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Associations between social media use and loneliness in a cross-national population: Do motives for social media use matter?

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Associations between social media use and loneliness in a cross-national population: Do motives for social media use matter?

Abstract

Background: We aimed to examine the association between social media use and loneliness two years after the COVID-19 pandemic outbreak.

Methods: Participants were 1649 adults who completed a cross-sectional online survey disseminated openly in Norway, United Kingdom, USA, and Australia between November 2021 and January 2022. Linear regressions examined time spent on social media and participants' characteristics on loneliness, and interactions by motives for social media use.

Results: Participants who worried more about their health and were younger, not employed, and without a spouse or partner reported higher levels of loneliness compared to their counterparts. More time spent on social media was associated with more loneliness ($\beta = 0.12$, $p < 0.001$). Three profile groups emerged for social media use motives: 1) social media use motive ratings on avoiding difficult feelings higher or the same as for maintaining contact; 2) slightly higher ratings for maintaining contact; and 3) substantially higher ratings for maintaining contact. Time spent on social media was significant only in motive profile groups 2 and 3 ($\beta = 0.12$ and $\beta = 0.14$, both $p < 0.01$).

Conclusions: Our findings suggest that people who use social media for the motive of maintaining their relationships feel lonelier than those who spend the same amount of time on social media for other reasons. While social media may facilitate social contact to a degree, they may not facilitate the type of contact sought by those who use social media primarily for this reason.

Introduction

The onset of the COVID-19 pandemic and the subsequent lockdown of society resulted in severe disruptions in many aspects of social life. As people were generally instructed to practice 'social distancing' to curb the virus transmission (World Health Organization, 2020), many restrictions were placed on people's opportunity to meet other people. Many usual arenas in society for meeting people, such as schools, workplaces, organized leisure, cafes, and restaurants, were temporarily closed, and transportation was restricted (Gostin & Wiley, 2020). This situation led to a growing concern about negative mental health effects of the well-intended measures to reduce the viral spread (Kaufman, Petkova, Bhui, & Schulze, 2020; Mi, Jiang, Xuan, & Zhou, 2020).

Loneliness refers to the subjective, distressing experience of having a lack or deficiency in one's social connection to others, indicating that relationships with others are missing or inadequate (Bekhet, Zauszniewski, & Nakhla, 2008). Some authors have distinguished between different aspects of loneliness, and subtypes have included social loneliness, referring to having too few people in one's social network, and emotional loneliness, referring to having a lack of intimacy and attachment in relationships (Dahlberg & McKee, 2014; de Jong Gierveld & Van Tilburg, 2010; Dykstra & Fokkema, 2007). A vast amount of studies have identified loneliness to be an important precursor of mental health problems such as depression (Beutel et al., 2017; Lee, Cadigan, & Rhew, 2020; Luanaigh & Lawlor, 2008; Palgi et al., 2020; Santini et al., 2016; Victor & Yang, 2012), anxiety (Beutel et al., 2017; Palgi et al., 2020) and suicidal ideation and behavior (Beutel et al., 2017; Stickley & Koyanagi, 2016). Due to the social restrictions during the pandemic, a particular concern was that more people would struggle with loneliness over a longer period of time (Hoffart, Johnson, & Ebrahimi, 2022; Luchetti et al., 2020; Palgi et al., 2020). However, the evidence to support such worries have been mixed. A nationwide study in the USA showed no marked

increase in loneliness, but rather a remarkable resilience in the response to the pandemic situation (Luchetti et al., 2020). During the first weeks of lockdown in the UK, a study showed relatively high levels of loneliness in the population, but little sign of worsening (Bu, Steptoe, & Fancourt, 2020). In contrast, other studies have shown increasing levels of loneliness in various population subsets during the COVID-19 pandemic (Buecker & Horstmann, 2021; Lampraki, Hoffman, Roquet, & Jopp, 2022; Lee et al., 2020). In view of its importance for the development of mental health problems and disorders, loneliness has been considered a major public health issue during the COVID-19 pandemic.

In situations where stressful events and circumstances are unavoidable, such as during the pandemic, engaging with the community and receiving support from the network can serve as an important way of coping with stress (Lazarus & Folkman, 1984; Zacher & Rudolph, 2021). However, adherence to the social distancing regulations during the pandemic meant that the typical ways of coping by engaging with others – being together in smaller or larger groups – were difficult to use. Reduced access to other people that typically provide social support and enhance resiliency might significantly affect people's usual coping strategies and therefore leave individuals more vulnerable to experiencing loneliness.

Since their inception, social media have become widely adopted in people's everyday lives (Boulianne, 2015; Chou, Hunt, Beckjord, Moser, & Hesse, 2009). Further, with the limited abilities to connect with others in person during social distancing and isolation mandates, social media have been increasingly used for connecting people in work, learning, and social interactions (Gao et al., 2020; Palgi et al., 2020; Wiederhold, 2020). However, the role of social media for people's mental health and wellbeing is disputed. While some studies have shown that social media allow people to maintain their social relationships, thereby representing one way of coping with loneliness and distress (Cauberghe, Van Wesenbeeck, De Jans, Hudders, & Ponnet, 2021; Morahan-Martin & Schumacher, 2003; Nowland, Necka,

& Cacioppo, 2018; Thomas, Orme, & Kerrigan, 2020), other studies have found higher levels of social media use to be associated with poorer mental health (Gao et al., 2020; Geirdal, Ruffolo, et al., 2021) and higher levels of loneliness (Bonsaksen, Schoultz, et al., 2021; Helm et al., 2022). Thus, the coping potential of social media use to mitigate stress, is unclear.

Experimental research has shown that students whose social media use was limited to 10 minutes per day over a three week period experienced significant reductions in depression and loneliness, compared to control group participants who used social media without restriction (Hunt, Marx, Lipson, & Young, 2018). Further, associations between social media use and mental health outcomes may vary by a range of other factors. For example, a previous study found that older people (60+ years of age) using more types of social media experienced lower levels of social loneliness, whereas younger people (18-39 years of age) using more types of social media experienced higher levels of emotional loneliness (Bonsaksen, Ruffolo, et al., 2021). Such findings increase the complexity of this picture, demonstrating that associations may depend on participant characteristics, which aspect of social media use is considered, as well as nuances in the employed outcome measures.

Time spent using social media during a defined time interval is often used as a measure of social media use. However, a wide range of social media measures is used in research. While varied measurement methods may contribute to ambiguity in the interpretation of research findings (Petropoulos Petalas et al., 2021), they may also be useful for addressing aspects of social media use that are otherwise left unexplored. One line of research has focused on people's motives for using social media, and a previous study found that using Facebook for making new friends reduced loneliness, whereas using Facebook for social skills compensation increased loneliness (Teppers, Luyckx, Klimstra, & Goossens, 2014). Similarly, a recent study found that dissimilar motives for social media use were differently associated with mental health (Thygesen et al., 2022). Higher ratings on the

'personal contact' and 'maintaining relationships' motives for using social media were associated with better mental health, while higher ratings on the 'decrease loneliness' and 'entertainment' motives were associated with poorer mental health. Intrapersonal motives for social media use, including the desire to forget complications of everyday life and to pass time, have also been found to be the most important predictor for problematic social media use (Schivinski et al., 2020).

The world continues to respond to the pandemic, via vaccination roll out, lock downs and restrictions on travel. Years after the initial onset of the pandemic it is possible that associations between social media use and mental health outcomes – including loneliness – are different from what they were in the early stages. Such changes may be due to lifted restrictions on social interaction, new waves of virus transmission, having adapted to a new lifestyle, or a combination of these and other contributing factors. In addition, previous results concerned with the significance of motives for social media use justify exploring whether the association between time on social media and loneliness depend on the motives people have for using social media. Considering motives for engaging with social media may provide nuance to our understanding of how social media use relates to loneliness. In addition, it may contribute to specifying some of the conditions moderating the coping potential related to using social media during the stressful COVID-19 pandemic.

Aim of the study

The aim of the study was to examine the association between daily time on social media and loneliness in a cross-national population two years after the COVID-19 pandemic outbreak, and to examine any moderation effect of motives for social media use. The research questions were:

1) What is the nature of the association between time spent on social media use and loneliness, as measured two years after the COVID-19 outbreak?

2) Do motives for social media use moderate the association between time spent on social media use and loneliness during the same period?

Methods

Design

The study reports from the third cross-sectional online survey disseminated openly by social media (i.e., Facebook, LinkedIn, and Twitter) in four countries (Norway, United Kingdom [UK], USA, and Australia) during the COVID-19 pandemic. This survey was open for the adult ($\geq$ 18 years of age) general public's participation between November 2021 and January 2022, while the two previous surveys were administered in April/May 2020 and in November 2020, respectively.

Sample

The total number of participants was 1649, with 242 (14.7%) from Norway, 255 (15.15%) from the UK, 915 (55.5%) from the USA, and 237 (14.4%) from Australia. The age distribution showed that 42% of the participants were under the age of 40 years, 43% between 40 and 59 years, and 15% were 60 years or older. Women comprised the larger part of the sample (75%), while there were 336 (20%) men. Seventy-one (4%) identified their gender as 'other' or preferred not to respond to the question, and due to small cell sizes, these individuals were removed from all analyses where the gender variable was included.

Measures

An overview of all variables used in the study is shown in Table 1.

Outcome variable

Loneliness

The Loneliness Scale (de Jong Gierveld & van Tilburg, 2006) consists of six statements, all of which are rated from 0 (totally disagree) to 4 (totally agree). There are two different uses of

the instrument. It is possible to construct two different scales, namely social loneliness (e.g.,

"There are plenty of people I can rely on when I have problems") and "emotional loneliness"

(e.g., "I experience a general sense of emptiness") (Bonsaksen et al., 2018; de Jong Gierveld

& van Tilburg, 2006). However, including all items to construct a one-factor scale measuring

loneliness as one overarching concept is also commonly used (Geirdal, Price, et al., 2021),

and provided that we required an overall measure of loneliness, we used the one-factor

approach in this study. Items with positive phrasing (e.g., having people to rely on) were

reverse coded prior to analysis. Cronbach's α for the scale items was 0.83 indicating strong

reliability. The score range was 0-24 with higher scores indicating higher levels of loneliness.

Main predictor variables

Daily social media use

The participants were asked to indicate the amount of time they had spent on social media on

a typical day during the last month. In line with the work of Ellison and co-workers (2007),

response options were less than 10 minutes (1), 10-30 minutes (2), 31-60 minutes (3), 1-2

hours (4), 2-3 hours (5), and more than three hours (6).

Motives for social media use

The participants were also asked about seven possible motives for using social media. These

questions were adapted to a more general form based on Teppers and colleagues (2014)

whose study was concerned with one particular social media. The items were phrased:

"Nowadays I use social media…" with the following endings: "to feel involved with what's

going on with other people" (personal contact motive), "because it makes me feel less lonely"

(decrease loneliness motive"), "so I don't get bored" (entertainment motive), "to keep in

contact with my friends" (maintaining relationships motive), "because I dare say more"

(social skills compensation motive), "to be a member of something" (social inclusion motive),

and "to make new friends" (meeting people motive). Response options for these items were never (1), seldom (2), sometimes (3), often (4) and very often (5).

One previous study showed that ratings on motives were differently associated with mental health (Thygesen et al., 2022). Specifically, the personal contact and maintaining relationships motives for using social media were associated with better mental health, while the 'decrease loneliness' and 'entertainment' motives were associated with poorer mental health. Thus, we focused on these two motives. The sum of the 'personal contact' and 'maintaining relationships' motives was used as a measure of *maintaining contact* motives, while the sum of the 'decrease loneliness' and 'entertainment' motives was used as a measure of *avoiding difficult feelings* motives. The items included on each of the scales correlated well (r=0.53, p<0.001 and r=0.40, p<0.001, respectively).

To categorize profiles of motives, a new variable was constructed as the difference between the participants' ratings on the *maintaining contact* and the *avoiding difficult feelings* motive. Based on the distribution of this variable, three similarly large profile groups were identified by using the visual binning procedure with two cut-points. Motive profile group 1 (n=686, 41.6%) rated the *avoiding difficult feelings* items higher or the same as the *maintaining contact* items. Motive profile group 2 (n=589, 35.7%) had slightly higher ratings (1 or 2 point difference) on the *maintaining contact* items than on the *avoiding difficult feelings* items, while motive profile group 3 (n=374, 22.7%) had substantially higher ratings (3 point difference or more) on the *maintaining contact* items than on the *avoiding difficult feelings* items.

Covariates

Sociodemographic characteristics

Sociodemographic variables included country (Norway UK, USA, Australia), age group (18-39, 40-59, 60 and above), gender, education level (lower vs bachelor's degree or higher), employment status (yes/no), and having a spouse/partner (yes/no).

Health worry

The participants were asked to rate their level of worry about their own health on one item. The item had the following response options: (1) not at all, (2) a bit, (3) pretty much, (4) very much, and (5) extremely.

Analysis

Comparisons between two groups were made using the independent *t*-test, while comparisons between several groups were made using the one-way analysis of variance (ANOVA). Bivariate associations between continuous variables were examined with Pearson's correlation coefficient *r*. Linear multiple regression analysis was used to examine adjusted associations between each of the independent variables and loneliness. An interaction term was included to examine whether the association between social media use and loneliness varied by motive profiles. Independent variables were entered in three blocks: (1) age group, spouse/partner, employment, and health worry; (2) daily time on social media; and (3) daily time on social media × motive profile group. If the interaction term was statistically significant, separate analyses were performed for each of the motive profile groups. Effect sizes are reported as standardized beta weights *β*, and statistical significance was set at $p<0.05$.

Missing data were removed from the analyses by casewise deletion. In preparation for the multivariate linear regression analysis, multicollinearity was checked with the variance inflation factor (VIF) (Hocking, 2013). All VIFs were between 1.02 and 1.12, indicating no problematic multicollinearity between the independent variables. While the distribution of loneliness scores deviated from the normal distribution (Kolmogorov-Smirnov test $p< 0.001$),

this has been found to be common in large public health datasets without compromising the validity of parametric test results (Lumley, Diehr, Emerson, & Chen, 2002). In addition, the loneliness variable showed only minor skewness (0.32, $SE= 0.06$), well within the recommended interval (George & Mallery, 2010). However, the standardized residuals of the dependent variable (between -2.39 and 3.19) just exceeded the upper range of the recommended interval (i.e., between -3 and 3) (Field, 2013), indicating a need for a cautious interpretation of the regression results.

Ethics

The study was conducted after receiving ethical approval from the following review boards: OsloMet (20/03676) and the regional committees for medical and health research ethics (REK; ref. 132066) in Norway, reviewed by the University of Michigan Institutional Review Board for Health Sciences and Behavioral Sciences (IRB HSBS) and designated as exempt (HUM00180296) in USA, by Northumbria University Health Research Ethics (HSR1920-080) and University of Central Lancashire (Health Ethics Review Panel) (HEALTH 0246) in the UK, and by The University of Queensland Human Research Ethics Committees in Australia (HSR1920-080 2020000956).

Results

Loneliness in sample subgroups

Table 2 displays the levels of loneliness in the sample subgroups with significance tests of differences. Participants from Norway reported lower levels of loneliness compared to participants from the other three countries. Participants who were younger, not employed, and without a spouse or partner reported higher levels of loneliness compared to their counterparts. There were no differences according to gender or education level.

Table 2 about here

Association between social media use and loneliness

Table 3 displays the results from the multiple linear regression analysis with the total sample. Adjusted for age, spouse/partner, employment and health worry, more time spent on social media was associated with more loneliness ($\beta = 0.12$, $p < 0.001$). Having a spouse or partner and having employment were associated with lower levels of loneliness, while higher levels of health worry was associated with higher levels of loneliness. Unadjusted associations between the study variables are displayed in Appendix 1.

Table 3 about here

Moderation analysis

The interaction between time on social media and motive profile included in Model 3 (Table 3) was significant, so we proceeded with separate analyses for each of the three motive profile groups. The results are shown in Table 4. For the participants in motive profile group 1 (social media use motive ratings on *avoiding difficult feelings* higher or the same as for *maintaining contact*), time spent on social media was not significantly associated with loneliness. For the participants in motive profile groups 2 and 3 (slightly, and substantially, higher ratings of using social media for *maintaining contact*, respectively), more time spent on social media was associated with higher levels of loneliness ($\beta = 0.12$ and 0.14, respectively; both $p < 0.001$).

Table 4 about here

Discussion

Summary of main results

This study found that more time spent on social media was associated with higher levels of loneliness, even when adjusting for age group, living with spouse/partner, employment, and health worry. The association between social media use and loneliness was found to vary by the participants' motive profile for social media use. For participants with higher or the same ratings on using social media to *avoid difficult feelings* (compared with their ratings on using social media to *maintain contact*), there was no significant association between social media use and loneliness. For participants who reported higher levels of *maintaining contact* motives for social media use (compared to *avoiding difficult feelings*), relatively weak, but statistically significant associations were shown between more time spent daily on social media and higher levels of loneliness.

Association between social media use and loneliness

The study showed that higher levels of social media use were related to higher levels of loneliness. This finding is in line with the results of previous surveys conducted in earlier stages of the COVID-19 pandemic (Bonsaksen, Schoultz, et al., 2021; Geirdal, Ruffolo, et al., 2021; Thygesen et al., 2022). The consistency of findings across studies using a variety of mental health-related outcomes supports the notion that high levels of social media use relate not only to loneliness, but to mental distress more in general. It also supports the notion that these associations are relatively stable across time – or, at least, across the extraordinary times of the COVID-19 pandemic. Paradoxically, 'social' media appears, in effect, to hinder rather than promote people's social wellbeing. The underlying mechanisms may concern the addictive properties of social media (Hawi & Samaha, 2017; Verduyn et al., 2015), so people who have problems with self-regulation may be less able to 'log off' and experience social media fatigue and/or social media addiction as a result (Islam, Laato, Talukder, & Sutinen,

2020). It may also concern people's perception of social media content, which is often in the form of texts and photos conveying a positive message of joy, fulfilment, adventure, or success of some kind. More time spent digesting other people's happiness on social media may accelerate one's own feelings of loneliness and distress, possibly fueled by envy, as shown in a recent study (Wang et al., 2020). In the opposite case, observing social media posts displaying the challenges of others without being able to provide direct support may also contribute to increased feelings of loneliness.

While the general finding of a negative association between social media use and mental health is supported by a recent meta-review (Meier & Reinecke, 2020), such results appear to rely heavily on the employed methods of measurement (Meier & Reinecke, 2020; Petropoulos Petalas et al., 2021). Further, all cross-sectional studies are hampered with an inability to establish cause and effect relationships. Thus, the nature of cross-sectional associations may be reversed, i.e., people with higher levels of loneliness tend to use social media more often.

Moderation analysis

For participants in Motive profile group 1, using social media predominantly to escape from burdensome feelings (boredom, loneliness), the perception of loneliness was not affected by time spent using social media. Entertaining oneself on social media can be time consuming, and given that escapism is the purpose, then time on social media does not seem to affect one's sense of connection or disconnection from other people. Conversely, for participants in Motive profile groups 2 and 3, who were more inclined to use social media for the purpose of staying in contact with people and use it as a means of 'relationship maintenance', levels of loneliness were higher for those with more frequent social media use. Possibly, people with such motives may be idealistic about the role of social media in connecting people. However, when using social media, they may not be met with the level of reciprocity they want or

expect, and they may therefore be disappointed by the response (or lack of such) they receive and may feel lonelier as a result. They may also experience social media to be a poor substitute for face-to-face contact. Even if they do get positive responses and have reciprocity in their online relationships, the contact is still 'virtual' and may not feel as real, or as meaningful, as it would in real life (Yao & Zhong, 2014). Thus, for those with predominant 'maintaining contact' motives, spending more time on social media may be like striving for a type of contact that is difficult to fully accomplish online. More time spent striving for meaningful relationships on social media may therefore result in a deeper sense of loneliness.

Assuming that social media use also can function as a coping mechanism related to the stress experienced during the COVID-19 pandemic, our findings may cautiously suggest a specific application of Lazarus and Folkman's (1984) stress, appraisal, and coping model, as shown in Figure 1. While the COVID-19 pandemic can be considered a general stressor, our study does not provide evidence of how people have interpreted the situation (appraisal). Social media may have been used as both problem-focused coping (e.g., obtaining information about vaccines or social distancing requirements in a given area) and emotion-focused coping (e.g., having contact with family and friends), while they have assumingly also been used in ways that do not reflect coping with stress in any way. Loneliness, depicted as the outcome of the stress appraisal and -coping process, was more strongly associated with social media use (coping behavior) among those whose motives for using social media were predominantly to maintain contact with other people.

Figure 1 about here

Loneliness according to country

Participants from Norway reported lower levels of loneliness compared to participants from the other three countries. This difference between Norway and the other involved countries mirrors the results of the study using data from the previous two surveys conducted in the four countries (Geirdal, Price, et al., 2021). Therefore, lower levels of loneliness in Norway compared to UK, USA, and Australia appear to be consistent across all stages of the pandemic. One possible explanation for the difference relates to variations in cultural norms and values, with norms and values being more aligned with 'collectivism' in Norway and more aligned with 'individualism' in the other countries. Research has shown lower levels of loneliness among citizens of countries classified as collectivistic, compared to citizens of individualistic countries (Barreto et al., 2021; Heu, van Zomeren, & Hansen, 2019; Rokach, 2018; Taniguchi & Kaufman, 2021). Despite social restrictions, people in countries with a collectivist orientation may be more inclined to feel being part of a larger community, and they may therefore feel less lonely than their counterparts in countries more oriented towards individualism.

An alternative explanation concerns the social restrictions effective at the time of completing the survey, as they may also have been different in the four countries. Possibly, fewer restrictions in Norway at the time of completing the survey might also have contributed to lower levels of loneliness among the participants from Norway. In the case of any systematic differences in the reporting pattern regarding loneliness between participants from Norway and participants from the other countries (i.e., people in Norway being less open about feeling lonely), such reporting differences might also explain the lower levels of loneliness among the participants from Norway.

Loneliness associated with health worries

We found that individuals who were more worried about their health consistently had higher levels of loneliness. Two years into the COVID-19 pandemic, shelter-in-place restrictions

have been relaxing for many locations around the world in different periods. People who are more worried about their own health may be more inclined to continue to self-isolate and engage in less social interactions, especially those with certain medical conditions that would make them vulnerable to more severe consequences if contracted with COVID-19. This reasoning is consistent with previous research findings from Norway, where stronger health anxiety was found to be related to less reduction in loneliness over time (Hoffart et al., 2022). Our findings indicate that resources allocated for mental health and social workers to reach out to individuals who have high levels of worries about their health to provide support, is warranted.

Study limitations

Our study is cross-sectional, and the findings cannot be used to infer causality. This applies to our finding that more time spent on social media was associated with higher levels of loneliness, especially in people who reported stronger motives of social media use for maintaining contact. We cannot infer that more time on social media use would result in higher levels of loneliness. It may be that people who have higher levels of loneliness to start off with were more likely to spend more time on social media in an effort to maintain contact, and we do not have information to inform how successful that had been, in terms of if levels of loneliness had already been reduced or if it increased compared to if they had spent less time on social media.

The recruitment of participants relied on disseminating the survey link via social media. Therefore, participants in this study might be particularly attentive towards social media postings in general, and possibly also towards content related to COVID-19. Based on the study, it is not known which social media platform(s) usage time participants reported. The sample composition was skewed, with more participants being female and from the USA,

and fewer participants in the older age groups. The study sample is not representative of the general population in the involved countries.

Conclusion and implications

The study showed that more time spent on social media was associated with higher levels of loneliness, in particular for people who used social media as a means for maintaining relationships. In combination with studies conducted in earlier stages of the pandemic, the study suggests that the relationship between more frequent social media use and poorer mental health outcomes has been relatively consistent throughout the pandemic. A novel finding was the moderating effect of motives for social media use on the association between social media use and loneliness. The finding suggests that people whose motive for using social media is for maintaining their relationships with other people feel lonelier than those who spend the same amount of time on social media, but who do it for other reasons. While social media may facilitate social contact to a degree, they may not facilitate the type of contact sought by those who use social media primarily for maintaining contact with others.

Alt text for Figure 1

The figure shows how the stress, appraisal and coping model may be applied to the study results. The association between time spent on social media and loneliness was stronger for participants motivated by a desire to maintain contact, and weaker for participants motivated by a desire to avoid difficult feelings.

Declarations

Conflict of interest: There are no conflicts of interest related to this article.

Informed consent: All participants in this study electronically provided informed consent to participate.

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Table 1. Overview of all variables used in the study

Variables	Categories	n (%)	Range	M (SD)
Country	Norway	242 (14.7)		
	UK	255 (15.5)		
	USA	915 (55.5)		
	Australia	237 (14.4)		
Age group	18-39	694 (42.0)		
	40-59	714 (43.3)		
	60+	241 (14.6)		
Gender	Male	336 (20.4)		
	Female	1242 (75.3)		
Education level	< BSc degree education	391 (23.7)		
	≥ BSc degree education	1258 (76.3)		
Spouse/partner	No spouse or partner	587 (35.6)		
	Having spouse or partner	1062 (64.4)		
Employment	No employment	463 (28.1)		
	Having employment	1186 (71.9)		
Loneliness			0-24	9.9 (5.3)
Time on social media			1-6	4.3 (1.4)
Social media motives	Personal contact		1-5	3.2 (1.1)
	Decrease loneliness		1-5	2.4 (1.2)
	Entertainment		1-5	3.2 (1.2)
	Maintaining relationships		1-5	3.4 (1.1)
	Social skills compensation		1-5	1.9 (1.1)
	Social inclusion		1-5	2.2 (1.2)
	Meeting people		1-5	1.6 (0.9)
Health worry			1-5	2.3 (1.2)

Table 2. Loneliness in sample subgroups

Subgroups	Loneliness *M* (*SD*)	*p*
Country		< 0.001
Norway	7.5 (5.3)	
UK	10.1 (5.1)	
USA	10.3 (5.0)	
Australia	10.8 (5.7)	
All countries	9.9 (5.3)	
Age groups		< 0.01
18-39 years	10.3 (5.1)	
40-59 years	9.8 (5.4)	
60 + years	9.1 (5.5)	
Gender (n = 1578)		0.81
Male	9.9 (5.4)	
Female	9.8 (5.2)	
Education level		0.13
Lower education	10.3 (5.4)	
Higher education (Bachelor's degree or higher)	9.8 (5.2)	
Spouse/partner		< 0.001
Yes	9.2 (5.1)	
No	11.2 (5.4)	
Employment		< 0.001
Yes	9.6 (5.1)	
No	10.7 (5.6)	

Note. Unless otherwise noted, *n* =1649 included in all analyses.

Table 3. Linear regression analysis displaying adjusted associations with loneliness

Independent variables	Model 1	Model 2	Model 3
Higher age group	-0.06*	-0.04	-0.00
Spouse/partner	-0.17***	-0.17***	-0.15***
Employment	-0.08***	-0.07**	-0.07**
Health worry	0.22***	0.20***	0.19***
Explained variance	**9.3%***		
Time on social media		0.12***	0.24***
R^2 change		**1.3%***	
Explained variance		**10.6%***	
Time on social media × motive profile			-0.24***
R^2 change			**4.0%***
Explained variance			**14.6%***

Note. n = 1649 for all analyses. *p<0.05, **p<0.01, ***p<0.001

Table 4. Linear regression analysis displaying adjusted associations with loneliness by motive profile

Independent variables	Motive profile 1	Motive profile 2	Motive profile 3
Higher age group	0.01	0.09*	-0.10
Spouse/partner	-0.18***	-0.14**	-0.16**
Employment	-0.10*	-0.06	-0.06
Health worry	0.11**	0.25***	0.28***
Explained variance	**6.4%***	**9.5%***	**12.8%***
Time on social media	0.05	0.12**	0.14**
R^2 change	**0.2%**	**1.3%**	**1.9%**
Explained variance	**6.6%***	**10.8%***	**14.7%***

Note. Motive profile groups were categorized based on ratings on using social media to avoid difficult feelings or for maintaining contact. Motive profile group 1 (n=686, 41.6%): avoiding difficult feelings higher or the same as for maintaining contact. Motive profile group 2 (n=589, 35.7%): slightly higher on maintaining contact than avoiding difficult feelings motives. Motive profile group 3 (n=374, 22.7%): substantially higher on the maintaining contact than on the avoiding difficult feelings motives.

*p<0.05, **p<0.01, ***p<0.001

Appendix 1. Pearson's *r* correlation coefficients indicating the strength of associations between variables employed in the study

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	.00	-.08**	.08**	-.25***	-.08**	-.14***	.05*	-.06*	-.31***	.02	.09***	.01	-.06*	-.13***
2	1	.05*	.02	-.04	-.01	.06*	.18***	.13***	.06*	.13***	-.13***	.05	-.05*	.15***
3		1	.10***	.16***	-.04	-.03	.04	.00	.03	.02	-.08***	-.02	-.05	.08***
4			1	.10***	-.19***	-.04	.02	-.15***	-.07**	-.03	-.00	-.06*	-.10***	-.02
5				1	-.09***	-.05*	-.06*	-.09***	.03	-.04	-.12***	-.08***	-.12***	-.03
6					1	.17***	.08**	.33***	.17***	-.10***	.10***	.14***	.12***	.23***
7						1	.27***	.32***	.33***	.14***	.20***	.23***	.21***	.17***
8							1	.54***	.29***	.53***	.21***	.40***	.25***	.22***
9								1	.40***	.36***	.26***	.43***	.33***	.28***
10									1	.20***	.10***	.23***	.13***	.14***
11										1	.15***	.30***	.26***	.11***
12											1	.40***	.36***	-.01
13												1	.50***	.12***
14													1	.10***

Note. Variables are: 1. Age group, 2. Gender, 3. Education level, 4. Spouse/partner, 5. Employment, 6. Loneliness, 7. Daily time on social media, 8. Personal contact, 9. Decrease loneliness, 10. Entertainment., 11. Maintaining relationships, 12. Social skills compensation, 13. Social inclusion, 14. Meeting people, 15. Health worry. Higher variables ratings indicate higher age, female gender, higher education, having a spouse/partner, having employment, higher levels of loneliness, more time spent daily on social media, higher levels on each motive for using social media (i.e., variables 8-14), and higher levels of health worry. $*p<0.05, **p<0.01, ***p<0.001$