

**Social Networking Sites Use and Loneliness in Young Adults
during COVID-19:
The Mediatlional role of Social Connectedness**

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Abstract

Background. Since the outbreak of the COVID-19 pandemic, everyone's life has changed. Due to governmental measures and preventive behaviours regarding in-person social contact, the prevalence of loneliness among the population has risen. Especially young adults show to be at risk of feeling lonely. Additionally, loneliness is associated with a variety of psychological and physiological effects which decrease well-being and resilience. Based on the increased prevalence of loneliness and restricted possibilities to have in-person social contact, this research focused on the impact of using Social Networking Sites (SNS) on experienced loneliness. Existing studies mainly focused on SNS use in general without distinguishing passive and active use. Moreover, possible mediating factors between SNS use and loneliness were scarcely investigated. Therefore, this study investigated the hypothesized positive effect of active SNS use on loneliness as well as social connectedness as mediating factor within this relationship.

Method. Through convenience and snowball sampling, a total sample of 101 participants between the ages of 18 to 29 years were acquired. The participants were asked to fill out an online survey which included questionnaires measuring the variables of loneliness, social connectedness, SNS use, and time spent on SNS to be controlled for.

Results. The mediation analysis revealed that more active SNS use did not significantly predict lowered feelings of loneliness. Additionally, social connectedness did not show to mediate the predicted relationship between SNS use and loneliness. The effect of SNS use on social connectedness showed to be non-significant. In contrast, more perceived social connectedness significantly predicted reduced feelings of loneliness.

Conclusion. Overall, the present study did not confirm the hypothesized outcomes. Nonetheless, valuable implications for future research were identified and the results contributed to the divergent findings of past studies investigating the effect of SNS use on feelings of loneliness.

Keywords: COVID-19, loneliness, well-being, social connectedness, social networking sites

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Introduction

The worldwide COVID-19 pandemic has become a great challenge all around the world and consequently impacted individuals' lives on a large scale. Since the pandemic started in 2019 and spread around the world in the subsequent months (World Health Organization, 2020), people were faced with an altered daily life shaped by governmental measures aiming to counteract the spread of the coronavirus. These measures included for instance social distancing, self-isolation and quarantine, as well as working and studying in home office due to temporary closure of educational institutions and workplaces (Pfefferbaum & North, 2020). Ultimately, these regulations led to a considerable decline of in-person social interactions and showed detrimental effects on individuals' mental health including a wide range of possible symptoms (Brooks et al., 2020; Dawson & Golijani-Moghaddam, 2020; Zhou et al., 2020). Therefore, it became increasingly important to investigate the aspects of people's mental health which declined during the COVID-19 pandemic as well as explore potential factors counteracting this decline.

Loneliness

Researchers dealing with the COVID-19 pandemic and accompanying governmental measures assume that the reduction of face-to-face social contact cause people to experience fewer social relationships than they long for (Groarke et al., 2020). This "discrepancy between desired and perceived social relationships" (Palgi et al., 2020, p. 109) can be defined as loneliness. The feeling of loneliness is not necessarily dependent on the physical state of aloneness or magnitude of social contacts but rather an individual's subjective feeling of connectedness (Luchetti, 2020).

Loneliness is associated with a variety of negative physical and psychological effects, for instance poor quality of sleep, substance abuse (Theeke, 2009), depression, and low life satisfaction, among others (Beutel et al., 2017); but also, with an aggravation of preceding mental health issues and the occurrence of self-harm and suicide (Groarke et al., 2020). Thus, an enduring state of feelings of loneliness, as it can be the case of social isolation during a pandemic, can have crucial negative effects on individuals' well-being. Moreover, higher levels of loneliness are also related to lower resilience (Jakobsen, et al., 2020), meaning a lower ability to cope with hard times, for example during a pandemic (Harms et al., 2018).

However, besides the consequences on an individual level, a higher prevalence of loneliness can also have a negative impact on a societal level. According to Stickley et al. (2020), individuals who feel lonely show a lower commitment to engage in COVID-19

preventive behaviours. Following this, lonelier people may show to be more reluctant to comply to governmental restrictions such as avoiding contact to other people, thereby enhancing the spread of the virus.

Overall, loneliness shows to be a phenomenon with increasing prevalence during the current pandemic. It involves several negative consequences, including detrimental effects on people's well-being, their capability to cope with COVID-19, and their willingness to take part in preventive measures. Thus, it is of importance to investigate which factors are related to and possibly mitigate the risk of feeling lonely.

Young Adults' Susceptibility to Loneliness

Recent studies indicated that younger adults are especially inclined to feel high levels of loneliness during the current situation of the coronavirus (Bu et al., 2020). According to Groarke et al. (2020), younger adults displayed a four to five times higher likelihood to experience feelings of loneliness than individuals over the age of 65 years. This high prevalence of loneliness in young adults might be explained by a greater disruption of their daily life and consequently increased social isolation due to governmental regulations such as closure of schools and universities (Groarke et al., 2020). In addition, individuals at this age do not only report higher disruption in general but this perceived disruption also showed to have a greater negative effect on well-being in younger than in older people (Knepple Carney et al., 2021). In accordance with that, the Centers for Disease Control and Prevention (2021) reported that individuals aged 18 to 29 years possessed the highest rates of anxiety and depression during the ongoing pandemic. Consequently, young adults are an important target group when investigating potential factors in relation to loneliness.

Loneliness and Social Networking Sites

Particularly in times when individuals feel lonely, Social Networking Sites (SNS), such as Instagram or Facebook, are a commonly used device to maintain and enhance social connections (Sinclair & Grieve, 2017). Under the circumstances of the COVID-19 pandemic and its measures, people reported to spend more time on SNS than before as well as showed a more excessive use when feeling lonely (Boursier et al., 2020). Further research also addressed the findings that especially younger individuals show an increased usage of SNS in order to deal with the decrease of social interactions (Cauberghe et al., 2021).

Previous studies on the effects of SNS use on loneliness showed diverse findings. In an experimental research by Deters and Mehl (2013), a sample of undergraduate students was divided into two groups, being asked to either publish more status updates on Facebook than they usually do or continue with their normal Facebook usage. It became apparent that the group of students who increased their number of status updates showed a reduction of feelings of loneliness. Similar results were found in the study by Vally and D'Souza (2019) who compared two groups of participants who either continued with their usual use of SNS or stopped using any SNS for one week. The results indicated that the abstinence of SNS increased participants' perceived loneliness. Also, Lou et al. (2012) showed an association between a frequent use of Facebook and a decrease in loneliness in their study with over 300 students. In contrast, in an experimental study with undergraduate students at the University of Pennsylvania, researchers found out that limiting the participants' social media use to ten minutes per platform each day significantly decreased feelings of loneliness (Hunt et al., 2018). Further studies also confirmed a positive relationship between the time spend on SNS and feelings of loneliness, especially in the case of excessive usage (Marttila et al., 2021; Matsuba, 2006; Stepanikova et al., 2010).

Passive and Active SNS use

Even though the amount of time devoted to SNS plays a crucial role in the way it affects an individual, the type of SNS use also shows to be important and can be differentiated between active and passive use (Thorisdottir et al., 2019). Active use refers to the usage of SNS which is more interactive such as chatting with other users, liking and commenting on other peoples' contents, or posting status updates and sharing photos, videos or other personal content targeted at a concrete audience. On the contrary, passive use is characterized by less interaction with other users, such as browsing, reposting, and scrolling through the content of others (Thorisdottir et al., 2019).

Existing research on the difference between active and passive SNS use showed that the two user patterns are associated with divergent outcomes related to individuals' well-being. As reported by Thorisdottir et al. (2019), passive use is related to more negative effects and more emotional distress through for example social comparison while using SNS. In contrast, active use showed to decrease social comparison and was related to decreased symptoms. The relationship between SNS use and psychological symptoms also reveals that active use predicts positive effects which are associated with decreased feelings of loneliness. Active SNS use was related to a decrease in symptoms of depression and anxiety while the opposite was found for passive use (Escobar-Viera et al., 2018; Thorisdottir et al., 2019). In line with that, the results

of the research by Deters and Mehl (2013) demonstrated that an increased posting of status updates, which belongs to the category of active SNS use, were associated with a decrease in loneliness of the participants. Although the difference between the two types of SNS use greatly influences how it impacts individuals, studies focusing on the relationship between SNS and loneliness still miss to take it into account (e.g., Hunt et al., 2018; Marttila et al., 2021). Additionally, it still lacks investigations which aim to explain how active SNS use decreases feelings of loneliness.

Social Connectedness as Mediator

The characteristics of active SNS use suggest that it entails more interplay and communication with other users than the passive use. Accordingly, previous research claimed that the positive outcomes of active SNS use are caused by establishing new connections and sustaining existing social ties within the social network (Marttila et al., 2021). Hence, SNS user's perceived social connectedness validates to play a crucial role in the effects of SNS use (Grieve et al., 2013).

Social connectedness refers to an individual's subjective perception of belonging. This includes the social connections someone experiences with other people, e.g., friends or family members, as well as the way the person perceives him- or herself regarding these relationships (Satici et al., 2016). Perceiving a higher social connectedness is associated with a variety of positive outcomes (Satici et al., 2016). Additionally, social connectedness is closely but negatively related to feelings of loneliness and its side effects. While an increase in social connectedness shows a positive relation with self-esteem, perceived self-efficacy, well-being, and life satisfaction, loneliness showed to be negatively correlated with these variables. Likewise, anxiety and depressive symptoms are proven to increase with loneliness while they decrease with higher perceptions of social connectedness (Grieve et al., 2013; Marttila et al., 2021; Satici et al., 2016).

In conclusion, the stated findings suggest that a more active SNS use is positively related to social connectedness while social connectedness decreases loneliness. Based on these connections, it is assumed that social connectedness gives a reasonable explanation for the predicted negative relationship between active SNS use and loneliness.

Present Study

This research aims to explore to what extent the use of SNS is related to feelings of loneliness. Since existing research showed that young adults are most at risk of experiencing

loneliness and hence a decreased well-being (Bu et al., 2020; Groarke et al., 2020; Knepple Carney et al., 2021), it is important to investigate factors which can mitigate these consequences for this specific target group. Therefore, this study focuses on individuals of the age between 18 to 29 years. Past research on the effects of SNS on aspects of loneliness are contradictory (e.g., Deters & Mehl, 2013; Matsuba, 2006). Also, the differences between the effects of active and passive use of SNS are often not considered as well as research on possible mediating factors between SNS use and loneliness are still deficient (e.g., Hunt et al., 2018; Marttila et al., 2021). However, SNS user's perceived social connectedness suggests being a crucial factor related to loneliness. Hence, a further purpose of this research is to take into account the differences between active and passive SNS use and to investigate the possible mediating role of social connectedness. Based on the previously presented research findings, the following hypotheses will be tested:

Hypothesis 1: The more active the use of SNS, the lower the feelings of loneliness in young adults of the age between 18 and 29 years.

Hypothesis 2: Social connectedness mediates the negative relationship between active SNS use and feelings of loneliness.

Method

Study design

A cross-sectional quantitative questionnaire survey design was used in order to investigate the relationship between the use of SNS and feelings of loneliness as well as to examine whether social connectedness mediates this relationship.

Since this study was conducted in the context of a larger survey of a research group, consisting of two third-year Psychology students at the University of Twente, the survey measured additional variables which are not discussed in this paper.

Participants

Convenience as well as snowball sampling were used in order to acquire participants via social media platforms, including WhatsApp, Facebook, and Instagram. Additionally, the survey was published on the test subject pool, SONA Systems, of the University of Twente. There, the participants received 0.25 credits for taking part in the survey.

With regard to the inclusion criteria, the participants needed to be between the age of 18 and 29 years, have a sufficient knowledge of the English language, and have a profile on at least one SNS, such as Facebook or Instagram. Further, they had to respond to all questions of the questionnaires and give active online informed consent before and after taking part in the survey.

A total of 101 participants took part in the study. After excluding the participants who did not meet the inclusion criteria, the sample comprised 71 participants consisting of 46 females and 25 males. The age of the participants ranged from 18 to 29 years ($M = 22.59$, $SD = 2.41$). The majority of 55 participants were German and most participants (67.6%) were resident in Germany. For a more detailed overview, see Table 1.

Table 1

Demographic Data of Participants (N=71)

| Variable | Frequency | Percentage (%) |
|----------------------|-----------|----------------|
| Gender | | |
| Male | 25 | 35.2 |
| Female | 46 | 64.8 |
| Age (years) | | |
| 18 - 21 | 24 | 33.8 |
| 22 - 25 | 38 | 53.5 |
| 26 - 29 | 9 | 12.7 |
| Nationality | | |
| German | 55 | 77.5 |
| Dutch | 8 | 11.3 |
| Bulgarian | 4 | 5.6 |
| Finnish | 1 | 1.4 |
| Irish | 1 | 1.4 |
| Italian | 1 | 1.4 |
| American | 1 | 1.4 |
| Country of residence | | |
| Germany | 48 | 67.6 |
| The Netherlands | 22 | 31.0 |
| Italy | 1 | 1.4 |

Materials

For the purpose of this study, the respondents' demographics, feelings of loneliness, sense of social connectedness, and SNS use were explored. In the subsequent paragraphs, the used questionnaires are described. All questions, besides the demographics, were asked to be answered with reference to the last past month.

Demographics

In the questionnaire about demographic data (see Appendix A), the participants were asked about their age, gender (male, female, non-binary, prefer not to say), nationality (German, Dutch, other), and country of residence (Germany, The Netherlands, other). If participants selected "other" as response to a question, they were able to write down the specific country or nationality in a blank field. Moreover, the participants were asked to indicate (yes, no) whether they have at least one account on a SNS.

Loneliness

In order to assess the respondents' feelings of loneliness, the eight-item short form of the UCLA Loneliness Scale, the ULS-8 by Hays and DiMatteo (1987) was used. An example of the ULS-8 was "I feel isolated from others." (see Appendix B). The questionnaire measured on a four-point Likert scale with "Never" (1), "Rarely" (2), "Sometimes" (3), and "Always" (4). The scale displayed a good internal consistency reliability with a Cronbach's alpha of .84 (Hays & DiMatteo, 1987). Within this study's sample, the items of the ULS-8 also showed a Cronbach's alpha of .84. In line with Field (2009), a Cronbach's alpha of .7 or higher was regarded as acceptable for this research.

Social Connectedness

The Social Connectedness Scale developed by Lee and Robbins (1995) was used to measure participants' sense of social connectedness. This was accomplished by answering eight items stating, for example, "I have no sense of togetherness with my peers." (see Appendix C). The response options were in style of a six-point Likert scale with "Strongly agree" (1), "Agree" (2), "Slightly agree" (3), "Slightly disagree" (4), "Disagree" (5), and "Strongly disagree" (6). The Social Connectedness Scale showed a Cronbach's alpha of .91 and test-retest reliability of .96 during a two-week interval (Lee & Robbins, 1995). A Cronbach's alpha of .94 was calculated within the sample of this study.

SNS use

To measure the SNS use, two sets of questions were supposed to be answered (see Appendix D). The first one asked for the approximate time the respondent spent on SNS per

day. The pre-determined response options included “less than 30 minutes”, “31 to 59 minutes”, “1 to 2 hours”, “more than 2 hours up to 4 hours”, “more than 4 hours up to 6 hours”, and “more than 6 hours”. The second set of questions measured the passive and active use of SNS. These questions were adopted from the study by Escobar-Viera et al. (2018). The active use of SNS was assessed by three items, for example “Thinking about your Social Networking Sites use in the last past month, how often did you post your own content (e.g., status update, videos, pictures, etc.)?”. Similarly, the passive use of SNS was measured by three items, including “Thinking about your Social Networking Sites use in the last past month, how often did you watch videos or view pictures?” (see Appendix D). All six items were supposed to be answered by selecting one of the given options: “Never”, “Less than once a week”, “Once a week”, “2 to 6 times a week”, “Once a day”, and “Several times a day”. Both scales showed an acceptable Cronbach’s alpha with .80 for the active SNS use scale and .72 for the passive SNS use scale (Escobar-Viera et al., 2018). Within this study’s sample, the items measuring the active use showed a Cronbach’s alpha of .31, and .73 for the items assessing passive use.

Procedure

The participants were directed to the survey by either clicking on the link distributed on social media platforms or through SONA Systems. Before proceeding with the survey, the respondents were requested to read and agree on the informed consent form (Appendix E) which contained information on the study’s procedure, the anonymity and confidentiality of the collected data, as well as participants’ rights and anticipated risks. Also, contact details of the researchers were provided in case of further questions. Before filling out the questionnaires, the participants were only informed about the study’s general purpose without further details to rule out possible biases.

In the beginning, several demographic questions were asked. Additionally, they were supposed to indicate whether they have any accounts on at least one SNS. If they selected the option “Yes, I have at least one account.”, they were asked to fill out the questionnaires of the ULS-8 and the Social Connectedness Scale, as well as a set of questions related to their use of SNS. If they selected “No, I don’t have an account”, they were not given any further questions related to this study’s variables since they did not meet the inclusion criteria. Afterwards, the respondents were provided with the full purpose of the study. Additionally, the participants were asked whether they still agree on giving their active online informed consent, and the researchers’ contact details were stated again. To view the information provided at the end of the survey, see Appendix F. Overall, completing the survey took approximately 15 minutes.

Data Analysis

The collected data was statistically analysed using IBM SPSS Statistics (Version 26.0). Firstly, the data of respondents who did not meet the inclusion criteria were removed from the data set. Additionally, the data was inspected for outliers by creating boxplots for the variables of loneliness, social connectedness, SNS use, and time spent on SNS. No outliers were found, thus no further data had to be removed. Next, the variable indicating the respondent's age was recoded into three equally spaced age ranges from 18 to 21, 22 to 25, and 26 to 29 for a more concise overview. In order to get an overview of the sample's characteristics, the descriptives (mean, SD, percentage, frequency) of the demographic data were calculated.

Furthermore, the questionnaires were inspected for reverse items. For the ULS-8, the items "I am an outgoing person." and "I can find companionship when I want it." were reverse items and were consequently coded into the opposite. The Social Connectedness Scale and the items measuring SNS use did not include reverse items. In order to obtain the scores for loneliness, social connectedness, passive SNS use, and active SNS use, the average of the corresponding items' values was taken. Since SNS use was calculated by three items measuring each active and passive use, a new variable was created for an overall score combining the two measures. Therefore, the score of passive SNS use was subtracted from the score of active SNS use. Consequently, a higher positive overall score indicated a more active use of SNS, and a negative score displayed a more passive use of SNS by the respondent. Next, the internal consistency reliability of the items measuring loneliness, social connectedness, and active and passive SNS use were checked by computing Cronbach's alpha. Also, descriptive statistics (frequency, percentage, minimum, maximum, mean, SD) were calculated for the variables of loneliness, social connectedness, active and passive SNS use, the overall score of SNS use, and the respondents' time spent on SNS.

In order to answer the two hypotheses, a mediation analysis was performed. Prior to this, the corresponding statistical assumptions were checked, and no assumption showed to be violated. The mediation analysis was executed using the additional programme PROCESS macro for SPSS, version 3.5.3 by Hayes (2017). Within the programme, the mediation model 4 was chosen treating loneliness as the dependent variable, SNS use as the independent variable, and social connectedness as the mediator. A bootstrapping of 5000 samples as well as a 95% confidence interval was used to test the statistical significance of total, direct, and indirect effects. Additionally, participants' time spent on SNS was included as control variable since previous literature showed that a high or excessive use of SNS is related to higher feelings of loneliness (Marttila et al., 2021; Matsuba, 2006; Stepanikova et al., 2010). Thus, in the case of

a very time intensive SNS use, differences in the effect of more active or passive use on loneliness remain detectable if time will be controlled for.

Results

Descriptive Statistics

The descriptive statistics for the variables of loneliness, social connectedness, active and passive SNS use, as well as the overall score of SNS use are displayed in Table 2.

Table 2

Descriptives of Loneliness, Social connectedness, and SNS use (N=71)

| Variable | Minimum | Maximum | Mean | Std. Deviation |
|--------------------------------|---------|---------|-------|----------------|
| Loneliness | 1.00 | 3.63 | 2.16 | .58 |
| Social connectedness | 1.25 | 6.00 | 4.16 | 1.19 |
| Active SNS use | 1.00 | 4.00 | 2.03 | .81 |
| Passive SNS use | 1.67 | 6.00 | 4.23 | 1.10 |
| (overall) SNS use ^a | -5.00 | 1.00 | -2.21 | 1.44 |

Note. ^a Negative values indicate more passive SNS use while positive values represent more active SNS use.

With regard to the variable time spent on SNS, 29.6% of the respondents indicated a time span of 1 to 2 hours per day. This was closely followed by a proportion of each 25.4% of the sample who reported spending either 31 to 59 minutes or more than 2 hours up to 4 hours per day on SNS. For a more detailed overview, see Table 3.

Table 3

Descriptives of Time spent on SNS (N=71)

| Variable | Frequency | Percentage (%) |
|-----------------------------|-----------|----------------|
| Time spent on SNS (per day) | | |
| Less than 30 minutes | 1 | 1.4 |
| 31 to 59 minutes | 18 | 25.4 |
| 1 to 2 hours | 21 | 29.6 |
| More than 2h up to 4h | 18 | 25.4 |
| More than 4h up to 6h | 10 | 14.1 |
| More than 6h | 3 | 4.2 |

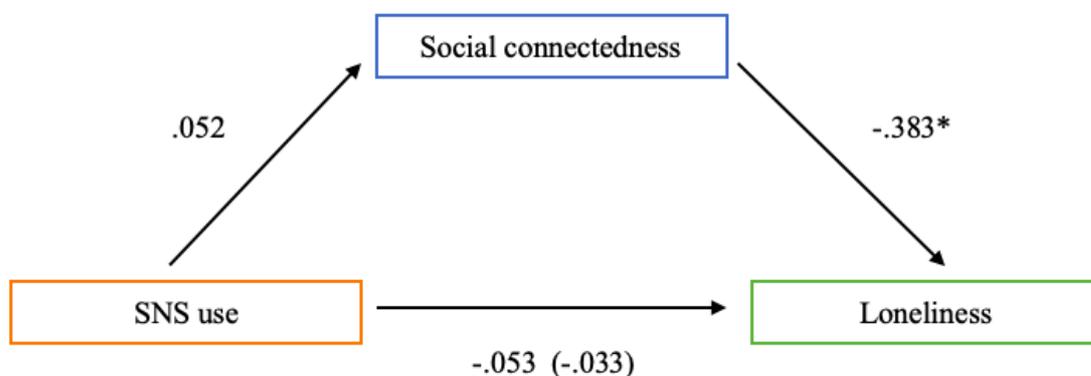
Relation between SNS use and Loneliness and the Mediation of Social Connectedness

Concerning the first hypothesis, the mediation analysis revealed a non-significant total effect of the independent variable SNS use on the dependent variable loneliness ($b = -.053$, $s.e. = .048$, $p = .271$), as can be seen in Figure 1.

In relation to the second hypothesis, stating that social connectedness mediates the effect of SNS use on loneliness, the indirect and direct effect were computed. The indirect effect of social connectedness was found to be non-significant ($b = -.020$, $s.e. = .040$, 95% CI [-.099, .056]). Additionally, the paths' coefficients of the mediator were calculated (see Figure 1). Social connectedness showed to have a significant negative effect on loneliness ($b = -.383$, $s.e. = .035$, $p = .000$). Nonetheless, a non-significant relationship was found for the effect of SNS use on social connectedness ($b = .052$, $s.e. = .099$, $p = .600$). Also, there was a non-significant direct effect of SNS use on loneliness ($b = -.033$, $s.e. = .029$, $p = .260$) when taking the mediator variable social connectedness into account (see Figure 1).

Figure 1

Unstandardized regression coefficients for the relationship between SNS use and Loneliness mediated by Social connectedness



Note. The unstandardized regression coefficient between SNS use and loneliness, controlling for social connectedness, is in parentheses.

* $p < .01$.

Discussion

The purpose of this study was to provide insights into the effect of SNS use on feelings of loneliness in young adults of the age between 18 to 29 years. In that regard, the research

focused on considering the possible impact of differentiating between active and passive SNS use. Moreover, the perceived social connectedness was investigated as potential mediating variable.

Regarding the first hypothesis which states that the more active the use of SNS is, the lower the feelings of loneliness are, a non-significant total effect of SNS use on loneliness was found. This implies that SNS use does not predict feelings of loneliness, thus the first hypothesis must be rejected. The second hypothesis states that social connectedness mediates the negative relationship between active SNS use and feelings of loneliness. The identified non-significant total effect of SNS use on loneliness indicated that SNS use is not directly predicting loneliness and consequently a partial mediation can be ruled out. Furthermore, the use of SNS did not significantly affect the participants' perceived social connectedness. Thus, also a complete mediation cannot be identified. Accordingly, also the indirect effect was non-significant, confirming that social connectedness is not mediating the relationship between SNS use and loneliness. Consequently, the second hypothesis is rejected as well. However, the negative effect of social connectedness on loneliness was significant, predicting that young adults who perceived more social connectedness felt less lonely.

SNS use and Loneliness

Based on the unexpected result of a non-significant effect of SNS use on loneliness, a more active use of SNS did not predict lower feelings of loneliness in young adults. However, this outcome is in line with the findings reported by Dienlin et al. (2017) and Yavich et al. (2019). According to their results, there was no significant impact of SNS use on loneliness implying that individuals' feelings of loneliness neither increase nor decrease based on changes in their use of SNS (Dienlin et al., 2017; Yavich et al., 2019). Nonetheless, most results of previous research on this topic contradict with the findings of the present study and the research by Dienlin et al. (2017) and Yavich et al. (2019). There are several researchers, including for example Deters and Mehl (2013) and Wang et al. (2018), who reported significant results showing that active SNS use is associated with feeling less lonely.

Differences in the research design might give a reasonable explanation for the deviant outcomes. Similar to the studies by Dienlin et al. (2017) and Yavich et al. (2019), the present research involved a cross-sectional questionnaire survey design. Thus, the variables were solely measured at one point in time. This implies that changes in the use of SNS and possible subsequent fluctuations in feelings of loneliness over time cannot be detected within one participant. Additionally, the obtained answers on participants' amount of active and passive

SNS use were self-reported data. The participants were instructed to base their answers on the last past month. However, making retrospective statements about past SNS use or feelings of loneliness might be biased by misestimation and the individual's current emotional state while filling out the questionnaire (Smetackova et al., 2014). In contrast, the two studies confirming a negative impact of active SNS use on loneliness were both longitudinal investigations (Deters & Mehl, 2013; Wang et al., 2018). Further, the research by Deters and Mehl (2013) included experimental conditions which entailed that the extend of participants' active SNS use was manipulated and assessed by the researchers. This allowed for a more controlled, reliable, and objective assessment of the impact of SNS use than relying on self-reported data.

In conclusion, a few studies showed to confirm the non-significant effect of SNS use on loneliness. Nevertheless, the outcomes of this study contrast most existing research which might also be due to a more restricted research design in the present study compared to previous investigations.

Social connectedness as Mediator

In contrast to the expectations, the assumed negative relationship between active SNS use and loneliness was not mediated by social connectedness. The mediation model showed that there was a non-significant effect of SNS use on social connectedness. Hence, more active SNS use did not predict an increase in perceived social connectedness. This result was opposed to existing studies (e.g., Deters & Mehl, 2013; Köbler et al., 2010) which reported that increased active SNS use is associated with more social connectedness perceived by the SNS user. The differences between the findings of the present study and existing research (Deters & Mehl, 2013; Köbler et al., 2010) might be explained by the scales used to measure social connectedness. Within this study, social connectedness was assessed by using the regular Social Connectedness Scale by Lee and Robbins (1995). By doing this, the construct of social connectedness was not specified to the online environment. The studies by Deters and Mehl (2013) and by Köbler et al. (2010), on the contrary, measured social connectedness related to the environment of SNS. As emphasized by Grieve et al. (2013), the social connectedness perceived in an online environment differs from the social connectedness in an offline environment. In their study, the results of the factor analysis revealed that 32 out of 37 questionnaire items loaded on either offline social connectedness or online (Facebook) social connectedness (Grieve et al., 2013). Hence, it can be assumed that it is crucial to differentiate between the assessments of these two constructs. As the present research did not specifically measure online social connectedness, this might explain the finding that the use of SNS does

not predict social connectedness. The SNS user might develop a sense of social connectedness by using SNS, but this form of online social connectedness might not be fully assessed through the Social Connectedness Scale (Lee & Robbins, 1995) which was utilised in this study.

As expected, the effect of social connectedness on loneliness revealed to be significantly negative meaning that individuals who perceived more social connectedness felt less lonely. This finding was in line with previous research by Satici et al. (2016) who found social connectedness negatively affecting loneliness in the absence of further mediators. Similarly, Jose and Lim (2014) reported social connectedness to predict reduced feelings of loneliness based on their study on adolescents. This relationship is reasonable since the feeling to be socially connected would be expected to reduce the disparity between perceived and sought social connections which defines loneliness (Palgi et al., 2020). Furthermore, a variety of variables such as well-being or life satisfaction, is positively related to social connectedness while being negatively associated with loneliness (Grieve et al., 2013; Marttila et al., 2021; Satici et al., 2016).

Based on the results of the mediation analysis, it can be concluded that only the negative effect of social connectedness on loneliness shows to be significant implying that young adults who perceive more social connectedness experience less feelings of loneliness.

Strengths and Limitations

The present research showed a few limitations which need to be considered with respect to the findings. A crucial limiting factor is the unacceptable Cronbach's alpha of the scale measuring active SNS use. Since the measurement of SNS use is important for testing both hypotheses, the results need to be considered and interpreted with caution. However, it also must be mentioned that the active SNS use scale only includes three items which can possibly lower the Cronbach's alpha (Field, 2009). In general, existing scales for SNS use which differentiate between passive and active use showed to be rather scarce. Regarding the choice of used measurement instruments, the Social Connectedness Scale by Lee and Robbins (1995) showed to be unfavourable in the context of the present study. As previously stated, social connectedness perceived in online environments can better be assessed using scales which are tailored to SNS and specifically measure the construct of online social connectedness (Grieve et al., 2013). Another point already mentioned is the study's research design. For the scope of this study, a cross-sectional questionnaire survey design was used. Nonetheless, being able to experimentally manipulate the time spent with active or passive engagement on SNS and measuring the variables repeatedly across a longer time-period would possibly generate more

insightful and reliable findings (Smetackova et al., 2014). Lastly, the research included a rather small sample size after excluding the participants who did not meeting the inclusion criteria. Thus, the sampling procedure could be improved to be capable of reaching out to more potential participants and gather a larger sample in the given time.

Aside from the limitations, the study also showed notable strengths. A major strength is its focus on the still recent and prevailing context of the COVID-19 pandemic. Since the start of the pandemic, individuals' well-being, and especially increased loneliness due to the preventive measures became an increasingly important issue (Brooks et al., 2020; Groarke et al., 2020). Therefore, researching the mechanisms and factors mitigating the psychological problems caused by the COVID-19 pandemic is extremely important. Additionally, the study addresses an important target group, namely young adults, which seem to be particularly impacted by symptoms such as loneliness (Brooks et al., 2020; Knepple Carney et al., 2021). Also, the SNS use is a crucial aspect to consider with respect to experienced loneliness during a pandemic since the use of SNS become even more important during times of infrequent face-to-face interaction (Pfefferbaum & North, 2020). Accordingly, the present study also builds on the research recommendation by Cauberghe et al. (2021) to further investigate the influence of SNS on aspects of people's mental health during the Covid-19 pandemic. Another strength is related to the sample's characteristics. Except for one participant who was resident in Italy, all other respondents' country of residence was either Germany or The Netherlands. During the period of data collection and the month prior to that (April 2021 until the end of May 2021), governmental measurements regarding the pandemic were very similar in these two countries. This is important to consider since participants reported their feelings of loneliness regarding the last past month. If in that time COVID-19 related restrictions, such as lockdowns, had been very different in these countries, this would have been assumed to influence the study's results related to the variable of loneliness.

Recommendation for Future Research

Based on the mentioned limitations of this study, some suggestions for future research can be recommended. To obtain a larger sample size, it is advisable to make use of a broader set of resources. A different or additional sampling procedures should be considered. To reach out to more young adults than only through social media platforms, a possibility would be to collaborate with other educational institutions if it is feasible to distribute the survey there. Additionally, it is favourable to consider a longer period of time for the data collection. Apart

from that, a power analysis could be conducted before the start of the data collection to be confident about the number of participants needed.

With regard to the choice of measurement instruments, a different scale measuring passive and active SNS use might be considered. Even though, both scales showed acceptable Cronbach's alpha values in the study by Escobar-Viera et al. (2018), a number of three items assessing each passive and active SNS use is rather small, and it might be useful to include more aspects which differentiate active from passive use. Moreover, further research on social connectedness should be careful about the context it is assessed in, i.e., whether it is related to the online or offline environment, so that the corresponding fitting scale is chosen (Grieve et al., 2013). In that respect it would also be interesting to investigate if online social connectedness would still predict loneliness, or whether the feelings of being socially connected in relation to the online and offline environment have a different impact on loneliness.

Since the present study showed that social connectedness predicts reduced feelings of loneliness, further research on factors increasing this perceived social connectedness is crucial. Thereby, factors might be detected that help to reduce loneliness through the generation of social connectedness. Also, additional research is still needed to investigate the effect of SNS use on loneliness and possible mediation models. Due to the contradicting findings on this topic (e.g., Deters & Mehl, 2013; Marttila et al., 2021), making clear statements about the usefulness or risks of using SNS is difficult. Especially in the current times of COVID-19 and accompanying higher rates of loneliness (Groarke et al., 2020), it is of importance to recognize factors which could aid individuals in counteracting these symptoms. Moreover, it is desirable that future research aims at conducting longitudinal and experimental studies to detect changes in a participant over a longer time-period and exercise more control over the type and frequency of SNS use. Also, the use of more objective measurements compared to self-reported data is recommended (Smetackova et al., 2014).

Conclusion

The COVID-19 pandemic and following governmental measures resulted in a sudden decrease of face-to-face social interactions and provoked high levels of loneliness, especially in younger adults (Groarke et al., 2020). Particularly during these times, communication devices such as SNS became increasingly important. Previous research started to investigate the effects of SNS use on loneliness, but findings did not give a clear answer (e.g., Deters & Mehl, 2013; Marttila et al., 2021). The present study's aim was to contribute to the debate. In contrast to the expectations, this research found that SNS use does not have an impact on

loneliness. Furthermore, the mediation model including social connectedness as mediating variable for the effect of SNS use on loneliness is not confirmed. Although this research contradicted many previous findings (e.g., Köbler et al., 2010; Lou et al., 2012), interesting insights were gained and recommendations for future research were obtained. Additional investigations are crucial to understand the relation between SNS use and loneliness, consider differences in active and passive SNS use, as well as investigate potential mediating factors.

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Appendix A: Demographic questions

What is your age?

What is your gender?

- Male
- Female
- Non-binary
- Prefer not to say

What is your nationality?

- German
- Dutch
- Other, namely

What is your country of residence?

- Germany
- The Netherlands
- Other, namely

Do you have an account on one or multiple Social Networking Sites? Social Networking Sites include for example, Facebook, Instagram, WhatsApp, TikTok, Snapchat, Twitter, etc.

- Yes, I have at least one account.
- No, I don't have an account.

Appendix B: ULS-8

Thinking about the **last past month**, indicate how often each of the statements below is descriptive of you.

I lack companionship.

There is no one I can turn to.

I am an outgoing person.

I feel left out.

I feel isolated from others.

I can find companionship when I want it.

I am unhappy being so withdrawn.

People are around me but not with me.

For each item, the answer options included “Never” (1), “Rarely” (2), “Sometimes” (3), and “Always” (4) on a four-point Likert scale. The items “I am an outgoing person.” and “I can find companionship when I want it.” are reverse-coded.

Appendix C: Social Connectedness Scale

Thinking about the **last past month**, indicate to what extent you agree or disagree with the following statements.

I feel disconnected from the world around me.

Even around people I know, I don't feel that I really belong.

I feel so distant from people.

I have no sense of togetherness with my peers.

I don't feel related to anyone.

I catch myself losing all sense of connectedness with society.

Even among my friends, there is no sense of brother/sisterhood.

I don't feel I participate with anyone or any group.

For each item, the answer options included "Strongly agree" (1), "Agree" (2), "Slightly agree" (3), "Slightly disagree" (4), "Disagree" (5), and "Strongly disagree" (6) on a six-point Likert scale.

Appendix D: SNS use

In the following you will be asked questions about your Social Networking Sites use. Social Networking Sites include for example Instagram, Facebook, Snapchat, TikTok, Twitter, etc.

In the **last past month**, approximately how much time did you spent on Social Networking Sites per day?

- less than 30 minutes
- 31 to 59 minutes
- 1 to 2 hours
- more than 2 hours up to 4 hours
- more than 4 hours up to 6 hours
- more than 6 hours

Thinking about your Social Networking Sites use in the **last past month**, how often did you...

- ...comment on or respond to someone else's content?
- ...share others' content (e.g., pictures, posts, retweet, etc.)?
- ...post your own content (e.g., status update, videos, pictures, etc.)?
- ...read discussions?
- ...read comments/reviews?
- ...watch videos or view pictures?

For each item, the answer options included “Never”, “Less than once a week”, “Once a week”, “2 to 6 times a week”, “once a day”, and “Several times a day”.

Appendix E: Informed consent form

INFORMED CONSENT

Thank you for considering participation in this research!

PURPOSE OF STUDY

The purpose of this study is to investigate the emerging consequences of the COVID-19 pandemic on the well-being of young adults.

PROCEDURE

If you agree to participate in this study, you will be asked to answer several demographic questions (age, gender, nationality, etc.). Next, you will be asked to answer four sets of questions concerning different aspects of your well-being, as well as one set of questions with regard to your Social Networking Sites use (e.g. Twitter, WhatsApp, Instagram, Facebook, etc.) in the last past month.

Your participation will last approximately 15 minutes. There are no right or wrong answers. Choose the one you believe fits you the best. After completing the survey, you will be provided with more details about the purpose of this study. After receiving information about the full purpose, you will be asked again for your consent to participate in the study. You are able to withdraw your initial consent, and in this case, your recorded data will be deleted.

We are seeking for participants in the age range of 18 to 29 years. Additionally, a proficiency level of the English language is required.

PARTICIPANT RIGHTS

Your participation is completely voluntary. You are free to withdraw from the study at any time without the need to give an explanation.

RISKS

There are no anticipated risks associated with this study.

DATA COLLECTION

The collected data will be anonymized and cannot be traced back to you. No information about your identity will be collected or retained. The information you provide will solely be

used in order to investigate the purpose of the study. The information will not be disclosed to third parties outside the research team.

QUESTIONS

If you have any questions, please do not hesitate to contact us:

(Hannah Bousardt, Researcher)

(Regina Amanzada, Researcher)

(N. Keesmeekers, Supervisor)

I hereby declare that I have read the aforementioned information and consent to participate in this study.

I agree.

I do not agree.

Appendix F: Provided information at the end of the survey

Thank you for your time and participation in this study!

PURPOSE OF STUDY

Before participating in the survey, you were informed that the purpose of this study is to explore the consequences of the COVID-19 pandemic on the well-being of young adults. In more detail, the recorded data will be used to investigate to what extent the active and passive use of Social Networking Sites is related to feelings of loneliness during the COVID-19 pandemic and the impact of perceived social connectedness on this relationship. Additionally, this study investigates whether feelings of loneliness during a pandemic can have an influence on well-being and whether certain coping mechanisms can influence it negatively or positively.

The precise goal was not revealed before completion of the survey in order to rule out that your responses were biased by being aware of the full purpose.

If you have any questions, please do not hesitate to contact us:

(Hannah Bousardt, Researcher)

(Regina Amanzada, Researcher)

(N. Keesmekers, Supervisor)

As explained in the beginning of this survey, you will now be asked again for your consent. If you want to withdraw from this study, you can do so now and your data will be deleted from the dataset.

I want to remain participant in this study.

I want to withdraw from this study.