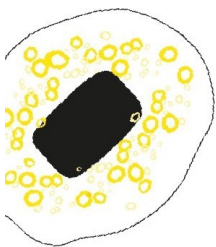


UNIVERSITY OF TWENTE.



**The Association between Loneliness and Gratitude among University
Students within a Daily Context**
- An Experience Sampling Study –

Fabiola Ruiz Alfranca - s2122448

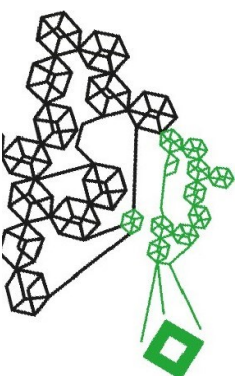
Positive Psychology and Technology

Faculty of Behavioural Management and Social Sciences (BMS)



Master Thesis (10 EC)

August, 2022



1st Supervisor: Dr. M.L. Noordzij

2nd Supervisor: Dr. L.I.M. Lenferink

Abstract

Introduction. Recent research found negative associations between loneliness and gratitude, highlighting the importance of gratitude in the context of loneliness. However, previous literature assessed these constructs mainly on the trait-level, omitting the dynamic nature of both constructs in daily life. Therefore, this study investigated this association both on the trait and state level in order to be able to distinguish between-person from within-person effects.

Method. The experience sampling method (ESM) was used for seven consecutive days among 34 university students ($M_{age} = 20.65$; $SD_{age} = 3.15$). Recruitment was done via convenience sampling. State loneliness/gratitude was assessed three times a day, whereas trait loneliness/ gratitude once at the end of the study period with the UCLA Loneliness Scale and Multi-Component Gratitude Measure. In order to analyse the data, linear mixed model analyses (LMM) were conducted.

Results. The results revealed variability in state loneliness and state gratitude within- and between persons. Strong, positive associations were found between trait and average state loneliness, as well as trait and average state gratitude. A significant negative association was found between loneliness and gratitude on the trait level. Further, the results showed a significant, negative within-person and between-person associations ($\beta = -.30$, $SE = .03$, $p < .001$ & $\beta = -.18$, $SE = .05$, $p < .001$), indicating that with higher momentary and average gratitude levels lower levels of loneliness are predicted.

Conclusion. This study provides new insights into people's momentary feelings of loneliness and gratitude, and how these constructs are associated in daily life among students, adding to and expanding existing literature. On top of that, the findings of this study can serve as an inspiration for future research, developing tailored, timed interventions aimed at decreasing people's loneliness in daily life.

Introduction

Loneliness is a public health problem in all age groups. The majority of all human beings experience the need to socialize with others by nature (Heinrich et al., 2006). The famous psychologist Abraham Maslow (1958) integrated love and belonging into his concept of the hierarchy of needs necessary for self-actualization. Based on his theory, interpersonal relationships refer to friendship and intimacy (McLeod, 2007). A problematic consequence of the lack of social relationships is loneliness. As loneliness is primarily associated with various negative mental and physical health consequences (Cacioppo & Cacioppo, 2000; Cacioppo et al., 2018), it has become an increasingly important topic in recent years.

Interestingly, several researchers emphasize the relevance of gratitude in the context of loneliness. This is not surprising, considering the positive outcomes of gratitude on people's mental and physical health (Emmons & McCullough, 2004). Several cross-sectional studies found a significant negative association between loneliness and gratitude (Caputo, 2015; Frinking et al., 2020; Ni et al., 2015; O'Connell et al., 2016), indicating the beneficial role of gratitude on loneliness. Besides, an experimental study by Bartlett and Arpin (2019) found that a simple gratitude exercise decreased feelings of loneliness among the older population, emphasizing the potential of gratitude for reducing loneliness.

Although the association between loneliness and gratitude is a well-established topic, traditional research, e.g., cross-sectional studies, mainly explored both constructs on the trait level (between-person) using one-time assessment. However, both loneliness (van Roekel et al., 2018) and gratitude (Wood et al., 2008) can be conceptualized as dynamic, state-like constructs which can vary across the day within individuals, emphasizing the importance of measuring these constructs multiple times a day in a natural environment. Using one-time measurements only allow for between-person effects, leaving within-person effects unexamined (Curran & Bauer, 2011). Further, one-time measurements require participants to self-report retrospectively, which can result in recall bias (Raphael, 1987; Myin-Germeys & Kuppens, 2021). To account for the current limitations in traditional studies, the experience sampling method (ESM) can be used.

Using ESM, participants can report their feelings and emotions multiple times a day, thus providing insight into within-person fluctuations in psychological constructs in a daily context (Myin-Germeys & Kuppens, 2021). Further, gaining insight into people's momentary feelings and emotions with ESM can be the basis for future research, which develop and optimize daily tailored interventions (Myin-Germeys & Kuppens, 2021). As there is a lack of

research that differentiates within- and between person effects, investigating the association between loneliness and gratitude on the trait as well as on the state level simultaneously can give more insight into people's emotional states in real-time, daily life moments.

Trait and State Loneliness

It is important to note that loneliness is not synonymous with being alone, meaning that one can be socially isolated without experiencing feelings of loneliness and vice versa (Nilsson et al., 2006). Loneliness refers to the subjective perception of a lack of social relationships (Tam & Chan, 2019). More specifically, loneliness can be defined as a negative emotion that arises when there is a discrepancy between desired and existing social relationships (Heinrich et al., 2006).

Recent research shows that many people experience loneliness constantly, which points to loneliness as a personality trait (Roberts & Krueger, 2021). A meta-analysis found a positive association between trait loneliness and neuroticism as well as a negative association between trait loneliness and extraversion, agreeableness, and conscientiousness. For instance, introverts experience more feelings of loneliness than extroverts (Buecker et al., 2020). Hence, loneliness can be viewed as a trait-like construct belonging to an individual's personality. This means that people differ from each other with respect to their average feelings of loneliness (Buecker et al., 2020). Besides, traditional studies used mainly one-time retrospective assessments such as the UCLA Loneliness Scale by Russell (1996), assessing trait loneliness. A lot of literature investigated the association between general levels of loneliness and health consequences such as obesity, coronary heart disease, and chronic pain (Wang et al., 2018). Besides, high feelings of loneliness are associated with psychosomatic disorders, depression and anxiety (Nilsson et al., 2006) as well as an increase in smoking and alcohol consumption (Hawkey & Cacioppo, 2010). These studies explored loneliness more on the general, trait-like level without considering fluctuations in this construct. However, loneliness is not only conceptualized as trait but also as state in literature (van Roekel et al., 2015).

An influencing paper by van Roekel et al. (2018) that measured state loneliness among early adolescence on six consecutive days using ESM stated that loneliness can be understood as a dynamic construct that changes depending on the social context someone is in. They found that external factors such as the type of day (e.g., working days vs. weekend) or company (e.g., being alone vs. being with others) can influence how lonely someone feels in certain situations. Further, they found that adolescence experiencing high levels of trait

loneliness, also experience higher levels of state loneliness when being alone. This finding provides evidence for the differential reactivity hypothesis, which states that people who feel lonely tend to react differently to external factors such as the company of others than those who feel less lonely (van Roekel et al., 2018).

Notably, another ESM study by Meng et al. (2020) found associations between state loneliness and daily emotions such as fear and anger. Another association was found between state loneliness and state psychological distress, such as stress and anxiety (Yung et al., 2021). Similar to the studies exploring trait loneliness, state loneliness also seems to lead to negative health consequences. Although a few studies explored the momentary feelings of loneliness in daily life and found a positive association between trait and state loneliness, there is still scarce research regarding the variability in state loneliness within and between-persons and the trait and state loneliness association, emphasizing the importance of investigating these relations in this study. In order to better understand how momentary feelings of loneliness fluctuate within individuals in daily life, assessing state loneliness using ESM is relevant.

Trait and State Gratitude

While feelings of loneliness are associated with negative health consequences, positive emotions such as gratitude gained more and more attention in recent literature because of their positive impact on an individual's mental and physical health (Emmons & Shelton, 2002). As with loneliness, gratitude can be conceptualized as a trait and a state (Wood et al., 2008).

Gratitude, as a trait-like construct, can be defined as stable and persistent feelings of appreciation towards others or positive aspects of life (Alkozei et al., 2018). Moderate associations between gratitude and the Big five personality traits were found (Szcześniak et al., 2020; Wood et al., 2008). More specifically, gratitude is positively associated with extraversion, openness to experience, agreeableness and conscientiousness whereas it is negatively associated with neuroticism (Szcześniak et al., 2020). Hence, e.g., extraverts are more grateful than introverts, indicating that gratitude can be part of a person's personality and thus be treated as a stable, trait-like construct. Existing studies mainly assessed gratitude using the retrospective one-time measurement Gratitude Questionnaire-Six Item Form (GQ6) by McCullough et al. (2002) which treats gratitude as a trait, neglecting the dynamic nature of gratitude.

Extensive research indicated the positive benefits of gratitude on people's health.

Several studies found negative associations between trait gratitude and several constructs of psychological wellbeing such as depression, anxiety and negative affect (Kashdan & Breen, 2007; Măirean et al., 2019). Additionally, dispositional gratitude can increase positive affect and prosocial characteristics (Emmons & Mishra, 2011) and is positively associated with mental wellbeing (Watkins et al., 2003). According to Dickens (2017), gratitude interventions can enhance people's wellbeing, life satisfaction and diminish depressive symptoms and negative affect, indicating the beneficial role of gratitude on people's mental health. Although existing studies have shown that gratitude can be a beneficial source of positive health outcomes, gratitude was mainly assessed on the trait level, neglecting the fluctuating nature of gratitude. However, gratitude can also be understood as a dynamic, state-like construct (Wood et al., 2008).

Conversely to trait gratitude, state gratitude can be defined as a 'momentary, positive emotion experienced after an unsolicited act of kindness' (Skrzelinska & Ferreira, 2020, p.1). State gratitude refers to gratitude as emotion or mood (Wood et al., 2008). Further, gratitude as a state-like phenomenon varies during the day, depending on external factors such as the social context (Alkozei et al., 2018). It was found that state gratitude is negatively associated with aggression (DeWall et al., 2012). Additionally, a recent study by Gallagher et al. (2020) found that state gratitude acts as a buffer against cardiovascular stress reactivity, while this does not apply to trait gratitude, emphasizing the importance of treating state and trait gratitude as separate constructs. Moreover, McCullough et al. (2004) found a positive association between trait and state loneliness, showing that high levels of trait gratitude can lead to high levels of state gratitude on average.

Although state gratitude can lead to positive health outcomes (Gallagher et al., 2020, Ginty et al., 2020), research is still lacking considering the variability of state gratitude within individuals. Since tailored interventions can be effective methods to achieve positive within-person changes (Dickens, 2017), getting a more detailed picture of momentary feelings of gratitude in people's daily life can provide relevant information for existing interventions.

Gratitude and Loneliness

Several experimental and cross-sectional studies found a negative association between gratitude and loneliness (Caputo et al., 2015; Frinking et al., 2020; Ni et al., 2015, O'Connell et al., 2016). However, to the author's knowledge, only one experimental study explored the association between state loneliness and gratitude in the older population (Bartlett & Arpin, 2019). They found that on days with high state gratitude, individuals felt less lonely.

Interestingly, several theoretical frameworks could explain the negative association between loneliness and gratitude on the trait level. For instance, the Broaden and Build Theory by Fredrickson (2001) argues that gratitude, like other positive emotions, can expand a person's repertoire of thought and action whereby personal resources such as social relationships can be built, which might lead to a reduction in loneliness. Further, grateful people tend to be more optimistic and hopeful (Alkozei et al., 2018) and are more prone to seek social support (Wood et al., 2008). In addition, gratitude is positively associated with positive memory bias, meaning that grateful people remember positive situations more easily, which in turn increases wellbeing (Watkins et al., 2004).

The present study

Although the association between loneliness and gratitude seems to be well established in literature, previous cross-sectional studies examined this association mainly at the trait level using one-time assessments and disregarded this association on the state level (within-person) in daily life. Due to the fluctuating nature of loneliness and gratitude, it is of great importance to assess the momentary feelings of loneliness and gratitude using ESM, as this allows for a better understanding of a person's internal state in a real-time context and provides more accurate results. This can be relevant for existing theories which explain this association such as the broaden-and-build theory. Further, it might serve as basis for future studies, which develop and enhance individualized, timed interventions (Myin-Germeys & Kuppens, 2021), aiming at increasing gratitude and reducing feelings of loneliness in daily life. Importantly, to the author's knowledge, no study so far differentiates between-person effects from within-person effects. However, conclusions from between-person effects cannot be drawn on within-person effects as these effects may differ greatly (Curran & Bauer, 2011), meaning that the negative trait association between loneliness and gratitude cannot apply to the state association. The between-person effect describes how people's emotions, feelings and behaviour differ from each other, while the within-person effect explores how emotions, feelings and behaviours vary within a person depending on the context and situation by collecting individual's data multiple times a day (Myin-Germeys & Kuppens, 2021). Thus, this study aims to investigate the variability of loneliness and gratitude, and the association of these constructs within- and between persons.

First, we examined to what extent state gratitude and state loneliness fluctuate. Based on prior research (Alkozei et al., 2018; van Roekel et al., 2018), it is hypothesized that both constructs show variability within-and between individuals. Second, the association between

trait gratitude and trait loneliness will be replicated. In line with previous literature (e.g., Caputo et al., 2015), it is assumed that trait gratitude is negatively associated with trait loneliness. Third, the association between the traits and states of gratitude and loneliness will be investigated. In line with recent studies (McCullough et al., 2004; van Roekel et al., 2018), it is hypothesized that people with high trait gratitude/loneliness will also be high in average state gratitude/loneliness. Fourth, it is explored whether the association between state loneliness and state gratitude is more a between or within-person association. It is hypothesized that loneliness could be both predicted by trait as well as state gratitude as both can diminish negative emotions (DeWall et al. 2012; Watkins et al., 2003).

Methods

Participants

Inclusion criteria for this study entailed being enrolled at a university, being at least 18 years old, having a good command of English, and owning a smartphone with the iOS or Android operating systems. Although a total of 59 participants had registered for this study, participants who were using an Apple device were hindered from taking part in this study due to technical problems, leading to an incompatibility between the TiiM app and the iOS system. Besides, participants who did not complete the trait questionnaire or did not fill in all state measures were removed from this study, resulting in a total of 34 participants.

Design and Procedure

The present study draws on the data sets of a recent study by Adam (2020) and Wallisch-Prinz (2010). To measure loneliness and gratitude both on the state and trait level, the Experience sampling method (ESM) was used. This longitudinal method captures real-time, daily life experiences by measuring an individual's behaviour, emotions and feelings multiple times a day (Myin-Germeys & Kuppens, 2021). Ethical approval was given by the faculty of Behavioural, Management and Social Sciences (BMS) of the University of Twente (Request-Nr: 191272). Recruitment was achieved via convenience sampling. More specifically, the survey was shared via the SONA system (Test Subject Pool of the University of Twente) and various social media platforms. Participants who took part in this study via SONA system were rewarded with 2.5 credits. Students outside of the University of Twente were not rewarded for their participation. In addition, the data collection took place in November 2019.

The total study duration comprises nine days, where the first day involved informing and preparing the participants about the actual study. In particular, participants needed to subscribe either via the SONA-System or the URL link of TiiM. Furthermore, they had to enter their email address, their age, gender, nationality and confirm to be a registered student. They also received the request to download the TiiM app on their smartphones to follow the next steps of the study and to fill in the questionnaires the following days. Participants were then notified that more information would be available in the app tomorrow morning. On the second day, further information was given via the app regarding the background of the study, study design, participant rights and contact information. Besides, the participants were asked to give consent to participate in the study. During the actual study period (the last seven days), participants were required to fulfil the provided questionnaires three times a day. On the last day (day 9), participants needed to fill in the trait questionnaires for loneliness and gratitude.

Materials

To compile the online survey of this study, ‘The Incredible Intervention Machine (TiiM)’ was used, developed and maintained by the BMS Lab of the University of Twente. TiiM is an intervention helping researchers designing online surveys which can be applied on mobile phones, offering Android or iOS systems. To obtain the relevant data, the Multi-Component Gratitude Measure (Morgan et al., 2017) and the UCLA Loneliness Scale Third Version (Russell, 1996) were formatted into the online survey. With TiiM, questions can be combined into modules that were presented to the participants at fixed time frames. As emotions and feelings can vary during the day (Myin-Germeys & Kuppens, 2021), participants needed to respond to the questions three times a day, namely between 8 AM and 10 AM, 12 AM and 2 PM, and 7 PM and 9 PM for seven consecutive days. This study period was chosen because it captures participants’ feelings in different contexts, namely during the weekdays and the weekend (Myin-Germeys & Kuppens, 2021), allowing for more informative and precise data.

To provide a comprehensive and easy survey to the participants, the questions were repeatedly tested and adjusted accordingly. Prior the data collection, two participants evaluated the application’s features including the survey’s interface, the timing of the application and the functionality of the response items. Due to technical issues with the reminder function, the first four participants who signed up for this study were taught to manually set the reminders themselves. As this method resulted in low response rates, the

researchers sent manual reminders in the form of push notifications, increasing the response rate. Besides, if participants did not respond to the questions 30 minutes before the end of a time frame, further reminders were sent to them individually. Reminding participants is a crucial part of ESM as it informs participants when to provide data, decreasing participant burden (van Berkel et al., 2017).

State Measurements

Gratitude. To measure the participant's momentary feelings of gratitude, the single item '*I am grateful right now*' was used. Previous studies assessed state gratitude with either a single item (DeWall et al., 2012) or multiple items (McGuire et al., 2020). However, in order to decrease the participant burden and increase the response rate, the state measure is kept as short and concise as possible (Myin-Germeys & Kuppens, 2021). Hence, this study uses only one item. The participants could respond on a 7-point Likert Scale, ranging from '1 = strongly disagree' to '7 = strongly agree'. This indicates that participants obtaining a high score experience high levels of gratitude.

Loneliness. The participant's momentary feelings of loneliness was assessed by using the single item 'I feel lonely right now'. This item was already used in the study by van Roekel et al. (2018). Participants responded on a 7-point Likert Scale, ranging from '1 = strongly disagree' to '7 = strongly agree'. Scoring high on this scale means experiencing high feelings of loneliness.

Considering the validity of the gratitude and loneliness items, correlational analyses were conducted to assess the associations between state and trait gratitude as well as state and trait loneliness (Csikszentmihalyi & Larson, 2014). Strong associations between state and trait gratitude ($r=.683$, $p<.001$), as well as state and trait loneliness were found ($r=.651$, $p<.001$), indicating these single items as valid measurement instruments of gratitude and loneliness.

Trait Measurements

Gratitude. Trait gratitude was measured using the Multi-Component Gratitude Measure (MCGM) by Morgan et al. (2017). This instrument assesses gratitude as a moral virtue. It consists of 29 items that could be answered on a 7-point Likert Scale from '1 = strongly disagree' to '7 = strongly agree'. The MCGM contains three subscales, namely the emotional, attitudinal and behavioural subscale. The first subscale, measuring emotional gratitude, includes six items, e.g. '*I feel grateful for the people in my life*', attitudinal gratitude is assessed by ten items, e.g. '*I believe gratitude is an important value to have*' and

the behavioural subscale consists of 13 items, e.g. *'I make it a priority to thank others'*. As the MCGM entails reversed items, some items needed to be recoded. For statistical analyses, a total gratitude score was obtained by adding the scores of the three subscales. Further, this total score ranges from 29 to 203. The higher the sum score, the higher the level of gratitude. According to Morgan et al. (2017), all three subscales showed good internal reliability and construct validity. In this study, Cronbach's alpha was categorized as good ($\alpha = .87$).

Loneliness. Trait loneliness was assessed with the UCLA Loneliness Scale of Russell (1996), ascertaining how often a person experiences the feeling of loneliness in general. This scale contains 20 items and uses a 4-point Likert Scale from '1 = never' to '4 = always'. An example item is 'How often do you feel lonely?' Some items needed to be reversed. After adding all items, the sum score ranges from 20 to 80. Participants with high sum scores reveal a high level of loneliness. Similar to the MCGM, previous research has shown that the UCLA Loneliness Scale has both good validity and reliability. In this study, the Cronbach's alpha was classified as excellent ($\alpha = .94$).

Data analysis

For data analysis, the software package IBM SPSS statistics v26.0 was used. To create graphical illustrations, Excel for Microsoft 365 was used. The two data sets were united into one dataset, which was converted into a long data format. Descriptive statistics were calculated to gain detailed information about the participant's demographic data and to assess the trait and state measurements. Further, simple boxplots were constructed, investigating the variability of state gratitude and state loneliness within- and between persons.

Prior to the statistical inferences, person mean (PM) scores for state gratitude and state loneliness were calculated by aggregating the state data for each participant, allowing for between-person analyses. In contrast, the person-mean centred score (PMC) is calculated to allow for within-person analyses. This is achieved by subtracting the mean score of the state constructs from the state scores (Curran & Bauer, 2011). To enable comparison of the results, gratitude and loneliness were standardized by computing z-scores.

To investigate the association between trait gratitude and trait loneliness and the association between trait gratitude and average state gratitude (PM), and trait loneliness and average state loneliness (PM), Pearson correlation analyses were run. According to Cohen (1988), correlations were classified as weak ($-/+ .10 \leq r < -/+ .30$), moderate ($-/+ 0.3 \leq r < -/+ 0.5$), strong ($r \geq -/+ 0.5$). Further, to assess the association between state gratitude and state loneliness, a linear mixed model (LMM) analysis was performed with an autoregressive

covariance structure (AR1), accounting for the clustered data of this ESM study. By using LMM, it was explored whether the association between loneliness and gratitude is more a within- or a between-person effect. Here, state loneliness was set as dependent variable, whereas the PM and PMC scores for state gratitude will be defined as fixed covariates.

Results

Descriptive Statistics

Out of a total of $N = 59$ participants, $N = 34$ remained due to the exclusion criteria mentioned above. These respondents aged between 18 and 31 years ($M = 20.65$; $SD = 3.15$). Regarding the gender distribution of the sample, 85% were women, 9% were men, 3 % were transgender, and 3 % were gender variant/non-conforming. Individuals with the nationalities German (50%), Dutch (38%), Indian (3%), Bulgarian (3%), Vietnamese (3%), and Indonesian (3%) participated in this study.

Descriptive statistics are displayed in Table 1, showing the minimum, maximum, mean scores, and standard deviations of the participant's trait and state measures. Unfortunately, norm tables were not available for the Multi-Component Gratitude Measure. However, the sample's gratitude level seemed to be rather high on average, as the total gratitude minimum score (104) indicates an average level of trait gratitude. Comparing the mean score of trait loneliness of the present sample ($M = 45.62$; $SD = 10.88$) with the mean score of the sample used by Russel (1996) ($M = 40.08$; $SD = 9.50$) that validates the measure by looking at the data, the current scores were approximately in line with the norm. This suggests a balanced degree of trait loneliness in the sample.

Table 1

Minimum, Maximum, Means (M), and Standard deviations (SD) for the trait and state measures in the final sample.

Variable	Minimum (Scale Minimum)	Maximum (Scale Maximum)	M (SD)
Trait Loneliness	27 (20)	71 (80)	45.62 (10.88)
Trait Gratitude	104 (29)	180 (203)	144.74 (17.11)
State Loneliness	1 (1)	7 (7)	2.67 (1.57)
State Gratitude	1 (1)	7 (7)	5.05 (1.44)

Note. $N=34$

Considering the variability of state loneliness and state gratitude, Figure 1 and 2 illustrate that the participants differed in their experience of momentary feelings of loneliness and gratitude, indicating considerable fluctuations in state loneliness and state gratitude between persons. In fact, variability in experiencing state loneliness and state gratitude could be found both within- and between-persons during the study period of one week. Interestingly, Figure 1 and 2 also indicate that the group mean score for state gratitude was higher than the group mean score for state loneliness.

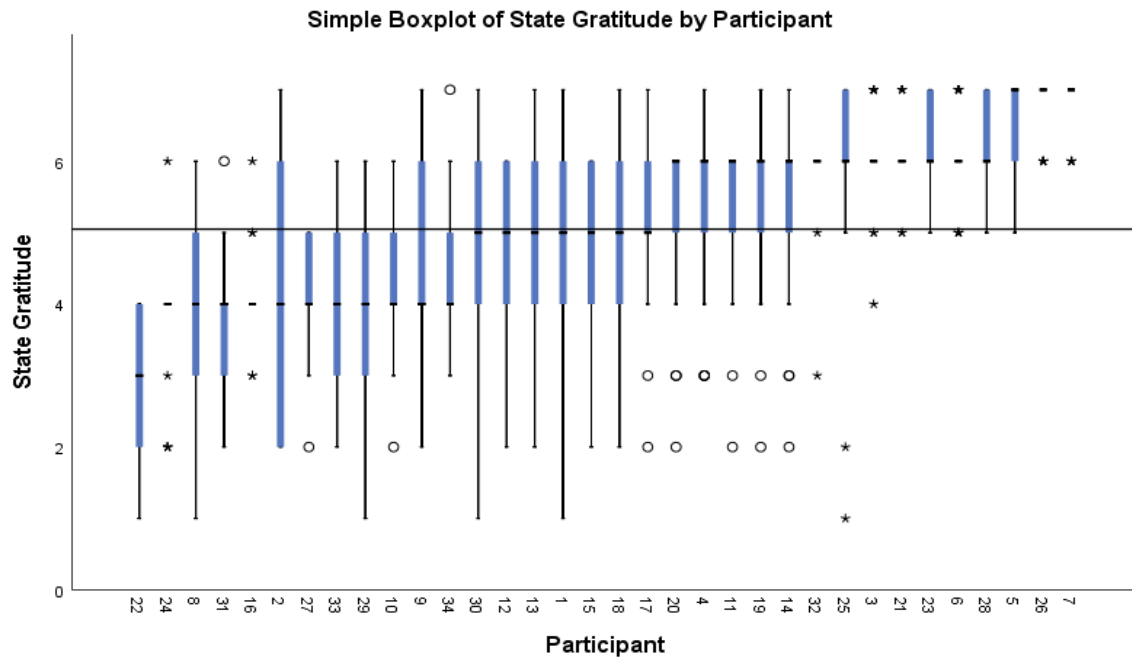


Figure 1. Boxplot illustrating the variation in experiencing gratitude for each participant with a reference line set to the mean of the sample ($M = 5.05$). The data are ranked in ascending order according to the mean score in state gratitude. The stars (*) signify extreme outliers and the circles (°) slight ones.

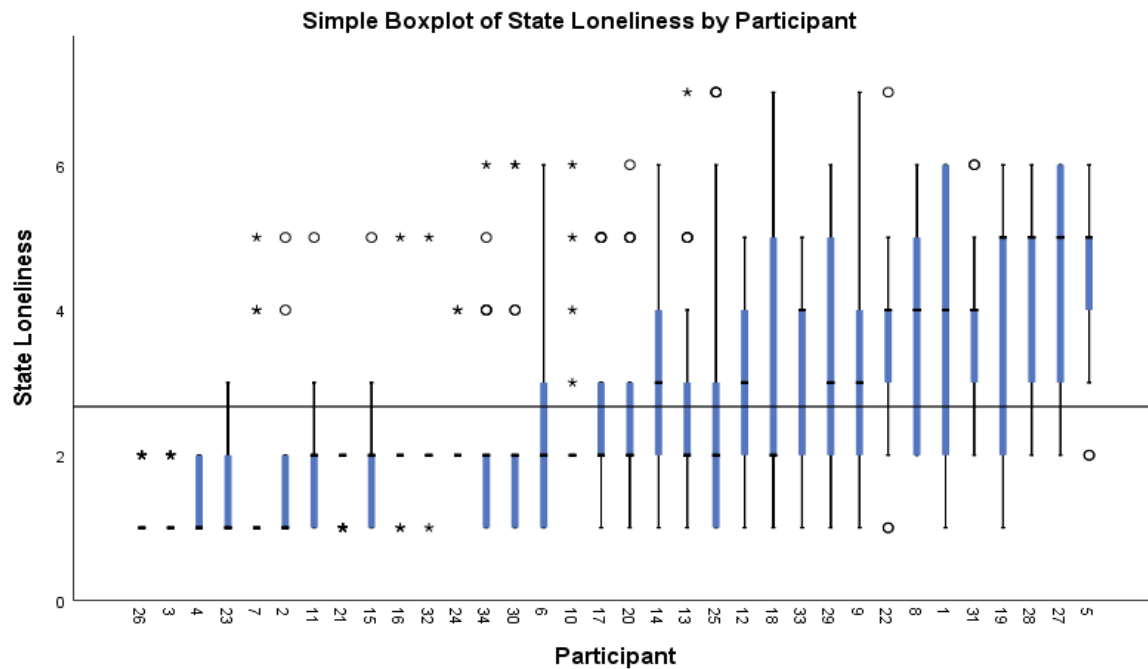


Figure 2. Boxplot illustrating the variation in experiencing loneliness for each participant with a reference line set to the mean of the sample ($M = 2.67$). The data are arranged in ascending order according to the mean score in state loneliness.

Associations between loneliness and gratitude

Several Pearson correlations were run to investigate the association between loneliness and gratitude on the trait level. Further, the associations between trait gratitude and average state gratitude (PM score), and trait loneliness and average state loneliness (PM score) were conducted. First of all, the results showed a significant moderate negative correlation between trait gratitude and trait loneliness ($r = -.48, p < .01$), meaning that those who have a high gratitude score, tend to have a low loneliness score.

Second, a significant and strong positive association between trait gratitude and average state gratitude ($r = .68, p < .01$) is found. This means that people who score higher on trait gratitude, tend to score higher on mean state gratitude as well. Also, the results revealed a significant and strong positive correlation between trait loneliness and average state loneliness ($r = .65, p < .01$), indicating that people who experience higher levels of loneliness, experience higher levels of mean state loneliness, respectively.

Lastly, a LMM analysis was conducted to examine whether state loneliness is more associated with state gratitude at a certain time point (within-person) or with average state gratitude (between-person). The results showed that both state gratitude (PMC score), $F(1, 626.94) = 90.61, p < .001$, and average state gratitude (PM score), $F(1, 148.07) = 13.35, p <$

.001, are associated with state loneliness. Hence, the association between state loneliness and state gratitude is both a within-person (state-like) and between-person (trait-like) effect.

Further, a significant, weak negative within-person association ($\beta = -.30$, $SE = .03$, $p < .001$, $CI[-.36, -.24]$), was found and a slightly weaker, negative between-person association ($\beta = -.18$, $SE = .05$, $p < .001$, $CI[-.28, -.08]$). However, due to the overlapping confidence intervals, it cannot be concluded that one association is stronger than the other.

Individual case analyses

Since the results of the LMM analysis found a negative association between gratitude and loneliness, all 34 participants were analysed separately to get better insight into their momentary feelings of gratitude and loneliness. Figures 3, 4, and 5 demonstrate the association between gratitude and loneliness over one week (21 measurement points) per participant. More specifically, three participants are chosen that represent three different correlations, namely a negative correlation, a positive correlation and no correlation.

Figure 3 demonstrates a significant, moderate negative correlation ($r = -.33$, $p < .01$) between gratitude and loneliness within one participant, representing the results of the LMM analysis. The measurement points 7, 9, and 12 show that an increase in loneliness leads to a decrease in gratitude within this participant. This participant is representative of showing the negative, moderate association between the two constructs. Further, Figure 3 also represents the high fluctuations in gratitude and loneliness.

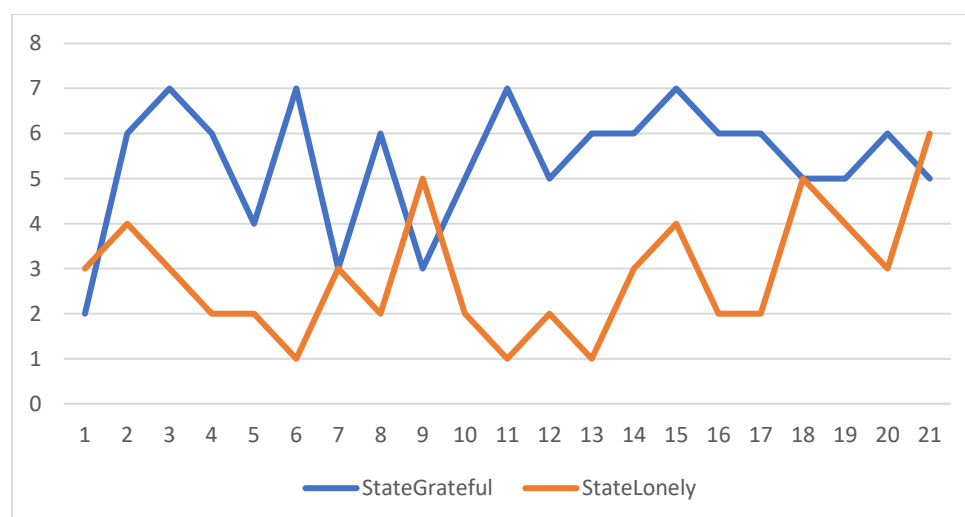


Figure 3. Line graph depicting state gratitude (blue) and state loneliness (orange) per timepoint of participant 14.

In contrast to the majority of participants who presented a negative state-state association, a positive association between state loneliness and state gratitude could be found for a few participants. As can be seen in Figure 4, e.g., participant 1 shows a positive association between the two state constructs ($r = .16$). Here, state loneliness and state gratitude moved in the same direction, e.g., at measurement points 4 and 16 to 20.

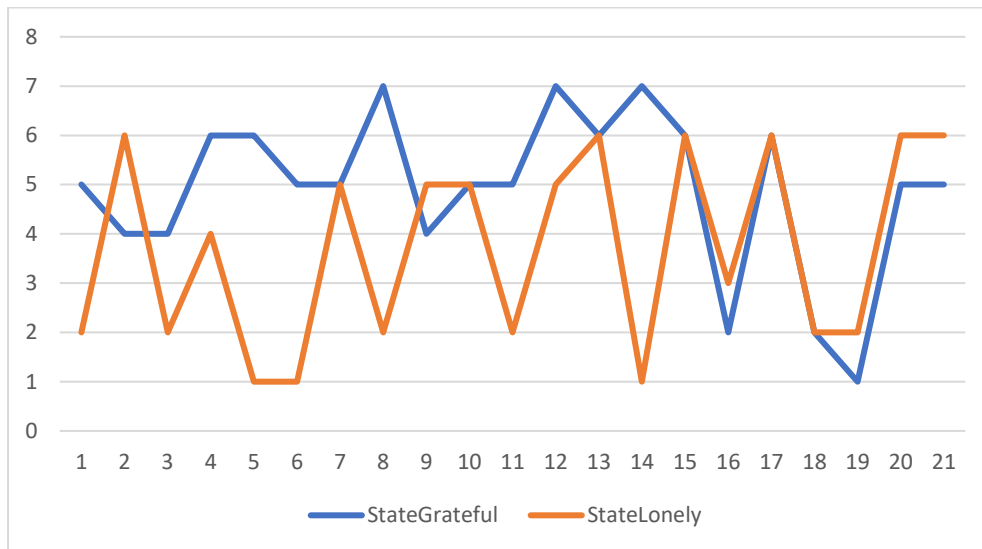


Figure 4. Line graph depicting state gratitude (blue) and state loneliness (orange) per timepoint of participant 1.

Figure 5 demonstrates one participant who is an exception and differs from the rest of the sample. Here, the results revealed no correlation between gratitude and loneliness ($r = .09$), meaning that an association between the two constructs cannot be found within this participant. For instance, at measurement time points 14 and 16, loneliness increased, while gratitude did not decrease. Comparing this participant to the current sample, this participant scored stable on both gratitude and loneliness.

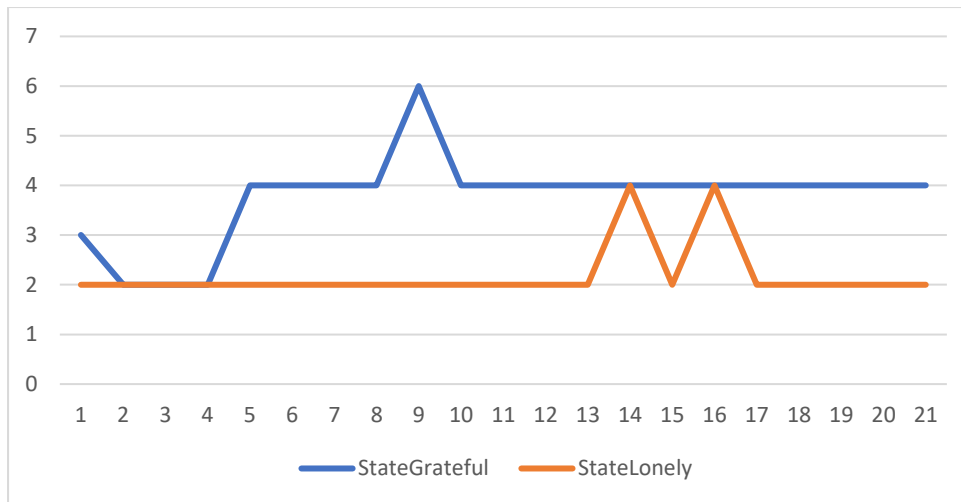


Figure 5. Line graph depicting state gratitude (blue) and state loneliness (orange) per timepoint of participant 24.

Discussion

The aim of the present study was to investigate the association between loneliness and gratitude among university students in their daily lives. More specifically, the variability of state loneliness and state gratitude, the association between gratitude and loneliness on the trait level, the association between trait gratitude and state gratitude as well as the association between trait loneliness and state loneliness were examined. Further, it was explored whether the association between state loneliness and state gratitude is more a momentary, within-person or more an average, between-person association.

The first hypothesis that claims that state gratitude and state loneliness vary within- and between persons can be confirmed, providing evidence for the fluctuating nature of these constructs. Besides, the results revealed a moderate, negative association between trait loneliness and trait gratitude, meaning that those who have a high average level of gratitude, also have a low average level of loneliness and vice versa. In line with the expectations, strong, positive associations between trait loneliness and average state loneliness and trait gratitude and average state gratitude were found, meaning that people who score higher on trait gratitude/loneliness, also score higher on mean state gratitude/loneliness. Lastly, the results revealed that momentary feelings of loneliness are both negatively associated with state gratitude and average state gratitude. The within-person association was stronger than the between-person association in the current sample. However, on the population level, it cannot be concluded that one association is stronger than the other one.

Interpretation of the results

The finding of the variability in loneliness is in line with the findings by van Roekel et al. (2018), stating that state loneliness depends on the type of the company or the type of the day. More specifically, they found that state loneliness can vary both within- and between individuals depending on the context. Further, within- and between person variability in loneliness was found in adults in an ESM study by Chui & Diehl (2021). Although the present study also found considerable variability within- and between individuals, a different target group, namely students, was used, suggesting that everyone experiences loneliness differently, confirming the importance of distinguishing between-and within person associations (Curran & Bauer, 2011). Moreover, the finding of the current study, indicating considerable variability in gratitude within individuals over the course of one week, is in accordance with previous literature that defines state gratitude as a positive emotion that varies during the day depending on the situation the person is in (Alkozei et al., 2018; McCullough et al., 2002). Because the current study did not consider the social and environmental context for assessing the variability of state loneliness and gratitude, no reasons can be given for these variations. However, this study indeed found fluctuations in both constructs within-and between persons.

Moreover, the current study found a significant, strong positive association between trait gratitude and average state gratitude, which is in accordance with previous findings. For instance, DeWall et al. (2011) and McCullough et al. (2004) also found a strong positive association between trait and average state gratitude in the daily context, indicating that individuals who score high in gratefulness, also score high in state gratefulness in daily life. This finding can be explained with the resistance hypothesis by McCullough et al. (2004), stating that people who, on average, experience high levels of gratitude are primarily driven by their personality rather than by daily events that evoke feelings of gratefulness compared to people who score low on average gratitude. Further, as expected, the strong, positive association between trait and state loneliness found in the current study is consistent with the research by van Roekel et al. (2018), stating that lonely individuals experience more state loneliness when being alone. A possible explanation could be that lonely people tend to spend their time more unproductively and less meaningfully than those who feel less lonely, resulting in fewer activities that would reduce loneliness (van Roekel et al., 2018).

Loneliness and gratitude

This study found a significant negative association between loneliness and gratitude

on the trait level in university students which is in line with previous research (Caputo, 2015; Frinking et al., 2020; Ni et al., 2015; O'Connell et al., 2016), These findings suggest that people who feel more grateful than others, tend to feel less lonely than others as well. The added value of this study is that the association between loneliness and gratitude was explored among university students, which is in contrast to previous studies as they explored the association between the trait constructs with a different target group, namely adults. This indicates that gratitude can have a beneficial role in different age groups ranging from the younger to the older population.

Next to the investigation of the association between gratitude and loneliness on the trait level, it was examined, whether the association on the state level is more a within-or between association. It means that it was investigated whether momentary feelings of loneliness are more associated with momentary feelings of gratitude (within-person, state-like association) or with average momentary feelings of gratitude (between-person, trait-like association). The results show that the association between loneliness and gratitude is both a within- and between person association as state gratitude and average state gratitude were significantly, negatively associated with state loneliness. In this sample, a slightly stronger association was found between momentary feelings of loneliness and momentary feelings of gratitude, meaning that individuals who score higher on state gratitude than his or her own average, score lower on state loneliness at this specific time point. However, on the population level, it cannot be concluded that the within-person association is stronger than the other one, indicating that no differences between the associations could be found. Because of the substantial variability in state loneliness and state gratitude between- and within individuals, it is reasonable that the associations were not strong.

The negative between-person association between loneliness and gratitude is in line with the study by Bartlett and Arpin (2019), which found that on days where individuals experience greater average state gratitude, felt less lonely among the older population. Besides, the negative between-person association can be explained by the 'Broaden-and-Build' Theory by Fredrickson (2001), stating that positive emotions such as gratitude expands people's thought-action repertoire, which in turn builds new resources, e.g., social bonds. Besides, grateful people are more likely to take care of other people, leading to a closer relationship between people (Bartlett & Arpin, 2019), which can reduce feelings of loneliness.

Further, a weak but significant within-person association was found between loneliness and gratitude. An explanation for this finding could be that grateful people tend to

integrate and apply new coping skills when facing challenging situations (Chun & Lee, 2013). This could have helped them to prevent themselves from experiencing high feelings of loneliness. However, lonely people are more likely to evaluate situations negatively and be less sensitive to positive stimuli (Cacioppo & Hawley, 2009), making it difficult to be grateful when feeling high levels of loneliness. Further, this weak within-person association signifies that there were exceptions, which displayed a positive association between state loneliness and state gratitude. In this sample, a few participants showed a positive association between loneliness and gratitude, which can also be seen when considering the individual case visualizations. This positive association supports the dual-factor model by Keyes that reports that people with high wellbeing can simultaneously experience mental health problems (Lyons et al., 2012). Hence, it might be the case that grateful individuals might be able to increase their level of gratefulness despite their level of loneliness.

As this study revealed both a negative within- and between-person association between state loneliness and state gratitude, it seems important to take both the momentary and average levels of loneliness and gratitude into account when creating precise, tailored interventions aimed at people suffering from loneliness.

Strengths and limitations

The present study involves strengths and limitations. Starting with the main strength of this study, the ESM design used for this study, provided deeper insights into the momentary feelings of loneliness and gratitude in daily life, increasing ecological validity. Further, due to the assessment of both state and trait measures, within-person analysis could be distinguished from between-person analysis (Curran & Bauer, 2011), which was never done before in previous studies. Further, due to the repeated measures, momentary feelings could be assessed in real-time and in their natural environment, preventing recall bias (van Berkel et al., 2017). Another strength is the validity and reliability of this study's trait and state measurement (Csikszentmihalyi & Larson, 2014). This study revealed a strong association between the trait and state measures, indicating good convergent validity. Further, both trait loneliness and trait gratitude questionnaires showed a high internal consistency, enabling a reliable measurement.

Just like other studies, the present study presents limitations. To begin with, the present study had technical problems with the TiiM app, so that the daily questionnaires measuring the momentary feelings of the respondents were not deleted after two hours. Hence, participants might have been answered these questions at a later time point of the day.

For instance, morning questions could have been answered later the day by thinking retrospectively about their feelings or by indicating how they felt in the moment. This would have diminished the ecological validity of the study. Another limitation is the sampling strategy. The convenience sampling strategy was used which did not include a random selection of participants. This study entails an over-representation of female respondents (85%), making it difficult to generalize the results to the general population. The last limitation refers to reactivity. As the state questionnaires were completed several times a day, participants' attention might have been unusually drawn to their feelings, which could have influenced their responses. In particular, participants might have anticipated which questions would follow the next day and thus consciously or unconsciously changed their behaviour and feelings (Arndt et al., 2021; Myin-Germeys & Kuppens, 2021).

Future research

To begin with, future research should consider a larger sample size and avoid the exclusion of participants who did not reach a 100% response rate as ESM handles missing data (Myin-Germeys & Kuppens, 2021). Further, it would be interesting to assess trait loneliness and trait gratitude before and after the state questionnaires in order to account for reactivity. On top of that, future research could come up with a more precise pilot test in order to account for the technical difficulties with the TiiM application. Lastly, as the data collection of this study was done one month before the COVID-19 outbreak, the level of loneliness might have drastically changed due to the lockdown and social distancing regulations. As the pandemic is still ongoing, it would be interesting to see whether these external factors influence the association between gratitude and loneliness.

This study provides relevant information about people's momentary feelings of loneliness and gratitude in daily life, which can facilitate the development of tailored interventions such as Ecological Momentary Interventions (EMIs). According to Myin-Germeys & Kuppens (2021), EMI's can adopt important data from ESM studies, enabling individualized treatment that can be transferred from clinical settings to real-time, daily life moments. Thus, people suffering from high levels of loneliness could benefit from these types of interventions, as they could receive help whenever needed, allowing for an effective coping strategy in their daily context.

Conclusion

Although the association between loneliness and gratitude was already established in previous studies, recent research considered these constructs only on the trait level,

neglecting the dynamic character of loneliness and gratitude. Thus, the present study provides more insights into the state measures by investigating the variability of these constructs within- and between persons, as well as the association in daily situations. As this study revealed that the association between loneliness and gratitude is both a between- and within person association, this insight may serve as a preliminary step for future research, which develop tailored, timed interventions aimed at helping individuals cope with high feelings of loneliness.

References

- Adam, J. T. (2020). How the company of others and being alone affect feelings of loneliness and gratitude : an experience sampling study [Bachelor's thesis, University of Twente]. <http://essay.utwente.nl/80442/>
- Alkozei, A., Smith, R., & Killgore, W. D. (2018). Gratitude and subjective wellbeing: A proposal of two causal frameworks. *Journal of Happiness Studies*, *19*(5), 1519-1542. <https://doi.org/10.1007/s10902-017-9870-1>
- Arndt, H. L., Granfeldt, J., & Gullberg, M. (2021). Reviewing the potential of the Experience Sampling Method (ESM) for capturing second language exposure and use. *Second Language Research*, *02676583211020055*. <https://doi.org/10.1177/02676583211020055>
- Bartlett, M. Y., & Arpin, S. N. (2019). Gratitude and loneliness: Enhancing health and wellbeing in older adults. *Research on Aging*, *41*(8), 772-793. <https://doi.org/10.1177/0164027519845354>
- Buecker, S., Maes, M., Denissen, J. J., & Luhmann, M. (2020). Loneliness and the Big Five personality traits: A meta-analysis. *European Journal of Personality*, *34*(1), 8-28. <https://doi.org/10.1002/per.2229>
- Cacioppo, J. T., & Cacioppo, S. (2018). The growing problem of loneliness. *The Lancet*, *391*(10119), 426. [http://doi.org/10.1016/S0140-6736\(18\)30142-9](http://doi.org/10.1016/S0140-6736(18)30142-9)
- Cacioppo, J. T., Ernst, J. M., Burleson, M. H., McClintock, M. K., Malarkey, W. B., Hawkley, L. C., ... & Berntson, G. G. (2000). Lonely traits and concomitant physiological processes: The MacArthur social neuroscience studies. *International Journal of Psychophysiology*, *35*(2-3), 143-154. [https://doi.org/10.1016/S0167-8760\(99\)00049-5](https://doi.org/10.1016/S0167-8760(99)00049-5)
- Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences*, *13*(10), 447-454. <https://doi.org/10.1016/j.tics.2009.06.005>
- Caputo, A. (2015). The relationship between gratitude and loneliness: The potential benefits of gratitude for promoting social bonds. *Europe's Journal of Psychology*, *11*, 323–334. <https://doi:10.5964/ejop.v11i2.826>

- Chui, H., & Diehl, M. (2021). Gratitude and loneliness in daily life across the adult lifespan. *Current Psychology*, 1-16. <https://doi.org/10.1007/s12144-021-02488-8>
- Chun, S., & Lee, Y. (2013). “I am just thankful”: the experience of gratitude following traumatic spinal cord injury. *Disability and rehabilitation*, 35(1), 11-19. <https://doi.org/10.3109/09638288.2012.687026>
- Csikszentmihalyi, M., & Larson, R. (2014). Validity and reliability of the experience-sampling method. In *Flow and the Foundations of Positive Psychology: The Collected Works of Mihaly Csikszentmihalyi* (pp. 35–54). Springer Netherlands. https://doi.org/10.1007/978-94-017-9088-8_3
- Curran, P. J., & Bauer, D. J. (2011). The Disaggregation of Within-Person and Between-Person Effects in Longitudinal Models of Change. *Annual Review of Psychology*, 62(1), 583– 619. <https://doi.org/10.1146/annurev.psych.093008.100356>
- DeWall, C. N., Lambert, N. M., Pond, R. S., Jr., Kashdan, T. B., & Fincham, F. D. (2012). A grateful heart is a nonviolent heart: Cross-sectional, experience sampling, longitudinal, and experimental evidence. *Social Psychological and Personality Science*, 3(2), 232-240. <https://doi.org/10.1177/1948550611416675>
- Dickens, L. R. (2017). Using Gratitude to Promote Positive Change: A Series of Meta-Analyses Investigating the Effectiveness of Gratitude Interventions. *Basic and Applied Social Psychology*, 39(4), 193-208. <https://doi.org/10.1080/01973533.2017.1323638>
- Emmons, R. A., & McCullough, M. E. (Eds.). (2004). *The psychology of gratitude*. Oxford University Press.
- Emmons, R. A., & Mishra, A. (2011). Why Gratitude Enhances Well-Being: What We Know, What We Need to Know. In *Designing positive psychology: Taking stock and moving forward* (pp. 248-262). Oxford University Press. <https://oxford.universitypressscholarship.com/view/10.1093/acprof:oso/9780195373585.001.0001/acprof-9780195373585-chapter-16>
- Emmons, R. A., & Shelton, C. M. (2002). Gratitude and the science of positive psychology. *Handbook of positive psychology*, 18, 459-471. Retrieved from:

http://ldysinger.stjohnsem.edu/@books1/Snyder_Hndbk_Positive_Psych/Snyder_Lopez_Handbook_of_Positive_Psychology.pdf#page=478

- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and- build theory of positive emotions [Article]. *American Psychologist*, 56(3), 218-226. <https://doi.org/10.1037/0003-066X.56.3.218>
- Frinking, E., Jans-Beken, L., Janssens, M., Peeters, S., Lataster, J., Jacobs, N., & Reijnders, J. (2020). Gratitude and loneliness in adults over 40 years: examining the role of psychological flexibility and engaged living. *Aging & Mental Health*, 24(12), 2117-2124. <https://doi.org/10.1080/13607863.2019.1673309>
- Gallagher, S., Solano, A. C., & Liporace, M. F. (2020). State, but not trait gratitude is associated with cardiovascular responses to acute psychological stress. *Physiology & behavior*, 221, 112896. <https://doi.org/10.1016/j.physbeh.2020.112896>
- Ghalesefidi, M. J., Maghsoudi, J., & Pouragha, B. (2019). Effectiveness of gratitude on psychological well-being and quality of life among hospitalized substance abuse patients. *Electronic Journal of General Medicine*, 16(2). Retrieved from: <http://eprints.abzums.ac.ir/id/eprint/4248>
- Ginty, A. T., Tyra, A. T., Young, D. A., John-Henderson, N. A., Gallagher, S., & Tsang, J. A. C. (2020). State gratitude is associated with lower cardiovascular responses to acute psychological stress: a replication and extension. *International Journal of Psychophysiology*, 158, 238-247. <https://doi.org/10.1016/j.ijpsycho.2020.10.005>
- Hawkey, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of behavioral medicine*, 40(2), 218-227. <https://doi.org/10.1007/s12160-010-9210-8>
- Heinrich, Liesl M., and Eleonora Gullone. "The clinical significance of loneliness: A literature review." *Clinical psychology review* 26, no. 6 (2006): 695-718. <https://doi.org/10.1016/j.cpr.2006.04.002>
- Kashdan, T. B., & Breen, W. E. (2007). Materialism and diminished well-being: Experiential avoidance as a mediating mechanism. *Journal of social and clinical psychology*, 26(5), 521. <https://doi.org/10.1521/jscp.2007.26.5.521>

- Lyons, M. D., Huebner, E. S., Hills, K. J., & Shinkareva, S. V. (2012). The dual-factor model of mental health: Further study of the determinants of group differences. *Canadian Journal of School Psychology, 27*(2), 183-196.
<https://doi.org/10.1177/0829573512443669>
- Măirean, C., Turluc, M. N., & Arghire, D. (2019). The relationship between trait gratitude and psychological wellbeing in university students: The mediating role of affective state and the moderating role of state gratitude. *Journal of Happiness Studies, 20*(5), 1359-1377. <https://doi.org/10.1007/s10902-018-9998-7>
- Maslow, A. H. (1958). A Dynamic Theory of Human Motivation. In C. L. Stacey & M. DeMartino (Eds.), *Understanding human motivation* (pp. 26–47). Howard Allen Publishers. <https://doi.org/10.1037/11305-004>
- McCullough, M. E., Emmons, R. A., & Tsang, J. A. (2001). The gratitude questionnaire-six item form (GQ-6). Retrieved April, 16, 2010. Retrieved from:
<https://socialskillsplus.com/wp-content/uploads/2018/11/Penn-Institute-Gratitude-Questionnaire.pdf>
- McCullough, M. E., Emmons, R. A., & Tsang, J.-A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology, 82*(1), 112–127. <https://doi.org/10.1037/0022-3514.82.1.112>
- McCullough, M. E., Tsang, J. A., & Emmons, R. A. (2004). Gratitude in Intermediate Affective Terrain: Links of Grateful Moods to Individual Differences and Daily Emotional Experience [Article]. *Journal of Personality and Social Psychology, 86*(2), 295-309. <https://doi.org/10.1037/0022-3514.86.2.295>
- McGuire, A. P., Szabo, Y. Z., Murphy, K. M., & Erickson, T. M. (2020). Direct and indirect effects of trait and state gratitude on health-related quality of life in a prospective design. *Psychological Reports, 123*(6), 2248-2262.
<https://doi.org/10.1177/0033294119868784>
- McLeod, S. (2007). Maslow's hierarchy of needs. *Simply psychology, 1*(1-18). Retrieved from: <https://canadacollege.edu/dreamers/docs/Maslows-Hierarchy-of-Needs.pdf>

- Meng, J., Wang, X., Wei, D., & Qiu, J. (2020). State loneliness is associated with emotional hypervigilance in daily life: a network analysis. *Personality and Individual Differences, 165*, 110154. <https://doi.org/10.1016/j.paid.2020.110154>
- Morgan, B., Gulliford, L., & Kristjánsson, K. (2017). A new approach to measuring moral virtues: The Multi-Component Gratitude Measure. *Personality and Individual Differences, 107*, 179–189. <https://doi.org/10.1016/j.paid.2016.11.044>
- Myin-Germeys, I. & Kuppens, P. (editors) (2021). Open Handbook of Experience Sampling Methodology. <https://www.kuleuven.be/samenwerking/real/real-book/index.htm>
- Ni, S., Yang, R., Zhang, Y., Dong, R. (2015). Effect of gratitude on loneliness of Chinese college students: Social support as a mediator. *Social Behavior and Personality, 43*, 559–566. <https://doi:10.2224/sbp.2015.43.4.559>
- Nilsson, B., Lindström, U. Å., & Näden, D. (2006). Is loneliness a psychological dysfunction? A literary study of the phenomenon of loneliness. *Scandinavian journal of caring sciences, 20*(1), 93-101. <https://doi.org/10.1111/j.1471-6712.2006.00386.x>
- O'Connell, B. H., O'Shea, D., & Gallagher, S. (2016). Mediating effects of loneliness on the gratitude-health link. *Personality and Individual Differences, 98*, 179-183. <https://doi.org/10.1016/j.paid.2016.04.042>
- Raphael, K. (1987). Recall bias: a proposal for assessment and control. *International journal of epidemiology, 16*(2), 167-170. Retrieved from: <https://www.alnap.org/system/files/content/resource/files/main/bias.pdf>
- Roberts, T., & Krueger, J. (2021). Loneliness and the emotional experience of absence. *The Southern Journal of Philosophy, 59*(2), 185-204. <https://doi.org/10.1111/sjp.12387>
- Russell, D. W. (1996). UCLA Loneliness Scale (Version 3): Reliability, Validity, and Factor Structure. *Journal of Personality Assessment, 66*(1), 20-40. https://doi.org/10.1207/s15327752jpa6601_2
- Skrzelinska, J., & Ferreira, J. A. (2020). Gratitude: the state of art. *British Journal of Guidance & Counselling, 1-13*. <https://doi.org/10.1080/03069885.2020.1789553>

- Szcześniak, M., Rodzeń, W., Malinowska, A., & Kroplewski, Z. (2020). Big five personality traits and gratitude: the role of emotional intelligence. *Psychology Research and Behavior Management, 13*, 977. <http://10.2147/PRBM.S268643>
- Tam, K. Y., & Chan, C. S. (2019). The effects of lack of meaning on trait and state loneliness: correlational and experience-sampling evidence. *Personality and Individual Differences, 141*, 76-80. <https://doi.org/10.1016/j.paid.2018.12.023>
- van Berkel, N., Ferreira, D., & Kostakos, V. (2017). The Experience Sampling Method on Mobile Devices. *ACM Computing Surveys, 50*(6), 1–40. <https://doi.org/10.1145/3123988>
- van Roekel, E., Scholte, R. H., Engels, R. C., Goossens, L., & Verhagen, M. (2015). Loneliness in the daily lives of adolescents: An experience sampling study examining the effects of social contexts. *The Journal of Early Adolescence, 35*(7), 905-930. <https://doi.org/10.1177/0272431614547049>
- van Roekel, E., Verhagen, M., Engels, R. C., Scholte, R. H., Cacioppo, S., & Cacioppo, J. T. (2018). Trait and state levels of loneliness in early and late adolescents: Examining the differential reactivity hypothesis. *Journal of Clinical Child & Adolescent Psychology, 47*(6), 888-899. <https://doi.org/10.1080/15374416.2016.1146993>
- Wallisch-Prinz, L. (2020). Measuring feelings of self-compassion and stress in daily life : an experience sampling study [bachelor's thesis, University of Twente]. <http://essay.utwente.nl/80787/>
- Wang, J., Mann, F., Lloyd-Evans, B., Ma, R., & Johnson, S. (2018). Associations between loneliness and perceived social support and outcomes of mental health problems: a systematic review. *BMC psychiatry, 18*(1), 1-16. <https://doi.org/10.1186/s12888-018-1736-5>
- Watkins, P. C., Grimm, D. L., & Kolts, R. (2004). Counting your blessings: Positive memories among grateful persons. *Current Psychology, 23*(1), 52-67. <https://doi.org/10.1007/s12144-004-1008-z>
- Watkins, P. C., Woodward, K., Stone, T., & Kolts, R. L. (2003). Gratitude and happiness: Development of a measure of gratitude, and relationships with subjective well-

being. *Social Behavior and Personality: an international journal*, 31(5), 431-451.
<https://doi.org/10.2224/sbp.2003.31.5.431>

Wood, A. M., Maltby, J., Gillett, R., Linley, P. A., & Joseph, S. (2008). The role of gratitude in the development of social support, stress, and depression: Two longitudinal studies. *Journal of Research in personality*, 42(4), 854-871.
<https://doi.org/10.1016/j.jrp.2007.11.003>

Wood, A. M., Maltby, J., Stewart, N., Linley, P. A., & Joseph, S. (2008). A social-cognitive model of trait and state levels of gratitude. *Emotion*, 8(2), 281.
<https://doi.org/10.1037/1528-3542.8.2.281>

Wood, A. M., Froh, J. J., & Geraghty, A. W. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical psychology review*, 30(7), 890-905.
<https://doi.org/10.1016/j.cpr.2010.03.005>

Yost-Dubrow, R., & Dunham, Y. (2018). Evidence for a relationship between trait gratitude and prosocial behaviour. *Cognition and Emotion*, 32(2), 397-403.
<https://doi.org/10.1080/02699931.2017.1289153>

Yung, S. T., Chen, Y., & Zawadzki, M. J. (2021). Loneliness and psychological distress in everyday life among Latinx college students. *Journal of American College Health*, 1-10. <https://doi.org/10.1080/07448481.2021.1927051>