescents included motives concerning physical appearance and popularity among peers (Rodgers et al., 2020).

Table 2
Motives (dimensions) measured by reviewed scales

Scale (name / description)	Author(s)	Year	No. of factors	Motives measured
Motivation for using YouTube	Hanson & Haridakis	2008	4	Leisure/Entertainment, Interpersonal expression, Information seeking, Companionship
Facebook Gratifications	Sheldon	2008	6	Relationship Maintenance, Passing Time, Virtual Community, Entertainment, Coolness, Companionship
Gratifications for Twitter usage	Liu et al.	2010	4	Content Gratifications, Social Gratifications, Process Gratifications, Technology Gratifications
Motives for Facebook use	Papacharissi & Mendelton	2011	8	Expressive Information Sharing, Habitual Pass Time, Relaxing Entertainment, Cool and New Trend, Companionship, Professional Advancement, Escape, Social Interaction
Motives for Facebook Use	Tosun	2012	7	Managing long-distance relationships, Passive activities, Initiating/terminating romantic relationships, Establishing new relationships, Active forms of photo-related activities, Game/entertainment, Organising events
Facebook gratifications	Giannakos et al.	2013	4	Social connection, Social surfing, Wasting time, Using applications
Gratifications for using SNS	Ku et al.	2013	6	Relationship maintenance, Information seeking, Amusement, Style, Sociability, Killing time
Motives for Facebook use	Yang & Brown	2013	2	Relationship formation, Relationship maintenance
SNS Motivations	Orchard et al.	2014	10	Procrastination, Freedom of Expression, Conformity, Information Exchange, New Connections, Ritual, Social Maintenance, Escapism, Recreation, Experimentation
Motives for using Facebook	Chang & Heo	2014	4	Social, Hedonic, Utilitarian, Social investigation
Motivations for Facebook use	Park & Lee	2014	5	Entertainment, Communication, Relationship Maintenance, Self-expression, Professional Use
Pinterest U&G	Mull & Lee	2014	5	Fashion, Creative projects, Cuisine, Entertainment, Virtual exploration, Organisation, Social
Motivations of Twitter use	Lee & Kim	2014	4	Surveillance, Network expansion, Intrapersonal, Relationship maintenance
Facebook motives	Hollenbaugh & Ferris	2014	5	Virtual community, Companionship, Exhibitionism, Relationship maintenance, Passing time
Facebook usage motivation	Hong & Chiu	2014	2	Instrumental motivation, Emotional motivation
Facebook motivation	Adnan & Mavi	2015	6	Entertainment, Communication, Social investigation, Social attention, Shared identity, Information seeking
SNS motives	Krishnan & Hunt	2015	4	Infotainment, Social Tool, Passing Time, Conformity
Motives for using social media	Al-Menayes	2015	5	Entertainment, Personal utility, Information seeking, Convenience, Altruism
Motivation to use Instagram	Lee et al.	2015	5	Social interaction, Archiving, Self-expression, Escapism, Peeking
Motives for Instagram	Sheldon & Bryant	2016	4	Surveillance/knowledge about others, Documentation, Coolness, Creativity
FAU Scale	Horzum	2016	7	Maintain Existing Relationships, Meet New People and Socialising, Make Express, Present or More Popular Oneself, Pass Time, Task Management Tool, Entertainment, Educational and Informational
Motives for using Facebook	Marino et al.	2016	4	Coping, Conformity, Enhancement, Social
WeChat Using Motivation Questionnaire	Wen et al.	2016	4	External, Introjection, Identification, Intrinsic
Facebook U&G	Dhir & Tsai	2016	3-5	Escape, Entertainment, Information seeking, Social influence, Exposure

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Table 2
(continued)

Scale (name / description)	Author(s)	Year	No. of factors	Motives measured
YouTube use motivations	Khan	2017	5	Seeking Information, Giving Information, Self-Status Seeking, Social Interaction, Relaxing Entertainment
Instagram U&G	Sheldon et al.	2017	5	Self-Promotion, Social Interaction, Diversion, Documenting, Creativity
SUMS	Shin & Lim	2018	4	Information-Enjoyment, Passtime, Social-Conformity, Mood Regulation
Facebook gratifications	Leiner et al.	2018	5	Escape/Tension-release, Cognitive gratifications, Social integration, Affective gratifications, Personal integration
Facebook motives	Alzougool	2018	6	Exhibitionism and companionship, Entertainment, Escapism/passing time, Social curiosity, Relationships formation, Relationships maintenance
Gratifications for using Weibo and WeChat	Gan	2018	4	Hedonic gratification, Affection gratification, Information gratification, Social gratification
Motives for Instagram use	Huang & Su	2018	5	Social interaction, Documentation, Diversion, Self-promotion, Creativity
Weibo use motivations	Pang	2018	4	Information needs, Social needs, Recognition needs, Entertainment needs
SMU-SNS	Pertegal et al.	2019	9	Dating, New Friendships, Academic Purposes, Social Connectedness, Following and Monitoring Others, Entertainment, Social Recognition, Self-expression, Information
IWBQ Item 14	Schaffer & Debb	2020	3	Sense of belonging, Self-expression, Documentation/curation
MSMU	Rodgers et al.	2020	4	Connection, Popularity, Appearance, Values
SNSU-MMG	Hou et al.	2020	4	Cognitive, Emotional, Leisure, Herd
Instagram usage motives	Kocak et al.	2020	6	Self-expression, Recreation, Socialisation, Recording, Creativity, Prying
Motives for SMSs use	Perugini & Solano	2020	3	Personal relationship maintenance/Search for information, Passtime/Exhibitionism, Search for companionship

Note. SNS = social network sites, U&G = uses and gratifications, FAU = Facebook usage aim, SUMS = Social Network Site Use Motives Scale, SMU-SNS = Scale of Motives for Using Social Networking Sites, IWBQ = Instagram and Wellbeing Questionnaire, MSMU = Motivations for Social Media Use Scale, SNSU-MMG = Social Networking Sites Use Multi-Motive Grid Questionnaire, SMSs – social media sites.

3.3. Psychometric properties

Psychometric properties of the 38 scales are summarised in Table 3.

3.3.1. Structural validity

Consistent with COSMIN standards for evaluating structural validity (Appendix D), the 38 studies were assessed on the basis of whether EFA (including PCA) or CFA was carried out on the SNS use motives scale. Only nine studies (23.68%) used CFA to validate the scale's factor structure, while the majority of studies ($n = 29$, 76.32%) included the results from only EFA or PCA. Of these studies, 12 used PCA (41.38%). Methodological quality ratings for

structural validity are shown in Supplementary Table 3. Seven of the nine studies which cross-validated the scale structure through CFA were rated as very good (Horzum, 2016; Hou et al., 2020; Marino et al., 2016; Pertegal et al., 2019; Rodgers et al., 2020; Schaffer & Debb, 2020; Wen et al., 2016), while one of these studies was rated as adequate (Dhir & Tsai, 2017) and one as inadequate (Mull & Lee, 2014) due to its sample size. Of the studies which conducted only EFA, 22 (75.86%) were rated as adequate. Three were rated as doubtful (Huang & Su, 2018; Kocak et al., 2020; Pang, 2018) as they did not describe the rotation method used for EFA (i.e. orthogonal or oblique rotation), while four studies were rated as inadequate (Ku et al., 2013; Liu et al., 2010; Sheldon, 2008; Tosun, 2012) on the basis of their sample size.

3.3.2. *Internal consistency*

The majority of studies ($n = 34$, 89.47%) calculated Cronbach's alpha as a measure of internal consistency, all of which had an average alpha value of greater than .70, with five of the studies reporting alpha values above .90 (Hanson & Haridakis, 2008; Hollenbaugh & Ferris, 2014; Horzum, 2016; Huang & Su, 2018; Shin & Lim, 2018). Three studies (7.89%) calculated composite reliability rather than Cronbach's alpha (Dhir & Tsai, 2017; Giannakos et al., 2013; Liu et al., 2010), which were rated equivalently given that some research suggests that composite reliability is a more robust measure of internal consistency with less bias, since Cronbach's alpha can underestimate or overestimate true reliability (e.g. Peterson & Kim, 2013). With the exception of three studies (7.89%) which were rated as inadequate (Horzum, 2016; Marino et al., 2016; Schaffer & Debb, 2020) as they did not calculate an internal consistency statistic for each subscale separately, or did not calculate Cronbach's alpha, the majority of studies ($n = 35$, 92.11%) achieved ratings of very good on the basis of assessment of internal consistency.

3.3.3. Cross-cultural validity / Measurement invariance

Only six studies (15.79%) provided evidence of cross-cultural validity. This included validating the scale in different age groups (adolescents versus young adults) (Dhir & Tsai, 2017; Pertegal et al., 2019), different gender groups (males versus females) (Pertegal et al., 2019; Rodgers et al., 2020), different ethnic groups (Schaffer & Debb, 2020; Sheldon et al., 2017), adolescents attending different types of schools (permissive versus cautious attitudes towards using SNS and mobile phones in school) (Dhir & Tsai, 2017), and among different SNS (WeChat versus Weibo) (Gan, 2018).

In Dhir and Tsai's (2017) study, different factor structures for the scale were found for the three different samples (adolescents attending two different schools, and university students). Overall, the findings suggested that social influence was more salient for SNS use among adolescents compared to young adults, and that adolescents attending different schools may have differed in their Facebook use motivations. However, this study achieved a quality rating of doubtful in this domain as the samples may have differed on other characteristics such as socioeconomic status.

In Pertegal et al.'s (2019) study of adolescents and young adults, multi-sample CFA (MSCFA) found that the nine-factor structure adequately represented the data for both males and females and held across three age groups. Similarly, in Rodger et al.'s (2020) study of adolescents, MSCFA demonstrated gender invariance for the four-factor solution.

In Sheldon et al.'s (2017) study of Instagram use motives in Croatian versus American university students, a five-factor structure was supported in both samples, but samples differed in their Instagram use motives. Similarly, Schaffer & Debb (2020) compared Instagram use motives in Caucasian versus African American university students but found that exact and approximate fit were not supported for a three-factor model when

the sample was separated by ethnicity, suggesting that the scale might require adaptation before being used across different cultural groups. These studies received quality ratings of inadequate and doubtful respectively, due to concerns that the two samples might have differed on other relevant and potentially confounding characteristics, particularly gender.

Finally, Gan (2018) validated the same scale in users of two different SNS: Weibo and WeChat. The same four-factor structure was extracted across both platforms, however further tests showed that Weibo users mainly obtain information gratification, while WeChat users primarily obtain affection gratification.

3.3.4. Reliability

Only one study (Shin & Lim, 2018) provided evidence of test-retest reliability, which was assessed with a two-week period and exceeded .70 for all factors. However, the study achieved a quality rating of doubtful for reliability, since Pearson correlation coefficients rather than intraclass correlation coefficients (ICC) were calculated, and it was not clear that no systematic change had occurred between test periods.

3.3.5. Criterion validity

Only one study (Shin & Lim, 2018) described evidence for ‘criterion validity’ by exploring associations between factors of the motives scale and a SNS addiction scale. The four factors of information-enjoyment, pastime, social-conformity and mood-regulation were all positively associated with SNS addiction.

3.3.5. Construct validity

A summary of findings relating to associations with other variables for the reviewed scales is shown in Table 3. The majority of studies were exploratory in nature and therefore did not involve specific hypothesis testing for construct validity, which is discussed within the

COSMIN methodology (Mokkink et al., 2017; Prinsen et al., 2018). Nevertheless, most of the studies provided evidence of the motivation scale's association with other variables by means of bivariate correlations, regression analyses and structural equation modelling (SEM) (see Table 3).

For studies of Facebook use motivation scales, findings relevant for construct validity included positive associations between different motives and social capital (Papacharissi & Mendelson, 2011), social motives predicting self-disclosure on Facebook (Chang & Heo, 2014), significant associations between entertainment, relationship maintenance, self-expression and communication motives and Facebook intensity (Park & Lee, 2014), shared identity and social attention gratifications significantly predicting life satisfaction (Adnan & Mavi, 2015), positive associations between using Facebook for relationship maintenance and agreeableness and conscientiousness (Horzum, 2016), and positive associations between different motives and Facebook addiction (Alzougool, 2018).

With respect to YouTube, different motives predicted different behaviours on YouTube, including sharing and liking/disliking videos (Hanson & Haridakis, 2008; Khan, 2017). For Twitter, content and technology gratifications significantly predicted user satisfaction (Liu et al., 2010), while using Twitter for surveillance was positively associated with Twitter use and network size on Twitter, and using Twitter for network expansion was positively associated with 'tweeting' and 'retweeting' (Lee & Kim, 2014). For Weibo, females were more likely to use Weibo for entertainment, while a user's education level was negatively associated with using Weibo for information seeking (Pang, 2018). In the case of Instagram, archiving and peeking motives significantly predicted both attitude toward and intention to use Instagram (Lee et al., 2015), while using Instagram to be cool and for surveillance was positively associated with narcissism (Sheldon & Bryant, 2016).

Finally, for scales which were non-specific with regards to SNS, entertainment and personal utility motives were positively associated with time spent using SNS and satisfaction with SNS (Al-Menayes, 2015), while using SNS for relationship maintenance and information-seeking was positively associated with wellbeing, and using SNS to pass the time and for exhibitionism were negatively associated with wellbeing (Perugini & Solano, 2020).

Studies were rated on construct validity where specific hypotheses were stated with regards to anticipated associations between SNS use motives and other variables (see Appendix I). Evidence for construct validity of Facebook use motivation scales included positive associations between relationship formation and maintenance motives and social adjustment (Yang & Brown, 2013), positive associations between instrumental and emotional motivation to use Facebook and Facebook usage (Hong & Chiu, 2014), and positive associations between coping, conformity and enhancement motives and problematic Facebook use (Marino et al., 2016). Similar findings emerged for the WeChat use motivation scale, including positive associations between external, introjected, identification and intrinsic motives and WeChat use and a positive association between intrinsic motivation and life satisfaction (Wen et al., 2016). For scales which were non platform-specific, different motives were predicted by various demographic and individual differences including age, gender and personality (Orchard et al., 2014), while SNS use motives were associated with age, gender, personality traits, social support, loneliness and life satisfaction (Pertegal et al., 2019). Furthermore, different motives were found to predict SNS usage and activity, including new connections, freedom of expression, recreation and experimentation (Orchard et al., 2014) and social tool and conformity motives (Krishnan & Hunt, 2015).

Four studies (10.53%) provided evidence of the SNS use motives scale's convergent and divergent validity based on the degree of association or uniqueness of the specific factors

(motives) (Dhir & Tsai, 2017; Horzum, 2016; Liu et al., 2010; Mull & Lee, 2014).

Convergent validity was assessed using item loadings on to underlying factors, internal consistency statistics and the AVE, while discriminant validity was assessed using squared correlations between latent variables and AVE.

Table 3
Psychometric properties of reviewed scales

Scale (Name / Description)	Author(s)	Year	Sample size (n)	Reliability		Structural validity		Associations with other variables
				Internal consistency (α)	Type of factor analysis	Fit indices	Type of validity / summary of results	
Motivation for using YouTube	Hanson & Haridakis	2008	291	.92*	EFA			Information-seeking motive significantly predicted watching traditional news videos on YT. Leisure entertainment motive significantly predicted watching comedy news videos. Interpersonal expression motive significantly predicted sharing traditional news videos. Leisure entertainment and interpersonal expression motives significantly predicted sharing comedy news videos.
Facebook Gratifications	Sheldon	2008	160	.82*	PCA			Significant positive associations between companionship and passing time motives and unwillingness to communicate.
Gratifications for Twitter usage	Liu et al.	2010	124	CR: .90	EFA			Content and technology gratifications significantly predicted user satisfaction. Factors showed convergent and divergent validity.
Motives for Facebook use	Papacharissi & Mendelson	2011	344	.82*	EFA			All motives correlated positively and significantly with social capital.
Motives for Facebook use	Tosun	2012	143	.77*	PCA			CR: Establishing new relationships and initiating/terminating romantic relationships motives associated with high tendency to express one's "true self" on FB
Facebook gratifications	Giannakos et al.	2013	222	CR: .82*	PCA			
Gratifications for using SNS	Ku et al.	2013	122	.89*	EFA			
Motives for Facebook use	Yang & Brown	2013	193	.78*	EFA			CR: Relationship formation and maintenance motives positively associated with social adjustment.
SNS motivations	Orchard et al.	2014	220	.80*	PCA			CR: Different motives predicted by individual differences including personality, age and gender. New connections, freedom of expression, recreation and experimentation motives significantly predicted SNS usage.
Motives for Facebook use	Chang & Heo	2014	192	.75*	PCA			Social motives significantly predicted self-disclosure on FB.
Motivations for Facebook use	Park & Lee	2014	246	.88*	EFA			Entertainment, relationship maintenance, self-expression and communication motives significantly associated with FB intensity.
Pinterest U&G	Mull & Lee	2014	243	.84* CR: .83*	CFA	RMSEA = .06, CFI = .95, SRMR = .07		CR: All item loadings exceeded .6 in CFA, all indicators significant and AVE values all exceeded .5. DV: All 5 factors shown to be unique variables from one another.

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Table 3
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Scale (Name / Description)	Author(s)	Year	Sample size (n)	Reliability		Structural validity		Associations with other variables
				Internal consistency (α)	Type of factor analysis	Fit indices	Type of validity / summary of results	
Motivations of Twitter use	Lee & Kim	2014	461	.73*	EFA			Surveillance motive positively associated with TW use and TW network size. Network expansion motive positively associated with tweeting and retweeting.
Facebook usage motivation	Hong & Chiu	2014	206	.89	EFA			CR: FB usage motivation positively correlated with FB usage and FB addictive tendency.
Facebook motives	Hollenbaugh & Ferris	2014	301	.90*	EFA			Exhibitionism and relationship maintenance motives predicted amount of FB self-disclosure. Virtual community motive predicted depth of self-disclosure. Relationship maintenance motive predicted breadth of self-disclosure.
Facebook motivation	Adnan & Mavi	2015	798	.87	PCA			Shared identity and social attention gratifications significantly predicted life satisfaction.
SNS motives	Krishnan & Hunt	2015	674	.88*	PCA			CR: Social tool and conformity motives significantly predicted level of SNS activity.
Motives for using social media	Al-Menayes	2015	1327	.71*	EFA			Entertainment and personal utility motives significantly positively correlated with amount of time since start of social media use, daily time spent using social media and satisfaction with social media.
Motivation to use Instagram	Lee et al.	2015	212	.83*	PCA			Archiving and peeking motives significantly predicted attitude toward and intention to use IG.
Motives for Instagram use	Sheldon & Bryant	2016	163	.77*	EFA			Positive associations between using IG to be cool and for surveillance and narcissism. Positive associations between coolness, creativity and surveillance motives and interpersonal interaction. Positive association between documentation motive and social activity.
FAU scale	Horzum	2016	673	.91	CFA	RMSEA < .08, CFI = .94		CV: AVE values for each factor were .5 DV: OVA square roots for all factors <.5 Maintaining relationship motive positively correlated with agreeableness and conscientiousness.
Motives for Facebook use	Marino et al.	2016	815	.86	CFA	RMSEA = .04, CFI = .98		CR: Coping, conformity and enhancement motives predicted problematic FB use.
WeChat using motivation	Wen et al.	2016	339	.87	CFA	RMSEA = .08, TLI = .93, IFI = .95		CR: All motives significantly and positively correlated with use intensity. Intrinsic use motivation significantly predicted life satisfaction.

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Table 3
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Scale (Name / Description)	Author(s)	Year	Sample size (n)	Reliability		Structural validity		Associations with other variables
				Internal consistency (α)	Type of factor analysis	Fit indices	Type of validity / summary of results	
Facebook U&G	Dhir & Tsai	2017	(1) 373	CR: .79*	CFA	RMSEA = .08*, CFI = .95*, TLI = 0.92†	DV/CV: FB U&G measure had sufficient discriminant/convergent validity across the 3 samples.	
			(2) 107	CR: .83*				
			(3) 105	CR: .85*				
YouTube use motivation	Khan	2017	1143	.87*	PCA		Relaxing entertainment motive predicted liking/disliking videos, social interaction motive predicted commenting/uploading, information giving motive predicted sharing.	
Instagram U&G	Sheldon et al.	2017	(1) 253 (2) 149	.76*	PCA			
SUMS	Shin & Lim	2018	481	.90* .79* (TR)	EFA		CN: All motives significantly and positive correlated with SNS addiction.	
Facebook gratifications	Leiner et al.	2018	482	.81*	EFA			
Facebook motives	Alzhougool	2018	358	.83*	PCA		All motives significantly associated with Facebook addiction.	
Gratifications for the use of Weibo and WeChat	Gan	2018	368	WB: .84* WC: .85*	EFA			
Motives for Instagram use	Huang & Su	2018	307	.91	EFA			
Weibo use motivations	Pang	2018	426	.84*	PCA		Gender was significantly correlated with entertainment needs motive. Education level was significantly negatively correlated with information needs. Social needs had a positive effect on civic participation when controlling for demographic variables, satisfaction with life and social trust.	
SMU-SNS	Pertegal et al.	2019	1102	.83*	CFA	RMSEA = .05, CFI = .93, TLI = .92, SRMR = .04	CR: SMU-SNS scores significantly correlated with age, gender, personality traits, social support, loneliness and life satisfaction	
IWBQ (Item 14)	Schaffer & Debb	2020	520	-	CFA	RMSEA = .19, CFI = .77, TLI = .73		
MSMU	Rodgers et al.	2020	770	.85*	CFA	RMSEA = .08, CFI = .89, SRMR = .06	CV: All scales associated with internalisation of media appearance ideals. DV: Connection and appearance motives negatively correlated with self-esteem. Values and interests motive was not correlated with self-esteem.	

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Table 3
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Scale (Name / Description)	Author(s)	Year	Sample size (n)	Reliability		Structural validity		Associations with other variables
				Internal consistency (α)	Type of factor analysis	Fit indices	Type of validity / summary of results	
SNSU-MMG	Hou et al.	2020	203	.86	CFA	RMSEA = .06, CFI = .99, TLI = .97		
Instagram usage motives	Kocak et al.	2020	507	.82*	EFA			
Motives for SMSs use	Perugini & Solano	2020	420	.88*	EFA		Personal relationship maintenance / search for information motive positively associated with wellbeing. Pastime / exhibitionism motive negatively associated with wellbeing.	

Note. SNS = social network sites, U&G = uses and gratifications, FAU = Facebook usage aim, SUMS = Social Network Site Use Motives Scale, SMU-SNS = Scale of Motives for Using Social Networking Sites, IWBQ = Instagram and Wellbeing Questionnaire, MSMU = Motivations for Social Media Use Scale, SNSU-MMG = Social Networking Sites Use Multi-Motive Grid Questionnaire, SMSs – social media sites, EFA = exploratory factor analysis, PCA = principal components analysis, CFA = confirmatory factor analysis, RMSEA = root mean square error of approximation, CFI = comparative fit index, TLI = Tucker-Lewis index, SRMR = standardised root mean square residual, CN = criterion validity, CR = construct validity, CV = convergent validity, DV = divergent / discriminant validity.

4. Discussion

4.1. Aims and strengths of the review

The aims of this review were to identify scales which had been developed to measure motivations for SNS use and systematically investigate their psychometric properties, and furthermore to establish with respect to *status quo*, measurement issues within the study of motivations of SNS use. A total of 38 eligible studies published between 2008 and 2020 were included in the review, which were obtained from searching four electronic databases using a combination of SNS-related terms, terms related to scale development and assessment, and terms related to motivations for use. The scales identified were developed in the U.S. along with a wide range of other countries in Asia (China, Korea, Taiwan, Hong Kong, India and Malaysia), Europe (UK, Italy, Spain, Croatia, Greece and Turkey), the middle-east (Jordan and Kuwait), and South America (Argentina). The review included scales developed to

measure use motives for a wide range of SNS including Facebook, Instagram, YouTube, Twitter, Pinterest, Weibo and WeChat, as well as non-specific scales designed to measure use motives across multiple SNS platforms. The breadth with respect to geographical representation and SNS platforms is a major strength of this review, particularly given that past research including previous systematic reviews in the field of social media and SNS has focused disproportionately on Facebook use, which not only neglects to capture and represent the diversity and re-evolving nature of social media use, but also excludes countries where Facebook is not used, such as China. Furthermore, it has been noted that many people use more than one SNS (Perugini & Solano, 2020), in which case a scale which can measure use motivations across platforms may be advantageous.

4.2. Summary and discussion of findings

4.2.1. Theoretical development

The vast majority of scales were founded in UGT, although the review also identified scales based on the TAM, motivational model of addictive behaviour, and SDT. This speaks to the dominance of UGT within the field of SNS use motivations. However, previous literature has raised criticisms of UGT including its narrow focus, the limited role of affect and the assertion that users are aware of their motivations for their behaviour and able to identify and freely articulate these via self-report (Bischof-Kastner et al., 2014; Sundar & Limperos, 2013). Adolescents in particular may struggle to be able to recall their motivations via self-report questionnaires (Fan et al., 2006). The scales identified in this review focused almost exclusively on explicit motivation, which is likely to reflect the difficulty in measuring implicit motivation via self-report questionnaire. However, Hou et al.'s (2020) multi-motive grid instrument was comprised of not only written statements designed to measure explicit motivation but also a series of fuzzy images designed to measure implicit motivation for SNS

use. This tool offers a promising avenue for future research into motivations for SNS use given that explicit and implicit motivation are two independent systems, with measurement of the former being more sensitive to response and recall biases (Rosnow & Rosenthal, 1991; Shweder & D'Andrade, 1979).

4.2.2. Sample characteristics

Study samples were relatively limited with respect to diversity and representativeness of the general population. For example, almost 80% of the studies validated the scale in a sample with a higher proportion of females compared to males, and in ten studies the ratio of females to males was greater than 2:1 (Al-Menayes, 2015; Hou et al., 2020; Khan, 2017; Kocak et al., 2020; Leiner et al., 2013; Marino et al., 2016; Schaffer & Debb, 2020; Sheldon & Bryant, 2016; Sheldon et al., 2017; Shin & Lim, 2018). While it has been reported that females are more likely to use SNS than males (Hollenbaugh & Ferris, 2014) and therefore these studies may reflect the reality of the composition of SNS users, future research would benefit from the inclusion of samples with a more balanced gender ratio so that findings can be generalised to male users, and from validating the scale in males and females separately to see if findings hold. It is possible that an uneven ratio of females to males could skew study findings, resulting in unequal variances and making it difficult to partition the sample based on gender in order to test measurement invariance (Schaffer & Debb, 2020).

It was also found that studies mostly validated the scales in samples comprised only of university students. Whilst the use of student samples seems to be an accepted practice within the field of social media research and relevant since students are both technologically skilled and heavy SNS users (Khan, 2017), caution must be taken in generalising such findings to other populations. Given that SNS user behaviour has been found to vary as a function of demographic factors, researchers should choose a motivations scale which has

been validated in a sample similar to the target population of their study (Sigerson & Cheng, 2018). If the scale has not been validated in a similar sample, researchers ought to evaluate structural validity and internal consistency to ensure that the scale has sound psychometric properties within the new sample (Sigerson & Cheng, 2018).

Whilst the cultural diversity of the samples across the reviewed studies is encouraging, only one of the scales was validated in two countries (an individualistic versus collectivist culture) (Sheldon et al., 2017). In contrast, Schaffer & Debb (2020) focused on Instagram users in the U.S. but partitioned the sample based on ethnicity (Caucasians versus African Americans) in order to test measurement invariance. This is a fruitful direction for future research since cultural variation occurs not only between but within countries, particularly with the development of globalisation (Sheldon et al., 2017).

Most scales were validated in relatively young participants with a mean age of less than 30. Future research might wish to evaluate the psychometric properties of these scales in older users. It was encouraging to identify a small number of scales developed to measure SNS use motivations in adolescents (Dhir & Tsai, 2017; Pertegal et al., 2019; Rodgers et al., 2020), particularly given that adolescents' SNS use and its links to mental health and wellbeing is a comparatively understudied yet emerging area of interest. While most studies employed adult samples (i.e. over 18), presumably as it is easier to recruit these users, the study of children and adolescents' motivations for SNS use warrants further investigation.

It is evident from this review that motives for SNS use vary as a function of the specific platform. For example, a number of unique factors emerged in scales developed for Instagram and Pinterest use motives, including archiving/documentation, fashion and creativity (Huang & Su, 2018; Kocak et al., 2020; Lee et al., 2015; Mull & Lee, 2014; Schaffer & Debb, 2020; Sheldon & Bryant, 2016; Sheldon et al., 2017), which is likely to

relate to these platforms' focus on images, in contrast to text-based platforms such as Twitter (Sheldon & Bryant, 2016). Consequently, researchers should choose a motivations scale which has been validated with their platform of interest, and if such a scale is not available then an existing scale will need to be validated in this new context (Sigerson & Cheng, 2018).

4.2.3. Content validity

With regards to content validity of the reviewed scales, the majority of studies were adapted from past UGT research and involved gleaning statements from previous literature to serve as potential gratifications. Whilst this method is widely accepted within the field since it can serve to increase concurrent validity (Orchard et al., 2014), its widespread use is problematic with regards to the generation of new motives. Only four studies employed focus groups for the purpose of concept elicitation (Hanson & Haridakis, 2008; Pertegal et al., 2019; Sheldon & Bryant, 2016; Yang & Brown, 2013), yet qualitative methods (i.e. interviews) are vital for the identification of other motives as the functions of SNS evolve and expand thus researchers interested in developing new scales should not rely solely on previous literature.

4.2.4. Structural validity, internal consistency and reliability

Only a small proportion of studies used CFA to validate the scale's factor structure (Dhir & Tsai, 2017; Horzum, 2016; Hou et al., 2020; Marino et al., 2016; Mull & Lee, 2014; Pertegal et al., 2019; Rodgers et al., 2020; Schaffer & Debb, 2020; Wen et al., 2016), with the majority of studies only exploring this via common factor analysis or PCA. However, in order to assure adequate structural validity, researchers should choose a scale whose factor structure has been explored and confirmed in a previous study (Sigerson & Cheng, 2018). Most studies had sufficient internal consistency estimates, so this psychometric property was not a major concern. However, only one study established test-retest reliability over a two-

week interval (Shin & Lim, 2018). It is therefore important for scholars to assess the external validity of these scales by testing them again future research over a meaningful timespan.

4.2.5. Cross-cultural validity

Only a small number of studies assessed cross-cultural validity including tests of measurement invariance. While the majority of studies focused on motivations for one type of SNS, Gan (2018) explored the scale's factor structure in two separate samples of WeChat and Weibo users. Rodger et al.'s (2020) scale for adolescents demonstrated similar psychometric properties among males and females, supporting its use across gender, while Pertegal et al.'s (2019) scale for adolescents showed measurement invariance across gender and age. Both scales offer a promising tool for future researchers interested in studying young people's motivations for SNS use.

4.2.6. Criterion and construct validity

Only one study provided evidence of what the researchers termed 'criterion validity' by exploring the motivation scale's association with a Korean measure of SNS addiction (Shin & Lim, 2018). However, the reviewer would argue that since the field of SNS use motives is still in its relative infancy, with the majority of identified studies exploratory in nature, there does not yet exist satisfactory gold standard measures to establish criterion validity.

Consequently, current researchers should exercise caution in asserting claims about criterion validity of SNS use motivations scales. At this stage, assessment of construct validity may be more appropriate, and a number of studies provided hypotheses regarding the scale's associations with other variables, including demographic and individual factors such as age, gender and personality, dimensions of SNS use (i.e. usage and activity counts), and constructs related to positive and negative aspects of wellbeing including social adjustment and life satisfaction, loneliness and problematic SNS use including addiction. These findings

suggest that motives for SNS vary depending on participant characteristics including age, gender and personality traits (Orchard et al., 2014; Pertegal et al., 2019), and that different SNS use motives are positively associated with SNS usage (Hong & Chiu, 2014; Krishnan & Hunt, 2015; Wen et al., 2016) and differential measures of wellbeing (Hong & Chiu, 2014; Marino et al., 2016; Pertegal et al., 2019; Wen et al., 2016; Yang & Brown, 2013).

4.3. Limitations

There are a number of limitations of this review which warrant consideration. Firstly, although the review covered a broad range of SNS, the search strategy may have missed certain platforms which are less widely used and therefore unknown to the reviewer. In addition and as discussed in the Introduction, the definition of a SNS was somewhat subjective and open to interpretation. However, for this reason a relatively broad definition of SNS was used. Secondly, although UGT is arguably the major driver of research into SNS use motivations, the search strategy may have missed scales founded in other theoretical frameworks. It should also be noted that only one reviewer completed the COSMIN quality ratings, which are therefore subjective and open to bias. Ideally two reviewers would have completed the ratings independently, with support from a third reviewer to achieve consensus if necessary (Mokkink et al., 2017; Prinsen et al., 2018). Finally, since the COSMIN standards were developed for the evaluation of patient-reported outcome measures with an evaluative application, they did not apply readily to the scales measuring SNS use motives, and therefore required considerable adaptation for this review.

4.4. Conclusions and recommendations

Future researchers interested in studying motivations for SNS use may use this review as a guide in order to help them identify a suitable scale for their study, as well as those who wish to develop or further validate existing SNS use motivation scales. However, researchers

should be cautious when choosing a scale given the psychometric shortcomings identified. As this review has demonstrated, researchers are not likely to come across a SNS use motivations scale with no validity concerns, which is likely to be a product of the fast pace and continuously changing nature of the discipline. The findings of this review may also be of use to those employed within social media settings who are involved in the marketing and/or development of SNS in order to better understand the gratifications of users. In time, these scales could be used within clinical settings given their association with psychological outcomes such as SNS addiction, to help to ascertain why an individual with problematic SNS use is using SNS. More broadly, these findings could assist those involved in designing interventions to change an individual's relationship with social media.

Future studies should examine other possible motivation factors through more qualitative methods such as focus groups. Given the concerns identified regarding the scales' psychometric properties, further validation of these scales is required in future research. Future research would also benefit from the development of more tools to measure implicit motivation, given the lack of instruments existing currently. Finally, considering the limitations of self-report questionnaires including recall bias and response accuracy, future studies might wish to explore alternative data collection methods for SNS usage purposes (Horzum, 2016).

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Part Two: Empirical Paper

Motivations for social media use in adolescents and their association with mental health during the COVID-19 pandemic

Abstract

Aims: This study sought to explore associations between adolescents' motivations for social media use and common mental health symptoms during the COVID-19 pandemic.

Method: British secondary school students aged 11-17 ($N = 162$) completed an online questionnaire covering demographics, social media use including motivations for use, and symptoms of depression, generalised anxiety disorder (GAD) and social anxiety. Multiple linear regression was used to explore associations between individual use motive and mental health symptoms scores in social media users ($N = 142$). In addition, latent profile analysis (LPA) was used to categorise users into homogenous profiles based on their pattern of use motives, and multinomial logistic regression used to explore associations between extracted profiles and symptoms scores.

Results: Motivation to use social media for entertainment predicted higher symptom scores across all three mental health categories: depression ($\beta = 1.41$, 95% CI [0.75, 2.06], $p < .001$), GAD ($\beta = 0.96$, 95% CI [0.46, 1.45], $p < .001$) and social anxiety ($\beta = 1.69$, 95% CI [0.98, 2.41], $p < .001$). In addition, motivation to follow/monitor others on social media was associated with higher symptoms of social anxiety ($\beta = 0.90$, 95% CI [0.29, 1.50], $p = .004$). Finally, the LPA identified four distinct social media motivation profiles, which were labelled high-motivation-dating, high-motivation-social, low motivation and intermediate motivation. Greater levels of social anxiety predicted membership to both high motivation profiles compared to the low motivation profile: high-motivation-dating ($RRR = 1.19$, 95% CI [1.05, 1.35], $p = .006$) and high-motivation-social ($RRR = 1.17$, 95% CI [1.06, 1.29], $p = .002$).

Conclusions: The findings suggest that elevated social media use for the purpose of entertainment may be a *trans*-diagnostic / general feature of common mental health difficulties in adolescence. Furthermore, social anxiety may be a driver and/or consequence

of motivation to use social media for entertainment and to fulfil interpersonal motives (e.g. following others). These findings have potential implications for the development of interventions aimed to modify adolescents' relationship with social media, and/or the identification of individuals who may be at higher risk of developing mental health difficulties. However, future longitudinal research is needed to identify the underlying direction of causality.

1. Introduction

1.1. Social media use and mental health in young people

Young social media users, so called “digital natives”, are a unique population to study in that they have grown up in a society increasingly dominated by the Internet and social media as opposed to having experienced the introduction of these as have older, “digital immigrants” (Prensky, 2001). Adolescence, defined as the period of life between the start of puberty and adult independence, is a unique stage of biological, social and psychological development (Patton et al., 2016), and social media use in this population may represent an important means for youth to explore themselves in relation to others, thereby supporting social and identity development (Uhls et al., 2017).

It has been reported that 70% of 12- to 15- year olds in the UK have a profile on social media (Ofcom, 2020); however anecdotally the proportion of teenagers who use social media is likely to be much higher than this. As a consequence of such widespread use, researchers have become concerned about the effects of social media use on child and adolescent mental health, with much controversy in the literature surrounding social media’s putative positive and negative effects (Ahn, 2011; Allen et al., 2014; Uhls et al., 2017). On the one hand, multiple studies (e.g. Sampasa-Kanyinga & Lewis, 2015) and systematic reviews (e.g. Keles et al., 2019) have demonstrated links between increased social media use and adverse mental health outcomes in adolescence. Conversely however, social media use in adolescence may also be associated with increased self-esteem, for instance by providing a means for youth to develop personal identity and access social support (Ahn, 2012). However, effects reported in the literature are small, nuanced, bidirectional and dependent on methods of analysis (Orben et al., 2019).

As our understanding of the relationship between young people's social media use and their mental health improves, several hypotheses and theories in relation to this association have become well-documented in the literature. With respect to potential positive effects of social media use on psychological wellbeing, these include both the "rich get richer" model, which proposes that individuals who have rich interpersonal relationships offline use social media to further strengthen their social connections, and the "poor get richer" or social compensation model, which proposes that individuals with social anxiety, poorer social skills, poorer interpersonal relationships and/or lower social support may use social media to compensate for this (Song et al., 2014). With respect to social media's negative effects, it has been suggested that engaging in social comparisons on social media, particularly upward social comparisons (i.e. comparing oneself to a perceived superior other), fosters envy, social anxiety and depression (Clark et al., 2018; Jiang & Ngien, 2020). Alternatively, the displacement hypothesis (Lin, 1993) or finite resources theory suggests that increased time spent online displaces -and is at the expense of- alternative activities offline (e.g. sleep, physical exercise or face-to-face interactions with friends and family) that are important for young people's wellbeing (Twigg et al., 2020). Furthermore, it has been suggested that anxiety and low mood may stem from a realisation that time has been "wasted" on meaningless or non-productive activities on social media (Sagioglou & Greitmeyer, 2014).

Generalised anxiety, social anxiety and depression are among the most common mental health difficulties presenting in adolescents (Mental Health Foundation, 2016), and all three of these internalising conditions have been implicated in young people's social media use (e.g. Ho et al., 2014; Keles et al., 2019; Sarmiento et al., 2020), potentially via various causal mechanisms connected with the aforementioned theories described above. For instance, young people who are depressed or anxious may use social media as coping strategy

(e.g. to reduce loneliness or as a means to relax) (Coyne et al., 2020), or alternatively engaging in specific activities or psychological processes on social media (e.g. social comparisons) may leave the user feeling anxious or depressed. However, as the majority of studies are correlational (Coyne et al., 2020), it remains unclear whether symptoms of anxiety and depression are a cause or consequence of social media use, and in reality, both explanations are plausible. Furthermore, the picture is often complicated by the moderating effect of demographic variables including age and gender (amongst others), with a recent systematic review on the relationship between social media use and internalising symptoms in adolescents concluding that females appear to be particularly vulnerable to the detrimental effects of social media use on mental health (Sarmiento et al., 2020).

Much more research is required to improve our understanding of the associations between young people's social media use and mental health outcomes (Stockdayle & Coyne, 2020). Part of the problem is that existing research has tended to focus on basic parameters of social media use in isolation (e.g. time spent or frequency of use), and increasingly it has been argued that *patterns* of social media use need to be considered in this relationship beyond simple measures of use, with inter-individual differences in social media use identified as being particularly important (Park & Lee, 2014).

1.2. Motivations for social media use

It has become clear that social media is used by different people in different ways and for various needs and motives (Dhir & Tsai, 2017). Motivations can be defined as an individual's reasons for or purposes of social media use, as distinct from (although related to) attitudes towards (e.g. Krishnan & Hunt, 2015) and behavioural intentions to use social media (e.g. Liu et al., 2010). It has been suggested that motivations have a key role in shaping ways in which young people engage with social media and have been found to be associated with

individual differences in psychological outcomes of social media use (Rodgers et al., 2020). Amongst university students, for example, it has been suggested that motives could explain 60% of the variance in social media use (Sheldon, 2008). However, to date, few studies have explored motivations for social media use among adolescents.

According to the uses and gratifications (U&G) theory (Katz et al., 1974), individual differences of users influence motivations for engaging with social media (Papacharissi & Rubin, 2000). The U&G theory is a widely accepted framework for understanding why and how individuals are likely to use a particular medium (Dhir & Tsai, 2017), and when applied to the field of social media proposes that people use social media because they anticipate particular gratifications from it (e.g. passing time), which come to reinforce future use (Pertegal et al., 2019). In accordance with U&G theory, adolescents are active and driven social media users to achieve particular goals (Coyne et al., 2013). Further, consistent with U&G theory is the notion that poor mental health might predict increased social media use (Coyne et al., 2020), since an important motivation for social media use is escapism, which refers to a form of avoidant coping aimed at dealing with stress by escaping unsatisfying life circumstances (Henning & Vorderer, 2001).

It has been suggested that primary motives for social media use among adolescents include to develop and maintain social relationships, to manage identity, to seek information, and for entertainment (Barker, 2009; Pertegal et al., 2019; Stockdale & Coyne, 2020; Young et al., 2017). Interpersonal motives for social media use in adolescents include to connect with existing peers and to build new friendships (Nesi et al., 2018) since peer relationships are particularly important during adolescence (Blakemore, 2018), and for dating since adolescence is a time in development when young people engage with potential or current romantic partners (Young et al., 2017). In terms of motives related to self-identity, given that adolescence represents a unique period of development and identity formation (Erikson,

1950; Orben et al., 2020), there is evidence to suggest that social media is used by this group as a means for self-expression and self-presentation (Leung, 2014) and social recognition (Allen et al., 2014). Information-seeking, defined as the “desire to increase awareness and knowledge of one’s self, others, and the world” (Shao, 2009, p.10) could include social media use to keep up-to-date with world news and current affairs, and for academic purposes to support learning in school (Pertegal et al., 2019). Finally, within the literature, entertainment motives broadly encompass social media use to relax and entertain oneself, to pass the time or out of habit, and as a means of escapism to manage or ameliorate negative emotional states (Dhir & Tsai, 2017; Pertegal et al., 2019; Stockdale & Coyne, 2020).

With regards to the relationship between motives for social media use and psychological outcomes, there is evidence to suggest that different reasons for use may have differential consequences. For example, among university students, relationship formation and maintenance motives were found to be positively associated with social adjustment (Yang & Brown, 2013), and shared identity and social attention gratifications with life satisfaction (Adnan & Mavi, 2015), while using social media as a result of peer pressure and as a coping strategy both in anticipation of positive affect and in order to manage negative emotional states were found to predict problematic social media use (Marino et al., 2016). In a recent study of adult social media users, relationship maintenance and information-seeking motives were positively associated with wellbeing, while using social media to pass the time and for exhibitionism were negatively associated with wellbeing (Perugini & Solano, 2020). Taken together, these findings might point to potential positive consequences from social media motives related to social connection, and negative consequences resulting from motives related to entertainment. However, a recent longitudinal study which followed a group of 385 adolescents over three years found that both social connection and entertainment social media use motives were positively associated with problematic use of

social network sites and anxiety (Stockdale & Coyne, 2020). Therefore, more research is needed to explore the associations between social media use motives and psychological outcomes in adolescents, particularly their association with mental health (Young et al., 2017).

Furthermore, increasing evidence suggests that young people's motives for social media use are influenced by demographic factors, namely age and gender. For example, some studies suggest that girls are more likely to use social media to follow and keep in touch with *existing* friends (e.g. Young et al., 2017), which are forms of 'bonding social capital', whereas boys may be more likely to use social media to establish *new* friendships and romantic relationships (e.g. Raacke & Bonds-Raacke, 2008), examples of 'bridging social capital'. It has also been suggested that girls are more likely than boys to use social media for entertainment, social recognition and access to social information (Pertegal et al., 2019). The role of age is less clear cut, however there is some evidence to suggest that older users are more likely to use social media for bonding social capital, to seek information and for academic purposes, while younger users may be more likely to use social media for bridging social capital, to obtain social recognition and feel part of an online community, and for entertainment purposes (Pertegal et al., 2019).

1.3. Identifying homogenous subgroups of social media users

Amongst literature pertaining to the relationship between social media use and mental health, most research has focused on identification of associations between psychological variables and single social media usage parameters, with researchers tending to adopt correlational univariate studies to explore this association (Huang, 2010; Lo Coco et al., 2018). However, in recent years, several studies have employed the statistical technique of latent class analysis (LCA; categorical indicator variables) or latent profile analysis (LPA; continuous indicator

variables), in order to identify homogenous subgroups of social media users based on a number of relevant usage indicator parameters, including frequency of use (Foerster & Rösli, 2017), time spent, number of ‘friends’ on social media and number of status updates (Lo Coco et al., 2018), and amount of use, upward and downward social comparisons and bridging and bonding social capital (Tibber et al., 2020). Subsequently, the association between these subgroups and various psychological variables has been explored, including quality of life (Foerster & Rösli, 2017), personality characteristics (Lo Coco et al., 2018) and self-esteem (Tibber et al., 2020). This technique offers a promising approach to explore *patterns* of social media use and how these relate to psychological outcomes (Foerster & Rösli, 2017). However, to date and to the author’s knowledge, no studies have yet employed this technique to identify subgroups of users based on motivations for social media use. Using LPA to differentiate various usage types based on individual motives for use may be an appropriate way to better characterise and evaluate potential associations between social media use and mental health outcomes in adolescents.

1.4. Impact of COVID-19 on social media use

In March 2020, the coronavirus disease (COVID-19) was declared a pandemic and governments in countries around the world including the UK introduced strict national lockdown measures aimed to reduce the spread of the disease (Király et al., 2020). These included the closure of schools and workplaces for periods of several months, significant restrictions placed on socialising, and a variety of other physical distancing interventions (Király et al., 2020). At the time of writing in the UK, whilst a mass vaccination programme is currently underway, schools and educational colleges have re-opened, and some social restrictions are beginning to lift as the lockdown eases, it is arguable that daily life for many people, particularly children and adolescents, has changed significantly as a result of the

pandemic, and it is likely that some physical distancing interventions will remain in place indefinitely coupled with the continued uncertainty of this global crisis.

Whilst research on the impact of COVID-19 on young people's mental health is still in its infancy, concerns have been raised regarding the negative impact of social distancing on children and adolescents' psychological wellbeing given the importance of contact with peers (Fegert et al., 2020), particularly for adolescents (Blakemore, 2008). Amidst these concerns are observations that young people are now spending significantly more time online including on social media, with potentially adverse consequences for their physical and emotional wellbeing (Király et al., 2020). However, information and communications technology (ICT) including social media is more important in these current circumstances than ever before, including to enhance social connectedness and provide entertainment (Király et al., 2020).

Data suggest that social media engagement globally since the start of the pandemic has increased by more than 60% within the general population in comparison to usual rates (Kantar, 2020), while a recent cross-cultural study of adolescents including data from the UK found that social media use has increased significantly over the course of the pandemic, and furthermore that increased social media use was associated with symptoms of depression and COVID-19-related anxiety (Fernandes et al., 2020). However, much more research is needed to elucidate the relationship between young people's social media use and their mental health in the context of the pandemic, including potential benefits to their psychological wellbeing, for example as resulting from creative and novel ways to foster social connectedness or increased opportunities for social connection with more free time.

This study was carried out during the pandemic, and data were collected from a sample of British secondary school students at the start of the new academic year in

September 2020. At this point in time, secondary school students in the UK had temporarily returned to school as the first wave of the pandemic had recovered. However, although they had returned to school their school lives remained significantly disrupted, with students having to stay in 'bubbles' (i.e. separate classes / year groups) and unable to easily socialise within or outside of school.

1.5. Aims and hypotheses

To address current limitations in the literature, the aims of this study were as follows:

1) To explore associations between young people's motivations for social media use and their mental health during the COVID-19 pandemic, as measured by symptom scores of depression, generalised anxiety and social anxiety;

2) To empirically derive underlying subgroups of young people based on their motivations for social media use using LPA; and

3) To explore associations between these subgroups and symptoms of depression, generalised anxiety and social anxiety.

Whilst this study was primarily exploratory given the relative scarcity of existing research on the relationship between adolescents' social media use motivations and their mental health, based on findings from previous literature, the following tentative hypotheses were put forward:

H1: Social media use motives related to social influence and social connection (i.e. to connect with others and follow/monitor others) would be significantly associated with symptoms of depression, generalised anxiety and social anxiety. This hypothesis was bidirectional since both positive and negative associations between social influence / connection motives and mental health variables have been documented in the literature (i.e.

via processes related to the rich get richer / poor get richer models, or via social comparisons).

H2: Social media use motives related to entertainment, including purposes of distraction and escapism, would be positively associated with symptoms of depression, generalised anxiety and social anxiety. This was hypothesised based on recent research which found entertainment motives to be positively associated with anxiety (Stockdale & Coyne, 2020) and negatively associated with wellbeing (Perugini & Solano, 2020).

No predictions were made with regards to the nuanced relationships between these different motives and depression, generalised anxiety and social anxiety given the infancy of research exploring the relationship between adolescents' motivations for social media use and their mental health, with existing studies having tended to focus on only one outcome variable (i.e. depression or anxiety). Furthermore, evidence points to co-occurrence and substantial overlap between symptoms of anxiety and depression in adolescents, highlighting the potential for common underlying mechanisms implicated in these conditions (Garber & Weersing, 2010).

Finally, whilst this study assumed the existence of different profiles which would differ in terms of social media use motives, no predictions were made concerning the latent structure, neither of anticipated associations between the identified profiles and mental health variables. This exploratory component aimed to build a foundation for more hypothesis-driven research in the future.

The definition of social media differs amongst researchers, and the term can include social networking sites (SNS) such as Facebook and Instagram, blogs and microblog sites (e.g. Twitter), virtual game and social worlds (e.g. Second Life, World of Warcraft), and content communities (e.g. YouTube) (Kaplan & Haenlein, 2010). In this study, social media was defined broadly to include SNS, blogs/microblog sites and content communities, but

excluded instant messaging sites/apps (e.g. Messenger), video chatting apps (e.g. Skype) and gaming including standard computer games, virtual social worlds and virtual game worlds.

2. Method

2.1. Ethical approval

The study was approved by University College London (UCL) Research Ethics Committee (Project ID: 17383/001) (Appendix J).

2.2. Design

This was a cross-sectional study in which data were collected via an online questionnaire. The data obtained in this study represented baseline data for a subsequent follow-up study and therefore formed part of a longitudinal study focusing on the development of young people's social media use over time (a future DClinPsy thesis). Thus, as part of the consent process, participants were asked whether they agreed to be contacted at both three to six and 12 to 18 months follow-up to take part in the longitudinal study.

This was a joint project working in collaboration with Ghiselle Green, who was exploring a preliminary model of the impact of social media on young people's mental health (Green, 2021; Appendix K).

2.3. Participants and inclusion criteria

Participants were adolescents aged 11-17 in Years 7-12 who were recruited from two secondary schools (schools A and B) in London, UK. School A was a co-educational, independent (private) school located in a relatively affluent borough of London, while school B was a mainstream, state-funded sixth form college located in a relatively deprived borough. Participants were recruited from Years 7-12 at school A and from Year 12 only at school B.

2.4. Consenting process

In order to take part in the study, parent/carer consent was sought *in addition to* participant consent/assent with the former undertaken on an opt-in basis. Young people whose parents or carers had opted out with respect to their participation were not invited to take part. Two weeks prior to the study, age-appropriate information sheets about the study and parental opt-out forms were emailed to eligible participants and their parents/carers (see Appendix L for study recruitment materials). Two weeks later, eligible participants whose parents/carers had not opted out with respect to their participation were emailed hyperlinks to the study questionnaire. Prior to completing the questionnaire, informed consent was sought from participants online (see Appendix M for full list of items). Participants who did not select yes to relevant consent items were automatically excluded from the study. Participants received no financial incentive for taking part due to concern that this might bias responses or encourage participation for financial/material gain only.

2.5. Procedure

The online survey was presented using the REDCAP (Research Electronic Data Capture) web-based survey tool, which is compliant with GDPR (General Data Protection Regulation). All identifiable data (i.e. name, date of birth) were stored in REDCAP and only accessible by the researchers via the secure environment UCL Data Safe Haven. This data was used only for the purposes of identifying participants who needed to be followed-up on the basis of their scores on mental health questionnaires or who requested to be subsequently contacted by their school's pastoral/wellbeing team, and in order to identify participants who agreed to be contacted in relation to the longitudinal study.

At the start of the questionnaire, participants were informed that the questionnaire would take approximately 30 minutes to complete, and that there were no right or wrong

answers. They were also encouraged to contact a member of the research team if they had any questions or if anything was unclear.

At the end of the questionnaire, participants were provided with contact details for key staff members of their schools' wellbeing teams, along with hyperlinks to the schools' wellbeing webpages. They were also asked to select yes if they wanted to be subsequently contacted by a member of staff from their school's pastoral or wellbeing team if they felt concerned about their safety or wellbeing or someone else's and wished to access support (see Appendix M).

Immediately following data collection, the researchers screened all responses in order to identify participants who had scored above the clinical threshold for a mood disorder on the basis of their mental health questionnaire scores, as well as participants who had requested to be contacted by their school's pastoral/wellbeing team for support. These participants were subsequently contacted by an appropriate member of staff from their school, who completed a risk assessment, and were signposted to further support services if necessary (i.e. school counsellor).

2.6. Measures

2.6.1. Demographic data

Demographic data were obtained, including participants' gender, ethnicity, age and academic year group (i.e., year 7-12). As part of a study completed by the wider research team, participants were also asked questions relating to their sleep, leisure and study habits and time spent with family and friends.

2.6.2. Digital screen use and social media data

Participants answered a series of questions related to their digital screen use (not including social media use), which were adapted from previous research (Tibber et al., 2020). These included daily time spent using messaging apps, video chatting apps and gaming. Response options included ‘less than 10 minutes’, ‘10-30 minutes’, ‘31-60 minutes’, ‘1-2 hours’, ‘3-5 hours’, and ‘more than 5 hours’ (see Appendix M).

In addition, participants were asked whether they used social media (yes or no). Participants who selected no were asked to provide a brief free-text response stating their reason for not using social media and were subsequently directed to the proceeding sections of the questionnaire. Participants who reported using social media were asked: (1) to list a maximum of three social media sites/apps that they used the most, and (2) approximately how much time per day in the past week they had spent using social media sites/apps (less than 10 minutes, 10-30 minutes, 31-60 minutes, 1-2 hours, 3-5 hours, more than 5 hours).

2.6.3. Motivations for social media use

In order to assess participants’ motivations for social media use, participants who reported using social media completed an adapted version of the Scale of Motives for Using Social Networking Sites (SMU-SNS; Pertegal et al., 2019). The SMU-SNS, based on U&G theory, was developed to measure motives for using SNS and although published in English, the scale was initially validated in a sample of Spanish-speaking young people aged 13-25 (Pertegal et al., 2019). The scale consists of 27 items arranged into nine factors with three items in each subscale: dating (e.g. ‘To look for a date’), new friendships (e.g. ‘To make new friends’), academic purposes (e.g. ‘To ask for or share class notes’), social connectedness (e.g. ‘To feel connected with people’), following and monitoring others (e.g. ‘To know the details of my friends’ lives’), entertainment (e.g. ‘To kill time when I am bored’), social

recognition (e.g. ‘For other people to comment on my posts’), self-expression (e.g. ‘To express my feelings and thoughts’), and information (e.g. ‘To keep up with what happens in the world’). Items are rated on a seven-point scale from (1) ‘completely untrue’ to (7) ‘completely true’, with higher scores on each factor indicating greater importance of the corresponding motive. This scale was adapted for use in this study by changing the focus from SNS to social media more generally. Furthermore, the wording of some items was altered slightly or expanded upon in order to aid comprehension for the English-speaking and younger sample employed in the current study (see Appendix M).

Preliminary validation of the SMU-SNS showed excellent internal consistency, measurement invariance across gender and age, and construct validity with personality traits, social support, loneliness and life satisfaction (Pertegal et al., 2019). Internal consistency for the full scale in our sample was excellent ($\alpha = .90$) and good for all subscales: dating ($\alpha = .88$), new friendships ($\alpha = .87$), academic purposes ($\alpha = .81$), social connectedness ($\alpha = .85$), following and monitoring others ($\alpha = .86$), entertainment ($\alpha = .80$), social recognition ($\alpha = .81$), self-expression ($\alpha = .82$), and information ($\alpha = .83$).

2.6.4. Social media use to stay informed about COVID-19

In addition, one item developed by the researchers was used to ask participants to what extent they used social media to stay informed about COVID-19 (see Appendix M). This item was rated on a seven-point scale from (1) ‘never’ to (7) ‘all the time’.

2.6.5. Anxiety and depression

Three scales from the Revised Child Anxiety and Depression Scales (RCADS; Chorpita et al., 2000) were used to measure symptoms of generalised anxiety disorder (GAD), social anxiety and depression. The RCADS was developed to measure anxiety and depression symptomatology consistent with Diagnostic and Statistical Manual (DSM) criteria for

selected anxiety disorders and major depression and has demonstrated clinical utility and good psychometric properties among community samples of school children (Chorpita et al., 2000; de Ross et al., 2002). While the RCADS includes additional scales for obsessive-compulsive disorder (OCD), separation anxiety and panic disorder, only the GAD, social anxiety and depression scales were used in this study. The GAD scale has six items (e.g. 'I worry about things'), the social anxiety scale has nine items (e.g. 'I worry what other people think of me') and the depression scale has ten items (e.g. 'I feel sad or empty'). All items are rated from 0-3 corresponding to (0) 'never', (1) 'sometimes', (2) 'often' and (3) 'always'. All three scales demonstrated good levels of internal consistency in this sample (GAD: $\alpha = .86$, social anxiety: $\alpha = .88$, depression: $\alpha = .89$).

2.6.6. Additional measures not included in the study

As part of a study completed by the wider research team, participants who reported using social media were also asked about their active and passive social media use (seven items; Li, 2016) and extent to which they engaged in upward and downward social comparisons on social media and offline (four items; Vogel et al., 2014). Furthermore, as part of the wider study, all participants completed several measures concerning their social relationships both online and offline. These included the Social Connectedness Scale-Revised (SCS-R; Lee & Robbins, 1995) and an adapted version of the Internet Social Capital Scale (Williams, 2006), as used by Ahn (2012). These data were not used in the current study and therefore these measures will not be described in detail.

2.7. Consultation on the questionnaire

Prior to data collection, six students from Years 9-12 who attended school A were consulted on draft versions of the questionnaires in a focus group facilitated by two members of the wider research team. These students (all female, all white British) were members of the

school's youth advisory group which focused on issues concerning emotional wellbeing. They were consulted on the comprehensibility, comprehensiveness and relevance of the questions, paying particular attention to measures which were developed or adapted by the research team for use in the study. Following this, minor amendments were made to the questionnaire where appropriate.

2.8. Statistical analyses

2.8.1. Descriptive statistics and data distributions

Descriptive statistics, assessment of normality, comparisons between social media users and non-users and bivariate correlations were carried out in IBM SPSS Statistics Version 25. To assess univariate normality, histograms were examined, along with skewness and kurtosis statistics and Kolmogorov-Smirnov (*KS*) tests. Where violations were identified these are reported in the results section. Where assumption of normality was violated, non-parametric variants of statistical tests were used.

2.8.2. Basic statistics

To compare social media users and non-users on demographic and mental health variables, non-parametric Mann-Whitney *U* tests and chi-square tests were used, which are tolerant of unequal sample sizes and variances. Likelihood ratio test statistics (G^2) were reported for chi-square tests of association where assumptions regarding expected counts were violated.

Where data were not normally distributed, basic first-order correlations between key variables of interest were explored using Spearman's bivariate analysis.

2.8.3. Regression analyses

To explore the association between motivations for social media use and mental health variables, a series of regression analyses were undertaken. Univariate and multivariate forward stepwise linear regression models were conducted in Stata version 16.1 to explore

associations between the nine social media use motives and symptoms of depression, generalised anxiety and social anxiety. In multivariate regression analyses, mental health symptom scores were regressed on social media use motive indicators using forward stepwise selection. Predictor variables were retained if they significantly improved model fit ($p < .05$; Likelihood Ratio Test). Assumptions of normality and homoscedasticity of residuals were assessed for all multivariate regression analyses using histograms, scatterplots and Jarque-Bera (*JB*) tests. To deal with violations of these, models were re-run with outliers recoded to within two standard deviations (*SD*) of the mean, and heteroscedastic regression models were run to correct for homoscedasticity (Stata, 2021).

2.8.4. Latent Profile Analysis

In order to categorise the sample of social media users into underlying subgroups based on motivations for use, LPA was conducted in R version 4.0.2 using the tidyLPA package (Rosenberg et al., 2018). LPA is a mixture-modelling technique that aims to build profiles based on individual responses from a set of variables (Ahlborg et al., 2019). It employs structural equation modelling (SEM) and multiple diagnostics to identify latent groups (profiles) in multivariate data and is advantageous over traditional cluster analytic methods. While cluster analysis uses *ad hoc* distance parameters to establish underlying groups, LPA allocates participants to a latent categorical variable using an iterative function such as maximum likelihood, therefore increasing the chance that participants will belong to profiles in which they have the greatest probability of association (Lo Coco et al., 2018).

LPA allows for unequal variances across profiles and does not require assumption of normality. It is therefore less prone to statistical biases in the data (Magidson & Vermunt, 2003). There is little consensus in the literature with regards to sample size guidelines for LPA, and rather statistical power is dependent on factors including the number of variables

used in the analysis, the number of profiles extracted, and how distinct classes are (Tein et al., 2013). However, based on findings from simulation studies, LPA should not be run using samples of fewer than 100 participants (e.g. Nylund et al., 2007; Tein et al., 2013; Wurpts & Geiser, 2014).

There are no common standard criteria for choosing the number of profiles in LPA and researchers typically use a combination of fit criteria in determining the number of latent profiles, including likelihood ratio statistical test methods, information-theoretic methods and entropy-based criterion (Tein et al., 2013). As guided by simulation studies (Nylund et al., 2007; Tein et al., 2013), the following fit indices were used to select the number of classes: log-likelihood test, Akaike information criterion (AIC), Bayesian information criterion (BIC), sample-size adjusted BIC, Bozdogan's criterion, bootstrap likelihood ratio test (BLRT) and entropy.

Following LPA, chi-square tests and Kruskal-Wallis tests were conducted in SPSS to compare demographic, social media use and mental health variables across identified profiles. Finally, a series of multinomial logistic regression models were conducted in Stata to explore the associations between mental health predictor variables and identified profiles from LPA.

3. Results

3.1. Missing and excluded data

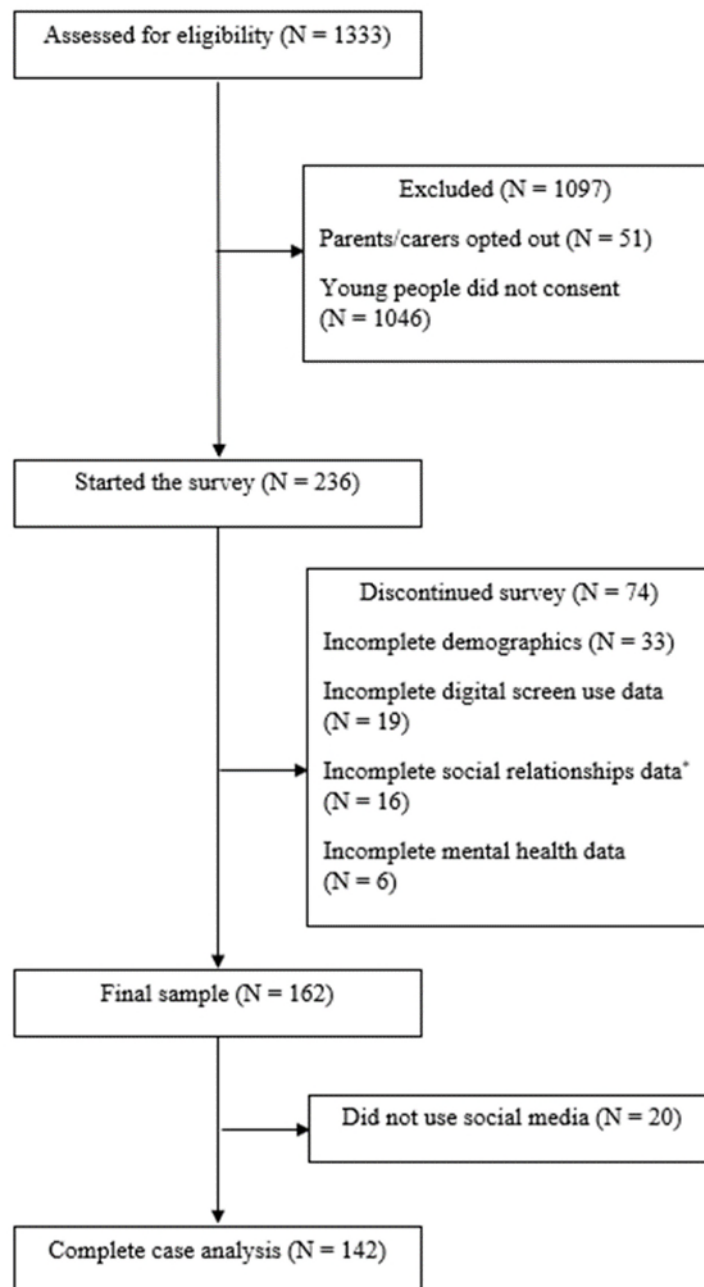
Due to missing and excluded data as a result of gradual loss of participants throughout the questionnaire, the final sample consisted of 162 young people (see Figure 1). This included 141 participants from school A and 21 participants from school B. Complete case analyses were performed using data from 142 participants who reported using social media (see Figure 1).

3.2. Data distributions

Other than the dating motive subscale (skewness = 2.27, kurtosis = 4.59), all demographic, social media and mental health variables had acceptable skewness and kurtosis values between ± 2 (George & Mallery, 2010) (Supplementary Table 6). However, the *KS* test statistics were significant for all variables, violating assumption of normality (all $ps < .05$) (Supplementary Table 6).

Figure 1

Flowchart of participants



* Social relationships data obtained as part of a larger study completed by the wider research team and not included in this study.

3.3. Sample characteristics

Demographic and mental health characteristics of the total sample ($N = 162$) and social media users ($N = 142$) are presented in Table 1. Participants had a median age of 13.52 ($IQR = 2.9$) and the majority were female ($n = 93, 57.41\%$). Most participants identified themselves as white ($n = 92, 56.79\%$). Most participants reported using social media ($n = 142, 87.65\%$), with only 20 participants (12.35%) reporting no social media use. The most common reasons cited for not using social media were: 1) not allowed ($n = 9, 45\%$); 2) not interested ($n = 9, 45\%$); 3) concern about inappropriate content/users ($n = 2, 10\%$); and 4) belief that social media is a ‘waste of time’ or ‘distraction’ ($n = 2, 10\%$) (see Supplementary Table 4 for full list of reasons for non-use).

Fourteen participants scored above the clinical threshold for a mood disorder based on their mental health questionnaire scores (8.64%), while seven participants (4.93%) requested to be contacted by their school’s pastoral/wellbeing team for support.

3.4. Comparisons between social media users and non-users

Comparisons between social media users ($n = 142$) and non-users ($n = 20$) found that on average, social media users ($Mdn = 13.7$) were older than non-users ($Mdn = 12.6$), $U = 858.00, p = .004$. There was no difference between social media users and non-users with respect to gender, $G^2(2, 162) = 0.66, p = .718$, or ethnicity, $G^2(5, 162) = 4.40, p = .494$. On average, social media users ($Mdn = 6.5$) had higher depression scores than non-users ($Mdn = 2.5$), $U = 2056.50, p = .001$, and also had higher levels of social anxiety ($Mdn = 12.0$) than non-users ($Mdn = 6.0$), $U = 2001.50, p = .003$. There was no difference between users and non-users with respect to GAD scores, $U = 1693.50, p = .162$.

3.5. Characteristics of social media users

Digital screen use and social media characteristics for the total sample and social media users are presented in Table 2. Participants most commonly reported using social media between one and two hours per day ($n = 47, 33.10\%$). Participants reported using an average of three social media sites/apps. The most popular social media platforms used by participants were Instagram ($n = 75, 52.82\%$), YouTube ($n = 69, 48.59\%$), Snapchat ($n = 52, 36.62\%$) and TikTok ($n = 45, 31.65\%$) (see Supplementary Table 5 for full list of platforms).

Table 1

Demographic and mental health characteristics of the total sample (N = 162) and social media (SM) users (N = 142). Mdn = median, IQR = interquartile range.

Variable		Total sample N = 162	SM users N = 142
Age, <i>Mdn (IQR)</i>		13.5 (2.9)	13.7 (3.1)
Gender, <i>n (%)</i>	Male	66 (40.74)	57 (40.1)
	Female	93 (57.41)	83 (58.5)
	Prefer not to say	2 (1.23)	2 (1.4)
Ethnicity, <i>n (%)</i>	White	92 (56.79)	81 (57.0)
	Mixed	23 (14.2)	19 (13.4)
	Asian / Asian British	24 (14.81)	21 (14.8)
	Black / Black British	10 (6.17)	8 (5.6)
	Any other	12 (7.41)	12 (8.5)
	Prefer not to say	1 (0.62)	1 (0.7)
Year group, <i>n (%)</i>	7	33 (20.37)	26 (18.3)
	8	33 (20.37)	26 (18.3)
	9	32 (19.75)	27 (19.0)
	10	19 (11.73)	19 (13.4)
	11	17 (10.49)	17 (12.))
	12	28 (17.28)	27 (19.0)
Depression, <i>Mdn (IQR)</i>		6.0 (7.0)	6.5 (7.0)
GAD, <i>Mdn (IQR)</i>		6.5 (6.0)	7.0 (6.0)
Social anxiety, <i>Mdn (IQR)</i>		11.0 (9.0)	12.0 (9.0)

Table 2

Digital screen use and social media characteristics of the total sample (N = 162) and social media (SM) users (N = 142). Mdn = median, IQR = interquartile range.

Variable		Total sample N = 162	SM users N = 142
Daily messaging apps use, <i>n</i> (%)	< 10 minutes	23 (14.2)	18 (12.7)
	10 – 30 minutes	66 (40.7)	61 (43.0)
	31 – 60 minutes	41 (25.3)	33 (23.2)
	1 – 2 hours	21 (13.0)	19 (13.4)
	3 – 5 hours	7 (4.3)	7 (4.9)
	> 5 hours	4 (2.5)	4 (2.8)
Daily video chatting apps use, <i>n</i> (%)	< 10 minutes	109 (67.3)	5 (66.9)
	10 – 30 minutes	32 (19.8)	28 (19.7)
	31 – 60 minutes	9 (5.6)	9 (6.3)
	1 – 2 hours	7 (4.3)	6 (4.2)
	3 – 5 hours	4 (2.5)	3 (2.1)
	> 5 hours	1 (0.6)	1 (0.7)
Daily gaming, <i>n</i> (%)	< 10 minutes	73 (45.1)	60 (42.3)
	10 – 30 minutes	37 (22.8)	33 (23.2)
	31 – 60 minutes	25 (15.4)	24 (16.9)
	1 – 2 hours	19 (11.7)	17 (12.0)
	3 – 5 hours	4 (2.5)	4 (2.8)
	> 5 hours	4 (2.5)	4 (2.8)
Multiplayer gaming, <i>n</i> (%)	Yes	84 (51.9)	76 (53.5)
	No	41 (25.3)	31 (21.8)
	N/A	37 (22.8)	35 (24.6)
No. of social media sites, <i>n</i> (%)			3.33 (1.79)
Daily social media use, <i>n</i> (%)	< 10 minutes		7 (4.9)
	10 – 30 minutes		28 (19.7)
	31 – 60 minutes		35 (24.6)
	1 – 2 hours		47 (33.1)
	3 – 5 hours		19 (13.4)
	> 5 hours		6 (4.2)
SM for Covid-19 information, <i>n</i> (%)	Never		37 (26.1)
	< Once a week		34 (23.9)
	Once a week		29 (20.4)
	2-6 times a week		15 (10.6)
	Once a day		13 (9.2)
	Several times a day		8 (5.6)
	All the time		6 (4.2)
<i>SM use motive, Mdn (IQR)</i>			
Dating			1.0 (2.3)
New friendships			2.7 (2.3)
Academic purposes			4.3 (2.3)
Social connectedness			4.7 (2.0)
Following / monitoring others			3.7 (2.3)
Entertainment			5.3 (1.7)
Social recognition			1.8 (2.0)
Self-expression			4.0 (2.3)
Information			5.3 (1.7)

3.6. Bivariate correlations

Spearman's rho correlations for key study variables are presented in Table 3 (Pearson's correlations are reported in Supplementary Table 7). The number of social media sites/apps used by participants was positively associated with all mental health variables and all social media use motives (all $ps < .05$, see Table 3). Depression, GAD and social anxiety were significantly and positively correlated with one another (all $ps < .01$, see Table 3). Apart from dating, all other social media use motives were significantly and positively associated with at least one mental health variable (all $ps < .05$, see Table 3). The new friendships, social connectedness, following and monitoring others, entertainment, social recognition and self-expression motives were positively associated with all three mental health variables (all $ps < .05$, see Table 3). Age was positively associated with social anxiety, $r_s(140) = .23, p = .006$, and with use of social media for entertainment, $r_s(140) = .28, p = .001$. The use of social media to stay informed about COVID-19 was positively associated with GAD, $r_s(140) = .29, p = .001$, and with using social media for information more generally, $r_s(140) = .55, p < .001$. Furthermore, the majority of motives were positively correlated with one another (see Table 3).

Table 3

Spearman's rho (r_s) correlation coefficients. Values in bold are significant.

Variable	Age	GAD	Depression	Social anxiety	SM sites#	DT	FR	AC	SC	FO	EN	SR	SE	IN	COVID-19 IN
<i>Demographic</i>															
Age	-														
<i>Mental health</i>															
GAD	.10	-													
Depression	.12	.64**	-												
Social anxiety	.23**	.64**	.64**	-											
<i>SM use</i>															
No. of SM sites	.22**	.17*	.32**	.32**	-										
<i>SM motive</i>															
Dating	.15	.13	.15	.15	.24**	-									
New friendships	.17*	.19*	.18*	.28**	.36**	.48**	-								
Academic purposes	.27**	.12	.15	.27**	.31**	.26**	.39**	-							
Social connectedness	.11	.24**	.31**	.29**	.44**	.22**	.43**	.31**	-						
Following others	.11	.27**	.23**	.35**	.40**	.34**	.40**	.32**	.54**	-					
Entertainment	.28**	.33**	.41**	.43**	.41**	.03	.22**	.06	.38**	.31**	-				
Social recognition	.12	.26**	.30**	.31**	.21*	.28**	.49**	.26**	.41**	.46**	.25**	-			
Self-expression	.05	.22**	.26**	.19*	.18*	.18*	.35**	.22**	.47**	.39**	.23**	.49**	-		
Information	.01	.23**	.08	.17*	.20*	-.09	.15	.14	.32**	.15	.14	.14	.08	-	
COVID-19 information	-.07	.29**	.06	.14	.02	.02	.23**	.19*	.18*	.12	-.05	.13	-.02	.55**	-

Note. GAD = generalised anxiety, SM = social media, DT = dating, FR = new friendships, AC = academic purposes, SC = social connectedness; FO = following and monitoring others, EN = entertainment, SR = social recognition, SE = self-expression, IN = information

** = $p < .01$ (sig 2-tailed), * = $p < .05$ (sig 2-tailed)

3.7. Social media use motives and their association with mental health

3.7.1. Data distributions

Examination of histograms, scatterplots and the *JB* test statistics indicated residuals which violated assumptions of homoscedasticity and normality for all three mental health variables (*JB*: $\chi^2 = 10.81$, $p = .005$). Two predictor variables (entertainment and information) and one outcome variable (depression) were found to have outliers: entertainment (2 outliers), information (6 outliers), depression (3 outliers). Re-running the analyses with outliers recoded did not rectify the issues of non-normality and heteroscedasticity, with residuals continuing to violate these assumptions (Supplementary Tables 8a-c) (*JB*: $\chi^2 = 7.23$, $p = .027$). Running heteroscedastic regression models (Supplementary Tables 9a-c) did not change the findings, thus the original models are reported in the main body of the report. It should be noted that residuals are more robust to deviations from normality in samples > 100 (Lumley et al., 2002; Minitab, 2014), and that skewed residuals are less problematic where regression analysis is not being used to generate prediction intervals (Minitab, 2014).

3.7.2. Depression

Univariate linear regression of depression on the nine social media use motivations (Table 4a, Model 1) indicated that six of the nine motives significantly predicted levels of depression, with higher motivation scores predicting higher depression symptom scores. These were: new friendships ($\beta = 0.63$, 95% *CI* [0.09, 1.18], $p = .024$), social connectedness ($\beta = 1.04$, 95% *CI* [0.49, 1.58], $p < .001$), following and monitoring others ($\beta = 0.76$, 95% *CI* [0.22, 1.34], $p = .007$), entertainment ($\beta = 1.66$, 95% *CI* [1.05, 2.28], $p < .001$), social recognition ($\beta = 1.09$, 95% *CI* [0.39, 1.79], $p = .003$) and self-expression ($\beta = 0.87$, 95% *CI* [0.29, 1.44], $p = .003$). In contrast, dating, academic purposes and information did not emerge as significant

predictors; neither did using social media for COVID-19 (all $ps \geq .05$). Age and gender also did not predict depression symptom scores (all $ps > .05$).

Given the correlations *between* motivations for use, forward stepwise multivariate analyses were then run to determine which of these motivations showed the most robust / significant association with depression. This multivariate model (Table 4a, Model 2) retained entertainment and social connectedness motivations only, $F(2, 139) = 16.78, p < .001$, and explained 19.45% of the variance in depression scores, $R^2 = .19$. Thus, higher motivation to use social media for entertainment was associated with higher levels of depression (Beta = 1.41, 95% CI [0.75, 2.06], $p < .001$), as was higher motivation to use social media for social connectedness ($\beta = 0.59$, 95% CI [0.03, 1.15], $p = .040$).

Finally, a third multivariate model (Table 4a, Model 3) showed that these effects survived when controlling for participants' age and gender, $F(4, 137) = 8.33, p < .001$.

Table 4a

Univariate and multivariate regression analyses of depression on social media use motives and demographic variables. Values in bold show significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>Social media use motives</i>						
Dating	0.94 [-0.02, 1.89]	.056	-	-	-	-
Friendships	0.63 [0.09, 1.18]	.024	-	-	-	-
Academic	0.54 [-0.004, 1.09]	.052	-	-	-	-
Social connectedness	1.04 [0.49, 1.58]	< .001	0.59 [0.03, 1.15]	.040	0.59 [0.03, 1.16]	.039
Following others	0.76 [0.22, 1.34]	.007	-	-	-	-
Entertainment	1.66 [1.05, 2.28]	< .001	1.41 [0.75, 2.06]	< .001	1.42 [0.74, 2.10]	< .001
Social recognition	1.09 [0.39, 1.79]	.003	-	-	-	-
Self-expression	0.87 [0.29, 1.44]	.003	-	-	-	-
Information	0.4 [-0.27, 1.06]	.242	-	-	-	-
COVID-19 information	0.26 [-0.26, 0.77]	.325	-	-	-	-
<i>Demographic</i>						
Age	0.35 [-0.15, 0.86]	.169	-	-	0.03 [-0.47, 0.52]	.915
Gender	0.53 [-1.18, 2.24]	.543	-	-	-0.37 [-1.99, 1.25]	.652

3.7.3. Generalised anxiety

Univariate analyses found that seven of the nine motives predicted GAD, with higher social media use for each motive associated with higher generalised anxiety symptom scores (Table 4b, Model 1): new friendships ($\beta = 0.51$, 95% *CI* [0.09, 0.94], $p = .019$), social connectedness ($\beta = 0.60$, 95% *CI* [0.17, 1.04], $p = .007$), following and monitoring others ($\beta = 0.74$, 95% *CI* [0.31, 1.16], $p = .001$), entertainment ($\beta = 1.08$, 95% *CI* [0.59, 1.58], $p < .001$), social recognition ($\beta = 0.78$, 95% *CI* [0.23, 1.32], $p = .006$), self-expression ($\beta = 0.47$, 95% *CI* [0.02, 0.92], $p = .042$) and information ($\beta = 0.81$, 95% *CI* [0.30, 1.31], $p = .002$).

Furthermore, using social media to stay informed about COVID-19 was associated with higher generalised anxiety symptom scores ($\beta = 0.81$, 95% *CI* [0.44, 1.19], $p < .001$). Dating and academic purposes did not emerge as significant predictors (all $ps > .05$). With respect to demographic variables, being female was associated with higher generalised anxiety symptom scores ($\beta = 1.63$, 95% *CI* [0.33, 2.93], $p = .014$).

A basic multivariate model (Table 4b, Model 2) retained entertainment and information as significant predictors of GAD, $F(2, 139) = 12.89$, $p < .001$, explaining 15.65% of the variance in GAD scores, $R^2 = 0.16$. Higher motivation to use social media for entertainment was associated with higher generalised anxiety symptom scores ($\beta = 0.96$, 95% *CI* [0.46, 1.45], $p < .001$), as was higher motivation to use social media for information ($\beta = 0.61$, 95% *CI* [0.12, 1.10], $p = .027$).

To explore whether the effect of information was explained by motivation to use social media to access information related to the pandemic, a third multivariate model (Table 4b, Model 3) was run to determine whether these findings were retained following inclusion of COVID-19 information as a covariate, along with demographic covariates (age and gender). Within this model, $F(5, 136) = 9.74$, $p < .001$, which explained 26.36% of the

variance in GAD scores ($R^2 = 0.26$), the (general) information motive no longer predicted GAD ($p > .05$). Higher motivation to use social media to stay informed about COVID-19 was associated with higher generalised anxiety symptom scores ($\beta = 0.78$, 95% *CI* [0.37, 1.18], $p < .001$), as was higher motivation to use social media for entertainment ($\beta = 0.96$, 95% *CI* [0.47, 1.46], $p < .001$).

Table 4b

Univariate and multivariate regression analyses of generalised anxiety on social media use motives and demographic variables. Values in bold show significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM use motives</i>						
Dating	0.59 [-0.16, 1.33]	.124	-	-	-	-
New Friendships	0.51 [0.09, 0.94]	.019	-	-	-	-
Academic	0.34 [-0.09, 0.77]	.117	-	-	-	-
Social connectedness	0.60 [0.17, 1.04]	.007	-	-	-	-
Following others	0.74 [0.31, 1.16]	.001	0.42 [-0.02, 0.85]	.062	-	-
Entertainment	1.08 [0.59, 1.58]	< .001	0.81 [0.29, 1.32]	.002	0.96 [0.47, 1.46]	< .001
Social recognition	0.78 [0.23, 1.32]	.006	-	-	-	-
Self-expression	0.47 [0.02, 0.92]	.042	-	-	-	-
Information	0.81 [0.30, 1.31]	.002	0.55 [0.06, 1.04]	.027	0.15 [-0.38, 0.69]	.570
Covid-19 information	0.81 [0.44, 1.19]	< .001	-	-	0.78 [0.37, 1.18]	< .001
<i>Demographics</i>						
Age	0.26 [-0.13, 0.65]	.195	-	-	-0.02 [-0.39, 0.35]	.913
Gender	1.63 [0.33, 2.93]	.014	-	-	1.37 [0.16, 2.59]	.027

3.7.4. Social anxiety

Finally, univariate linear regression of social anxiety on the nine social media use motivations found that eight motives significantly predicted social anxiety such that higher motivation scores were associated with higher social anxiety symptom scores (Table 4c, Model 1): new friendships ($\beta = 1.09$, 95% *CI* [0.48, 1.70], $p = 0.001$), academic purposes ($\beta = 0.95$, 95% *CI* [0.33, 1.56], $p = .003$), social connectedness ($\beta = 1.22$, 95% *CI* [0.59, 1.84], $p < .001$), following and monitoring others ($\beta = 1.38$, 95% *CI* [0.77, 1.99], $p < .001$), entertainment ($\beta = 2.05$, 95% *CI* [1.36, 2.74], $p < .001$), social recognition ($\beta = 1.53$, 95% *CI* [0.75, 2.32], $p < .001$),

.001), self-expression ($\beta = 0.71$, 95% *CI* [0.04, 1.37], $p = .037$) and information ($\beta = 1.01$, 95% *CI* [0.26, 1.75], $p = .008$). Dating did not emerge as a significant predictor ($p > .05$). With respect to demographic variables, both age and gender significantly predicted social anxiety, such that older participants had higher social anxiety symptom scores ($\beta = 0.74$, 95% *CI* [0.17, 1.31], $p = .011$), as did females ($\beta = 3.54$, 95% *CI* [1.68, 5.40], $p < .001$).

A basic multivariate model (Table 4c, Model 2) retained entertainment and following and monitoring others as significant predictors of social anxiety, $F(2, 139) = 22.32$, $p < .001$), explaining 24.31% of the variance in social anxiety scores ($R^2 = 0.16$). Higher motivation to use social media for entertainment was associated with higher social anxiety symptom scores ($\beta = 1.69$, 95% *CI* [0.98, 2.41], $p < .001$), as was higher motivation to use social media to follow and monitor others ($\beta = 0.90$, 95% *CI* [0.29, 1.50], $p = .021$).

Finally, a third multivariate model (Table 4c, Model 3) showed that these effects survived when controlling for participants' age and gender, $F(4, 137) = 13.28$, $p < 0.001$). A summary of multivariate regression analyses for all three mental health variables is shown in Table 4d.

Table 4c

Univariate and multivariate regression analyses of social anxiety on social media use motives and demographic variables. Values in bold show significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM use motives</i>						
Dating	0.99 [-0.11, 2.08]	.078	-	-	-	-
New Friendships	1.09 [0.48, 1.70]	.001	-	-	-	-
Academic Purposes	0.95 [0.33, 1.56]	.003	-	-	-	-
Social connectedness	1.22 [0.59, 1.84]	< .001	-	-	-	-
Following others	1.38 [0.77, 1.99]	< .001	0.90 [0.29, 1.50]	.004	0.73 [0.11, 1.34]	.021
Entertainment	2.05 [1.36, 2.74]	< .001	1.69 [0.98, 2.41]	< .001	1.54 [0.82, 2.27]	< .001
Social recognition	1.53 [0.75, 2.32]	< .001	-	-	-	-
Self-expression	0.71 [0.04, 1.37]	.037	-	-	-	-
Information	1.01 [0.26, 1.75]	.008	-	-	-	-
Covid-19 information	0.58 [-0.0002, 1.16]	.050	-	-	-	-
<i>Demographics</i>						
Age	0.74 [0.17, 1.31]	.011	-	-	0.19 [-0.35, 0.72]	.488
Gender	3.54 [1.68, 5.40]	< .001	-	-	2.10 [0.30, 3.89]	.022

Table 4d

Summary of multivariate regression analyses of depression, generalised anxiety and social anxiety on social media use motives and demographic variables. Values in bold show significant predictors.

Predictor	Depression Model 3 (multivariate)		Generalised anxiety Model 3 (multivariate)		Social anxiety Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM use motives</i>						
Social connectedness	0.59 [0.03, 1.16]	.039	-	-	-	-
Following others	-	-	-	-	0.73 [0.11, 1.34]	.021
Entertainment	1.42 [0.74, 2.10]	< .001	0.96 [0.47, 1.46]	< .001	1.54 [0.82, 2.27]	< .001
Information	-	-	0.15 [-0.38, 0.69]	.570	-	-
Covid-19 information	-	-	0.78 [0.37, 1.18]	< .001	-	-
<i>Demographic</i>						
Age	0.03 [-0.47, 0.52]	.915	-0.02 [-0.39, 0.35]	.913	0.19 [-0.35, 0.72]	.488
Gender	-0.37 [-1.99, 1.25]	.652	1.37 [0.16, 2.59]	.027	2.10 [0.30, 3.89]	.022

3.8. Latent profile analysis

LPA was performed on 142 participants who reported using social media, with the nine social media use motives modelled as indicators. Estimating one to five-class models, a four-class model was the best solution based on all fit indices (see Table 5) (Akogul & Erisoglu, 2017), with profiles 1-4 capturing 13 (9.15%), 31 (21.83%), 33 (23.24%) and 65 (45.77%) of participants respectively.

Table 5

Latent profile analysis models. Values in bold correspond to the solution retained.

Model	LL	AIC	BIC	SSA-BIC	CAIC	Entropy	BLRT (p value)
One profile	-2211.01	4458.03	4511.23	4454.28	4529.23		
Two profile	-2102.16	4260.31	4343.07	4254.48	4371.07	.89	.01
Three profile	-2040.36	4156.71	4269.03	4148.80	4307.03	.93	.01
Four profile	-2000.42	4096.83	4238.71	4086.84	4286.71	.87	.01
Five profile	-1992.58	4101.15	4272.59	4089.07	4330.59	.87	.43

LL = Log-Likelihood; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SSA-BIC = Sample-Size Adjusted BIC; CAIC = Bozdogan's Criterion; BLRT = Bootstrap Likelihood Ratio Difference test

3.8.2. Characteristics of identified profiles

Descriptive statistics for basic characteristics of the four profiles are displayed in Table 6.

These indicate that the distribution of genders differed significantly across classes, $G^2(4, 142) = 14.54, p = .024$, with profiles 1 and 3 having significantly more males than expected, while profiles 2 and 4 had significantly more females. In contrast, profiles did not differ with respect to age, $\chi^2(3) = 5.39, p = .146$, or ethnicity, $G^2(4, 142) = 11.47, p = .718$. Furthermore, there was no significant difference between profiles in terms of daily time spent using social media, $G^2(4, 142) = 19.88, p = .177$.

Table 6*Basic characteristics of the four profiles. IQR = Interquartile range.*

Variable	Profile 1 (n = 13)	Profile 2 (n = 31)	Profile 3 (n = 33)	Profile 4 (n = 65)
<i>Age (Mdn, IQR)</i>	14.9 (2.3)	13.8 (3.3)	13.0 (3.2)	13.7 (3.1)
<i>Gender (N, %)</i>				
Male	8 (61.5)	7 (22.6)	20 (60.6)	22 (33.8)
Female	5 (38.5)	23 (74.2)	13 (39.4)	42 (64.6)
Prefer not to say	0 (0)	1 (3.2)	0 (0)	1 (1.5)
<i>Ethnicity (n, %)</i>				
White	6 (46.2)	18 (58.1)	23 (69.7)	34 (52.3)
Mixed	3 (23.1)	4 (12.9)	4 (12.1)	8 (12.3)
Asian / Asian British	2 (15.4)	4 (12.9)	3 (9.1)	12 (18.5)
Black / Black British	1 (7.7)	4 (12.9)	1 (3.0)	2 (3.1)
Any other	1 (7.7)	1 (3.2)	2 (6.1)	8 (12.3)
Prefer not to say	0 (0)	0 (0)	0 (0)	1 (1.5)
<i>Daily SM use (n, %)</i>				
< 10 minutes	0 (0)	1 (3.2)	3 (9.1)	3 (4.6)
10 – 30 minutes	2 (15.4)	5 (16.1)	11 (33.3)	10 (15.4)
31 – 60 minutes	3 (23.1)	5 (16.1)	8 (24.2)	19 (29.2)
1 – 2 hours	5 (38.5)	13 (41.9)	7 (21.2)	22 (33.8)
3 – 5 hours	2 (15.4)	4 (12.9)	2 (6.1)	11 (16.9)
> 5 hours	1 (7.7)	3 (9.7)	2 (6.1)	0 (0)

With respect to patterns of social media use across profiles, Kruskal-Wallis tests were conducted (Table 7). Significant differences were found across all social media use motives included (see Figures 2a-e also): dating ($\chi^2(3) = 64.52, p < .001$), new friendships ($\chi^2(3) = 63.64, p < .001$), academic purposes ($\chi^2(3) = 22.62, p < .001$), social connectedness ($\chi^2(3) = 80.61, p < .001$), following and monitoring others ($\chi^2(3) = 60.98, p < .001$), entertainment ($\chi^2(3) = 17.99, p < .001$), social recognition ($\chi^2(3) = 64.57, p < .001$), self-expression ($\chi^2(3) = 43.89, p < .001$) and information ($\chi^2(3) = 14.02, p < .01$). Further, all effects survived correction for seven multiple comparisons.

Post hoc Dunn-Bonferroni tests showed that compared with participants in profile 3, participants in profiles 1 and 2 reported higher motivation to use social media for dating ($ps < .01$), new friendships ($ps < .001$), academic purposes ($ps < .05$), social connectedness ($ps < .001$), following and monitoring others ($ps < .001$), social recognition ($ps < .01$), and self-expression ($ps < .01$). The only difference between profiles 1 and 2 was that participants in

profile 1 reported using social media more for dating ($p < 0.001$). Consequently, profiles 1, 2 and 3 were named high motivation (dating), high motivation (social) and low motivation respectively.

Profile 4 (intermediate motivation) had moderate levels of social media use motivation respectively, with participants in profile 4 reporting higher motivation to use social media than participants in profile 3 for new friendships ($p < .001$), academic purposes ($p = .008$), social connectedness ($p < .001$), following and monitoring others, social recognition ($p = .045$) and self-expression ($p = .010$), and lower levels of social media use than participants in profile 1 and 2 for dating ($ps < .01$) and new friendships ($ps < .05$), and lower levels of social media use compared with participants in profile 2 for social connectedness ($p = .009$), following and monitoring others ($p = .008$), social recognition ($p < .001$) and self-expression ($p < .001$). The exceptions to this were the academic purposes, entertainment and information motives, which had similar levels of use across profiles 1, 2 and 4.

Finally, Kruskal-Wallis tests were also used to explore how the profiles differed with respect to symptoms of depression, generalised anxiety and social anxiety. Significant differences were found between the profiles on all three mental health variables: depression ($\chi^2(3) = 10.07, p = .02$), GAD ($\chi^2(3) = 10.33, p = .02$) and social anxiety ($\chi^2(3) = 17.38, p < .001$). For depression and GAD, however, these effects did not survive correction for seven multiple comparisons. *Post hoc* Dunn-Bonferroni tests showed that participants in profile 2 (high-motivation-social) had significantly higher levels of social anxiety than participants in profile 3 (low motivation) ($p < .001$).

Figures 2a-c

Bar charts showing mean scores and standard errors for a) Dating, New Friendships and Social Recognition; b) Social Connectedness, Following and Monitoring Others and Self-expression; and c) Academic, Information and Entertainment motives across four profiles.

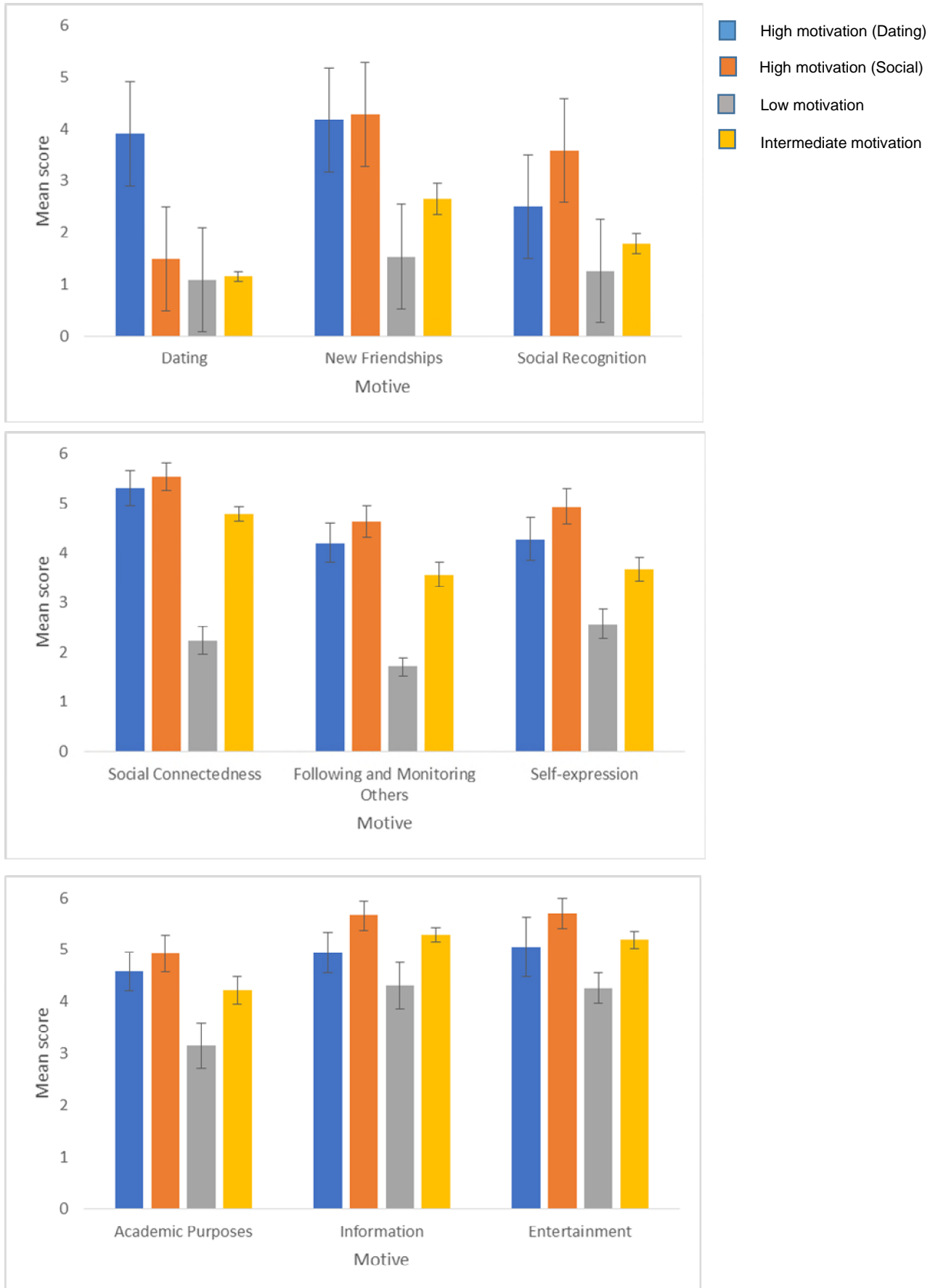


Table 7

Comparison of social media and mental health variables across profiles. Degrees of freedom for all Kruskal-Wallis (KW) tests = 3. Profile 1 = high motivation (dating), Profile 2 = high motivation (social), Profile 3 = low motivation, Profile 4 = intermediate motivation. P values in bold are significant.

Variable (<i>M, SD</i>)	Mean score (SE)				KW-test statistics		Dunn-Bonferroni test statistic (<i>p</i> value)					
	Profile 1 (<i>n</i> = 13)	Profile 2 (<i>n</i> = 31)	Profile 3 (<i>n</i> = 33)	Profile 4 (<i>n</i> = 65)	χ^2	<i>p</i> value	1-2	1-3	1-4	2-3	2-4	3-4
<i>Social media motives</i>												
Dating	3.9 (0.3)	1.5 (0.2)	1.1 (0.1)	1.2 (0.1)	64.52	<.001	<.001	<.001	<.001	.002	.004	1.000
New friendships	4.2 (0.6)	4.3 (0.4)	1.5 (0.2)	2.7 (0.3)	63.64	<.001	1.000	<.001	.038	<.001	<.001	<.001
Academic purposes	4.6 (0.4)	4.9 (0.4)	3.1 (0.4)	4.2 (0.3)	22.62	<.001	1.000	.036	1.000	<.001	.196	.008
Social connectedness	5.3 (0.4)	5.5 (0.3)	2.2 (0.3)	4.8 (0.2)	80.61	<.001	1.000	<.001	.958	<.001	.009	<.001
Following others	4.2 (0.4)	4.6 (0.3)	1.7 (0.2)	3.6 (0.2)	60.98	<.001	1.000	<.001	.832	<.001	.008	<.001
Entertainment	5.1 (0.6)	5.7 (0.3)	4.3 (0.3)	5.2 (0.2)	17.99	<.001	1.000	.333	1.000	<.001	.790	.007
Social recognition	2.5 (0.4)	3.6 (0.5)	1.3 (0.1)	1.8 (0.2)	64.57	<.001	.135	.002	.319	<.001	<.001	.045
Self-expression	4.3 (0.4)	4.9 (0.4)	2.6 (0.3)	3.7 (0.2)	43.89	<.001	.815	.004	.831	<.001	<.001	.010
Information	4.9 (0.4)	5.7 (0.3)	4.3 (0.5)	5.3 (0.1)	14.02	.003	.385	1.000	1.000	.003	1.000	.028
COVID-19 information	2.8 (0.6)	3.4 (0.3)	2.4 (0.3)	2.9 (0.2)	9.77	.021	.620	1.000	1.000	.014	.751	.271
<i>Mental health</i>												
Depression	10.2 (1.5)	9.3 (1.1)	5.8 (0.8)	7.1 (0.6)	10.07	.018	1.000	.055	.406	.065	.720	.980
Generalised anxiety	8.7 (1.1)	8.9 (0.7)	6.2 (0.6)	6.7 (0.5)	10.33	.016	1.000	.415	.573	.054	.058	1.000
Social anxiety	15.0 (1.9)	15.7 (1.0)	9.7 (1.1)	12.8 (0.7)	17.38	.001	1.000	.052	1.000	<.001	.198	.079

3.9. Patterns/profiles of social media use motives and mental health

To explore whether symptoms of depression, generalised anxiety and social anxiety were predictive of profile membership, a series of univariate and multivariate multinomial logistic regression models were run with class as a four-level categorical outcome variable, and depression, GAD and social anxiety as predictor variables (Table 8). Profile 3 (low motivation) was used as a reference category for all analyses.

Univariate analyses found that higher depression symptom scores predicted membership to profile 1 (high-motivation-dating: $RRR = 1.81$, 95% $CI [1.04, 1.34]$, $p = .01$) and profile 2 (high-motivation-social: $RRR = 1.15$, 95% $CI [1.04, 1.28]$, $p < .001$) relative to profile 3 (low motivation). Higher generalised anxiety symptom scores also predicted membership to profile 2 (high-motivation-social: $RRR = 1.18$, 95% $CI [1.04, 1.34]$, $p = .01$) relative to profile 3 (low motivation). Finally, higher social anxiety symptom scores predicted membership to profiles 1, 2 and 4 relative to profile 3: high-motivation-dating ($RRR = 1.18$, 95% $CI [1.05, 1.33]$, $p < .01$), high-motivation-social ($RRR = 1.21$, 95% $CI [1.09, 1.33]$, $p < .001$), intermediate motivation ($RRR = 1.11$, 95% $CI [1.02, 1.21]$, $p = .01$).

Given previously established correlations *between* mental health variables (see Table 3), a forward stepwise multivariate analysis was then run to determine which mental health variables showed the most robust / significant association with profile membership. This multivariate model ($\chi^2(9) = 32.44$, $p < .001$) retained social anxiety only. Higher social anxiety symptom scores predicted membership to both profile 1 (high-motivation-dating: $RRR = 1.19$, 95% $CI [1.05, 1.35]$, $p < .01$) and profile 2 (high-motivation-social: $RRR = 1.17$, 95% $CI [1.06, 1.29]$, $p < .01$) relative to profile 3 (low motivation). These effects survived the inclusion of age and gender as covariates. Therefore, participants with higher social anxiety

symptom scores were more likely to belong to the high social media use motivation profiles (profiles 1 and 2).

Table 8

Univariate and multivariate multinomial logistic regression analyses of profile membership on mental health and demographic variables. Values in bold indicate significant predictors.

Predictor	High motivation (Dating) vs Low motivation		High motivation (Social) vs Low motivation		Intermediate motivation vs Low motivation	
	RRR [95% CI]	<i>p</i> value	RRR [95% CI]	<i>p</i> value	RRR [95% CI]	<i>p</i> value
<i>Univariate analysis</i>						
Depression	1.81 [1.04, 1.34]	.010	1.15 [1.04, 1.28]	.009	1.07 [0.97, 1.17]	.186
Generalised anxiety	1.16 [0.99, 1.37]	.063	1.18 [1.04, 1.34]	.011	1.04 [0.93, 1.16]	.542
Social anxiety	1.18 [1.05, 1.33]	.006	1.21 [1.09, 1.33]	< .001	1.11 [1.02, 1.21]	.013
Age	1.48 [1.00, 2.18]	.048	1.30 [0.97, 1.75]	.079	1.22 [0.95, 1.58]	.122
Gender	0.96 [0.26, 3.54]	.954	5.26 [1.84, 15.0]	.002	3.01 [1.29, 7.04]	.011
<i>Multivariate analysis</i>						
Social anxiety	1.19 [1.05, 1.35]	.006	1.17 [1.06, 1.29]	.002	1.08 [0.99, 1.18]	.069
Age	1.51 [0.98, 2.31]	.059	1.09 [0.79, 1.51]	.600	1.10 [0.84, 1.43]	.497
Gender	0.35 [0.07, 1.62]	.179	3.05 [0.98, 9.51]	.054	2.20 [0.89, 5.44]	.086

4. Discussion

4.1. Summary and discussion of findings

This study sought to explore associations between adolescents' motivations for social media use and symptoms of depression, generalised anxiety and social anxiety. With respect to the two main hypotheses, both were supported. Thus, the findings from the regression analyses indicated that social media use motives related to both entertainment and social connection / social influence were positively associated with symptoms of depression, generalised anxiety and social anxiety. In addition, the LPA showed that higher self-reported social anxiety symptoms predicted membership to profiles 1 and 2 (high-motivation-dating and high-motivation-social) relative to profile 3 (low motivation), which were characterised by higher motivation to use social media for entertainment, social influence and social connection purposes compared to the low motivation profile.

Multivariate regression analyses found that the only predictor to predict variance in all three mental health variables (depression, generalised anxiety and social anxiety) was the social media for entertainment motivation. This finding is in line with a recent longitudinal study which found that motivation to use SNS to reduce boredom was positively associated with anxiety and problematic use at three years follow-up (Stockdale & Coyne, 2020). This finding suggests that motivation to use social media for entertainment may be a *trans*-diagnostic feature of general mental health difficulties in adolescents, and potentially may both precipitate and perpetuate difficulties. It has been suggested that problematic social media use occurs when social media is evaluated as an important mechanism to reduce negative emotional states such as stress, loneliness or depression (Xu & Tan, 2012). Furthermore, increased social media use to relieve dysphoric mood states may lead to avoidance of engagement in activities offline (e.g. relationships with friends and family, schoolwork or physical exercise), which in turn may further exacerbate symptoms of anxiety or depression (Griffiths, 2013). It is therefore possible that young people might become caught in a ‘vicious cycle’ whereby they become dependent on social media to manage adverse mood states (e.g. boredom), and that as this pattern perpetuates they spend more time using social media and find activities offline less rewarding (Griffiths, 2013). However, the study’s cross-sectional design precludes conclusions about the direction of causality, such that it is not clear whether motivation to use social media for entertainment leads to symptoms of anxiety and depression or whether negative emotional states (i.e. anxiety and depression) lead to higher motivation to use social media for entertainment.

In addition to this general effect, some more specific effects were seen, with several individual motivations showing unique patterns of association (in multivariate analyses) with outcome variables. Thus, higher use of social media for social connectedness was uniquely associated with symptoms of depression, higher use of social media for information was

uniquely associated with symptoms of generalised anxiety, and higher use of social media for following and monitoring others was uniquely associated with symptoms of social anxiety. This suggests that it may be possible to identify a set of *typical profiles* with respect to adolescents' social media use motivations and their association with specific mental health symptoms.

The pattern of findings reported is broadly consistent with previous research on young people's social media use and mental health. For example, with respect to the association between social connectedness motivation and depression, participants who are more isolated and potentially therefore depressed might turn to social media to connect with others as a means to reduce loneliness (i.e. the '*poor get richer*' theory) (Song et al., 2014). This may be particularly relevant in the context of the COVID-19 pandemic, since social distancing and school closures have led to increased feelings of loneliness amongst adolescents (Loades et al., 2020), and there are clear associations in the literature between loneliness and mental health (Wang et al., 2017). More generally, 'social capital', a broad construct which encompasses the quantity and quality of family and peer relationships as well as the impact of neighbourhoods and communities, has repeatedly been identified as an important factor in adolescents' mental health (McPherson et al., 2014).

The positive relationship between information motivation and symptoms of generalised anxiety makes sense given the definition of GAD includes excessive worry about events that a young person cannot control (Gale & Millichamp, 2016) and the use of social media to seek information might therefore be a means to establish feelings of reassurance or control (Rector et al., 2019). However, this association was lost following the inclusion of COVID-19 information as a covariate, suggesting that most of the variance in symptoms of generalised anxiety explained by information motivation could be attributed to motivation to use social media to access information related to the pandemic. This lends support to a recent

study of adolescents which found that increased social media use during the pandemic was associated with COVID-19-related anxiety (Fernandes et al., 2020). Since causality could not be established, it is also possible that generalised anxiety is a consequence of exposure to COVID-19 information (including *misinformation*) (e.g. Depoux et al., 2020).

Finally, in relation to the association between the following and monitoring others motive and social anxiety, it is plausible that young people with poorer social skills and interpersonal relationships offline experience higher levels of social anxiety and in turn are more likely to use social media to access information about or keep up to date with the lives of their peers as means to compensate for less engagement in these relational processes in their everyday lives, also consistent with the poor get richer theory (Song et al., 2014). Alternatively, following and monitoring others may be a process which involves or is akin to making upward or downward social comparisons, which may render a young person vulnerable to social anxiety via increased concern about the evaluations of others (Antony et al., 2005). Indeed, in support of this hypothesis, a recent study in Singapore found that social comparisons mediated the relationship between Instagram use and social anxiety (Jiang & Ngien, 2020).

With respect to the LPA a four-profile solution showed the best fit to the data. Aside from social media use motivations, these profiles differed significantly with respect to gender and mental health symptomatology. With respect to social media motivations, the profiles were characterised as high-motivation-dating, high-motivation-social, low motivation and intermediate motivation. The high-motivation-dating and high-motivation-social profiles demonstrated the highest levels of motivation generally, and particularly with regards to interpersonal motives including new friendships and social connectedness. However, an important distinction between these two profiles was that only one was characterised by relatively high motivation to use social media for dating. Therefore, the use of social media to

develop romantic relationships may be an important motive for a small subset of, but not all adolescents. Furthermore, the high-motivation-dating group was characterised by a relatively high ratio of males to females, suggesting that this motive might be more salient for adolescent boys than girls, in line with previous findings (Raacke & Bonds-Raacke, 2008).

The low motivation profile showed the lowest levels of social media use motivation across all nine motives compared to the other three profiles, but particularly for the interpersonal motives including new friendships, social connectedness and following and monitoring others. The intermediate motivation profile was the largest group and showed moderate levels of social media use motivation on most motives but particularly in relation to the interpersonal motives. Levels of motivation for entertainment and information were more similar across the four profiles, with the intermediate motivation profile (the largest group) showing the second highest levels of motivation for entertainment and information following the high-motivation-social group. This pattern of findings might suggest that the use of social media for entertainment and information-seeking represents relatively 'typical' social media use among adolescents given higher levels of use for these motives across the four profiles.

In the final stage of the analysis, this study investigated how different patterns of social media use as reflected by the four different groups were related to mental health variables by exploring how symptoms of depression, generalised anxiety and social anxiety predicted profile membership. Only social anxiety symptom scores emerged as predictive; thus individuals with higher self-reported social anxiety symptoms were more likely to belong to either of the high-motivation profiles (high-motivation-dating and high-motivation-social) compared to the low motivation profile, and this was independent of participants' age and gender. Interestingly, whilst profiles 1 and 2 were higher than profile 3 across *all* motives, this effect was most notably pronounced for the social motivations (i.e. new friendships, social connectedness, following and monitoring others and social recognition)

rather than for example academic purposes and self-expression. This raises the possibility that adolescents who are generally highly motivated to engage with social media (i.e. those who strongly endorse a wide range of social media use motivations) may be particularly vulnerable to social anxiety. Conversely, young people with higher levels of social anxiety may be more likely to turn to social media to fulfil a variety of interpersonal needs and gratifications. Individuals with higher social anxiety may be both more likely to use social media for entertainment (e.g. due to spending more time at home and less time with peers offline, as a coping strategy or to escape from adverse emotional states such as fear of negative evaluation), *and* to use social media as a compensatory mechanism to fulfil interpersonal needs, which is consistent with a previous study of undergraduate students which found that participants who experienced more anxiety in offline relationships used social media more to pass the time and for social connectedness (Sheldon, 2008).

Alternatively, social anxiety could be a consequence of managing a large network of friends on social media, comparing oneself to others and feeling jealous of others' lives, or "fear of missing out" on activities in online interactions (Jiang & Ngien, 2020).

4.2. Strengths and Limitations

The motivations questionnaire used in this study was developed for use in adolescents and covered a wide range of social media use motives likely to be important in this population (Pertegal et al., 2019). Furthermore, previous research in the field of social media use motivations has largely focused on undergraduate student samples and on Facebook use. Important strengths of the study therefore include a focus on motivations for social media use in adolescence (i.e. under the age of 18), which represents a unique period of identity and social development, and furthermore a broad perspective on social media which did not focus on one platform such as Facebook but rather allowed participants to consider their motivations for any number of social media platforms which they used personally. In fact,

anecdotal evidence suggests that Facebook is not used by adolescents anymore (e.g. Hollenbaugh & Ferris, 2014), and the findings of this study support that claim since only one participant reported using Facebook and rather the top four platforms used by participants were Instagram, YouTube, Snapchat and TikTok. Therefore, when considering young people's social media use, it may be time to move away from Facebook.

A major limitation of this study is that the findings may not be representative of adolescents' social media motivations more generally since most of the sample was recruited from a high-achieving, independent school in an affluent area of the UK. For example, in relation to information-seeking, it might be the case that students who attended this school were more highly motivated to keep up to date with news and current affairs compared with students attending state-funded schools or those from lower socioeconomic backgrounds, as consistent with findings from a longitudinal study that socioeconomic variables including parents' educational level, parents' occupation and family income positively predicted adolescents' educational attainment and academic engagement (Melby et al., 2008). In addition, the data were collected during a unique moment in the context of a global pandemic. The relatively high levels of social media use motivation for entertainment and information-seeking across the sample may therefore have reflected the context of the pandemic, and although this study sought to obtain a snapshot of young people's social media use during this time, these findings may not be characteristic of their social media use more generally. Alternatively, it is also possible that this pattern of findings reflects some degree of social desirability bias, with participants tending to report higher motivation for motives they perceived to be more socially acceptable to adults (e.g. information-seeking).

Relatedly, the pandemic also posed challenges with regards to participant recruitment and resulted in a smaller sample than originally intended. Owing to the sample size, it is possible that the study was underpowered to detect certain effects, such as potential

associations between motivation to use social media for dating and mental health variables since only a small number of participants reported using social media for dating. Nonetheless, as noted the sample size was adequate based on the chosen methodology and guidelines for LPA (Nylund et al., 2007; Tein et al., 2013; Wurpts & Geiser, 2014).

Another issue with the study (noted above), is that it is not possible to infer causality or direction of causality from the associations identified, since the study was cross-sectional in design. Furthermore, although gender and age were included in the analyses as covariates, the study did not measure and control for other relevant variables which may have moderated the associations between social media use motivations and mental health, e.g. socioeconomic variables such as household income, social support, family conflict and parental mental health (Twigg et al., 2020). The study also relied on the use of self-report questionnaires which are subject to social desirability and recall biases (Orben et al., 2019).

Finally, this study adopted a relatively narrow perspective on motivations for social media use grounded in the U&G theory. Whilst the social media use motivations literature has focused almost exclusively on the U&G theory and on the measurement of explicit motivation, likely to reflect difficulty in measuring implicit motivation via self-report questionnaire, criticisms of U&G include the fairly limited role of affect and the assertion that users may not always be aware of the motivations for their behaviour or be able to identify and freely articulate these via self-report (Bischof-Kastner et al., 2014; Sundar & Limperos, 2013).

4.3. Clinical implications and future directions

Notwithstanding its limitations, the findings from this study have several important clinical implications for applied social media research and young people's mental health. First, since entertainment was identified as a possible *trans*-diagnostic process / general feature of

depression, generalised anxiety and social anxiety, young people who rely on social media to pass the time or to lift their mood might be doing so at the expense of engagement in healthier coping strategies offline such as spending time with friends and family or participation in physical activity (Twigg et al., 2020). Whilst the UK is now moving out of lockdown restrictions, it will be important for those supporting young people to hold this in mind as many countries continue to remain in lockdown and uncertainty surrounding the future of the pandemic (i.e. new variants) continues to arise.

Furthermore, the results suggest that interpersonal motives for social media use such as following and monitoring others, in combination with motivation to use social media for entertainment, might render young people vulnerable to social anxiety via processes such as social comparisons (Jiang & Ngien, 2020). Alternatively, young people who have higher levels of social anxiety might be drawn to use social media both for entertainment purposes and to fulfil a variety of interpersonal needs and gratifications (Sheldon, 2008). However, since causality or directionality cannot be inferred from this study given the cross-sectional design, it is imperative that future studies adopt experimental or longitudinal designs which enable temporal patterns to be observed (Orben et al., 2019). Indeed, a subsequent doctoral research project is currently underway to investigate the development of this sample's social media use over time, involving data collection at six months follow-up using the same questionnaire.

Based on the findings from longitudinal data, if different motivations / patterns of social media use do drive mental health difficulties, this can inform interventions designed to modify young people's relationship with social media. Parents and carers, schools or mental health practitioners could play a role in social media psychoeducation for young people, which might involve highlighting potential risks and supporting and encouraging youth to spend more time offline and engaged in alternative activities to alleviate boredom or which

they enjoy (Stockdale & Coyne, 2020). However, if the reverse is true and adolescents with particular motivations for social media use are characteristic of specific mental health profiles, this could inform identification of young people who might be at risk based on their patterns of social media use (Lo Coco et al., 2018). Some research has begun to explore the feasibility of algorithmic identification of mental health characteristics based on individuals' social media use obtained from publicly available information (e.g. De Choudhury et al., 2013; Reece & Danforth, 2017). For example, De Choudhury and colleagues (2013) have showed that it may be possible to detect and diagnose depression in adult social media users based on behavioural data such as the number of social connections an individual has and number and timing of 'posts' on social media. Notwithstanding data protection concerns arising from the use of such methods (Felzmann & Kennedy, 2016), findings may have implications for the potential use of algorithms that automatically flag young people who might be at risk for mental health difficulties based on their patterns of use and direct them to useful resources or services.

Aside from potential practical implications, the findings are also important in terms of basic foundational science and our understanding of social media use in adolescents, a national priority given the ubiquity of social media use in this population (House of Commons Science and Technology Committee, 2019). As noted above, this research represents a step away from reductionist approaches to understanding the relationship between young people's social media use and mental health which typically focus on unidimensional or more objective usage indicators (e.g. time spent or frequency of use), and rather adopts a more contextual approach by exploring the role of inter-individual differences in mental health in young people.

Whilst a pivotal direction for future research is the use of experimental or longitudinal designs, other suggestions for future research include exploration of the associations between

social media use motives and loneliness / social isolation (e.g. Cauberghe et al., 2021), and externalising problems (e.g. aggression; Young et al., 2017), or to explore which motives are associated with positive outcome variables such as self-esteem, subjective well-being or life satisfaction which are theoretically related yet conceptually and qualitatively distinct to mental health variables including depression and anxiety. Indeed, it has been noted that some young people who have symptoms of common mental health disorders do not report low self-esteem or life satisfaction, and furthermore such variables may reflect more stable and enduring traits compared to comparatively fleeting assessments of mood (Twigg et al., 2020). Although not supported in this study, it is important not to discount potentially positive consequences of social media use, particularly since directionality could not be established.

Finally, future research exploring adolescents' motivations for social media use could focus on alternative motivational theoretical frameworks (other than U&G), such as the technology acceptance model (TAM; Davis, 1989), self-determination theory (SDT; Deci & Ryan, 1985), or motivational model of addictive behaviour (Cox & Klinger, 1988), which have been used to explore motivations for social media use among adults and university students (Kocak et al., 2018; Marino et al., 2016; Wen et al., 2016) but not adolescent samples. Alternatively, the use of tools developed to tap into implicit motivational systems (e.g. Hou et al., 2020) also offer a fruitful direction for future research on adolescents' motivations for social media use.

4.4. Conclusions

Although previous research highlights both positive and negative consequences of social media use among adolescents in relation to their psychological wellbeing and mental health, the findings from this study draw attention to potential risks of social media use in this group for symptoms of depression, generalised anxiety and social anxiety. In particular, the use of

social media for entertainment, which might include to pass the time, relax or have fun, could render a young person vulnerable to increased risk of developing a mental health condition, and may be an important *trans*-diagnostic process or general feature of common mental health disorders presenting in adolescents. Furthermore, interpersonal motives for social media use such as following and monitoring others, in combination with motivation to use social media for entertainment, might render young people vulnerable to social anxiety, or alternatively young people who have higher levels of social anxiety might be drawn to use social media both for entertainment purposes and to fulfil a variety of interpersonal needs and gratifications. Implications for clinical practice include potential interventions to raise awareness of these risks via psychoeducation and promote engagement in alternative leisure activities offline in order to modify a young person's relationship with social media, or identification of young people who might be vulnerable to mental health difficulties based on their patterns of social media use. It is important not to lose sight of potential beneficial outcomes of social media use for young people, and it is vital that future research in the field of adolescents' social media use motivations prioritises the use of longitudinal designs which will enable a more nuanced understanding of the relationship between social media use motives and mental health outcomes in this group including directions of causality.

5. References

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Part Three: Critical Appraisal

1. Introduction

This critical appraisal discusses some of my reflections on completing the thesis. This includes the role of my background in the process of selecting a topic, the process of formulating a research question for the empirical study and systematic review, reflections on the impact of COVID-19 and my thoughts on the processes of ethical approval, data collection and analysis. It concludes with some closing reflections.

2. Background and selection of a project

My clinical experience prior to starting the doctorate had focused almost exclusively on working with children and young people. This included teaching English for three years in Japan in junior and senior high schools, working as a Healthcare Assistant at The Priory Hospital Roehampton on an acute mental health ward for adolescents, and training and working in CAMHS as a Children's Wellbeing Practitioner. I have therefore been passionate about supporting the emotional, developmental and mental health needs of children and young people for several years, and when I began training continued to find myself particularly drawn towards working with this population. Further developing this interest by pursuing a research project in the field of child and adolescent mental health was therefore a no-brainer. Nonetheless, the process of choosing a project was not a straightforward one.

Prior to commencing training, I had also completed a master's at UCL in Health Psychology and considered a future career in paediatric psychology as a means of combining my interests in health and children and young people. An initial project which grabbed my attention was based at Great Ormond Street Hospital (where I went on to complete my child placement during the course) and would have involved completing semi-structured interviews with children and young people, their parents or healthcare professionals about their views on and experiences of ceremonial bell ringing to mark the end of cancer treatment. Having

completed quantitative research projects during both my undergraduate and master's degrees, I was also keen to try qualitative research in order to develop my existing research skills. Clinical psychologists are encouraged to develop competency in both quantitative and qualitative research methods, and qualitative approaches often appeal to clinical psychology students as they can allow closer contact with clinical phenomena (Barker et al., 2016). However, I came to experience some doubts about this project as I wondered whether it was too niche of an area for me, not to mention the relatively competitive selection process underlying many of the DCLinPsy projects!

My master's dissertation research project (which I am thrilled was accepted for publication during clinical training) focused on demographic and psychological predictors of alcohol use and misuse in autistic adults. Briefly stepping away from the idea of completing my thesis in the field of children and young people's mental health, I also considered a project in psychopharmacology on the use of mindfulness training in reducing cannabis dependency given my existing research interest in substance misuse. In addition, as a result of longstanding clinical interest in complex mental health, as stemming from my experiences at The Priory, completing an internship at an adult personality disorder service alongside my master's, and my first-year placement in a crisis assessment and treatment team, I came close to choosing a project evaluating the effectiveness of trauma-focussed interventions for complex PTSD.

However, it was the project on children and adolescents' social media use which ultimately captured my attention and stole my heart. In my role as a Children's Wellbeing Practitioner in CAMHS prior to training, I was fortunate to have the opportunity to organise and co-facilitate a monthly service-user involvement forum alongside a clinical psychologist (to whom I will remain eternally grateful for writing my clinical reference to support my successful application for training). A theme which emerged time and time again during our

discussions with the small group of young people involved was social media. This included not only the risks of social media use in terms of young people's mental health (e.g. cyberbullying, "catfishing" and exposure to "triggering" content), but also the benefits of social media use, such as being a means to share information and access social support. These are consistent with discussions in the literature on the risks and benefits of social media use in adolescence (Uhls et al., 2017). We also discussed the potential utility of social media as a platform through which youth might be able to access specific support in relation to their mental health. This is also consistent with discussions in the literature, since it has been reported that individuals with mental health difficulties use social media use at rates comparable to the general population, and furthermore that such individuals may turn to social media to share personal experiences, give and receive support from others who might be experiencing similar challenges, and seek information about their mental health and treatment options (Naslund, 2020).

I was also struck and fascinated by the rapid growth of social media use among society, especially young people, during the 21st century (Trifiro & Gerson, 2019). In particular, I was interested in how mental health, life satisfaction and psychological wellbeing might differ between "digital immigrants" (i.e. adults who have lived to experience the introduction of the Internet including social media) and "digital natives" (younger people who have grown up in a society in which ICT is an integral part of daily life) (Prensky, 2001), and specifically whether social media use might be a causal mechanism for any such differences (e.g. Twigg et al., 2020). Throughout completing this thesis, I have often reflected on the start of my own social media use as a teenager, including the creation of a Myspace account at 16 years of age, and subsequently the conception of a Facebook account at 18 years old which remains active today! At the time, these public profiles and virtual communities were incredibly important to my sense of identity and social relationships,

including both with peers and those with whom I wanted to become more than friends. Indeed, social media use among adolescents may be a crucial means for young people to explore themselves in relation to others, supporting the natural psychological and social development which occurs during this unique stage in a person's life (Spies Shapiro & Margolin, 2014).

One of the remarks made by the young people who participated in the service-user involvement forum which largely inspired me to undertake my thesis in the field of social media use in adolescence was that adolescents these days rarely use Facebook, as was echoed by statements such as "My parents use Facebook". This is supported in the literature by reference to anecdotal evidence which suggests that "it is, in fact cooler to *not* be on Facebook" (Hollenbaugh & Ferris, 2014, p.56). However, much of the existing research in the field of social media has focused on Facebook use (Tibber et al., 2020). I was therefore keen to contribute to the development of the literature by moving away from Facebook when considering young people's social media use, and this matched my supervisor's hopes.

Finally, while I had heard anecdotally that social media was to blame for the increase in referrals to CAMHS in recent years (British Association for Counselling and Psychotherapy, 2018), I felt that this claim lacked evidence and was poorly understood in terms of potential mechanisms likely to be involved in the relationship between young people's social media use and mental health (Keles et al., 2019). I also felt that scholars and clinicians had disproportionately focused on the risks or detrimental effects of social media use on young people's mental health (Orben et al., 2020), tending to neglect potential positive implications arising from use. I hoped that through completing my thesis in the field, I might be able to shed further light on our understanding of the association between social media use and mental health in adolescence, including developing understanding of possible benefits of use.

I felt extremely fortunate to have selected a project with a supervisor who was so enthusiastic about the field of social media research, who similarly had been inspired by his own clinical experience with young people. I was also very thankful for the opportunity to complete a joint research project with another trainee. As a clinician who values working systemically, with a firm belief that “two heads are better than one”, the opportunity to approach research with my systemic hat on really appealed to me.

3. Formulating a research question

The social media research base is broad, and my research could have taken any number of fruitful directions. I recall feeling somewhat lost and overwhelmed when engaging with the literature in the first weeks. Indeed, “the process of planning research is painstaking and often anxiety-provoking, but effort put in here usually pays off later” (Barker et al., 2016). My supervisor was primarily interested in exploring and testing a model of the impact of social media on young people’s mental health and self-esteem, focusing on connecting and disconnecting patterns of use including social capital, social connectedness and upward and downward social comparisons, as first proposed by the interpersonal-connections-behaviours-framework (ICBF; Clark et al., 2018). We also planned to expand the original model with the inclusion of values (intrinsic versus extrinsic) based on self-determination theory (SDT; Deci & Ryan, 1985) and demographic moderating variables (age, gender, socioeconomic status [SES], perceived self-status). However, despite being relatively broad in scope, it was difficult to think about how to divide aspects of the model between the two trainees in order to ensure that we both developed meaningful yet distinct research questions.

A provisional plan for my project was to explore the association between socioeconomic variables, social media use and mental health including indices of inequality / deprivation. It has been reported that parents’ SES influences children’s and adolescents’

digital screen use patterns (Männikkö et al., 2020), and this would have been interesting to examine in the context of our sample since the two participating schools were located in relatively affluent (school A) and deprived (school B) boroughs of London respectively. Having largely grown up in a single-parent household myself, this was also a topic which appealed to me on a more personal level. However, following discussions with the external supervisor, this question proved to be problematic for two main reasons. Firstly, there were ethical and logistical concerns about collecting and using sensitive data (e.g. postcode, parental occupation, parental income). Secondly, since we only had access to Year 12 students at school B, it became apparent early on that the two samples would be unequal in terms of size and age distribution, thereby making potential comparisons between the two schools difficult.

The second and final idea for my project as initially suggested by my supervisor was to use the statistical technique latent profile analysis (LPA) to explore *patterns* of young people's social media use based on a number of relevant variables including demographics, indices of social media use (e.g. time spent, frequency of use), values and mental health. Most previous research into the association between social media use and mental health had focused on correlational and univariate studies (Huang, 2010; Lo Coco et al., 2018), and LPA offered a promising alternative approach to exploring inter-individual differences in social media use and how these might relate to mental health. Having no prior familiarity with this technique (I had never heard of it before!), it was difficult to envisage the project initially despite relatively extensive reading into LPA (e.g. Nylund et al., 2007; Tein et al., 2013; Wurpts & Geiser, 2014) – which was not the most engaging or accessible literature to say the least! However, I was keen to develop my existing quantitative research skills by learning a new method of analysis, and hoped that previous experience using multinomial logistic

regression as part of my master's dissertation might stand me in good stead since these techniques often complement one another (e.g. Tibber et al., 2020; Várnai et al., 2020).

As my reading unfolded, motivations continued to emerge as a variable of interest in the association between social media use and mental health, which tap into psychological components of use beyond simpler, more objective aspects of use such as time spent or frequency of use. I became interested in the numerous different reasons why individuals might use social media and how these might differentially relate to mental health or psychological wellbeing. It also became apparent that motivations for social media use had been relatively understudied in adolescents, and thus seemed like a good niche to explore with my project. In collaboration with my supervisor, the decision was made to focus on patterns of use based on adolescents' motivations for social media use using LPA.

When scanning the literature to find a motivations questionnaire which might be suitable for use in the study, I realised that several scales had been adapted from previous measures designed to assess motivations for Internet use (e.g. Marino et al., 2016; Papacharissi & Mendelson, 2011). Furthermore, I noticed that researchers tended to employ self-created scales which had been developed for the purpose of the study, which contrasted from other variables among the social media research base, such as the widely used Facebook Intensity Scale (Ellison et al., 2007). This made it difficult to choose a questionnaire to use in my study, as I felt concerned about potential implications for validity and reliability since many of these scales had not been subjected to thorough psychometric investigation. In addition, few scales had been developed for use in adolescents, although I eventually came across the Scale of Motives for Using Social Networking Sites (SMU-SNS; Pertegal et al., 2019) which was used in my study. As a result of my observations and concerns in this process, I decided to focus my systematic review on scales used to measure motivations for SNS use and their psychometric properties.

4. Impact of COVID-19

Nothing could have prepared me for the arrival of COVID-19, and as I write this critical appraisal, I simultaneously feel excitement and relief at the prospect of completing my thesis and (with any luck) enjoying the summer as social restrictions continue to relax, and an element of grief, mourning the loss of half of my training completed under ‘normal’ circumstances. Society had to adapt quickly and unexpectedly to the consequences posed by the pandemic, and this included academic and clinical research (e.g. Radecki & Schonfeld, 2020; Weiner et al., 2020).

The main impact of COVID-19 on our project was that we were no longer able to collect data from young people in person (at the schools) as was originally intended. Consequently, we had to develop the online questionnaire, which involved considerable time spent applying for access to UCL Data Safe Haven and learning how to use the REDCap survey tool. Furthermore, we had to make significant modifications to our ethics application (although this had not been finally accepted yet). I felt very grateful to be working as part of a team at this stage, as we were required to make multiple adaptations to the project in a relatively short period of time to ensure that we stuck to our timeline. However, due to the modifications necessitated by the pandemic, we were not able to collect data in the summer of 2020 before the school holiday as planned initially, and instead had to wait until the start of the new academic year in September.

On reflection, I feel sad that we were not able to meet the young people who participated in the study in person in schools. I had been unable to join my colleague in co-facilitating a consultation session with a small group of participants regarding the questionnaires which was completed prior to the onset of the pandemic, so had been particularly looking forward to the opportunity to meet the young people in schools as part of

the data collection process. Service users can provide valuable contributions when they are involved in research (Borkman, 1990). The original intention had been to both obtain informed consent / assent from participants and to distribute the questionnaires to the young people during a Personal, Social, Citizenship and Health Education (PSCHE) lesson, where the research team would have been available to support participants completing the questionnaires. A major implication for the study posed by the pandemic was that the size of the final sample ($N = 162$) was significantly smaller than hoped for (300). While the sample size was nonetheless adequate for LPA (Nylund et al., 2007; Tein et al., 2013; Wurpts & Geiser, 2014), it is possible that the study was underpowered to detect certain effects (i.e. in regression analyses). It was felt that it would have been easier to recruit participants face-to-face in the school setting, and it is possible that young people were less motivated to take part in the study owing to the context of the pandemic and the absence of face-to-face interaction with school staff and the research team. Furthermore, we had also planned to deliver an educational session on social media guidelines and wellbeing within schools following data collection as a way of giving back to the schools, but unfortunately this was also unable to go ahead as planned.

5. Ethical approval

The process of obtaining ethical approval was somewhat arduous. We initially submitted the application in January 2020 but were required to modify this six times before it was finally accepted in June 2020. This included three modifications prior to the onset of the pandemic and three subsequent modifications following this, which delayed data collection considerably. I was not expecting the whole process to take six months and will ensure that I allow ample time for this in the future. I had never completed research involving children and young people before and believe that this was the main reason for the lengthy application process since our study was “high risk”. Some of the issues which required more careful

consideration and/or modification included an initial plan to enter participants into a prize drawer, justification for wishing to access participants' academic grades (data not included in this study), and data protection considerations such as deidentification.

We had originally intended to give participants the option of being entered into a prize drawer for a chance to win one of 20 £10 book vouchers. This was to encourage participation as well as being a means to thank participants for their contribution to the study.

Unfortunately, we would have been unable to offer all students a voucher given our limited project budget and planned sample size (300). However, the ethics panel were concerned that some parents or young people might have sensitivities towards a raffle (i.e. "akin to gambling") and wondered how we would deal with this. Current ethical frameworks view the provision of gifts or other financial incentives to research participants as potentially problematic since they may undermine participant autonomy or lead to exploitation of vulnerable populations (London et al., 2012). We therefore decided to remove the prize drawer from the study. While we were not able to recruit as many participants as desired, I believe that this was due to the impact of the pandemic rather than the absence of a prize drawer, and the sample size is nevertheless notable considering the context of COVID-19 and despite the setbacks this posed. In the future, I will think carefully about financial incentive for research participants, particularly if working with young people, since this study suggests that it is not required to encourage participation and participants seemed motivated to take part for other reasons (e.g. interest in the topic).

It has been suggested that social media use impacts upon young people's learning and academic achievement, although research is lacking compared to studies of social media use and mental health or psychological wellbeing (Ahn, 2011). For this reason, we asked participants to consent to their school sharing their academic grades with the research team. Academic data were subsequently shared by the schools for all students who had consented to

this ($n = 145$, 89.5%) for the period between December 2020 and January 2021 (i.e. 2-3 months following data collection). I considered analysing and including this data in my study since one of the social media use motivations covered by the questionnaire was academic purposes. It would have been interesting to explore whether motivation to use social media for academic purposes was associated with academic performance. As academic data were provided for a variety of different school subjects which differed for each participant and varied across each year group, my supervisor and I had difficulty deciding on the best way to analyse the data (i.e. modal grade versus only core subjects [English, Maths and Science]). Since the academic data shared by the schools were categorical (i.e. ‘outstanding’, ‘good’ etc), these would have required recoding before being used in regression analysis (Institute for Digital Research and Education, 2021). However, since the two schools used different grading systems with different categories, this process would not have been straightforward. I considered analysing only a subset of the academic data from the larger sample (school A; $n = 120$, 74.1%) but eventually decided against the inclusion of academic data at all, wondering whether this might detract somewhat from the focus of the study. I may however reconsider this for the purposes of publication.

6. Data collection

Data collection was a relatively straightforward process. Although initially disappointed by the impact of COVID-19 and transition to an online questionnaire, in hindsight I think that this made the process of data collection much simpler. Since we had originally planned to collect data from participants in schools via pen-and-paper questionnaires, the online questionnaire meant that we were not required to manually enter data into SPSS and rather could automatically export the data from REDCap into statistical software relatively easily via Data Safe Haven. This saved us considerable time which to some extent we had lost earlier in the context of the pandemic.

Initially we considered including both self-esteem and mental health (generalised anxiety and depression) as outcome measures. Due to concern about the length of the questionnaire for young participants we decided against the inclusion of self-esteem prior to ethics application. It was noted that prior research into young people's social media use had tended to focus on self-esteem or psychological wellbeing (e.g. Ahn, 2011) rather than mental health, and it was felt that the inclusion of mental health would address a larger gap in the research, as well as having more relevance for clinical psychology. Furthermore, self-esteem has rather been identified as a potential mediator in the pathway between social media use and mental health (Tibber et al., 2020). Symptoms of anxiety and depression were measured using the Revised Child Anxiety and Depression Scale (RCADS; Chorpita et al., 2000), a measure that was highly familiar to me from my prior experience in CAMHS. Following ethical approval, we decided to include an additional RCADS subscale (social anxiety), given its relevance to social media use (e.g. Jiang & Ngien, 2020; Sarmiento et al., 2018). This required us to apply for an ethics amendment, but I feel very glad that we did since social anxiety emerged as a key variable in my study.

As part of the data collection process, my project partner (Ghiselle) and I were required to screen all mental health data in order to identify participants who were at risk on the basis of their RCADS scores ($n = 14$, 8.64%) and those participants who had requested to be contacted by their school's wellbeing staff ($n = 7$, 4.93%). This process was completed over a period of one month alongside data collection, during which Ghiselle and I took turns to screen responses daily for one week at a time. This was a fairly time-consuming activity which required us to devote time each evening to the project whilst balancing placement and other course-related work (case reports), which I had not envisaged at the start of the project. It was nevertheless an essential one, since we had a duty to safeguard the young people involved in the research in collaboration with the schools. When working with vulnerable

participants including children, researchers may find themselves in a position of increased responsibility or expectation (Economic and Social Research Council, n.d.). To some extent, I was surprised that the proportion of young people reaching clinical threshold for a mental health disorder appeared relatively low given national averages (e.g. National Health Service, 2018), particularly considering the context of the pandemic since mental health rates in children increased during the COVID-19 lockdown (Newlove-Delgado et al., 2021). It is possible that participants might have under-reported symptoms of anxiety and depression due to social desirability or concern that they might subsequently be approached by the research team or their schools, or alternatively that rates of anxiety and depression in our sample were not representative of rates in young people more generally. Furthermore, another study of approximately 1000 secondary school students in south west England, which reported increased social media use in young people during the COVID-19 lockdown, found little change in anxiety and depression levels during this time (Widnall et al., 2020), while one study found that 27.2% of 11-16 year olds with mental health difficulties reported that their lives had improved as a result of lockdown (Vizard et al., 2020).

7. Analysis

The analysis was one of the most challenging aspects of the project. Not only did I have to familiarise myself with and learn a new statistical method (LPA), but also had to get to grips with two statistical packages which I had not used before – R and Stata. Both of these packages rely on coding, which aside from being taught some very basic HTML from my father at the age of 10, was completely new to me. I relied on the support from my supervisor most heavily during this time and encountered much frustration in the process when met with error messages. However, retrospectively I am thankful that I have had the opportunity to learn how to use these packages and further develop my quantitative and analytical research skills.

8. Closing reflections

Although my first Band 7 role post-qualification will be working with adults within clinical health psychology, I am glad that I chose to complete my thesis on young people's social media use given all my previous clinical experience working with children and adolescents. I believe that the topic and evidence base will continue to grow considering its relevance for CAMHS and public policy (House of Commons Science and Technology Committee, 2019), and I hope to disseminate my findings via publication. However, it will be essential for future research to adopt experimental or longitudinal designs given that my study was cross-sectional and did not allow for interpretations to be made regarding causality or directionality. I am interested to see what the subsequent DCLinPsy thesis finds based on the development of our sample's social media use over time, and hopefully the data can enable some inferences to be made regarding temporal patterns in young people's social media use over the course of the COVID-19 pandemic.

I was delighted to hear recently that UCL's clinical psychology conference in December 2021 will be on social media, and my project partner and I have agreed to be involved with this as alumni. This will include sharing the findings from our theses so that others can learn from them.

Throughout the process of completing the thesis, I have reflected on my own relationship with social media and how this has in fact changed significantly during the doctorate. For example, I no longer feel compelled to check my social media accounts every day, my overall levels of use have decreased considerably, and my platform preferences have changed (i.e. to Twitter and Instagram rather than Facebook). Furthermore, I have noticed that I am not such an 'active' user these days; for instance, I reflected on how I no longer choose to share my successes via social media (e.g. Band 7 job or completion of this thesis!)

in the way that I used to as a young adult. Indeed, this highlights how young people's motivations for social media use may be unique and closely related to identity and social development needs (Uhls et al., 2017), and may develop over time.

9. References

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Appendices

APPENDIX A: List of search terms

(social media/ OR communications media/ OR online social networks/ OR blog/ OR social media OR social network* site* OR social network* app* OR online social network* OR Facebook OR Twitter OR Instagram OR YouTube OR Pinterest OR Snapchat OR Weibo OR WeChat OR Renren OR TikTok OR blog*) AND (psychometrics/ OR measurement/ OR factor analysis/ OR item analysis(test)/ OR test reliability/ OR test sensitivity/ OR test specificity/ OR test validity/ OR scale development OR valid* OR measur* OR assess* OR reliab* OR internal* consisten* OR scale* OR factor analysis OR metric* OR questionnaire) AND (usage OR uses and gratifications OR reason* for us* OR purpose* of us* OR motiv*)

APPENDIX B: COSMIN standards for evaluating the quality of scale development

ADAPTED FROM TERWEE ET AL (2017)

<i>General design requirements</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Is a clear description provided of the construct to be measured?	Construct clearly described			Construct not clearly described	
2. Is the origin of the construct clear; was a theory or conceptual framework used or clear rationale provided to define the construct to be measured?	Origin of the construct clear		Origin of the construct not clear		
3. Is a clear description provided of the target population for which the scale was developed?	Target population clearly described			Target population not clearly described	
4. Is a clear description provided of the context of use?	Context of use clearly described		Context of use not clearly described		
5. Was the development study performed in a sample representing the target population for which the scale was developed?	Study performed in a sample representing the target population	Assumable that the study was performed in a sample representing the target population, but not clearly described	Doubtful whether the study was performed in a sample representing the target population	Study not performed in a sample representing the target population (SKIP standards 6-12)	
<i>Concept elicitation (relevance and comprehensiveness)</i>					
6. Was an appropriate method used to identify relevant items for a new scale?	Widely recognised or well justified method used, suitable for the construct and study population	Assumable that the method was appropriate and suitable for the construct and study population, but not clearly described	Doubtful whether the method was suitable for the construct and study population	Method used not appropriate or not suitable for the construct or study population	
7. Were skilled group moderators/interviewers used?	Skilled group moderators/interviewers used	Group moderators/interviewers had limited experience or were trained specifically for the study	Not clear if group moderators/interviewers were trained or group moderators/interviewers not trained and no experience		N/A
8. Were the group meetings or interviews based on an appropriate topic or interview guide?	Appropriate topic or interview guide	Assumable that the topic or interview guide was appropriate, but not clearly described	Not clear if a topic guide was used or doubtful if topic or interview guide was appropriate or no guide		N/A
9. Were the group meetings or interviews recorded and transcribed verbatim?	All group meetings or interviews were recorded and transcribed verbatim	Assumable that all group meetings or interviews were recorded and transcribed verbatim, but not clearly described	Not clear if all group meetings or interviews were recorded and transcribed verbatim or recordings not transcribed verbatim or only notes were made during the group meetings/interviews	No recording and no notes	N/A
10. Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
11. Was at least part of the data coded independently?	At least 50% of the data was coded by at least two researchers independently	11-49% of the data was coded by at least two researchers independently	Doubtful if two researchers were involved in the coding or only 1-10% of the data was coded by at least two researchers independently	Only one researcher was involved in coding or no coding	N/A
12. Was data collection continued until saturation was reached?	Evidence provided that saturation was reached	Assumable that saturation was reached	Doubtful whether saturation was reached	Evidence suggests that saturation was not reached	N/A
13. For quantitative studies (surveys): was the sample size appropriate?	≥ 100	50-99	30-49	< 30	N/A

Concept elicitation (relevance and comprehensiveness)	Very good	Adequate	Doubtful	Inadequate	N/A
14. Was a cognitive interview study or other pilot test conducted?	YES			NO (SKIP standards 15-34)	
15. Was the cognitive interview study or other pilot test performed in a sample representing the target population?	Study performed in a sample representing the target population	Assumable that the study was performed in a sample representing the target population, but not clearly described	Doubtful whether the study was performed in a sample representing the target population	Study not performed in a sample representing the target population	
16. Were participants asked about the comprehensibility of the scale?	YES		Not clear (SKIP standard: 17-25)	NO (SKIP standards 17-25)	
17. Were all items tested in their final form?	All items were tested in their final form	Assumable that all items were tested in their final form, but not clearly described	Not clear if all items were tested in their final form	Items were not tested in their final form or items were not re-tested after substantial adjustments	
18. Was an appropriate qualitative method used to assess the comprehensibility of the scale's instructions, items and response options?	Widely recognised or well justified qualitative method used	Assumable that the method was appropriate but not clearly described	Only quantitative (survey) method(s) used or doubtful whether the method was appropriate or not clear if participants were asked about the comprehensibility of all items, response options and instructions or participants not asked about the comprehensibility of the instructions	Method used not appropriate or participants not asked about the comprehensibility of all items and response options	
19. Was each item tested in an appropriate number of participants? For qualitative studies For quantitative (survey) studies	≥ 7 ≥ 50	4-6 ≥ 30	< 4 or not clear < 30 or not clear		
20. Were skilled interviewers used?	Skilled group moderators/interviewers used	Group moderators/interviewers had limited experience or were trained specifically for the study	Not clear if group moderators/interviewers were trained or group moderators/interviewers not trained and no experience		N/A
21. Were the interviews based on an appropriate topic or interview guide?	Appropriate topic or interview guide	Assumable that the topic or interview guide was appropriate, but not clearly described	Not clear if a topic guide was used or doubtful if topic or interview guide was appropriate or no guide		N/A
22. Were the group meetings or interviews recorded and transcribed verbatim?	All group meetings or interviews were recorded and transcribed verbatim	Assumable that all group meetings or interviews were recorded and transcribed verbatim, but not clearly described	Not clear if all group meetings or interviews were recorded and transcribed verbatim or recordings not transcribed verbatim or only notes were made during the group meetings/interviews	No recording and no notes	N/A
23. Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
24. Were at least two researchers involved in the analysis?	At least two researchers involved in the analysis	Assumable that at least two researchers were involved in the analysis, but not clearly described	Not clear if two researchers were included in the analysis or only 1 researcher involved in the analysis		

Supplementary Table 1

Original sources for content of the reviewed scales

Scale (name / description)	Author(s)	Year	Adapted from past research	Original source(s)
Motivation for using YouTube	Hanson & Haridakis	2008	Yes	Papacharissi & Rubin (2000); Rubin (1983)
Facebook Gratifications	Sheldon	2008	Yes	Flaherty et al. (1998); Flanagin & Metzger (2001); Papacharissi & Rubin (2000)
Gratifications for Twitter usage	Liu et al.	2010	Yes	-
Motives for Facebook use	Papacharissi & Mendelson	2011	Yes	Papacharissi & Rubin (2000); Pornsakulvanich et al. (2008)
Motives for Facebook Use	Tosun	2012	Yes	Joinson (2008); Pennington (2009); Sheldon (2008)
Facebook gratifications	Giannakos et al.	2013	Yes	Dimmick et al. (2000); Flaherty et al. (1998); Flanagin & Metzger (2001); Leung (2001); Papacharissi & Rubin (2000)
Gratifications for using SNS	Ku et al.	2013	Yes	Leung (2001); Leung & Wei (2000); Lo & Leung (2009); Trammell et al. (2006)
Motives for Facebook use	Yang & Brown	2013	Yes	Sheldon (2008); Yang & Brown (2009)
SNS Motivations	Orchard et al.	2014	Yes	Ko (2000); Lo & Leung (2009); Papacharissi (2002); Papacharissi & Rubin (2000); Stafford et al. (1999)
Motives for using Facebook	Chang & Heo	2014	Yes	Joinson (2008); Sheldon (2008); Smock (2011)
Motivations for Facebook use	Park & Lee	2014	Yes	Jung et al. (2007)
Pinterest U&G	Mull & Lee	2014	No	
Motivations of Twitter use	Lee & Kim	2014	No	
Facebook motives	Hollenbaugh & Ferris	2014	Yes	Barker & Ota (2011); Hollenbaugh (2011); Sheldon (2008)
Facebook usage motivation	Hong & Chiu	2014	No	
Facebook motivation	Adnan & Mavi	2015	Yes	Flanagin (2005); Joinson (2008); Lampe et al. (2006); Nyland et al. (2007); Rubin (2002)
SNS motives	Krishnan & Hunt	2015	Yes	Banczyk et al. (2008); Charney & Greenberg (2002); Foregger (2009)
Motives for using social media	Al-Menayes	2015	No	
Motivation to use Instagram	Lee et al.	2015	Yes	Brandtzaeg & Heim (2009); Hsu & Lin (2008); Jung et al. (2007); Kim et al. (2011); Ko et al. (2005); Lin & Lu (2011); Papacharissi & Rubin (2000); Teo et al. (1999)
Motives for Instagram	Sheldon & Bryant	2016	No	
FAU Scale	Horzum	2016	No	
Motives for using Facebook	Marino et al.	2016	Yes	Bischof-Kastner et al. (2014)
Facebook U&G	Dhir & Tsai	2016	No	
WeChat Using Motivation Questionnaire	Wen et al.	2016	Yes	Ryan & Connell (1989)
YouTube use motivations	Khan	2017	Yes	Dholakia et al. (2004)
Instagram U&G	Sheldon et al.	2017	Yes	Sheldon & Bryant (2016)
SUMS	Shin & Lim	2018	Yes	Khang et al. (2013); Turel & Serekno (2012); Zhang et al. (2014)
Facebook gratifications	Leiner et al.	2018	Yes	Burke et al. (2010); Choi (2016); Levy & Windall (1984); Lin (1993); Palmgreen et al. (1980); Park & Lee (2014); Quan-Hase & Young (2010); Raacke & Bonds-Raacke (2008); Schorr (2000); Sheldon (2008); Sherer & Schlüt (2004); Smock et al. (2011); Tosun (2012); Weissensteiner & Leiner (2011); Whiting & Williams (2013); Wolfe & Fiske (1948); Yoo (2011)
Facebook motives	Alzougool	2018	Yes	Barker & Ota (2011); Hollenbaugh (2011); Sheldon (2008); Shoenberger & Tandoc (2014); Yang & Brown (2013)
Gratifications for using Weibo and WeChat	Gan	2018	Yes	Ku et al. (2013); Quan-Hase & Young (2010); Yoo et al. (2014)
Motives for Instagram use	Huang & Su	2018	Yes	Sheldon et al. (2017)
Weibo use motivations	Pang	2018	Yes	Leung (2009); Park et al. (2009)
SMU-SNS	Pertegal et al.	2019	No	
IWBQ Item 14	Schaffer & Debb	2020	No	
MSMU	Rodgers et al.	2020	Yes	Dhir et al. (2017); Papacharissi & Mendelson (2010)
SNSU-MMG	Hou et al.	2020	Yes	Deng & Zhu (2011); Huang (2012)
Instagram usage motives	Kocak et al.	2020	Yes	Lee et al. (2015); Sheldon & Bryant (2015)
Motives for SMSs use	Perugini & Solano	2020	Yes	Hollenbaugh & Ferris (2014); Sheldon (2008)

Note. FAU = Facebook usage aim, SUMS = Social Network Site Use Motives Scale, SMU-SNS = Scale of Motives for Using Social Networking Sites, IWBQ = Instagram and Wellbeing Questionnaire, MSMU = Motivations for Social Media Use Scale, SNSU-MMG = Social Networking Sites Use Multi-Motive Grid Questionnaire, SMSs – social media sites.

APPENDIX C: COSMIN standards for evaluating the quality of additional content validity studies

ADAPTED FROM TERWEE ET AL (2017)

<i>Asking participants about the relevance of scale items</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Was an appropriate method used to ask participants whether each item is relevant for their experience with the construct?	Widely recognised or well justified method used	Only quantitative (survey) method(s) used or assumable that the method was appropriate but not clearly described	Not clear if participants were asked whether <u>each</u> item is relevant or doubtful whether the method was appropriate	Method used not appropriate or participants not asked about the relevance of all items	N/A (SKIP standards 2-7)
2. Was each item tested in an appropriate number of patients? For qualitative studies For quantitative (survey) studies	≥ 7 ≥ 50	4-6 ≥ 30	< 4 or not clear < 30 or not clear		
3. Were skilled group moderators/interviewers used?	Skilled group moderators/interviewers used	Group moderators/interviewers had limited experience or were trained specifically for the study	Not clear if group moderators/interviewers were trained or group moderators/interviewers not trained and no experience		N/A
4. Were the group meetings or interviews based on an appropriate topic or interview guide?	Appropriate topic or interview guide	Assumable that the topic or interview guide was appropriate, but not clearly described	Not clear if a topic or interview guide was used or doubtful if topic or interview guide was used or no guide		N/A
5. Were the group meetings or interviews recorded and transcribed verbatim?	All group meetings or interviews were recorded and transcribed verbatim	Assumable that all group meetings or interviews were recorded and transcribed verbatim, but not clearly described	Not clear if all group meetings or interviews were recorded and transcribed verbatim or recordings not transcribed verbatim or only notes were made during the group meetings/interviews	No recording and no notes	N/A
6. Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
7. Were at least two researchers involved in the analysis?	At least two researchers involved in the analysis	Assumable that at least two researchers were involved in the analysis, but not clearly described	Not clear if two researchers were included in the analysis or only 1 researcher involved in the analysis		
<i>Asking participants about comprehensiveness</i>	Very good	Adequate	Doubtful	Inadequate	N/A
8. Was an appropriate method used for assessing the comprehensiveness of the scale?	Widely recognised or well justified method used	Only quantitative (survey) method(s) used or assumable that the method was appropriate but not clearly described	Doubtful whether the method was appropriate	Method used not appropriate	N/A (SKIP standards 9-14)
9. Was each item tested in an appropriate number of patients? For qualitative studies For quantitative (survey) studies	≥ 7 ≥ 50	4-6 ≥ 30	< 4 or not clear < 30 or not clear		
10. Were skilled group moderators/interviewers used?	Skilled group moderators/interviewers used	Group moderators/interviewers had limited experience or were trained specifically for the study	Not clear if group moderators/interviewers were trained or group moderators/interviewers not trained and no experience		N/A
11. Were the group meetings or interviews based on an appropriate topic or interview guide?	Appropriate topic or interview guide	Assumable that the topic or interview guide was appropriate, but not clearly described	Not clear if a topic guide was used or doubtful if topic or interview guide was appropriate or no guide		N/A

<i>Asking participants about comprehensiveness</i>	Very good	Adequate	Doubtful	Inadequate	N/A
12. Were the group meetings or interviews recorded and transcribed verbatim?	All group meetings or interviews were recorded and transcribed verbatim	Assumable that all group meetings or interviews were recorded and transcribed verbatim, but not clearly described	Not clear if all group meetings or interviews were recorded and transcribed verbatim or recordings not transcribed verbatim or only notes were made during the group meetings/interviews	No recording and no notes	N/A
13. Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
14. Were at least two researchers involved in the analysis?	At least two researchers involved in the analysis	Assumable that at least two researchers were involved in the analysis, but not clearly described	Not clear if two researchers were included in the analysis or only one researcher involved in the analysis		
<i>Asking patients about comprehensibility</i>	Very good	Adequate	Doubtful	Inadequate	N/A
15. Was an appropriate qualitative method used for assessing the comprehensibility of the scale instructions, <i>ICGSA</i> and response options?	Widely recognised or well justified qualitative method used	Assumable that the method was appropriate but not clearly described	Only quantitative (survey) method(s) used or doubtful whether the method was appropriate or not clear if participants were asked about the comprehensibility of all items, response options and instructions or participants not asked about the comprehensibility of the instructions	Method used not appropriate or participants not asked about the comprehensibility of all items and response options	N/A (SKIP standards 16-21)
16. Was each item tested in an appropriate number of participants? For qualitative studies For quantitative (survey) studies	≥ 7 ≥ 50	4-6 ≥ 30	< 4 or not clear < 30 or not clear		
17. Were skilled group moderators/interviewers used?	Skilled group moderators/interviewers used	Group moderators/interviewers had limited experience or were trained specifically for the study	Not clear if group moderators/interviewers were trained or group moderators/interviewers not trained and no experience		N/A
18. Were the group meetings or interviews based on an appropriate topic or interview guide?	Appropriate topic or interview guide	Assumable that the topic or interview guide was appropriate, but not clearly described	Not clear if a topic guide was used or doubtful if topic or interview guide was appropriate or no guide		N/A
19. Were the group meetings or interviews recorded and transcribed verbatim?	All group meetings or interviews were recorded and transcribed verbatim	Assumable that all group meetings or interviews were recorded and transcribed verbatim, but not clearly described	Not clear if all group meetings or interviews were recorded and transcribed verbatim or recordings not transcribed verbatim or only notes were made during the group meetings/interviews	No recording and no notes	N/A
20. Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
21. Were at least two researchers involved in the analysis?	At least two researchers involved in the analysis	Assumable that at least two researchers were involved in the analysis, but not clearly described	Not clear if two researchers were included in the analysis or only one researcher involved in the analysis		

<i>Asking professionals about relevance</i>		Very good	Adequate	Doubtful	Inadequate	N/A
22.	Was an appropriate method used to ask professionals whether each item is relevant for the construct of interest?	Widely recognised or well justified method used	Only quantitative (survey) method(s) used or assumable that the method was appropriate but not clearly described	Not clear if professionals were asked whether <u>each</u> item is relevant or doubtful whether the method was appropriate	Method used not appropriate or professionals not asked about the relevance of all items	N/A (SKIP standards 23-26)
23.	Were professionals from all relevant disciplines included?	Professionals from all required disciplines were included	Assumable that professionals from all required disciplines were included, but not clearly described	Doubtful whether professionals from all required disciplines were included or relevant professionals were not included		
24.	Was each item tested in an appropriate number of professionals? For qualitative studies For quantitative (survey) studies	≥ 7 ≥ 50	4-6 ≥ 30	< 4 or not clear < 30 or not clear		
25.	Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
26.	Were at least two researchers involved in the analysis?	At least two researchers involved in the analysis	Assumable that at least two researchers were involved in the analysis, but not clearly described	Not clear if two researchers were included in the analysis or only one researcher involved in the analysis		
<i>Asking professionals about comprehensiveness</i>		Very good	Adequate	Doubtful	Inadequate	N/A
27.	Was an appropriate method used for assessing the <u>comprehensiveness</u> of the scale?	Widely recognised or well justified method used	Only quantitative (survey) method(s) used or assumable that the method was appropriate but not clearly described	Doubtful whether the method was appropriate	Method used not appropriate	N/A (SKIP standards 28-31)
28.	Were professionals from all relevant disciplines included?	Professionals from all required disciplines were included	Assumable that professionals from all required disciplines were included, but not clearly described	Doubtful whether professionals from all required disciplines were included or relevant professional were not included		
29.	Was each item tested in an appropriate number of professionals? For qualitative studies For quantitative (survey) studies	≥ 7 ≥ 50	4-6 ≥ 30	< 4 or not clear < 30 or not clear		
30.	Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	
31.	Were at least two researchers involved in the analysis?	At least two researchers involved in the analysis	Assumable that at least two researchers were involved in the analysis, but not clearly described	Not clear if two researchers were included in the analysis or only one researcher involved in the analysis		

Supplementary Table 2

Reviewer's content validity ratings (adapted from Terwee et al., 2017)

Scale (name/description)	Reference	Reviewer's content validity rating
Motivation for using YouTube	Hanson & Haridakis (2008)	+
Facebook Gratifications	Sheldon (2008)	±
Motives for Facebook use	Papacharissi & Mendelson (2010)	?
Gratifications for Twitter usage	Liu et al. (2010)	+
Motives for Facebook use	Tosun (2012)	±
Facebook gratifications	Giannakos et al. (2013)	±
Gratifications for using SNS	Ku et al. (2013)	+
Motives for Facebook use	Yang & Brown (2013)	±
SNS motivations	Orchard et al. (2014)	+
Motives for Facebook use	Chang & Heo (2014)	+
Motivations for Facebook use	Park & Lee (2014)	±
Pinterest U&G	Mull & Lee (2014)	+
Motivations of Twitter use	Lee & Kim (2014)	+
Facebook usage motivation	Hong & Chiu (2014)	±
Facebook motives	Hollenbaugh & Ferris (2014)	+
Facebook motivation	Adnan & Mavi (2015)	+
SNS motives	Krishnan & Hunt (2015)	+
Motives for using social media	Al-Menayes (2015)	±
Motivation to use Instagram	Lee et al. (2015)	+
Motives for Instagram use	Sheldon & Bryant (2016)	±
FAU scale	Horzum (2016)	+
Motives for Facebook use	Marino et al. (2016)	+
Facebook U&G	Dhir & Tsai (2016)	±
WeChat using motivation	Wen et al. (2016)	?
YouTube use motivation	Khan (2017)	+
Instagram U&G	Sheldon et al. (2017)	+
SUMS	Shin & Lim (2018)	?
Facebook gratifications	Leiner et al. (2018)	?
Facebook motives	Alzhougool (2018)	+
Gratifications for using Weibo and WeChat	Gan (2018)	+
Motives for Instagram use	Huang & Su (2018)	+
Weibo use motivations	Pang (2018)	+
SMU-SNS	Pertegal et al. (2019)	+
IWBQ (Item 14)	Schaffer & Debb (2020)	±
MSMU	Rodgers et al. (2020)	±
SNSU-MMG	Hou et al. (2020)	+
Instagram usage motives	Kocak et al. (2020)	+
Motives for SMSs use	Perugini & Solano (2020)	+

Note. FAU = Facebook usage aim, SUMS = Social Network Site Use Motives Scale, SMU-SNS = Scale of Motives for Using Social Networking Sites, IWBQ = Instagram and Wellbeing Questionnaire, MSMU = Motivations for Social Media Use Scale, SNSU-MMG = Social Networking Sites Use Multi-Motive Grid Questionnaire, SMSs – social media sites.

+ Sufficient, ± Inconsistent, ? Indeterminate

Criteria and Key:

Relevance	Sufficient (+)	Insufficient (-)	Indeterminate (?)
1. Are the included items relevant for the construct of interest?			
2. Are the included items relevant for the target population of interest?			
3. Are the included items relevant for the context of use of interest?			
4. Are the response options appropriate?			
Comprehensiveness			
5. Are all key concepts included?			
Comprehensibility			
6. Are the scale items appropriately worded?			
7. Do the response options match the question?			

(+) ≥ 85% of the items of the scale (or subscale) fulfil the criterion

(-) < 85% of the items of the scale (or subscale) fulfil the criterion

? No(t enough) information available

APPENDIX D: COSMIN standards for assessing structural validity

ADAPTED FROM MOKKINK ET AL. (2017); PRINSEN ET AL. (2018)

<i>Statistical methods</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Was exploratory or confirmatory factor analysis performed?	Confirmatory factor analysis performed	Exploratory factor analysis performed		No exploratory or factor analysis performed	N/A
2. Was the sample size included in the analysis adequate?	7 times the number of items, and ≥ 100	At least 5 times the number of items, and ≥ 100 ; OR at least 6 times the number of items, but < 100	5 times the number of items, but < 100	< 5 times the number of items	
<i>Other</i>	Very good	Adequate	Doubtful	Inadequate	N/A
3. Were there any other important flaws in the design or statistical methods of the study?	No other important methodological flaws		Other minor methodological flaws (e.g. rotation method not described)	Other important methodological flaws (e.g. inappropriate rotation method)	

APPENDIX E: COSMIN standards for assessing internal consistency

ADAPTED FROM MOKKINK ET AL. (2017); PRINSEN ET AL. (2018)

<i>Design requirements</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Was an internal consistency statistic calculated for each unidimensional scale or subscale separately?	Internal consistency statistic calculated for each unidimensional scale or subscale		Unclear whether scale or subscale is unidimensional	Internal consistency statistic NOT calculated on unidimensional scale	N/A
<i>Statistical methods</i>	Very good	Adequate	Doubtful	Inadequate	N/A
2. For continuous scores: Was Cronbach's alpha or omega calculated?	Cronbach's alpha, or Omega calculated		Only item-total correlations calculated	No Cronbach's alpha and no item-total correlations calculated	N/A
3. For dichotomous scores: Was Cronbach's alpha or KR-20 calculated?	Cronbach's alpha or KR-20 calculated		Only item-total correlations calculated	No Cronbach's alpha or KR-20 and no item-total correlations calculated	N/A

APPENDIX F: COSMIN standards for assessing cross-cultural validity / measurement invariance

ADAPTED FROM MOKKINK ET AL. (2017); PRINSEN ET AL. (2018)

<i>Design requirements</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Were the samples similar for relevant characteristics except for the group variable?	Evidence provided that samples were similar for relevant characteristics except group variable	Stated (but no evidence provided) that samples were similar for relevant characteristics except group variable	Unclear whether samples were similar for relevant characteristics except group variable	Samples were NOT similar for relevant characteristics except group variable	N/A
<i>Statistical methods</i>	Very good	Adequate	Doubtful	Inadequate	N/A
2. Was an appropriate approach used to analyse the data?	A widely recognised or well justified approach was used	Assumable that the approach was appropriate, but not clearly described	Not clear what approach was used or doubtful whether the approach was appropriate	Approach not appropriate	N/A
3. Was the sample size included in the analysis adequate?	Regression analyses: 200 subjects per group MGCFA*: 7 times the number of items, and \geq 100	150 subjects per group 5 times the number of items, and \geq 100; OR 5-7 times the number of items, but < 100	100 subjects per group 5 times the number of items, but < 100	<100 subjects per group <5 times the number of items	

APPENDIX G: COSMIN standards for assessing reliability

ADAPTED FROM MOKKINK ET AL. (2017); PRINSEN ET AL. (2018)

<i>Design requirements</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Were participants stable in the interim period on the construct to be measured?	Evidence provided that participants were stable	Assumable that participants were stable	Unclear if participants were stable	Participants were not stable	N/A (SKIP standards 2-8)
2. Was the time interval appropriate?	Time interval appropriate		Doubtful whether time interval was appropriate or time interval was not stated	Time interval not appropriate	
3. Were the test conditions similar for the measurements (e.g. type of administration, environment, instructions)	Test conditions were similar (evidence provided)	Assumable that test conditions were similar	Unclear if test conditions were similar	Test conditions were not similar	
<i>Statistical methods</i>	Very good	Adequate	Doubtful	Inadequate	N/A
4. For continuous scores: Was an intraclass correlation coefficient (ICC) calculated?	ICC calculated and model or formula of the ICC is described	ICC calculated but model or formula of the ICC not described or not optimal. Pearson or Spearman correlation coefficient calculated with evidence provided that no systematic change has occurred	Pearson or Spearman correlation calculated without evidence provided that no systematic change has occurred or with evidence that systematic change has occurred	No ICC or Pearson or Spearman correlations calculated	N/A
5. For dichotomous/nominal/ordinal scores: Was kappa calculated?	Kappa calculated			No kappa calculated	N/A
6. For ordinal scores: Was a weighted kappa calculated?	Weighted kappa calculated		Unweighted kappa calculated or not described		N/A
7. For ordinal scores: Was the weighting scheme described? E.g. linear, quadratic	Weighting scheme described	Weighting scheme not described			N/A
<i>Other</i>	Very good	Adequate	Doubtful	Inadequate	N/A
8. Were there any other important flaws in the design or statistical methods of the study?	No other important methodological flaws		Other minor methodological flaws	Other important methodological flaws	

APPENDIX H: COSMIN standards for assessing criterion validity

ADAPTED FROM MOKKINK ET AL. (2017); PRINSEN ET AL. (2018)

<i>Statistical methods</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. For continuous scores: Were correlations, or the area under the receiver operating curve calculated?	Correlations or AUC calculated			Correlations or AUC not calculated	N/A (SKIP standards 2-3)
2. For dichotomous scores: Were sensitivity and specificity determined?	Sensitivity and specificity calculated			Sensitivity and specificity not calculated	N/A
<i>Other</i>	Very good	Adequate	Doubtful	Inadequate	N/A
3. Were there any other important flaws in the design or statistical methods of the study?	No other important methodological flaws		Other minor methodological flaws	Other important methodological flaws	

APPENDIX I: COSMIN standards for assessing construct validity

ADAPTED FROM MOKKINK ET AL. (2017); PRINSEN ET AL. (2018)

<i>Design requirements</i>	Very good	Adequate	Doubtful	Inadequate	N/A
1. Is it clear what the comparator instrument(s) measure(s)?	Constructs measured by the comparator instrument(s) is clear			Constructs measured by the comparator instrument(s) is not clear	N/A (SKIP standards 2-3)
2. Were the measurement properties of the comparator instrument(s) sufficient?	Sufficient measurement properties of the comparator instrument(s) in a population similar to the study population	Sufficient measurement properties of the comparator instrument(s) but not sure if these apply to the study population	Some information on measurement properties of the comparator instrument(s) in any study population	No information on the measurement properties of the comparator instrument(s), OR evidence of insufficient measurement properties of the comparator instrument(s)	
<i>Statistical methods</i>	Very good	Adequate	Doubtful	Inadequate	N/A
3. Were design and statistical methods adequate for the hypotheses to be tested?	Statistical methods applied appropriate	Assumable that statistical methods were appropriate	Statistical methods applied NOT optimal	Statistical methods applied NOT appropriate	

Supplementary Table 3

Methodological quality scores for reviewed scales (adapted from Mokkink, Terwee, Knol et al. 2010; Mokkink, Terwee, Patrick et al. 2010; Terwee et al. 2012). Blank scores indicate domains were not relevant for that scale.

Scale (name/description)	Reference	Development	Content validity	Structural validity	Internal consistency	MI	Reliability	Criterion validity	Construct validity
Motivation for using YouTube	Hanson & Haridakis (2008)	I		A	V				
Facebook Gratifications	Sheldon (2008)	I		I	V				
Motives for Facebook use	Papacharissi & Mendelson (2010)	I		A	V				
Gratifications for Twitter usage	Liu et al. (2010)	I		I	V				V
Motives for Facebook use	Tosun (2012)	I		I	V				D
Facebook gratifications	Giannakos et al. (2013)	I		A	V				
Gratifications for using SNS	Ku et al. (2013)	I		I	V				
Motives for Facebook use	Yang & Brown (2013)	D		A	V				A
SNS motivations	Orchard et al. (2014)	I		A	V				D
Motives for Facebook use	Chang & Heo (2014)	I		A	V				
Motivations for Facebook use	Park & Lee (2014)	I		A	V				
Pinterest U&G	Mull & Lee (2014)	I		I	V				V
Motivations of Twitter use	Lee & Kim (2014)	I		A	V				
Facebook usage motivation	Hong & Chiu (2014)	I		A	V				V
Facebook motives	Hollenbaugh & Ferris (2014)	I		A	V				
Facebook motivation	Adnan & Mavi (2015)	I		A	V				
SNS motives	Krishnan & Hunt (2015)	I		A	V				
Motives for using social media	Al-Menayes (2015)	I		A	V				
Motivation to use Instagram	Lee et al. (2015)	I	D	A	V				
Motives for Instagram use	Sheldon & Bryant (2016)	I		A	V				
FAU scale	Horzum (2016)	I	D	V	I				V
Motives for Facebook use	Marino et al. (2016)	I		V	I				V
Facebook U&G	Dhir & Tsai (2016)	I		A	V	D			V
WeChat using motivation	Wen et al. (2016)	I		V	V				D
YouTube use motivation	Khan (2017)	I		A	V				

**Supplementary
Table 3
(continued)**

Scale (name/description)	Reference	Development	Content validity	Structural validity	Internal consistency	MI	Reliability	Criterion validity	Construct validity
Instagram U&G	Sheldon et al. (2017)	I		A	V	I			
SUMS	Shin & Lim (2018)	I	D	A	V		D	V	
Facebook gratifications	Leiner et al. (2018)	I		A	V				
Facebook motives	Alzhougool (2018)	I		A	V				
Gratifications for using Weibo and WeChat	Gan (2018)	I		A	V	A			
Motives for Instagram use	Huang & Su (2018)	I		D	V				
Weibo use motivations	Pang (2018)	I		D	V				
SMU-SNS	Pertegal et al. (2019)	D	D	V	V	V			A
IWBQ (Item 14)	Schaffer & Debb (2020)	I		V	I	D			
MSMU	Rodgers et al. (2020)	I		V	V	D			A
SNSU-MMG	Hou et al. (2020)	I		V	V				
Instagram usage motives	Kocak et al. (2020)	I		D	V				
Motives for SMSs use	Perugini & Solano (2020)	I		A	V				

Note. SNS = social network sites, U&G = uses and gratifications, FAU = Facebook usage aim, SUMS = Social Network Site Use Motives

Scale, SMU-SNS = Scale of Motives for Using Social Networking Sites, IWBQ = Instagram and Wellbeing Questionnaire, MSMU =

Motivations for Social Media Use Scale, SNSU-MMG = Social Networking Sites Use Multi-Motive Grid Questionnaire, SMSs – social

media sites, V = very good, A = adequate, D = doubtful, I = inadequate.

APPENDIX J: Ethical approval letter

UCL RESEARCH ETHICS COMMITTEE
OFFICE FOR THE VICE PROVOST RESEARCH



2nd June 2020

Dr Marc Tibber
Research Department of Clinical, Educational and Health Psychology
UCL

Cc: Ghiselle Green & Maya Bowri, Trainee Clinical Psychologists, UCL Research Department of Clinical, Educational and Health Psychology

Dear Dr Tibber

Notification of Ethics Approval with Provisos

Project ID/Title: 17383/001: The impact of social media on young people's mental health in the context of the COVID-19 pandemic: testing a preliminary model and exploring patterns of use.

Further to your satisfactory responses to the Committee's comments, I am pleased to confirm in my capacity as Chair of the UCL Research Ethics Committee (REC) that your study has been ethically approved by the UCL REC until **1st September 2021**.

In view of the fast developments of the pandemic, the numerous projects being initiated and the constantly changing framework, please provide us with regular updates every 3 months (with the 1st report due on 2nd September) regarding the ethical aspects of your project and the specific problems (if any) that you have encountered. At the end of the study, as part of the final report you have to submit to the UCL REC, please include alongside a brief outline of the research outcomes, any experiences which would be valuable for informing the fast-track COVID review process, and in turn subsequent fast-tracked studies.

Ethical approval is also subject to the following conditions:

Notification of Amendments to the Research

You must seek Chair's approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an 'Amendment Approval Request Form' <http://ethics.grad.ucl.ac.uk/responsibilities.php>

Adverse Event Reporting – Serious and Non-Serious

It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse

Office of the Vice Provost Research, 2 Tavistock Street
University College London
Tel: +44 (0)20 7679 8717
Email: ethics@ucl.ac.uk
<http://ethics.grad.ucl.ac.uk/>

incident is unexpected and serious, the Joint Chairs will decide whether the study should be terminated pending the opinion of an independent expert. For non-serious adverse events the Joint Chairs of the Ethics Committee should again be notified via the Ethics Committee Administrator within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Joint Chairs will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Final Report

At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes in particular issues relating to the ethical implications of the research i.e. issues obtaining consent, participants withdrawing from the research, confidentiality, protection of participants from physical and mental harm etc.

In addition, please:

- ensure that you follow all relevant guidance as laid out in UCL's Code of Conduct for Research: <http://www.ucl.ac.uk/srs/file/579>
- note that you are required to adhere to all research data/records management and storage procedures agreed as part of your application. This will be expected even after completion of the study.

With best wishes for the research.

Yours sincerely



Professor Michael Heinrich
Joint Chair, UCL Research Ethics Committee

APPENDIX K: Joint Thesis Declaration

This was a joint project working in collaboration with Ghiselle Green, who was exploring a preliminary model of the impact of social media on young people's mental health (Green, 2021).

Systematic Review: Each systematic review was completed independently including search strategy and rating. However, Ghiselle Green will be a second rater if the review is submitted for publication.

Empirical Paper: Trainees conducted initial scoping searches independently to understand the literature and develop meaningful research questions. The ethics application was completed and submitted jointly. The recruitment strategy was jointly planned in consultation with the supervisors, and both trainees contributed equally to the design and development of the online questionnaire and data collection, including screening participants for risk on the basis of their scores on mental health questionnaires. Initial descriptive statistics to characterise the sample were carried out together, however subsequent analyses (LPA and SEM) and write up of the findings were carried out independently.

Appendix L: Study recruitment materials

Email invitation to parents/carers

Invite to take part in Social Media Research (IMPORTANT: please read)

Dear parent/guardian,

We are getting in touch to let you know about two research projects that we are running in a collaboration between [removed for anonymity], the school's Director of Wellbeing [removed for anonymity] and researchers at University College London (UCL) headed by Dr Marc Tibber.

Both studies explore young people use social media, the role it plays in their wellbeing, but also, how this may have changed during the coronavirus pandemic. We hope that the findings from these studies (further details below) will help us identify ways to help young people to use social media in a way that is safe and supports their wellbeing.

Study One: Online Questionnaire

Study Coordinators: Ghiselle Green and Maya Bowri (Trainee Clinical Psychologists, UCL)

In study One we will be inviting all pupils in Years 7-12 to complete an online questionnaire that will ask questions about their social media use, online habits and mental health. This should take around 25 minutes to complete. In addition, we will be asking for permission to link these data to school grades to see if social media use is associated with academic performance. Your child will be sent a link to the online questionnaire two weeks after receipt of this email and asked if they agree to take part. Your child is under no obligation to take part and not doing so will not impact on them in any way.

IMPORTANT INFORMATION: We include full details of this study and what it entails in the attached 'Study 1 Information Sheet'. Please read this carefully. As parents/carers you may opt-out of this study on behalf of your child and chose for them not to take part. If you do not want your child to take part in the study, please complete the attached 'Study 1 Opt Out Form' and email it to the Study Coordinator (ghiselle.green.18@ucl.ac.uk). Please note that if we do not hear from you by XX/XX/XX we will assume that you are happy for your child to take part in the study.

FOR FULL DETAILS: Please read the attached information sheet (Study 1 Information Sheet).

IF YOU HAVE FURTHER QUESTIONS: Please email ghiselle.green.18@ucl.ac.uk

If you have any general questions about this research programme, or would like to discuss any concerns you have please contact Marc Tibber (Lead Researcher on the project: m.tibber@ucl.ac.uk) or [removed for anonymity]. Please note that there is detailed information in the attached sheets on how the data will be stored, analysed and used, as well as steps we are taking to ensure anonymity.

Many thanks,

[removed for anonymity]

Dr Marc Tibber (Clinical Psychologist & Lecturer in Clinical Psychology, UCL)

Email invitation to participants

Invite to take part in Social Media Research

Dear pupil,

We are writing to let you know about two research studies that we are running with the school's Director of Wellbeing [removed for anonymity] and researchers at University College London (UCL).

Both studies are trying to determine young people use social media and how it can be helpful or harmful to their wellbeing. We hope that the findings from these studies will help us find ways to support you (and other young people) to use social media in a way that is safe and enjoyable.

Study One: Online Questionnaire

In study One we will be inviting all pupils in Years 7-12 to complete an online questionnaire that will ask you questions about your social media use, your online habits and mental health. This should take around 25 minutes. You will be sent a link to the questionnaire two weeks from now and asked if you agree to take part. You do not have to take part. We will also be asking your parents/carers if they are happy for you to take part. However, even if they *are* happy for you to take part, you can still say no (it is completely your choice).

Attached to this email are details of the study ('Study 1 Information Sheet'). If you have any other questions, please email ghiselle.green.18@ucl.ac.uk

If you have any general questions about the study please contact Marc Tibber (who is running the research at UCL: m.tibber@ucl.ac.uk) or [removed for anonymity].

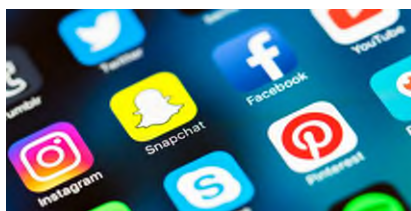
Many thanks,

[removed for anonymity]

Dr Marc Tibber (Clinical Psychologist & Lecturer in Clinical Psychology, UCL)

PARTICIPANT INFORMATION SHEET FOR PARENTS/CARERS

Study title: Social media use in young people in the context of COVID-19



What is this study? We are inviting your child to take part in a research study that is investigating young people's digital screen and social media use, and how this is related to their mental health and academic attainment. We are particularly interested in how this may have changed as a result of COVID-19, e.g. time away from school. Before you decide if you agree to your child taking part in the study, it is important that you understand why the research is being done and what it will involve. Please read this information sheet carefully.

Why are we doing this study? Researchers have become interested in both the positive and negative consequences of young people using social media, with controversy concerning whether social media use exposes young people to harm or helps them to develop relationships. Furthermore, it has been suggested that social media use may impact upon young people's learning and academic achievement. However, much of the research until now has only looked at overall levels of use, i.e. how many hours per day young people use social media, rather than how young people use social media. In this study, we want to explore how different ways of using social media impact on young people's mental health and wellbeing, as well as whether or not it has any impact on academic performance. We are also interested in how these effects change over time, as well as the relationship between young people's social media use and their emotional wellbeing in the context of COVID-19 given associated changes to young people's routines. It is hoped that the information we gather from this study will help us design resources to help young people use social media in a way that maximises its positive effects and minimizes its negative effects.

Why has my child been invited to take part? Your child has been invited to take part because they are a student attending one of our collaborating schools.

Does my child have to take part? No. Taking part is completely voluntary. The nature of the study will be explained to them in a separate age-appropriate participation information sheet and they will be given two weeks to read through it and contact a member of the research team to ask any questions they might have about the study. If you would like we can also arrange a time to speak to you or your child by phone about the study. If they would like to participate they will be sent an online link where they will be asked to consent / assent to take part in the study before being directed to the questionnaires. Your child is free to stop taking part at any time during the study without giving a reason. As their parent/carer, you are also free to decide whether or not they should take part in the study. ***Unless we hear from you within two weeks, we will assume that you are happy for them to participate (if they choose to).*** To opt-out with respect to their participation, please scroll down the email and **click on Reply for the opt-out form**. This will alert [removed for anonymity] with the name of your child, and your child's name and any other information will not be shared with anyone. If you choose to opt-out with respect to your child's participation, your child will not be sent the link to the online questionnaire. If you or your child decide not to take part, or to stop taking part at any point, this will not affect the education or care they receive, now or in the future.

What will my child have to do if they decide to take part? Your child will complete some questionnaires online via the RedCAP (Research Data Collection Service) web based survey tool, which is compliant with General Data Protection Regulation (GDPR). If your child agrees to take part, after being sent a link to the questionnaires, they will have one month within which to complete these. We anticipate that the questionnaires will take your child approximately 30 minutes to complete. Before assenting/consenting to participate they will be asked to contact a member of the research team by email if they require any support with completing the questionnaires or to answer any questions they might have.

The questionnaires will ask your child about:

- Their age, school year, gender and ethnicity.
- Sleep, leisure and study habits and time spent with family.
- Their social media and digital screen use, including time spent on apps/websites and their reasons for use.

- Their social networks and social relationships
- Their emotional wellbeing/mental health (anxiety and depression symptoms).

To investigate whether social media use impacts upon young people's learning and academic attainment, we will also ask you and your child for your permission to access your child's exam grades from school. If you and your child agree to this, your child's school will share your child's exam grades with us. After they have completed the questionnaires, your child will be provided with a number of educational resources about social media, mental health and emotional wellbeing, which have been developed by the researchers in collaboration with their school. These resources will be made available to all students regardless of their participation in the study.

As part of the study, your child will be asked to complete the questionnaires again in 3-6 months' time. If you and your child agree, you will also be contacted in 12-18 months' time to ask whether you consent to your child completing the original questionnaires again as part of a 'follow-up' study. This will enable us to explore how the relationship between social media use and mental health and wellbeing might change as the COVID-19 situation develops, and will enable us to begin to understand whether current social media use impacts on mental health and wellbeing in the future, i.e. whether one might truly cause the other. At all three time points of the study, your child will be asked whether or not they wish to participate and will be able to refuse participation in the study even if you consent to their taking part. If you do not wish for you or your child to be contacted in the future for this purpose, please let us know using the opt-out form. Please note, that by allowing us to contact you for this express purpose in the future, you are in no way consenting to ongoing contact, only for the follow-up study. In addition, you will be able to withdraw participation from this at a later date also. If you wish to withdraw your child's data from the study, you or your child should contact Dr Marc Tibber (contact details below) within one month following data collection at each stage of the study to remove their data.

Are there any risks in taking part in this study? There are no major risks to your child in taking part in this study. However, if for any reason your child experiences any emotional discomfort or distress by answering any of the questions, they will have the opportunity to speak with a clinical member of the team (a qualified or trainee clinical psychologist) in order to discuss

this further and think about whether any further support is needed. Questionnaires about mental health and emotional wellbeing that will be used in the study are used in standard routine research and clinical practice.

Are there any benefits to taking part? Your child's participation in the study will be very important in helping us to understand more about young people's social media use, its relation to mental health, and more specifically, in the context of social isolating. The hope is that the findings of the study will be published in professional and academic journals in order to help inform the work of other researchers, clinicians and educators. However, your child's anonymity will be preserved, and no identifiable information will be included in any published materials. The study is being undertaken in partnership with the school's wellbeing programme and all findings from the study will also be shared with the school to help the school consider how best to manage social media use amongst its pupils. We would also like to use the findings from this research to develop resources and interventions to support young people to use social media in ways that supports their wellbeing. As part of the study, your child will be provided with educational resources on social media and mental health, contributing to the school's ongoing wellbeing program.

Who is organising and funding the research? This research is being undertaken by participating schools in collaboration with the research department of Clinical, Educational and Health Psychology at University College London. The project is not externally funded. However, a small amount of funding has been given by the department within UCL as part of a fund that helps finance trainee research. The research will contribute to the doctoral thesis of two training clinical psychologists within the department who are funded by the NHS.

Who has reviewed the research? The research has been reviewed by the UCL Research Ethics Committee.

What happens to information you collect about my child? All the information you and your child provide will be treated as confidential and will be stored securely on the UCL network and will be accessible only to members of the research team. Any identifiable data will be stored separately from the questionnaire response data, and will only be accessed by members of the research team in order to invite your child to participate at the follow-up time-points

(where consent has been given for this), to contact your child if there are concerns about their safety and/or wellbeing on the basis of their questionnaire responses, or if they indicate on the questionnaire that they would like to schedule a meeting with a clinical member of the research team to discuss any concerns they might have about their mental health or wellbeing.

The anonymised data from the study will be shared with [removed for anonymity] (contact details below), who will share this data with the schools if this is requested. Anonymised data may be shared with other researchers at UCL or other institutions, to help answer further research questions, but they will never be given your child's name, contact details or any other identifiable information. Once names and contact details are no longer required for the research project, they will be deleted, and all data will then become fully anonymised.

We will keep a digital record of your child's anonymous information for up to 10 years, as it may be required for future research. All information will be destroyed once it is no longer required for research purposes. If you or your child decide that they want to stop taking part in the study their information can be removed if this is requested within one month following data collection.

What will happen to the findings of the study? When the study is finished, the findings will be written up and presented as part of Clinical Psychology doctoral theses and as scientific articles to be published in peer-reviewed journals or conference abstracts. A summary of the findings will be shared with parents / guardians, young people, and the schools that took part. We think it is important to inform you about the information we found out and what will happen next. As mentioned above, it will not be possible to identify your child from findings in these publications.

What if there is a problem during the study? If you wish to raise a complaint, then please contact Dr Marc Tibber (the Principal Investigator for the study) at m.tibber@ucl.ac.uk. If you feel that your complaint has not been handled to your satisfaction, you can contact the Chair of the UCL Research Ethics Committee at ethics@ucl.ac.uk. If something happens to your child during or following their participation in the project that you think may be linked to taking part, please contact the Principal Investigator.

Thank you for taking the time to read this information and to consider participation in the study.

Local Data Protection Privacy Notice: The controller for this project will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities involving the processing of personal data, and can be contacted at data-protection@ucl.ac.uk. This 'local' privacy notice sets out the information that applies to this particular study. Further information on how UCL uses participant information can be found in our 'general' privacy notice: For participants in health and care research studies, click [here](#). The information that is required to be provided to participants under data protection legislation (GDPR and DPA 2018) is provided across both the 'local' and 'general' privacy notices. The lawful basis that will be used to process your personal data are: 'Public task' for personal data and 'Research purposes' for special category data. UCL will keep identifiable information about you for three months after the study has finished. To safeguard your rights, we will use the minimum personally identifiable information possible. If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at data-protection@ucl.ac.uk

Research Contact: Dr Marc Tibber (Principal Investigator for the study). m.tibber@ucl.ac.uk
Address: Research Department of Clinical, Educational and Health Psychology,
University College London, Gower Street, London, WC1E 6BT

School Contacts: [removed for anonymity]

Please note: While UCL systems are secure and updated regularly, UCL cannot ensure the security of external email systems, by using email communication you are accepting of these potential risks. If you would like more information on this, please ask and more details can be provided before you send on any confidential data



PARTICIPANT INFORMATION SHEET FOR YOUNG PEOPLE

Social media use in young people

Would you help us with our research?

We are researchers and clinical psychologists at University College London and would like to ask you to help us by taking part in a research study. Please read this information sheet carefully, talk to other people about it if you would like, and ask any questions before you decide.



Why are we doing this study?

Social media use is common in young people. The purpose of our research is to increase our understanding of how young people use social media and how young people's social media use is related to their wellbeing. We will also look at whether social media use impacts upon young people's learning by asking for your permission for your school to share your grades with us. If you agree to this, your school will share your school grades with us. We are particularly interested in the relationship between social media use and wellbeing during Covid-19 since young people's usual routine has changed.

Who is invited to take part in this study?

We are inviting students to participate from across year groups between Year 7 and Year 12 at [removed for anonymity].

What will happen if I take part?

1. If you and your parents/carers agree to you taking part, you will be asked to complete a series of questionnaires online. You must complete the questionnaire within 10 days of receiving the link to the questionnaire if you wish to take part. The questionnaires will take you about 30 minutes to complete. You can contact members of our research team by email in case you have any questions or wish to arrange to speak with them. If your parents/carers do not agree to you taking part, you will not be sent the link to the online questionnaires.
2. If you agree, we will also contact you in 3-6 months' time and again in 12-18 months' time and ask you to complete the same questionnaires again, so that we can explore how social media use might change as the Covid-19 situation changes, and can begin to see whether social media use now affects mental health and wellbeing later. At all three stages of the study, we will ask you whether you agree to take part. You do not have to agree to take part in the study at any stage.

The questionnaires will ask you about:

- Your age, school year, gender and ethnicity.
- Your sleep, leisure and study habits and time spent with family.
- Your social media and digital screen use, including time spent on apps/websites and your reasons for use
- Your social networks and social relationships.
- Your emotional wellbeing (anxiety and depression symptoms).



Do I have to take part?

No! It is up to you whether you take part. If you do not want to take part that is fine, and your decision won't affect your education or anything else in any way. You can stop taking part at any time during the study and don't have to say why. We have also informed your parents/carers about the study and asked them if they have any objection to you taking part. You don't have to take part even if your parents/carers agree. If you wish to remove your data from the study, please contact Dr Marc Tibber (Principal Researcher) up to one month following data collection at each stage of the study (contact details below).

What happens to information you collect about me?

- Nobody except the researchers will have access to the information we collect about you and what you tell us.
- Your information will be labelled with a number code which can't identify you. Your name and contact details will be kept separately from the information you provide and will only be used in order to contact you in 3-6 and 12-18 months' time if you agree. We will ask you again at these times whether you agree to participate in the study.
- When we finish the research we will write a report about the study and our findings. We hope to publish these in scientific journals so that other researchers and professionals can benefit from what we have learnt too.
- We will share all anonymous data from the study with [removed for anonymity], which can then be requested by your school. Your school won't be able to identify you from this data.
- Your name and other information that might make it possible for people to guess who you are will not appear anywhere in the data or the report of the study.
- Your anonymous information will be kept for up to 10 years as it might be needed to help with future research.

Are there any risks in taking part in this study?

There should not be any risks with this study. However, sometimes answering questions about wellbeing can remind people of difficult experiences they've had. These might be things that happened in the past, or things happening now.

If you find answering any of the questions upsetting, you can speak with a member of the research team during or after the study. We can then make sure that you have the support that you need. For example, we can arrange for you to speak with a psychologist from our research team.

Your safety and wellbeing if we have concerns about your safety/wellbeing from your questionnaire answers, this information will be shared with [removed for anonymity], who may arrange for a member of the research team to

What are the benefits of taking part?

Your participation will be very important in helping us to understand more about young people's social media use, particularly during Covid-19. We would like to use the findings from this research to develop an intervention to support young people to use social media in ways that supports their wellbeing.

Data Protection privacy notice

UCL's Data Protection Officer is Alexandra Potts and she can be contacted at data-protection@ucl.ac.uk. You can read UCL's privacy notice at: <https://www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice> and details of your rights at: <https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/>

All questionnaires will be completed online on the RedCAP (Research Data Collection Service) web-based survey tool, which is General Data Protection Regulation (GDPR) compliant.

If I have any questions, who can I ask?

If you have any questions, please contact us:

Dr Marc Tibber (Principal Researcher)
m.tibber@ucl.ac.uk

[removed for anonymity]

APPENDIX M: Study questionnaire

Consent items

Please check whether or not you agree with the following statements:

I have read the young person participant information sheet and I understand what will happen if I take part in this study. Yes
 No

I have the names and contact details of the people I can contact if I want more information (please see the information sheet). Yes
 No

I understand that I do not have to take part at any stage of the study. I understand that during the study, it is OK to stop taking part. Yes
 No

I have had an opportunity to contact the research team with any questions I wanted to ask. If I contacted them, my questions were answered in a way that I could understand. Yes
 No

I understand that the research team will keep my information private and confidential but that I may be contacted if there are concerns about my safety or wellbeing. I understand that findings from the research will be published in scientific reports and journals but that no one will be able to identify me from this information. Yes
 No

I understand that my school will be able to request access to the information that I provide in the study but that no one will be able to identify me from any information which is shared with my school. I agree to this information being shared with my school if it is requested. Yes
 No

I agree to take part in this study. I understand that I do NOT have to take part even if my parents/carers have agreed for me to take part. Yes
 No

I agree to answer questions about myself (age, school year, gender and ethnicity), how I spend my time (sleep, leisure, study habits and time spent with family), my social media use and social relationships. Yes
 No

I agree to answer questions about my emotional wellbeing (anxiety and mood). Yes
 No

I agree to my school sharing my school grades with the research team. Yes
 No

I agree to be contacted by the researchers in 3-6 months' time to take part in the final part of the study. I understand that I do NOT have to agree to take part in 3-6 months' time even if my parents/carers have agreed for me to take part. Yes
 No

I agree to be contacted by the researchers in 12-18 months' time to take part in the final part of the study. I understand that I do NOT have to agree to take part in 12-18 months' time even if my parents/carers have agreed for me to take part. Yes
 No

I understand that my information may be kept by the researchers for up to 10 years but that this will NOT include identifiable information like my name or date of birth. Yes
 No

Demographic questions

What is your name?

What is your date of birth (DD/MM/YYYY)?

(DD/MM/YYYY)

What is the name of your favourite film? (This information will help us to link your data if you agree to take part in the follow-up study, and will also be used to make sure that you are who you say you are in case we need to contact you. Your answers will remain confidential.)

What year group are you in?

- 7
- 8
- 9
- 10
- 11
- 12

What gender were you assigned at birth?

- Male
- Female
- Prefer not to say

What gender do you self-identify as now?

- Male
- Female
- Other
- Prefer not to say

What is your ethnicity? (Please choose one)

- White (British; Irish; Any Other White Background)
- Mixed (White and Black Caribbean; White and Black African; White and Asian; Any Other Mixed Background)
- Asian or Asian British (Chinese; Indian; Pakistani; Bangladeshi; Any Other Asian Background)
- Black or Black British (Caribbean; African; Any Other Black Background)
- Any Other Ethnic Group)
- Prefer not to say

Digital screen use questions

In the past week, on an average weekday (i.e. Monday to Friday), approximately how much time per day have you spent using messaging apps (e.g. WhatsApp and Messenger)?

- Less than 10 minutes
- 10-30 minutes
- 31-60 minutes
- 1-2 hours
- 3-5 hours
- More than 5 hours

In the past week, on an average weekday (i.e. Monday to Friday), approximately how much time per day have you spent using video chatting apps (e.g. House Party and Skype)?

- Less than 10 minutes
- 10-30 minutes
- 31-60 minutes
- 1-2 hours
- 3-5 hours
- More than 5 hours

In the past week, on an average weekday (i.e. Monday to Friday), approximately how much time per day have you spent gaming? Note: this includes standard computer games as well as virtual social worlds (e.g. Second Life) and virtual game worlds e.g. Fortnite, Minecraft, World of Warcraft).

- Less than 10 minutes
- 10-30 minutes
- 31-60 minutes
- 1-2 hours
- 3-5 hours
- More than 5 hours

Did this include multiplayer gaming (i.e. playing with others over the internet)?

- Yes
- No
- N/A

Do you use social media? Note: We are defining social media broadly to include social networking sites (like Facebook and Instagram), blogs and microblog sites (like Tumblr and Twitter) and content communities (like YouTube).

- Yes
- No

Please can you tell us why not?

Which top three social media sites / apps do you use? Please state up to three. If you use only one or two, please just name those.

How many social media sites / apps do you use in total?

In the past week, on average, approximately how much time per day have you spent using social media sites / apps?

- Less than 10 minutes
- 10-30 minutes
- 31-60 minutes
- 1-2 hours
- 3-5 hours
- More than 5 hours

Social media motivations scale (adapted from Pertegal et al., 2019)

Using the dropdown responses for each question, please choose the word that shows how true or untrue the following statements are for you:

I use social media to hook up (i.e. to start a relationship with a boyfriend or girlfriend)

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to look for a date

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to seek a romantic partner (i.e. to find a boyfriend or girlfriend)

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to make new friends

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to extend my circle of friends

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to meet new people

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to ask for information about what to study for exams

- Completely untrue
- Untrue
- Somewhat untrue
- Neutral
- Somewhat true
- True
- Completely true

I use social media to ask for or share class notes	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to check or share group assignments	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to not feel disengaged from the world	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to feel connected with people	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to feel socially integrated	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to keep up-to-date with what my contacts are doing in their day-to-day life	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to know the details of my friends' lives	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true

I use social media to snoop on people that I am interested in (i.e. to check out what others are doing)	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to fill my free time	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to kill time when I am bored	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to entertain myself	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to stand out from others	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media for other people to comment on my posts	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to check that others like my posts	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true

I use social media to express my feelings and thoughts	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to give my opinion on a topic	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to discuss subjects with other people	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to keep up with what happens in the world	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to be informed about the news	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true
I use social media to find information about topics that I like and am interested in	<input type="radio"/> Completely untrue <input type="radio"/> Untrue <input type="radio"/> Somewhat untrue <input type="radio"/> Neutral <input type="radio"/> Somewhat true <input type="radio"/> True <input type="radio"/> Completely true

Social media use to stay informed about COVID-19

I use social media to stay informed about Covid-19 (the coronavirus)	<input type="radio"/> Never <input type="radio"/> Less then once a week <input type="radio"/> Once a week <input type="radio"/> 2-6 times a week <input type="radio"/> Once a day <input type="radio"/> Several times a day <input type="radio"/> All the time
--	--

RCADS scales (Chorpita et al., 2000)

I worry about things

- Never
 - Sometimes
 - Often
 - Always
-

I feel sad or empty

- Never
 - Sometimes
 - Often
 - Always
-

I worry when I think I have done poorly at something

- Never
 - Sometimes
 - Often
 - Always
-

Nothing is much fun anymore

- Never
 - Sometimes
 - Often
 - Always
-

I feel scared when I have to take a test

- Never
 - Sometimes
 - Often
 - Always
-

I feel worried when I think someone is angry with me

- Never
 - Sometimes
 - Often
 - Always
-

I have trouble sleeping

- Never
 - Sometimes
 - Often
 - Always
-

I worry that I will do badly at my school work

- Never
 - Sometimes
 - Often
 - Always
-

I worry that something awful will happen to someone in my family

- Never
- Sometimes
- Often
- Always

I have problems with my appetite	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I have no energy for things	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I worry I might look foolish	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I am tired a lot	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I worry that bad things will happen to me	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I cannot think clearly	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I worry that something bad will happen to me	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I feel worthless	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I worry about making mistakes	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I worry what other people think of me	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always
I worry about what is going to happen	<input type="radio"/> Never <input type="radio"/> Sometimes <input type="radio"/> Often <input type="radio"/> Always

I think about death

- Never
- Sometimes
- Often
- Always

I feel afraid if I have to talk in front of my class

- Never
- Sometimes
- Often
- Always

I feel like I don't want to move

- Never
- Sometimes
- Often
- Always

I feel afraid that I will make a fool of myself in front of people

- Never
- Sometimes
- Often
- Always

I feel restless

- Never
- Sometimes
- Often
- Always

If after having completed this questionnaire you are concerned about your safety or mental wellbeing, or someone else's safety or mental wellbeing, and would like to access further help or talk to a mental health professional, please tick yes and a member of the research team will contact you.

- Yes
- No

Supplementary Table 4

Participants' reasons for not using social media (n = 20)

Reason
1. I've deleted social media from my phone until I turn 14
2. I do not want to see inappropriate images, am not allowed and do not have much time or interest for those kinds of things.
3. I don't really want to and I don't really like it.
4. I'm not allowed to and I don't really want to.
5. I haven't got those apps.
6. I do not take part in any social media sites because I am not the sort of person who is on their phone all the time.
7. I'm not old enough for most of them. And my mum says no.
8. I'm not interested in social media.
9. Because it takes over your life!
10. Not interested and not allowed.
11. I don't have any social media apps or games and my parents don't allow it.
12. I'm not allowed and I don't see much point in them.
13. Too much effort.
14. My parents won't allow me to use it (apart from WhatsApp).
15. I don't feel like it.
16. Phone is too old to download it.
17. I am not allowed to use social media.
18. I don't really enjoy it.
19. My parents think I am too young to have Instagram as there are hackers but also some pretty weird people on social media.
20. It is a distraction to my education.

Supplementary Table 5

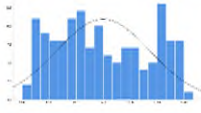
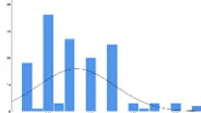
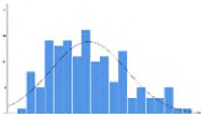
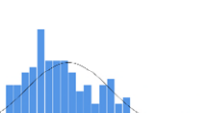
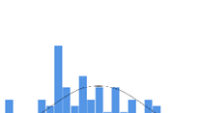


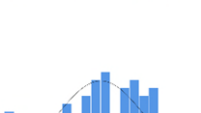
Social media platforms used by participants (N = 142)

Platform	Frequency (%)
Instagram	75 (52.82)
YouTube	69 (48.59)
Snapchat	52 (36.62)
TikTok	45 (31.69)
WhatsApp	43 (30.28)
Twitter	11 (7.75)
Pinterest	7 (4.93)
Reddit	7 (4.93)
Discord	7 (4.93)
Houseparty	3 (2.11)
Twitch	3 (2.11)
Messages	2 (1.41)
Amino	2 (1.41)
Tellonym	2 (1.41)
Facebook	1 (0.70)
FaceTime	1 (0.70)
Depop	1 (0.70)
Hatena Blog	1 (0.70)
Quora	1 (0.70)
Roblox	1 (0.70)
DebateIsland.com	1 (0.70)
Yubo	1 (0.70)

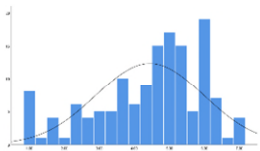
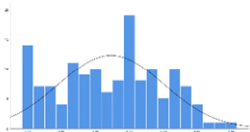
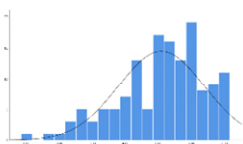
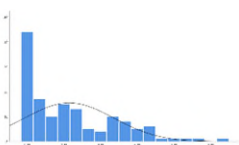
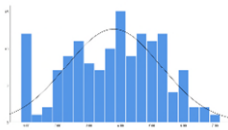
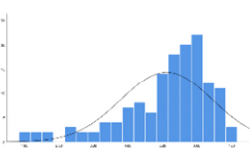
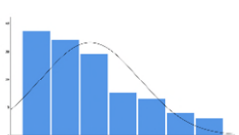
NB. Participants were asked to list their top three social media sites / apps.

Supplementary Table 6

Normality checks for complete case analysis ($N = 142$)

Variable	Histogram	Skewness ^a	Kurtosis ^b	K-S test statistic ^c
Age		0.17	-1.28	$D = .10, p = .001$
Number of SM sites		0.90	0.70	$D = .17, p < .001$
GAD		0.51	-0.38	$D = .11, p = .001$
Depression		0.88	0.66	$D = .12, p < .001$
Social anxiety		0.26	-0.66	$D = .09, p < .01$
Dating		2.27	4.59	$D = .35, p < .001$
New Friendships		0.53	-0.64	$D = .12, p < .001$
Academic Purposes		-0.30	-0.71	$D = .09, p < .01$

**Supplementary
Table 6**
(continued)

Social Connectedness		-0.67	0.03	$D = .14, p < .001$
Following and Monitoring Others		0.004	-0.94	$D = .10, p < .001$
Entertainment		-0.67	0.03	$D = .13, p < .001$
Social Recognition		1.01	0.35	$D = .18, p < .001$
Self-expression		-0.18	-0.74	$D = .09, p = .01$
Information		-1.22	1.27	$D = .17, p < .001$
Covid-19 information		0.79	-0.25	$D = .19, p < .001$

^a Skewness values between ± 2 are acceptable (George & Mallery, 2010)

^b Kurtosis values between ± 2 are acceptable (George & Mallery, 2010)

^c p values < 0.05 indicate significant deviations from normality

Supplementary Table 7

Pearson's correlation coefficients. Values in bold are significant correlations.

Variable	GAD	Depression	Social anxiety	DT	FR	AC	SC	FO	EN	SR	SE	IN
<i>Mental health</i>												
GAD	-											
Depression	.59**	-										
Social anxiety	.63**	.63**	-									
<i>Social media motive</i>												
Dating	.13	.16	.15	-								
Friendships	.20*	.19*	.29**	.41**	-							
Academic	.13	.16	.25**	.17*	.38**	-						
Social connectedness	.23**	.30**	.31**	.25**	.44**	.34**	-					
Following others	.28**	.23**	.35**	.27**	.39**	.34**	.59**	-				
Entertainment	.35**	.41**	.44**	.01	.23**	.07	.37**	.34**	-			
Social recognition	.23**	.25**	.31**	.20*	.46**	.20*	.41**	.45**	.29**	-		
Self-expression	.17**	.25**	.18*	.15	.37**	.25**	.48**	.39**	.24**	.46**	-	
Information	.26**	.10	.22*	-.08	.20*	.11	.35**	.19*	.20*	.16	.09	-
<i>Covid-19</i>												

DT = Dating; FR = Friendships; AC = Academic; SC = Social connectedness; FO = Following others; EN = Entertainment; SR = Social recognition; SE = Self-expression; IN = Information

** = $p < .01$ (sig 2-tailed)

* = $p < .05$ (sig 2-tailed)

Supplementary Table 8a

Univariate and multivariate regression analyses of depression on social media use motives and demographic variables with outliers recoded to ± 2 SD of the mean. Values in bold indicate significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM motives</i>						
Dating	0.93 [0.02, 1.88]	.044	-	-	-	-
New friendships	0.60 [0.07, 1.13]	.027	-	-	-	-
Academic purposes	0.52 [-0.01, 1.06]	.054	-	-	-	-
Social connectedness	0.99 [0.46, 1.52]	< .001	0.56 [0.02, 1.10]	.043	0.57 [0.02, 1.11]	.042
Following others	0.73 [0.19, 1.28]	.009	-	-	-	-
Entertainment	1.65 [1.04, 2.26]	< .001	1.40 [0.75, 2.05]	< .001	1.42 [0.75, 2.09]	< .001
Social recognition	1.06 [0.38, 1.74]	.003	-	-	-	-
Self-expression	0.84 [0.28, 1.39]	.003	-	-	-	-
Information	0.38 [-0.31, 1.06]	.282	-	-	-	-
COVID-19 information	0.23 [-0.27, 0.72]	.374	-	-	-	-
<i>Demographic</i>						
Age	0.32 [-0.17, 0.81]	.204	-	-	-0.01 [-0.48, 0.48]	.994
Gender	0.57 [-1.09, 2.22]	.498	-	-	-0.30 [-1.87, 1.27]	.708

Supplementary Table 8b

Univariate and multivariate regression analyses of GAD on social media use motives and demographic variables with outliers recoded to ± 2 SD of the mean. Values in bold indicate significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM motives</i>						
Dating	0.59 [-0.16, 1.33]	.124	-	-	-	-
New friendships	0.51 [0.09, 0.94]	.019	-	-	-	-
Academic purposes	0.34 [-0.09, 0.77]	.171	-	-	-	-
Social connectedness	0.60 [0.17, 1.04]	.007	-	-	-	-
Following others	0.74 [0.31, 1.16]	.001	0.42 [-0.02, 0.86]	.06	-	-
Entertainment	1.09 [0.60, 1.69]	< .001	0.82 [0.29, 1.34]	.002	0.97 [0.47, 1.47]	< .001
Social recognition	0.78 [0.23, 1.32]	.006	-	-	-	-
Self-expression	0.47 [0.02, 0.92]	.042	-	-	-	-
Information	0.86 [0.32, 1.39]	.002	0.61 [0.09, 1.13]	.02	0.18 [-0.39, 0.75]	.531
COVID-19 information	0.81 [0.44, 1.19]	< .001	-	-	0.77 [0.37, 1.18]	< .001
<i>Demographic</i>						
Age	0.26 [-0.13, 0.65]	.195	-	-	-0.01 [-0.38, 0.35]	.936
Gender	1.63 [0.33, 2.93]	.014	-	-	1.36 [0.15, 2.58]	.028

Supplementary Table 8c

Univariate and multivariate regression analyses of social anxiety on social media use motives and demographic variables with outliers recoded to ± 2 SD of the mean. Values in bold indicate significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM motives</i>						
Dating	0.99 [-0.11, 2.08]	.078	-	-	-	-
New friendships	1.09 [0.48, 1.70]	.001	-	-	-	-
Academic purposes	0.95 [0.33, 1.56]	.003	-	-	-	-
Social connectedness	1.22 [0.59, 1.84]	< .001	-	-	-	-
Following others	1.38 [0.77, 1.99]	< .001	0.90 [0.30, 1.51]	.004	0.74 [0.12, 1.35]	.019
Entertainment	2.08 [1.37, 2.78]	< .001	1.71 [0.99, 2.44]	< .001	1.56 [0.82, 2.30]	< .001
Social recognition	1.53 [0.75, 2.32]	< .001	-	-	-	-
Self-expression	0.71 [0.04, 1.37]	.037	-	-	-	-
Information	1.01 [0.22, 1.81]	.013	-	-	-	-
COVID-19 information	0.58 [-0.001, 1.16]	.05	-	-	-	-
<i>Demographic</i>						
Age	0.74 [0.17, 1.31]	.011	-	-	0.20 [-0.34, 0.73]	.465
Gender	3.54 [1.68, 5.40]	< .001	-	-	2.06 [0.27, 3.86]	.024

Supplementary Table 9a

Univariate and multivariate heteroscedastic regression analyses of depression on social media use motives and demographic variables. Values in bold indicate significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM motives</i>						
Dating	0.94 [-0.01, 1.88]	.052	-	-	-	-
New friendships	0.63 [0.09, 1.17]	.022	-	-	-	-
Academic purposes	0.54 [-0.004, 1.09]	.048	-	-	-	-
Social connectedness	1.03 [0.49, 1.58]	< .001	0.59 [0.04, 1.14]	.036	0.56 [0.01, 1.11]	.034
Following others	0.78 [0.22, 1.33]	.006	-	-	-	-
Entertainment	1.66 [1.06, 2.27]	< .001	1.41 [0.76, 2.05]	< .001	1.43 [0.77, 2.10]	< .001
Social recognition	1.09 [0.40, 1.78]	.002	-	-	-	-
Self-expression	0.87 [0.30, 1.43]	.003	-	-	-	-
Information	0.40 [-0.26, 1.05]	.237	-	-	-	-
COVID-19 information	0.26 [-0.25, 0.76]	.320	-	-	-	-
<i>Demographic</i>						
Age	0.35 [-0.14, 0.85]	.164	-	-	0.03 [-0.45, 0.51]	.913
Gender	0.53 [-1.15, 2.21]	.540	-	-	-0.34 [-1.91, 1.24]	.645

Supplementary Table 9b

Univariate and multivariate heteroscedastic regression analyses of GAD on social media use motives and demographic variables. Values in bold indicate significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM motives</i>						
Dating	0.59 [-0.15, 1.32]	.119	-	-	-	-
New friendships	0.51 [0.09, 0.93]	.017	-	-	-	-
Academic purposes	0.34 [-0.08, 0.76]	.113	-	-	-	-
Social connectedness	0.61 [0.17, 1.03]	.006	-	-	-	-
Following others	0.74 [0.31, 1.16]	.001	0.42 [-0.01, 0.84]	.056	0.28 [-0.13, 0.69]	.184
Entertainment	1.08 [0.60, 1.57]	< .001	0.81 [0.30, 1.31]	.002	0.87 [0.38, 1.37]	.001
Social recognition	0.78 [0.24, 1.32]	.005	-	-	-	-
Self-expression	0.47 [0.02, 0.91]	.039	-	-	-	-
Information	0.81 [0.31, 1.30]	.001	0.55 [0.07, 1.03]	.024	0.11 [-0.41, 0.64]	.671
COVID-19 information	0.81 [0.44, 1.18]	< .001	-	-	0.76 [0.38, 1.15]	< .001
<i>Demographic</i>						
Age	0.26 [-0.13, 0.65]	.190	-	-	-0.02 [-0.37, 0.34]	.927
Gender	1.63 [0.35, 2.91]	.012	-	-	1.18 [-0.03, 2.38]	.056

Supplementary Table 9c

Univariate and multivariate heteroscedastic regression analyses of social anxiety on social media use motives and demographic variables. Values in bold indicate significant predictors.

Predictor	Model 1 (univariate)		Model 2 (multivariate)		Model 3 (multivariate)	
	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value	Beta Coefficient [95% CI]	<i>p</i> value
<i>SM motives</i>						
Dating	0.99 [-0.09, 2.06]	.073	-	-	-	-
New Friendships	1.09 [0.49, 1.70]	<.001	-	-	-	-
Academic	0.95 [0.34, 1.56]	.002	-	-	-	-
Social connectedness	1.22 [0.60, 1.83]	< .001	-	-	-	-
Following others	1.38 [0.78, 1.98]	< .001	0.90 [0.30, 1.49]	.003	0.64 [0.05, 1.23]	.033
Entertainment	2.05 [1.37, 2.73]	< .001	1.69 [0.99, 2.39]	< .001	1.56 [0.87, 2.26]	< .001
Social recognition	1.53 [0.76, 2.31]	< .001	-	-	-	-
Self-expression	0.71 [0.05, 1.36]	.034	-	-	-	-
Information	1.01 [0.26, 1.74]	.007	-	-	-	-
COVID-19 information	0.58 [0.01, 1.15]	.047	-	-	0.57 [0.08, 1.05]	.023
<i>Demographic</i>						
Age	0.74 [0.18, 1.30]	.009	-	-	0.20 [-0.31, 0.71]	.442
Gender	3.54 [1.71, 5.47]	< .001	-	-	2.23 [0.52, 3.96]	.011