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Anxiety, Well-being, and Social Contacts in Daily Life of Students: An Experience Sampling Study

Master's Thesis

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September 6, 2021

Abstract

Objective. Research shows that higher levels of anxiety symptoms go along with decreased well-being. This problem is especially prevalent in students as they are facing several challenges and stressors. Social contacts are expected to buffer this relationship as they can decrease anxiety and influence well-being positively. The research on this topic is of increasing importance, yet there is a lack of research that is taking the daily fluctuations of those variables into account. Consequently, this study aimed at assessing the relationship between state anxiety and state well-being together with the potential moderator number of social contacts. It was expected that anxiety and well-being display a negative relationship and that social contacts have a positive relation to well-being and a negative association to anxiety. Besides, an interaction effect of social contacts on the relationship between anxiety and well-being was predicted.

Method. An Experience Sampling Method was conducted over the course of two weeks (42 measurement points), where the participants had to fill in a questionnaire three times a day. In total, 29 participants were included in the analyses (Mean age = 23.2; female = 55%). The variable state anxiety was measured through a Visual Analogue Scale, in which the participants should rate their level of anxiety. State well-being was assessed through the Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS). The number of social contacts was assessed by asking the participants with whom they had spent the last two hours. The analyses were performed with a series of Linear Mixed Models.

Results. The analyses revealed a significant negative relationship between anxiety and well-being on a within- (β=-.40, p<.001) and between-person level (β=-.19, p<.001). Social contacts and well-being displayed a significant positive relationship on both within- (β=.23, p<.001) and between-person levels (β=.36, p<.001). The relationship between social contacts

and anxiety was not significant. Finally, an interaction effect of social contacts and anxiety on well-being was found on a within-person level (β=.47, *p*<.001).

Conclusion. Overall, the study adds to the growing body of research as it gave more insights into the patterns of covariance of social contacts, anxiety, and well-being in daily life. In conclusion, the burden of university students when dealing with several stressors should be considered by research and suitable interventions should be made available.

Keywords: *Anxiety, Well-being, Social Contacts, Experience Sampling Method (ESM)*

Studying at a university can be stressful and worrisome at times. Studies demonstrate that anxiety symptoms are highly prevalent in university students (Regehr et al., 2013). Especially young adults, which applies to the majority of university students, have a particularly high risk to develop mental disorders (Kessler et al., 2005). According to Eisenberg et al. (2007), 4.2% of undergraduates and 3.8% of graduate students meet the criteria of a panic disorder and a generalized anxiety disorder, compared to 3.8% (Ritchie & Roser, 2018) of the general population who are diagnosed with an anxiety disorder. Bayram and Bilgel (2008) found that 47.1% of students experience anxiety symptoms. The number of those at risk of developing an anxiety disorder is even higher (Day et al., 2013). Anxiety symptoms include fatigue, insomnia, concentration difficulties, and irritability (Dias Lopes et al., 2020). Studying at a university often entails several stressors such as academic pressure, irregular sleep patterns, changes in personal relationships (Eisenberg et al., 2007), and anxiety about the future (Dias Lopes et al., 2020). Those challenges can influence students' mental health negatively (Dias Lopes et al., 2020). Further, this period can involve a series of symptoms and discomfort, which might even make it challenging for some people to fulfill daily life demands (Dias Lopes et al., 2020).

According to the two-continua model by Keyes (2002), mental illness and well-being are related but distinct concepts. Therefore, mental health cannot be referred to as just the absence of mental illness but also the presence of well-being (Westerhof & Keyes, 2010). Well-being can be distinguished into emotional (e.g., life satisfaction, happiness), psychological (e.g., self-acceptance, positive relations), and social well-being (e.g., social acceptance, social contribution) (Keyes, 2002). This suggests that the role of well-being needs to be considered in relation to the increasing number of mental disorders and psychological symptoms in students. The role of well-being is important as mental health according to the two-continua model is not defined by just the absence of anxiety but rather

the presence of mental well-being (Westerhof & Keyes, 2010). Therefore, further research is important to explore the relationship between psychopathology and well-being. As there is a lack of research on the association of anxiety and well-being, research on quality of life is considered additionally as an aspect of well-being. A negative association between anxiety and quality of life/well-being has been found repeatedly in cross-sectional studies (De Beurs et al., 1999; Olatunji et al., 2007; Panayiotou & Karekla, 2013).

Anxiety and well-being have been shown to fluctuate and to be unstable and context-dependent and can therefore be described as state variables (Kraemer et al., 1994). It is impossible to measure fluctuations in state variables using a cross-sectional design. Measures taken at one single time-point cannot be generalized to other time-points (Curran & Bauer, 2011). Hence, the between-person effects of cross-sectional designs would not provide representative results in this context. Through repeated measurements in longitudinal studies, the fluctuations of variables can be assessed. Increasing knowledge about anxiety and well-being, and their patterns in daily life situations of university students is useful for research due to its close insights into the individual's daily life and the chance to evaluate psychological constructs and mechanisms further (Verhagen et al., 2016). Whereas state anxiety consists of rapid changes and depends on different contexts and situations, well-being is also affected by short-term variations (Xanthopoulou et al., 2012) and can be assumed to be a dynamic concept. Longitudinal designs can separate those concepts into between- and within-person associations, meaning interindividual and intraindividual associations which can provide more details than traditional designs (Curran & Bauer, 2011). However, inter- and intraindividual relationships need to be interpreted separately as no conclusions should be drawn from one to the other – the same relationship is possible but not necessary (Curran & Bauer, 2011).

Structured diary techniques, such as the Experience Sampling Method (ESM), in which participants are asked to fill in short questionnaires multiple times per day are convenient (Verhagen et al., 2016). Through ESM, momentary assessments are conducted and specific moments in which symptoms might occur are captured (Walz et al., 2014). Thereby, multiple assessments in real-time settings can be made which is especially useful for unstable and fluctuating variables; those unpredictable dynamics can be captured using ESM (Myin-Germeys et al., 2009; Walz et al., 2014). Another advantage of ESM is that assessments take place in the natural environment instead of a laboratory, and participants display natural behavior which is helpful to prevent biases like the retrospective recall bias (Van Berkel et al., 2017). By assessing the constructs frequently and in the natural environment of the participants the ecological validity is increased (Myin-Germeys et al., 2009).

One factor that might be negatively related to anxiety is social contacts. Social contacts are described as relationships that are seen as helpful, loving, and caring (Cohen, 1992). Benke et al. (2020) found that a lack of social contact negatively impacts mental health. Therefore, people with few or without social contacts might be more prone to anxiety disorders than people with many social contacts (Beutel et al., 2017). Furthermore, the frequency of social contacts is shown to improve well-being (Hartas, 2019) and therefore, it can be expected that social contacts and friends alleviate psychological symptoms in students. Consequently, social contacts are a relevant aspect in research on well-being as social contacts can provide care, increase the individual's self-worth, and give the person the feeling of being part of a community and the feeling of usefulness (Cohen & Wills, 1985). Social contacts may enhance positive experiences due to a rewarding role in a community that causes a stable environment and provide support which could make the life situation more predictable (Cohen & Wills, 1985). Still, a reverse relationship is possible as well; anxiety

might also lead to fewer social contacts. This is supported by Green et al. (2002) who found a connection between mental problems and social withdrawal. Especially in anxiety disorders, social withdrawal is prevalent (Rubin & Burgess, 2001). Furthermore, next to the predominant positive aspects of social contacts on well-being also negative aspects as e.g., stress caused by them should be considered (Green et al., 2002). Negative aspects of social contacts might also trigger anxiety as it can be the reason for pressure to conform to a group, feel obliged to cultivate social contacts or to provide social support (Kawachi & Berkman, 2001).

Social contacts' positive influence on mental health is supported by the social buffering theory by Cohen and Wills (1985). According to this theory, the support provided through a group of social contacts might function as a buffer between the experience of stress and the reaction to the stressful experience which can have positive psychological and physiological effects (Cohen & Wills, 1985; Kikusui et al., 2006). Consequently, social contacts cause a reduction in the persons' stress level (Kikusui et al., 2006). Overall, social buffering might help to deal with stressors which the individual perceives as less threatening and more controllable when being with others (Kirschbaum et al., 1995). As anxiety symptoms can also be seen as a stressor, it can be assumed that social contacts might also have a positive impact on anxiety symptoms. As mentioned earlier, as people tend to have fewer social contacts during periods of mental health problems, the positive aspects of social buffering might be decreased in anxious people.

Considering the effect of social contacts on psychopathology and well-being, it could be assumed that the number of social contacts might make a difference for the social buffering effect. Schwanen and Wang (2014) found that the number of friends correlates positively with happiness and life-satisfaction which relates to well-being. These findings were also supported by Pinquart & Sörensen (2000), who stated that the quantity of

friendships impacted well-being positively. Based on these findings it can be concluded that the number of social contacts might affect how a person's anxiety is associated with well-being, meaning that anxiety might have less influence on people with a high number of social contacts and vice versa.

The current study

In sum, anxiety is prevalent among university students and has a negative impact on well-being (Panayiotou & Karekla, 2013). Therefore, it is essential to promote and improve the understanding of mental health in this group and to identify the factors that are associated with poor mental health (Eisenberg et al., 2007). The study is relevant to gain a better understanding of the factors associated with students' well-being. Hence, measuring them in the participants' daily lives by using ESM might give more insights into the role of social contacts in the context of the state variables well-being and anxiety. Thereby, the effects between persons and within the individual person are revealed which provides deeper real-time insights (Connor & Barrett, 2012) about the short-term fluctuations of those variables as the variables are measured across different time points. Focusing on university students might add to the limited body of literature.

Due to the positive effect of social contacts on well-being in students (Diener & Seligman, 2002) and its positive effect on psychopathology, it was expected that social contacts in students might serve as a buffer between anxiety and well-being. Accordingly, this study examined whether the number of social contacts moderates the relationship between anxiety and well-being. It was expected that anxiety has a negative relationship with well-being, while social contacts are positively associated with well-being. Additionally, it was anticipated that a higher number of social contacts influences anxiety negatively. The following hypotheses were examined in the current study:

1) Anxiety is negatively associated with well-being on both a within-person level and a between-person level in university students.

2) In university students, the number of social contacts is positively related with well-being and negatively related with anxiety on both a within-person level and a between-person level.

3) The relationship between anxiety and well-being is different for university students with a high versus a low number of social contacts on a within-person level. A high number of social contacts weakens the relationship, while a low number of social contacts strengthens the association.

Methods

Participants

In total, 34 participants took part in the study. The participants were university students from different countries and were recruited via convenience sampling. To get a sufficient sample size, a median of 19 participants is recommended (Van Berkel et al., 2017). Therefore, 34 participants seemed suitable for the study. The participants were contacted through the social networks of the researchers. Criteria for including participants were being a registered university student, being 18 years or older, being able to understand English adequately, and owning a smartphone with either an Android or iOS operating system.

Materials

Data were collected by using the app Ethica. The participants needed access to an email address and a smartphone that could install the app. Using mobile phones has the advantage that questionnaires are easily accessible in daily life, and participants' burden is decreased as no study-related additional measurement objects need to be carried around as it used to be in earlier ESM studies (Van Berkel et al., 2017). Two questionnaires were provided, one baseline and one daily questionnaire. The baseline questionnaire consisted of

demographics and different questionnaires addressing feelings and thoughts regarding i.e.,

depression and well-being.

Measures

This study was part of a larger study examining mental health in daily life using ESM

in university students. Only the questionnaires described below were used in the current

study.

State Anxiety

State anxiety was assessed by using a Visual Analogue Scale (VAS). The VAS is used

in several clinical and non-clinical studies, suggesting that it is an adequate instrument to

assess fluctuations in state anxiety (Rossi & Pourtois, 2012). With the VAS, participants rate

the intensity of a specific feeling. According to Rossi & Pourtois (2012), it is convenient for

repeated measurements and participants' burden is kept low due to its simplicity. The current

study asked the participants to answer the question '*How anxious do you feel right now?*'

which is also the most used VAS to assess anxiety (VAS-A, Rossi & Pourtois, 2012). The

scale was ranging from '*Not down at all*' (0) to '*Extremely Down*' (100).

State Well-being

Further, the Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS) was

used to measure mental well-being. It is a short version of the original questionnaire

Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and was constructed for the

evaluation of mental well-being programs (Stewart-Brown et al., 2009). Moreover, the

SWEMWBS has shown adequate reliability and validity in people with anxiety and other

representative population samples as students (Stewart-Brown et al., 2009; Vaingankar et al.,

2017). Internal consistency reliability of the SWEMWBS is high (Vaingankar et al., 2017).

The value for Cronbach's alpha was α=.83 in the current study. It consists of seven items

referring to the participants past two hours, which were answered on a 5-Point Likert-Scale

('*None of the time*' to '*all of the time*'), for example, '*I am feeling optimistic about the future.*'. The SWEMWBS displays a strong correlation (r_s >.95) with its original version (WEMWBS) (Stewart-Brown et al., 2009). The variable well-being was created by aggregating the seven items of the SWEMWBS.

Social Contacts

One question was included asking for the number of social contacts and how this contact took place ('*Who did you spend time with within the last 2 hours*?'). For this question, there were five answer possibilities, namely '*Partner*'. '*Close friend(s)*', '*Family member(s)*', '*Acquaintances (e.g., colleagues/ fellow students)*', '*This does not apply, I was by myself*'. If the participant had spent time with multiple people during the last two hours, those contact should be chosen to whom one feels most connected. The variable social contact was based on a dummy variable which was coded 1 if any contact took place and 0 if not. The scores per day were summed and the variable social contacts$_{day}$ represented the summed contacts per day. Additionally, a second variable (social contacts$_{low}$) was generated which was coded 0 if the summed contacts for the whole measurement period per participant were below 34. If the summed social contacts were 34 or above 34 it was coded 1. Both variables were included in the analyses.

Procedure

The current study was approved by the Ethics Committee (#191314). The participants received an invitation via email, had to register, and needed to download the Ethica Application. Informed consent was given prior to the beginning of the data collection. The baseline questionnaire was provided together with the first of the daily morning questionnaires on day 1 of the study (10 minutes). The participants could complete the baseline questionnaire at any point during the study. The daily questionnaires were supplied three times a day (3 minutes each). Interval-contingent sampling was used in the current

study, which is less intrusive as the daily questionnaires are following a fixed timing schedule, and the participants can integrate the questionnaires into their daily planning (Fisher & To, 2012). The daily questionnaires were sent at 10 AM, 3 PM, and 8 PM. If the participants had not filled in the questionnaire after 90 minutes, they were reminded by the application. The questionnaires expired after four hours. In previous studies, the participants needed to fill in questionnaires at 7-10 time points each day (Kramer et al., 2014; Csikszentmihalyi & Larson, 2014). The number of questionnaires per day in the current study was below these limits, and participants' burden can be seen as acceptable. The study lasted two weeks (April 06, 2020 – April 19, 2020). According to Csikszentmihalyi and Larson (2014), the higher the frequency and the longer the study's duration, the less compliance of the participants was observed. Moreover, Connor and Lehman (2012) propose a duration of three days to three weeks if multiple measurements per day are done. When taking those assumptions into account, it can be estimated that the duration of two weeks would be feasible for the participants.

Data Analysis

SPSS 27th Version was used for data analyses (IBM SPSS Statistics 27, 2020). Descriptive statistics for age, gender identity, nationality, and degree level were carried out. Three cases were removed because they did not fill in the baseline questionnaire (25836, 25842, 25863), one was removed because the participant was not enrolled at a university (25804) and finally, one case was removed because less than 50% of the measurement points were completed (25802). Lastly, 29 participants were included in the analyses.

Due to multi-level structured data, Linear Mixed Models (LMMs) were used as they can deal with nested data appropriately and can account for missing data (Magezi, 2015). For the series of LMMs the repeated covariance type of first-order autoregressive AR(1) was chosen. The first-order autoregressive structure forecasts values based on the previous value

or lag (Littell et al., 2000). Littell et al. (2000) assume that with increasing lag less

correlations can be found on a within-person level.

The Person Mean (PM) and the Person Mean Centered (PMC) of the variables state

anxiety, state well-being and social contacts were calculated. Calculating the PM and PMC is

needed to disaggregate between- and within-person effects (Curran & Bauer, 2011). The PM

is created by calculating the mean across all measurement points per participant. Afterward,

the PMC is created by subtracting the PM from the total score of each measurement point per

participant. Standardized Z-scores were calculated throughout the analyses. The Beta-

estimates are compared according to Cohen (1988) who considers the scores as weak if β

<.30, as moderate if β=.30 - .50, and as strong if β >.50 which helps to interpret the results.

Estimated marginal means (EM means) were used to get an overview of the relationship of

the variables of all participants over time and for each single participant over time.

To test the first hypothesis, concerning the association of anxiety and well-being on a

within- and between-person level, one LMM was performed using well-being as the

dependent variable and both PM anxiety and PMC anxiety as the fixed covariates. The EM

means were calculated to visualize the association. Whereby, two LMMs were calculated

using anxiety as the dependent variable and two LMMs using well-being as the dependent

variable. To account for the variation over time and per participant either time (42

measurement points) or ID served as fixed independent factors for each dependent variable.

To explore the second hypothesis and, thereby, the relationship between social

contacts, well-being, and anxiety on a within- and between-person level two LMMs were

conducted. The data was examined on a day level to account for the social contacts$_{day}$

variable which defined the sum of contacts for each day. The data was considered on a day

level because the social contacts variable was created through a dummy variable. If the 42

timepoints would have been considered, the model would not run because the level of the

repeated effect would not differ from each measurement point as the social contacts variable could just take the values 1 or 0. For the variables anxiety and well-being, two new variables were created displaying the mean per day to include them in the analyses. Thus, duplicate cases were removed and the first row for each day was included in the analyses. Furthermore, both well-being$_{day}$ and anxiety$_{day}$ were chosen separately as dependent variables. The within- and between-person effects were modelled by using the PM and the PMC score for social contacts$_{day}$ as fixed covariates in both analyses. Additionally, to get a visual overview of the associations EM means were obtained by using LMMs, in which social contacts$_{day}$, well-being$_{day}$ and anxiety$_{day}$ are defined as dependent variables. To test the variation for each participant on a between-person level, ID was marked as the fixed independent factor in separate analyses for each dependent variable.

Lastly, to test the third hypothesis, the relationship between anxiety and well-being for persons with high versus low social contacts was examined. Due to the social contacts variable the data was considered on a day level as mentioned above. Therefore, for the analysis on a day level duplicate cases were removed and only the first row for each day was included. One LMM was used to measure the assumed interaction effect. Thereby, well-being was used as the dependent variable, while anxiety, the social contacts$_{low}$ variable, and the interaction term namely anxiety*social contacts$_{low}$ were defined as fixed covariates.

Microsoft Excel 365 was used to visualize the results of the analyses. The figure displaying the interaction effect of the third hypothesis was created with SPSS 27th Version (IBM SPSS Statistics 27, 2020).

Results

Participant characteristics and descriptive statistics

Table 1 includes the characteristics and descriptive statistics of the participants namely age, gender, nationality, degree, and field of study.

Table 1

P*articipant characteristics and descriptive statistics*

	n	%
Gender		
Male	13	45
Female	16	55
Nationality		
German	26	90
Australian	1	3
Other	2	7
Degree		
Highschool	18	62
Bachelor	11	38
Field of Study		
Natural Sciences	1	3.4
Social Sciences	23	79
Arts	1	3.4
Other	4	14

Note. N=29. Participants were on average 23.2 years old (SD=2.81), the age range was

between 19 and 32 years.

The association between anxiety and well-being

To create an overview of the data, the estimated marginal means of both anxiety and well-

being were calculated per participant (Figure 1). In Figure 1, the fluctuations of anxiety and

well-being for each participant are displayed. A negative relationship is visible, where

increased well-being scores are associated with low anxiety scores. Moreover, participants

with high anxiety scores showed lower well-being scores in general on a between-person level. Additionally, to demonstrate the association of the two variables over the course of the 42 measurement points, the estimated marginal means were calculated. Thereby, the trend of the fluctuations over the course of the 42 measurement points is visible in Figure 2. The variables show the tendency of being negatively correlated.

To test the associations of anxiety and well-being, a LMM was conducted, the results are shown in Table 2. The association was tested to be significant on a between- and within-person level over the 42 time points and across the 29 participants. A negative relationship between anxiety and well-being was found which was statistically significant. The associations were weak to moderate and given the non-overlapping confidence intervals, the association was stronger on a within-person than between-person level, indicating that increased anxiety was associated with lower well-being.

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Figure 1

Estimated Marginal Means of anxiety, well-being, and social contacts per participant
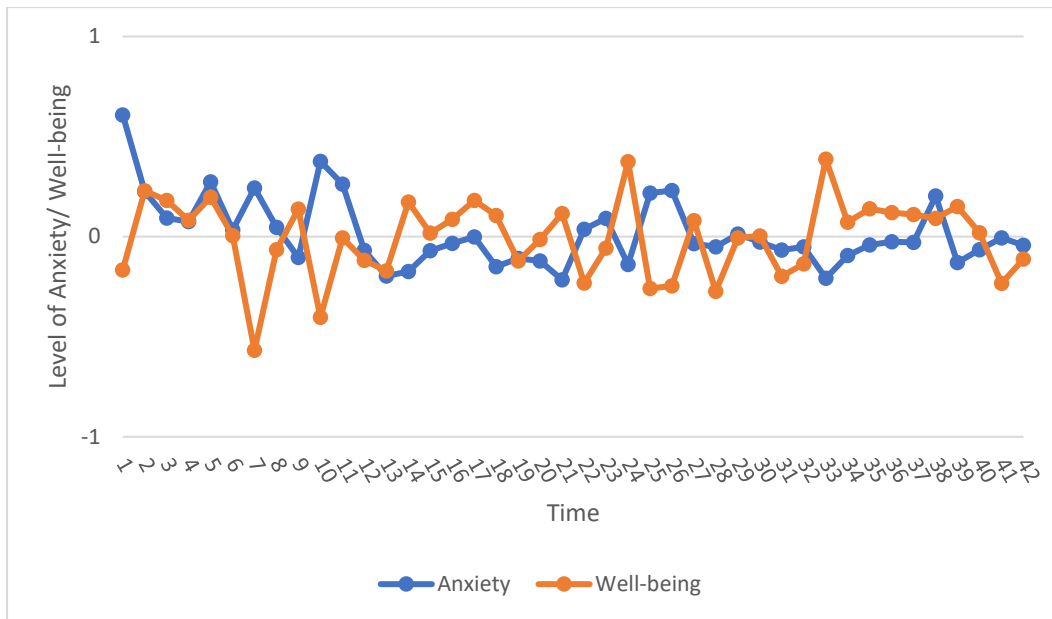
(N=29).
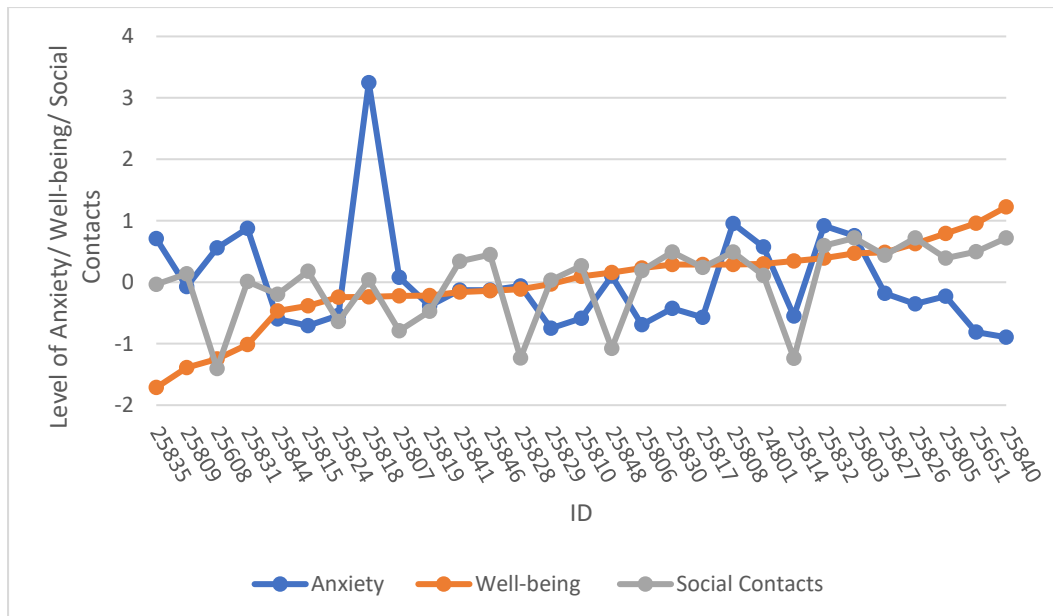
Note. On the y-axis the standardized scores for anxiety, well-being, and social contacts are displayed, on the x-axis the 29 participants are presented. The participants were sorted in ascending order by their well-being scores.

Figure 2

Estimated Marginal Means of anxiety and well-being per time-point (N=29).

Note. On the y-axis the standardized scores for anxiety and well-being are displayed, while on the x-axis the 42 measurement points are shown.

Table 2

LMM with standardized PM and PMC anxiety as the fixed factors and standardized well-being as the dependent variable (N=29).

	β	*SE*	*p*	*95% CI*	
state anxiety (between-person)	-.19	.04	<.001	-.27	-.10
state anxiety (within-person)	-.40	.03	<.001	-.45	-.34

Note. The model was significant for both PM anxiety [$F(1,197.10)=17.89$, *p*<.001] and PMC anxiety [$F(1,920.86)=208.68$, *p*<.001]

The association of social contacts with well-being and anxiety

Additionally, the association between social contacts and both well-being and anxiety as dependent variables was explored by conducting two LMMs. In Table 3 the first LMM is presented, which demonstrates that on a within-person level, social contacts and well-being had a statistically significant positive relationship. Additionally, on a between-person level, social contacts and well-being were positively associated and the relationship was statistically significant as visible in Table 3. The second LMM was calculated to investigate the relationship between social contacts and anxiety. The relationship was not statistically significant, neither on a within-person level nor on a between-person level (Table 4).

Table 3

LMM with standardized PM and PMC social contacts per day as the fixed factors and standardized well-being as the dependent variable (N=29).

	β	SE	p	95% CI	
social contacts (between-person)	.36	.07	<.001	.21	.50
social contacts (within-person)	.23	.04	<.001	.14	.32

Note. The model was significant for both PM social contacts [$F(1,74.51)=22.99$, $p<.001$] and PMC social contacts [$F(1,325.93)=27.54$, $p<.001$].

Table 4

LMM with standardized PM and PMC social contacts per day as the fixed factors and standardized anxiety as the dependent variable (N=29).

	β	*SE*	*p*	95% CI	
social contacts (between-person)	.05	.13	.73	-.21	.30
social contacts (within-person)	-.01	.03	.71	-.07	.05

Note. The model was not significant, neither for PM social contacts [$F(1,37.01)=.125$, $p=.73$] nor PMC social contacts [$F(1,298.85)=.14$, $p=.71$].

To visualize the tendentially stronger between-person relationship of social contacts, well-being and anxiety, Figure 1 displays the associations across participants. In Figure 1, the relationship of the variables anxiety, well-being, and social contacts was visualized on a between-person level, showing that the scores of social contacts and well-being displayed a moderate relationship. Furthermore, it can be seen that fewer social contacts were associated with higher anxiety scores and vice versa, even though this relationship was not found to be statistically significant (Table 4).

The relationship between anxiety and well-being for people with high and low social contacts

As it can be seen in Table 5, to test the interaction effect between anxiety and social contacts on well-being, another LMM was calculated which demonstrates that the interaction effect of social contacts and anxiety was statistically significant. Consequently, this implies that at an aggregated level, social contacts moderated the relationship between anxiety and well-being. The high social contacts group had higher well-being scores and lower anxiety scores

throughout the measurement period, while the low social contacts group had lower well-being scores and higher anxiety scores. Suggesting that the number of social contacts could buffer the negative association between anxiety and well-being. The interaction effect is visualized in Figure 4, in which it is noticeable that a high number of social contacts positively impacted the relationship insofar as the effect of anxiety on well-being was lower. Oppositely, participants with a lower number of social contacts displayed lower well-being scores with increasing anxiety. Therein, social contacts had a lower impact on this association.

Table 5

LMM with standardized anxiety, social contacts and the interaction variable as the fixed factors and standardized well-being as the dependent variable (N=29).

	β	SE	p	95% CI	
state anxiety	-.79	.09	<.001	-.98	-.61
social contacts	.63	.12	<.001	.40	.86
state anxiety*social contacts	.47	.11	<.001	.25	.69

Note. The interaction effect of social contacts and anxiety was significant [$F(1,269.71)=17.67$, $p<.001$].

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Figure 3

Overview of the impact of social contacts on the relationship between anxiety and well-being

(N=29).
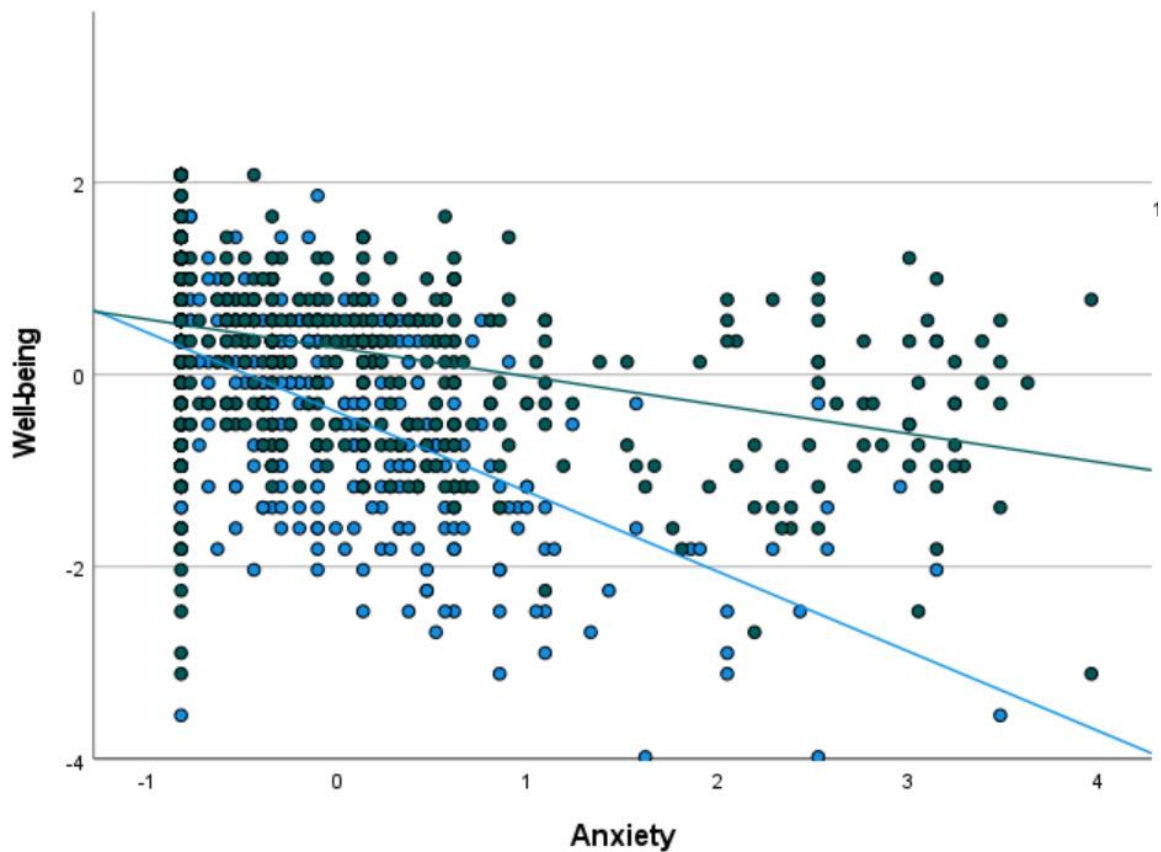
Note. On the y-axis the well-being scores are displayed, on the x-axis the anxiety scores are

shown. The mean scores of all measurement points are presented. The green line indicates the

direction of the effect of high social contacts, while the blue line displays the effect of low

social contacts.

Discussion

The current study was part of a larger study, in which mental health in daily life is explored

by using ESM. Thereby, the purpose of the current study was to explore the relationship

between state anxiety, state well-being, and number of social contacts in daily life of

university students. To the author's knowledge, it was the first study, considering these

relationships by using ESM.

The first aim was to explore the relationship between anxiety and well-being on a within- and between-person level. It was hypothesized that they display a negative relationship. In line with the expectations, it was found that anxiety and well-being show a negative relationship on both a between- and within-person level. Still, the within-person effects are stronger than between-person effects, meaning that on an individual level anxiety has a stronger association with well-being than across persons. The within-person association can be seen as a state which varies compared to the individual's average level. If anxiety increases, well-being decreases and vice versa. The between-person association is weaker but still present, meaning that persons who show on average higher levels of anxiety tend to display lower levels of momentary well-being. Higher levels of anxiety were correlated with lower levels of well-being and conversely. Those findings are in line with existing research about anxiety and well-being in students. Their well-being is affected by high demands and pressure which can lead to difficulties in performing everyday tasks, and symptoms such as irritability which can impact well-being negatively (Dias Lopes et al., 2020). Beiter et al. (2015) showed that anxiety is prevalent in students which affects quality of life and well-being. The found association refers to the two-continua model which states that mental-health and well-being are related (Keyes, 2002). According to Keyes (2002), complete mental health will not be reached until low levels of psychopathology and high levels of well-being are achieved. The results encourage that anxiety and well-being displayed a related pattern and therefore, it might be important for interventional purpose to focus on methods on decreasing anxiety symptoms in students which might be associated positively with well-being. Moreover, it is also important to focus on them as distinct constructs and consider well-being separately. Thereby, it can be helpful taking other aspects than psychopathology into account.

The second aim was to investigate if the number of social contacts relates positively to well-being and negatively to anxiety. Thereby, the within- and between-person level was

explored. The findings suggest that social contacts have a positive relationship with well-being on a within- and between-person level as expected. The found relationship between social contacts and well-being matches prior research of college students (which are comparable to university students), where social contacts were associated with happiness and well-being (Lyubomirsky et al., 2005). Besides, aspects of well-being as happiness and life satisfaction are positively associated with the number of social contacts (Schwanen & Wang, 2014). Social contacts are consequently positively correlated with well-being on a state and trait-level as the within- and between-person association suggests. Social well-being is an important factor impacting mental well-being (Westerhof & Keyes, 2010). Due to the positive association of social contacts and well-being it might be valuable to include social contacts in intervention programs for people with anxiety symptoms, e.g., in form of support groups.

Contrary to the expectations, social contacts did not have a significant relationship with anxiety, neither on a within- nor on a between-person level. The assumed relationship between social contacts and anxiety was not supported by the results in this study, which is contrary to the findings by Tran et al. (2018). They found that social contacts, especially family members, in college students are helpful when dealing with stressors like financial stress and general anxiety which suggests a positive impact of social contacts on occurring stressors. However, the negative results can be explained by a possible lack of social contacts among people with anxiety symptoms who tend to seek fewer social contacts (Rubin & Burgess, 2001). Therefore, the data might be biased as the positive impact of social contacts on anxiety might not be detected. The findings can also be explained through the two-continua model because it highlights that the constructs psychopathology and well-being are distinct constructs. This might explain why no association between social contacts (as aspect of social well-being) and anxiety could be found.

Finally, the last aim was to explore if the relationship between anxiety and well-being is different for people with a high versus a low number of social contacts. Based on prior research, it was hypothesized that the relationship would be stronger for people with a low number of social contacts and weaker for people with a high number of social contacts. Reasoned by the fact that social contacts were expected to buffer the negative effect of anxiety on well-being. In line with the expectation, it was shown that social contacts influence the relationship between anxiety and well-being. Therefore, the number of social contacts moderates the relationship between anxiety and well-being on a within-person level. The within-person effect takes the momentary state into account and the results are compared to the individual's average level. The findings support previous research which has shown a moderating effect of social contacts when stress occurred. Several studies proposed the positive influence of social contacts as being socially integrated during a stressful event could prevent an increase in anxiety (Bolger & Eckenrode, 1991). Furthermore, the support of friends during difficult life events has a positive impact on well-being (Secor et al., 2017). Social contacts in students, for example living in a campus dormitory or being married or living with their partner, appear to be associated with a lower risk of mental health problems (Eisenberg et al., 2007). As students must deal with many stressors, social contacts may act as a buffer against psychological distress and promote mental health as proposed in the social buffering theory (El Ansari et al., 2011). Besides, social contacts have been shown to enhance mental health and well-being (Cohen & Wills, 1985; Kessler & McLeod, 1985).

Limitations and Recommendations

The current study was implemented using ESM. Especially in the context of measuring mental states as state anxiety and state well-being, ESM is highly recommendable due to the possibility to investigate the relationship of variables in a real-time setting (Palmier-Claus et al., 2011). Fluctuations over time can be assessed directly, while the

variability and associations of variables can be detected (Myin-Germeys et al., 2018). ESM has a good ecological validity through the frequent assessment in the natural environment of the participants (Myin-Germeys et al., 2009). Liddle et al. (2017) used the approach to measure quality of life in students and found that the approach was suitable for this target group and the concept, therefore ESM might give valuable insights for state well-being as well.

Besides the several strengths of the current study, it involves some limitations. To start with, interval-contingent sampling was used in the current study, which is less intrusive compared to e.g., signal-contingent sampling as the daily questionnaires are following a fixed timing schedule, and the participants can integrate the questionnaires into their daily routine (Fisher & To, 2012). Still, the method of interval-contingent sampling entails some disadvantages because it might only capture experiences that happen at those specific time points and might neglect experiences happening at other time points, e.g., some situations might not be reported when they are not included by the time span which is considered by the questionnaire. Furthermore, the generalizability might be negatively impacted by the method of convenience sampling. In the current study, the target group consisted only of university students who represent a homogeneous, highly educated group and therefore, the general population was not presented. However, the goal of the study was not to represent the whole population. Another limitation is that the data was collected during the first weeks of the measures against Covid-19. As the World Health Organization (WHO, 2021) declared, physical and social distancing is one of the most important measures to prevent Coronavirus spreading. The restrictions of social life might have impacted the results as people were not able to see social contacts as regularly and, anxiety might be higher as usual.

For future research, it will be important to assess the importance of social contacts in more detail. It remains unclear to what extent the type of social contact (e.g., frequency vs.

intensity) and to whom this contact is (e.g., family vs. friends), might have an influence on

the buffering effect. Social contacts can differ and range from marriage or family to friends

and colleagues (Helliwell & Putnam, 2004). As some research has shown, there can be a

difference between contact with friends and contact with family members (Secor et al., 2017).

Contact with friends has the strongest impact on well-being, while family and relatives have

an essential but subordinate role (Schwanen & Wang, 2014). Also, the frequency of contact is

beneficial for the subjective well-being (Helliwell & Putnam, 2004). According to the

research, the reason for the positive impact was the sharing of positive experiences, for which

regular contact (high frequency) is needed (Pinquart & Sörensen, 2000). Furthermore, for a

positive influence of social contacts on well-being the level of attachment to a social contact

is important. The closer the connection to the social contact is, the more effective the contact

is in terms of well-being (Kikusui et al., 2006). Due to the positive impact on well-being, it

can be assumed that frequent and intense contact with others might also lower anxiety

symptoms, as mentioned above social contacts positively affect mental health. It would be

valuable to assess this in more detail in future studies.

Moreover, as Verhagen et al. (2017) show, ESM can also be used for interventional

purposes which is helpful to personalize health care for example in form of a smartphone

application (van Os et al., 2017). In their research van Os et al. (2017) found several

advantages of ESM in clinical practice when collecting data from the patient. Some

advantages are its efficacy and its low financial burden. Thereby, ESM can entail self-

monitoring and feedback which can support e.g., collaborative diagnosis and treatment

evaluation and might be helpful for a personalized diagnosis and treatment (van Os et al.,

2017). ESM is shown to be effective in the treatment of mental disorders as depression

(Simons et al., 2017) and might therefore also be effective when treating other

psychopathological symptoms such as anxiety. Using ESM interventions might be helpful to examine and treat anxiety symptoms and increase well-being on an individual level.

Overall, the findings are relevant as the importance of anxiety in terms of well-being is highlighted. Additionally, the importance of social contacts regarding well-being is displayed in the results and it can be assumed that social contacts can buffer the effect of anxiety on well-being. The importance of prevention and intervention programs is highlighted as the target group of students is prone to mental health problems. Mental illness is seen as a public health problem, and students often do not make use of treatment opportunities (Dias Lopes et al., 2020). Thus, early diagnosis and the support of the universities in promoting mental health and supporting the students is crucial (Dias Lopes et al., 2020; Eisenberg et al., 2007). Especially now as the consequences of social distancing, for example, lower mental health increase in importance. Studies found that a social network is essential to deal with the pandemic's psychological consequences (Tull et al., 2020). This highlights the need for follow-up studies and treatments.

Conclusion

Going to university contains many stressors, and it is crucial to take the mental health of students into account during this transition period. An important characteristic of the current study is that it takes within- and between-person effects into account which makes it valuable for future research. The current study revealed that within-person levels of anxiety predicted momentary levels of well-being stronger compared to between-person levels of anxiety. These outcomes suggest that it is important to take individual fluctuations over time into account. Within-person associations need to be studied in more detail in the future to make predictions about the reason for certain individual patterns in psychopathology. It is possible to use these findings for individualized treatment options focusing on decreasing anxiety symptoms or increasing well-being. Thereby, also the positive aspects of social contacts

might be integrated. More research on the topic is needed for the development and

implementation of interventions and preventive measures on an individual basis instead of

just taking group differences into account. Considering individual fluctuations might help to

personalize intervention programs to improve mental health in students.

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