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Positive Clinical Psychology & Technology

Master Thesis:

THE ASSOCIATION BETWEEN POSITIVE SOCIAL RELATIONS AND STATE NEGATIVE AFFECT
AN EXPERIENCE SAMPLING STUDY

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Abstract

Background: A history of research has shown that social contacts are relevant in different areas of life. Especially when it comes to psychopathology, there are several mental disorders integrating impairments in social interaction as well as negative mood as diagnostic criteria. Negative affect is used in this study indicating negative mood and a tendency to psychopathology. Some research suggests that positive social relationships have a positive influence on mood in general. These findings are extended in this study with the experience sampling method (ESM) on the association between momentary positive social contact and state negative affect.

Aim: The goal is to get insights into this association not only generally but on a daily basis to understand patterns and fluctuations in the correlation between positive social contact and state negative affect. Additionally, this study distinguished between different types of contact.

Method: A post-hoc analysis of a convenience sample including 37 participants who filled in three questionnaires per day for two weeks and one baseline questionnaire was used. Data were analyzed with Linear mixed models (LMM) and graphs are presented about the association between the investigated constructs.

Results: The LMMs show negative associations between perceived positive social contact and state negative affect in the same moment (β = -.144, p < .001). Regarding to the type of contact, contact to friends (β =-.09, p<.001) and romantic partners (β=-.*116*, p<.001) showed the strongest association with state negative affect.

Discussion: These findings support previous research about the negative association between negative affect and positive social relationships, respectively implicitly about the positive correlation between positive affect and positive social contact. As implication for clinical practice one should take into account positive social relationships as one key element in therapy and daily life in general. Future studies should ask for more information about the social contact and classifying them more precise (e.g. duration of relationship). Furthermore, an event-based ESM could identify actual contacts in the real moment directly and a lagged design could benefit deriving more precise implications. **Conclusion:** This study gives an insight into the negative association between negative affect and positive social relationships and its fluctuations. It confirms the relevance of these constructs for daily life. Further research is needed to foster the understanding of the investigated constructs.

Introduction

There is scientific evidence that positive relations have a positive influence on many different constructs. Happy people, for instance, are found to be highly social, and have stronger romantic and other social relationships (Diener & Seligman, 2002). Simultaneously, the absence of positive relations is correlated negatively with physical and mental well-being and more (Cacioppo & Cacioppo, 2014). The perceived absence of positive relations, for instance feelings of isolation or loneliness, are highly correlated to depression (Santini et al., 2020; Singh & Misra, 2009; Weeks et al., 1980). Impairments in social functioning are DSM-V diagnosis criterions for several psychological disorders like social anxiety or depression (American Psychiatric Association, 2013). Consequently, there is a direct link from psychopathology, respectively mental health, to social relationships (Sroufe et al., 2000). As an indicator for psychopathology, the construct of negative affect (NA) can be used since many studies found its significant correlation to several internalizing psychological disorders like depression, anxiety disorders and posttraumatic stress disorder (Brown et al., 1998, Mineka et al., 1998; Stanton & Watson, 2014). The relationship between social relationships and negative affect seems to be reciprocal since for example happy people have stronger relationships (Diener & Seligmann, 2002). Also, the absence of positive relations is correlated with depression, i.e. high negative affect (Santini et al., 2020; Singh & Misra, 2009; Weeks et al., 1980). This reciprocal relationship must be kept in mind while studying these constructs although this study mainly focuses on the relation between positive social relationships and negative affect.

In particular, research on mood and anxiety disorders is relevant since these types of psychological disorders are most prevalent in Europe (Alonso et al., 2004). Therefore, there is a need to do research on constructs that are related to these highly prevalent disorders, i.e. the construct of negative affect. In this case on positive relations that seem to be related to mental health as well as on negative affect that has shown to be a good indicator for psychopathology. The current pandemic increased the importance even more since there is a decrease in mental and physical well-being. This might be also related to a noticeable decrease of real-life social contacts since there were regulations aiming to decrease these explicitly. Especially, anxiety and depressive symptoms increased regardless of the number of COVID-19 cases in the specific countries (Varma et al, 2021).

This study investigates the correlation of positive relations and negative affect, to detect how the constructs correlate in the current moment at several times per day as well as over time.

Positive social relations

Especially in the field of positive psychology the value of positive relationships is determined. Jeste et al. (2015) include positive relationships belonging to social engagement as one of the positive psychological constructs which are "a stronger predictor of well-being than is physical health" (Jeste et al., 2015, p. 677). The importance of positive relations is also stated by Holt-Lunstad et al. (2010) who emphasize that strong, i.e. positive, social relationships are associated with an increased likelihood of survival.

Nevertheless, there is no general definition of positive social relationships. Algoe (2019, p. 184) defines positive interpersonal processes as "a social dynamic in which one person's thoughts, feelings, and behavior change another's, fueled by positive emotion". Consequently, in positive relationships one feels positive emotions and can influence the thoughts feelings and behavior of the specific contact. In positive contacts positive emotions are "at the heart of the interaction" (Algoe, 2019, p. 184). Thus, one can assume that positive emotions are central in positive social relations.

Many different studies examine different types of relationships (with supervisors, with parents, with colleagues, etc.). Distinguishing between different types of relationships can be difficult since there may be overlaps between different kinds of relationships. For instance it could be that individuals might also maintain friendships with colleagues. Regarding to that, Linek (2017) notes that friendships are not yet clearly defined sociologically. He argues, that it remains an open question on what basis individuals distinguish between friendships and other close relationships and when these boundaries are crossed; for example, when colleagues become good friends (Linek, 2017). While specific relationships like friendships or relations to relatives are often considered in literature, this paper focuses on all positively perceived social relationships. Therefore, it will be distinguished between different kinds of contact that participants have. This might provide information on the probably different relationships that the different kinds of contact might have. Also within specific contacts there might be differences; For example, several romantic partnerships are not alike and can be further divided. For example into relationship phases etc. However, this would extent the frame of this study. Passmann (2022) and Schleich (2022) distinguished between several types of contact to family members, friends, romantic partners, co-workers/fellow students, others and not spending time with anyone. Therefore, this distinction is used in this post-hoc analysis.

Regarding to the history of research on social support, it can be distinguished between perceived and actual received support (Wills & Shinar, 2000) as well as supportive functions

like informational, instrumental, appraisal and emotional support (Malecki & Demaray, 2003). It is crucial to keep in mind that people were not explicitly asked about the support functions in Passmann and Schleichs (2022) studies but that all information handled is based on self-reports. Consequently, it is about perceived support in this post-hoc analysis.

In this study every social interaction is seen as a kind of relationship. Therefore relationships, for example to cashiers, can also be neutral. Also, there can be negative or destructive relationships. These relationships are deliberately not considered in this study. It aims to identify general positive social contacts and delimits neutral and negative relations.

Negative affect

The described positive social relations are considered in the context of affect in this study. Affect in general consists of positive affect (PA) and negative affect (NA) as two broad dimensions that can be measured both as state and as trait. The current study focuses on state rather than on trait affect since emotions change over time. Kuppens et al. (2010, p. 1042) state that "people's affective lives only have meaning because they change". Affect in general is a central part of human emotions, it forms cognitions and determines human experience (Watson et al., 1999). Negative affect responses can be seen as "emergency reactions" to current crises (Watson et al., 1999) and are therefore essential for human life. Consequently, the influence of affect on thoughts and daily life is immense.

In this study the focus lies on negative affect which is especially associated with negative feelings like distress, fear, hostility, nervosity, sadness, guilt etc. (Stanton & Watson, 2014; Watson & Clark, 1992; Watson et al., 1999). High negative affect is connected to internalizing psychological disorders like depression and anxiety (Brown et al., 1998, Mineka et al., 1998; Stanton & Watson, 2014). In this study negative affect is seen as an indicator for mental illness as it can predict subjective health and health-related behavior like symptom perception, intention of physician consultation and search for help (Koopmans & Lamers, 2005). In line with that, Geschwind et al. (2010) found that the ability to create positive affect boosts from daily events can create resilience mechanisms that buffer the risk of depression and related disorders. Therefore, affect states can be used as a predictor for mental disorders. It is noteworthy that these states indicate mental illness but do not prove it. This would require further testing for specific disorders. Investigating negative affect provides the opportunity to get a broader picture about the affectability of participants than for example categorizing them as depressive or mentally healthy. Findings about affect may provide opportunities to prevent mental disorders by understanding by what affect is influenced, for instance by positive relationships.

Positive social relations and negative affect

Combining both described constructs, namely positive relationships in daily life and negative affect as an indicator for psychopathology, is important to understand how these may influence each other. Interestingly, negative affect might influence relationships positively since negative mood has shown to make people more attentive to other's behavior (Forgas, 2011). Consequently, negative affect may evoke greater empathy for people in need which can influence relationships positively. In an ESM-studies these moments might be found as well as moments in which positive relations occur in the same moment as positive affect.

The broaden-and-build theory by Fredrickson (2004) could be interpreted in the opposite way. Since negative emotions narrow the view, it would be more consistent when they do not foster positive relations. Positive emotions broaden the view and the scope of attention, therefore probably also the view on others and their feelings. Although both theoretical statements (i.e. Forgas, 2011 and Fredrickson, 2004) are comprehensible, there is more scientific confirmation that positive affect strengthens positive relations. Moore et al. (2018) for instance, showed that positive affect helps to produce better positive relationships. Nevertheless, one needs to keep in mind that negative affect can also enhance positive relationships by increasing individuals attentiveness like stated by Forgas (2011). Considering this is in particular important when analyzing the results of this study. One cannot exclusively assume that negative affect prevents positive relationships, as one might intuitively think.

Algoe (2019) emphasizes the connection between positive affect and positive relationships. Therefore, it can be expected that individuals who had a positive contact in a recent moment show a reduced negative affect, i.e. there might be a tendency towards positive affect. This is supported by Robins et al. (2000) who found that a romantic partners' relationship happiness is correlated to the partners low negative affectability. For woman there was also find a correlation to the partner's high positive emotionality with her relationship happiness (Robins et al., 2000). Bao (2012) found that especially having romantic relationships leads to more moments of positive emotions. Based on these findings, low negative affect can be expected in moments when participants had a positive contact to their romantic partner. An investigation of the different kinds of positive contact and its potential influence on affect will be conducted in this study as well.

Moreover, positive psychological research has shown that positive emotions foster positive interpersonal processes (Algoe, 2019). These are social dynamics wherein one person's thoughts and feelings change other people's thoughts and behabior driven by positive emotions (Algoe, 2019). Regarding to that, negative emotions might prevent or at

least not foster positive interpersonal processes like described by Algoe (2019).

Also, positive affect is associated with social constructs like greater social connectedness, emotional and practical support as well as with lower depression and optimism (Steptoe et al., 2008) as another positive psychological trait (Jeste et al., 2015). Independently of that, negative affect is associated with negative relationships, depressed mood and pessimism (Steptoe et al., 2008).

Experience Sampling Method

The latent psychological construct of negative affect can be distinguished in state and trait levels. Generally, states can be defined as the current mood dependent on the current situation. Steyer et al. (1999) emphasize that psychological states are created by the characteristics of a person (traits), characteristics of the situation and the interaction between the person and the situation. Therefore, states can be expected to be highly different within persons because they are dependent on the different circumstances that change continuously in daily life. States are not stable and vary over time within each person (Hamaker et al., 2007). Distinct from this, trait can be identified as characteristics of a person that do not fluctuate as much as states since they are not affected by current situations (Steyer et al., 1999).

In this study the different states within each individual are investigated, i.e. the state differences are observed with help of the experience sampling method (ESM). ESM studies are in particular suitable to assess states since participants are asked about their states in the real moment. This allows identifying correlations between affect and positive relations in the real-moment and compare them moment-to-moment (Myin-Germeys & Kuppens, 2021). Traditionally, daily self-report questionnaires are used to investigate these constructs which allows detecting the subjective experience of participants (Myin-Germeys & Kuppens, 2021). In comparison, traditional, retrospective questionnaires can be biased by a memory-bias of participants (Althubaiti , 2016). This obstacle can be overcome by ESM which asks participants for information about their current state several times per day in real-time in their normal, real world environment (Brown et al., 2011, Myin-Germeys et al., 2018). Measuring the participant's states in the natural moment rather than in an experimental setting also contributes to the high validity of ESM studies (Myin-Germeys & Kuppens, 2021). There is evidence that ESM is a valid and reliable method for assessing patterns in psychological states and social interaction in the short- and long-term (Csikszentmihalyi & Larson, 2014). Due to the longitudinal format, ESM studies provide data to understand the within- and between person differences over time (Curan & Bauer, 2011). Especially in the field of psychology

ESM studies are an instrument to assess psychopathology with its underlying mechanisms (Myin-Germeys et al., 2018). As one investigated underlying mechanism, negative affect is measured in this study.

The current study

Although there is research on the interplay between positive social relations and negative as well as positive affect, research yet lacks identifying correlations from moment to moment over time.

Using an ESM rather than a cross-sectional analysis helps understanding the fluctuations of the states (perceived positive contact and NA) on a daily basis. It is relevant to understand for instance whether people choose to avoid contacts in a specific mood (more positive or more negative affect) or whether it is the opposite and some people are searching for contact in a specific affect. This study can contribute to this understanding as a first step.

Thus, this study aims to explore the daily fluctuations of affect in the presence of positive relations in order to get a comprehensive understanding of both constructs and the association between them. Based on that, following research questions are investigated:

Q1: What is the relationship between momentary positive relations and state negative affect?

Based on existing research like described earlier (Robins et al., 2000; Steptoe et al., 2008), it can be assumed that there is a negative association between positive relations and NA. One can expect a negative correlation between positive relations and negative affect.

Q2: How are different types of positive social contact related with state negative affect?

Similar to the expectations for *Q1,* one can expect that all positive contacts correlate negatively with state negative affect. There might be differences in the strength of the associations, for instance, contact with romantic partners might be correlated more strongly with negative affect. That would be in line with Bao (2012) who found that contact with romantic partners leads to high positive affect.

Method

Participants

This study is a post-hoc analysis of the data collection conducted by Passmann (2022) and Schleich (2022). The BMS Ethics Committee at the University of Twente approved the research (request number 211225). Passmann (2022) and Schleich (2022) collected the data between the 22nd of November and the 5th of December in 2021. The study was a within-subject longitudinal design using experience sampling (ESM). 37 participants were included after excluding insufficient data, i.e. data with response rates below 50% were removed. This

sample size is above the median sample size found by van Berkel at al. (2017) that is 19.

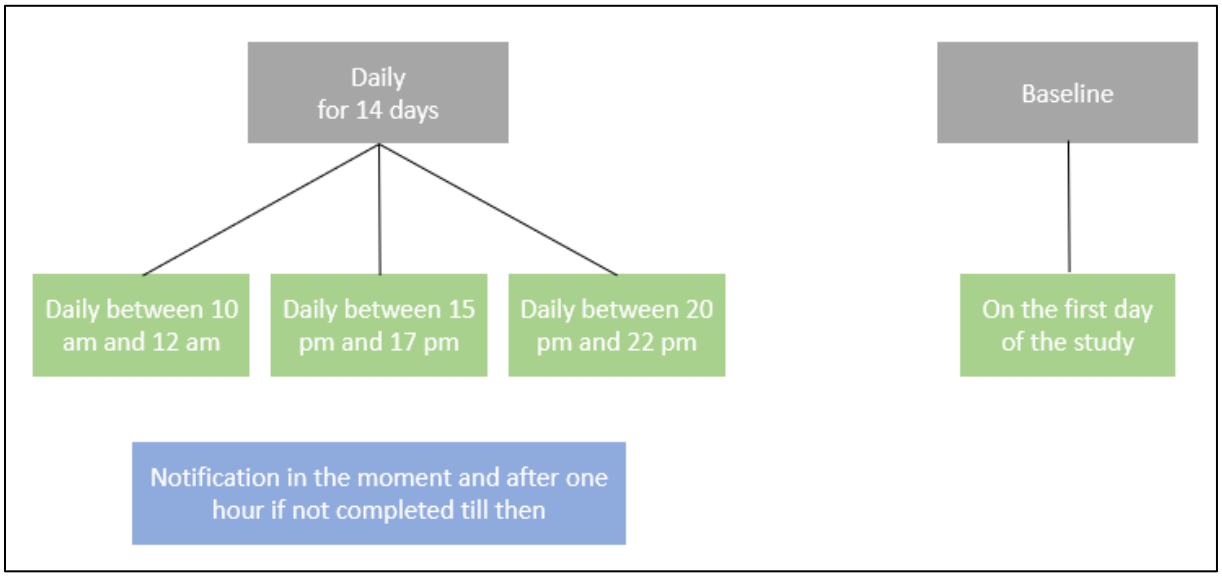
The sample recruitment strategy convenience sampling was used, recruiting mainly participants from SONA and the researchers' social networks. This sampling method can lead to higher participation rates (Conner & Lehman, 2012). Due to that, participant's motivation could be increased since they might be more committed to the researchers that belong to their social network. To be able to participate, all participants needed to have sufficient English or German skills and smartphones with internet-access and which support the app Ethica.

ESM protocol

Participants received instructions on the download of the 'Ethica' app (https://ethicadata.com/) and were informed about the study in general as well as on its procedure. Furthermore, participants needed to give active online informed consent within the Ethica app before they participated. The app provided three daily questionnaires that occurred on the participants smartphones. Data were collected for 14 days in total between 22nd of November and 5th of December 2021. This duration is slightly above the average duration of 11.2 days in ESM studies and can therefore be seen as adequate (Conner & Lehman, 2012; Myin-Germeys & Kuppens, 2021). The participants were asked to fill out the questionnaires with each 12 items at random moments during the day, i.e. at variable timings. The semi-random timing schedule (Conner & Lehman, 2012) consisted of one questionnaire triggered in the morning (between 10 a.m. and 12 a.m.), one in the afternoon (between 3 p.m. and 5 p.m.) and one in the evening (between 8 p.m. and 10 p.m.). Hence, questionnaires were triggered in the app within the described intervals at random moments. This is an improvement compared to "usual" diary questionnaires since there is no recall bias with the data being collected at multiple times per day (Palmier-Claus et al., 2011). Due to habituation, participants knew after some days of participating when to expect questionnaires approximately (Conner & Lehman, 2012). Due to the semi-random schedule the questionnaires are neither triggered completely random nor to exactly the same times every day but randomly within a range of in this case two hours. It was expected that participants need about two minutes to answer one daily questionnaire. The participants were asked to fill out the questionnaires within two hours after the app triggered them, including one reminder after 60 minutes. Additionally, the participants were asked to fill out a baseline questionnaire that asked about demographics and four more constructs that are not relevant for this study. For the baseline questionnaires participants received reminders as well. The measurement design is illustrated in *figure 1*.

Figure 1

Overview of measurement design



Measures

The study included one baseline questionnaire which gives information on participants traits and the described daily questionnaires to detect different states in participants daily life's. Both questionnaires were available in either German or English.

Baseline measures

Following measurements were included in the baseline questionnaire at the beginning of the study**.**

Overall mental well-being was measured by the short form of the established questionnaire Mental Health continuum (MHC-SF). This questionnaire includes three subscales to measure emotional, social and psychological well-being (Keyes et al., 2008). The 14 items were rated on a six-point Likert scale from 0 (never) to 5 (every day). Thereby, higher calculated mean scores indicate higher overall mental well-being. The participants were asked to consider their feelings during the past month as reference frame when answering the questions. The MHC-SF is an established measurement instrument with a satisfactory validity and reliability (Lamers et al., 2011).

To measure trait anxiety, the 7-item General Anxiety Disorder Assessment (GAD-7) was used in the baseline questionnaire. On a 4-point Likert scale (*not at* all to *every day)* participants were asked to indicate whether they suffered from anxiety symptoms like feelings of nervosity, anxiety and more within the last two weeks. Higher scores indicate higher probability of suffering from general anxiety. High validity and internal consistency with α = .85 are advantages of this assessment (Hinz et al., 2007).

Depression levels were assessed by the Patient Health Questionnaire (PHQ-9). As well as in the GAD-7 participants were asked to indicate how often they suffered from specific symptoms like *"feeling down, depressed or hopeless"* within the last two weeks on a 4-point Likert scale. Higher scores indicate higher levels of trait depression. Adequate psychometric measures (reliability and convergent/discriminant validity) confirm the usefulness of the scale that is based on the diagnosis criteria for depression (Titov et al., 2011).

State measures

The states of the relevant constructs for this study, namely positive social relations and negative affect, were measured with following instruments:

The kind and occurrence of social contacts was asked by the question "*Who did you spend time with since the last time you answered a questionnaire for this study? (online or offline) If more answers apply, only choose the longest contact*" (Passmann, 2022). The answer options included *(1) family members, (2) friends, (3) romantic partners, (4) coworkers/fellow students, (5) others and the possibility of (6) not spending time with anyone* (Passmann, 2022). The perceived quality of these social contacts was investigated by two questions ("*How pleasant did you experience the contact you had?" and "How positive did you experience the contact you had*?", Passmann, 2022). Both questions were answered on a seven-point Likert-scale with answers from "*not at all*" (1) to "*very much*" (7), where higher scores indicate more positive and pleasant relations (Passmann, 2022).

Values above 4 are considered to indicate a positive contact since the mid-point of the scale can be considered as neutral (Chyung et al., 2017). Correlating the positive relations scale with the psychological wellbeing scale items from the positive relations with others subscale shows a weak correlation ($r = .105$ with $p < 0.01$). The subscale about positive relations with others was chosen since it was assumed that it is the closest construct to the daily positive relationships questionnaires in the dataset. Nevertheless, an acceptable validity can be assumed since the items to measure positive relations are based on validated questionnaires. The split half reliability (first week correlated with second week of the study) showed according to Coolican (2014) a sufficient value for the positive social relations scale that is highly statistical significant ($r = .611$ with $p < .001$).

Negative affect was assessed through the 8-item version of the PANAS-SF. Since it measures positive affect and negative affect with four items each, in this study only the measures of negative affect are considered to answer the research questions. Therefore, participants' answers to the questions *Please indicate the extent you currently feel anxious/insecure/down/guilty?* are of importance. The questions are answered on a seven-

point Likert-scale from “not at all” (1) to “very much” (7). High scores indicate high negative affect for the four negative affect items and a high positive affect for the four positive affect items. The internal consistency for the PANAS-SF is considered as good and for the negative affect satisfactory values (α= .80) are reported (Karim et al., 2011). PANAS in general is a reliable and valid measure of the constructs (Crawford & Henry, 2010; Thompson, 2007). Generally, negative affect is seen as continuous variable with values above 4 are indicating high negative affect since they are clearly above the middle value which indicates neutral affect (Chyung et al., 2017). The measurement of negative affect can be considered as valid since its scale correlates moderately and significantly (r = .367 with $p < 0.01$) with the PHQ scale measuring depression. The split half reliability of the negative affect scale is highly statistical significant with r = .902 ($p < 0.001$). Since the split half reliability for the scale is above the threshold of .75 (Coolican, 2014), it is supposed that the respective items of the scale measures are consistent.

In general, it can be assumed high validity for both state measures since the items are based on existing and validated questionnaires. Thus, one can argue that both scales might be close to the real positive relations and the negative affect participants experience. Regarding to the reliability, both scales show satisfactory values. It can be concluded that the scales are sufficiently reliable and dependable. Ergo, about the same values could be expected when a person fills out the scales again.

Data analysis

In total, 37 participants were included in the analysis. As cut-off value to be included, a response rate of 50% was required which is seen as sufficient since the statistical method can deal with that amount of missing data (Conner & Lehman, 2012). The data is analyzed with IBM SPSS Statistics 28, Excel for Microsoft was used to create figures.

First, an analysis of the demographics was run utilizing descriptive statistics. Due to that, age, gender, nationality, current occupation and the education level (highest degree) of the participants can be reported.

Since linear mixed models (LMM) can handle missing data at random time points and the hierarchical ESM data (Black et al., 2012), it is used for further data analyses. Participants are nested within timepoints. For this study it is important that at every time point participants are asked to give information about their type of contact and to rate these contacts as well as their affect. Scores were calculated for the different constructs, namely negative affect, positive social contact, positive affect, PHQ-9, GAD-7, gratitude and the other measured constructs that are not considered in this study.

For positive contact, a dummy variable was created with 1 indicating that a participant had a contact that was positive and with 0 indicating that a participant either had no contact or the contact was negative, i.e. with a score under 4 on the contact scale.

The split-half reliability of the main constructs was calculated by splitting the dataset into two halves, namely the first 7 days of the study duration and the last 7 days of the study duration. These halves were correlated and Pearson's correlation coefficient is reported as reliability measure.

The Shapiro-Wilk-Test was run to test for normal distribution of the data with p-values greater than .05 indicating a normal distribution (Ghasemi & Zahediasl, 2012).

To answer the research questions, namely how positive contact in general and the kind of positive contact are associated with state negative affect at the same moment, LMMs were run. For all LMMs, the participant IDs were used as subject variable and the time variable (measurement points) as repeated measure. A first-order autoregressive covariance structure (AR1) with homogenous variances was used to take the repeated measures into account.

The first research question about the relation between momentary positive relations and state negative affect. Negative affect was set as dependent variable and positive contact as fixed covariate in SPSS. The same analysis was run with standardized and unstandardized scores, therefore z-scores were produced. The individual differences were visualized in line graphs for two participants as an example with different scores on the positive social contact and the negative affect scales to get an insight into the variability for the study period.

For the second research question about the association between the different types of contact and negative affect, another LMM was run. Therefore, dummy variables were calculated for the types of contact (family member, friend, romantic partner, co-worker, other and no contact). Again, negative affect was set as dependent variable and all dummies as covariates except the "no contact"-variable which will serve as reference category in this model. All models were also run with standardized values. The scores are interpreted in line with Cohens (1988) interpretation recommendations.

Results

Sample characteristics

The final sample's characteristics are reported in *Table 1*. The sample included 37 participants (70.2 % female) and had an average response rate of 81.25 % daily. The age ranged from 18 to 57 years with an average age of 25 (*SD*=9.33) years. Most of the participants were students (54 %). The sample was mainly Dutch (*N*=13) and German (*N*=19). The baseline questionnaire showed that the samples mean does not lie within the

range of depression. With *mean*=1.79 (*SD=0*.455) this sample scores low in comparison to other studies like Hinz et al. (2016) who found *mean*=3.3 (*SD*=3.65). Thus, we can assume a sample that tends to be mentally healthy since the scores are low in comparison to e.g. Hinz et al. (2016).

The Shapiro-Wilk-Test showed that the data is not normally distributed ($p < .05$). Due to a sample size above 30, parametric analyses can still be performed instead of non-parametric tests that would be appropriate for data that is not distributed normally.

Table 1

Sample characteristics

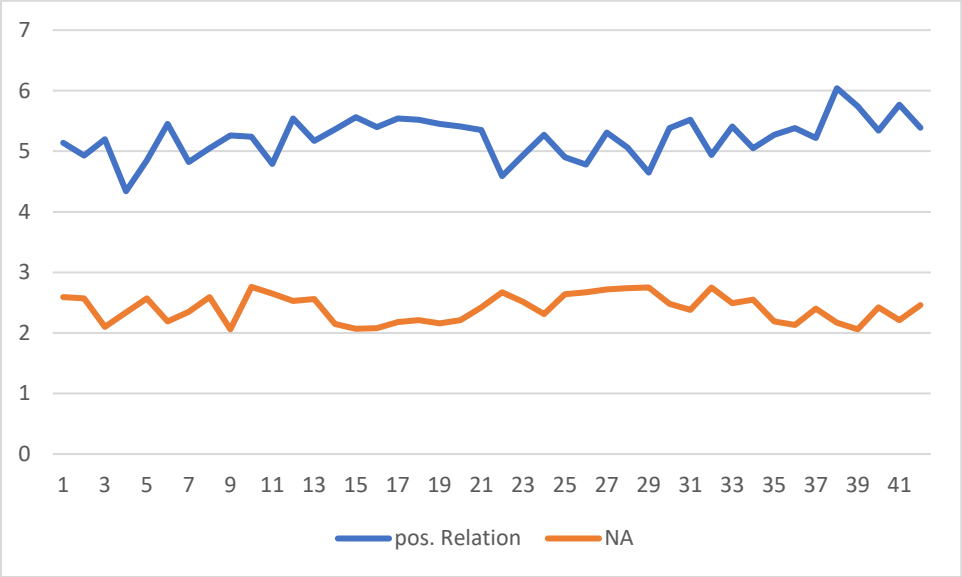
Variable	n	%
Gender		
Female	26	70.2
Male	11	29.7
Nationality		
German	19	51.3
Dutch	13	35.1
Other	5	13.5
Current occupation		
Student	20	54.0
Employee	5	13.5
Self-employed	2	5.4
Student & working	10	27.0
Highest degree		
Bachelor	13	35.1
Master	4	10.8
High school/vocational training	19	51.3
Other	1	2.7

On the two scales, both with *minimum*=1 and *maximum*=7, the overall mean for perceived positive social contact is *m*= 5.21 (*SD*=1.68) and for NA it is *m*= 2.41 (*SD*=1.26). Consequently, the mean score for positive contact corresponds to the set threshold of at least 4 to be considered a positive contact. The average for NA is below the threshold and thus it can be assumed that the participants reported a low overall average of negative affect.

Supporting that, in *figure 2* it can be seen that participants reported high positive relations (>4) and low NA (<4) on the original, not recoded scale. This state seems stable for the study period of two weeks, including 42 measurement points. Furthermore, *figure 2* indicates a negative correlation of positive relations and NA over time. While there are on average high values on the positive relations scale, there can be found a decrease on the negative affect scale and vice versa.

Figure 2

Average negative affect and positive relations over time for all participants



Relationship between positive social contact and negative affect

Regarding to research question 1, *what is the relationship between momentary positive relations and state negative affect*, the LMM supports the indication given by *figure 1*. It shows a significant negative correlation (β = -.144, p < .001) between the two state measures. According to Cohen (1988), this can be seen as a moderate correlation. Consequently, a person who had a positive contact, had less negative affect in that moment.

The unstandardized and standardized values for the associations of positive contact with NA can be seen in *Table 2*.

Table 2

Overview of LMM with types of social contact as predictors and negative affect as dependent variable

Predictor	*Estimate*	*Standardized Estimate*	*SE*	*Confidence Interval*	*Sig*
positive contact	-0.405	-.144	.053	[-.508, -.302]	<.001

Note. SE is given for the unstandardized estimate. Dichotomous variable of positive contact is used.

Figure 3

Distribution of contact types

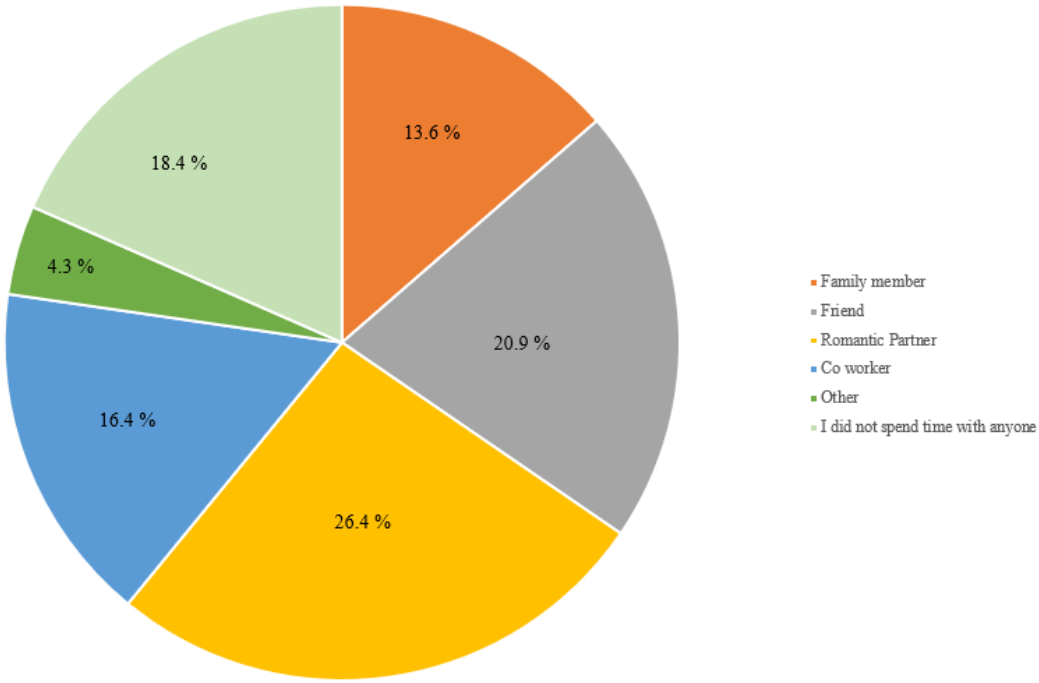


Figure 3 shows with whom the participants spent their time between two triggered questionnaires. With 26.4%, most of the time the participants spent with a romantic partner in this study. Next, 20.9% of the time questionnaires were triggered was spent with friends, 16.4% with co-workers, 13.6% with family members and 4.3% with others. 18.4% of the time questionnaires were triggered, participants did not spend time with anyone.

Association between the different kinds of contact and negative affect

To answer the second research question, *how are the different types of positive contact*

related with state negative affect, several LMMs were run. *Table 3* shows the unstandardized and standardized values for the associations of the different types of contact with NA. Especially the low correlations (Cohen, 1988) of spending time with friends and romantic partners with NA are noticeable. The unstandardized values show a low to moderate correlation. The results show a statistically significant correlation for the contact types *friend* (β =-.09, p<.001) and *romantic partner* (β=-.*116*, p<.001) with NA. Consequently a decrease in NA can be expected when participants spend time with friends or romantic partners. The associations for *coworkers/fellow students* (β=-.051, p=.033) and *others* (β=-.003, p=.896) were lower and non-significant. Only the association between *family members* and NA was positive on a low, non-significant level (β=.006, p=.803). It is noteworthy, that the estimate for romantic partners is significantly stronger than for family members since the estimate does not fall within the confidence interval (*CI*) of family members. Also the overlap of the *CI's* of family members and friends is little which as well suggests an almost significant stronger association of friends with negative affect than of family members with negative affect.

Table 3

Overview of LMM with types of social contact as predictors and negative affect as dependent variable

Predictor	*Estimate*	*Standardized Estimate*	*SE*	*Confidence Interval*	Sig
Intercept (no contact and no positive contact)	2.565	-.012	.087	[2.395, 2.735]	.829
Family member	0.023	.006	.094	[-0.160, 0.207]	.803
Friend	-0.279	-.090	.077	[-0.430, -0.128]	<.001
Romantic partner	-0.331	-.116	.080	[-0.488, -.0174]	<.001
Coworker/ fellow student	-0.173	-.051	.081	[-0.333, -0.014]	.033
Other	-0.016	-.003	.122	[-0.255, 0.223]	.896

Note. SE and *CI* are given for the unstandardized estimates.

Individual plots of two participants

To show that the presented data is valid for the sample as a whole but that the individual participants still differ from each other, two participants' scores in NA and positive social contacts are presented in *Figure 4* and *Figure 5*. The graphs indicate that it is still important to look at the individual differences and that no general conclusions can be made about the sample. The sample results show tendencies that can differ from the individual scores either in intensity, i.e. higher or lower scores, or in patterns, e.g. there are different associations for some individuals.

In both, *Figure 4* and *Figure 5,* apparent differences to *Figure 2* which presents the sample mean scores occur. Both figures about the individual scores show more extreme values like at measurement point 29 in *Figure 4.* In general, the individual scores are apparently not as stable as the sample's mean scoring in *Figure 2* indicates. Furthermore,

Figure 4 indicates due to the fluctuations in positive social contact that participant #45036 perceived the contacts very different while the NA is continuously, relatively low. In contrast to this, in *Figure 5* it appears that the scores of participant #44881 strongly fluctuate and that there are overlaps of the two lines. This means, that there are measurement points in which the participant perceived a contact as not positive and that he/she scored high on the NA scale at the same time. This supports the findings above that in moments of perceived positive contacts, NA is lower.

Figure 4

Individual negative affect and positive relations scorings over time for participant #45036

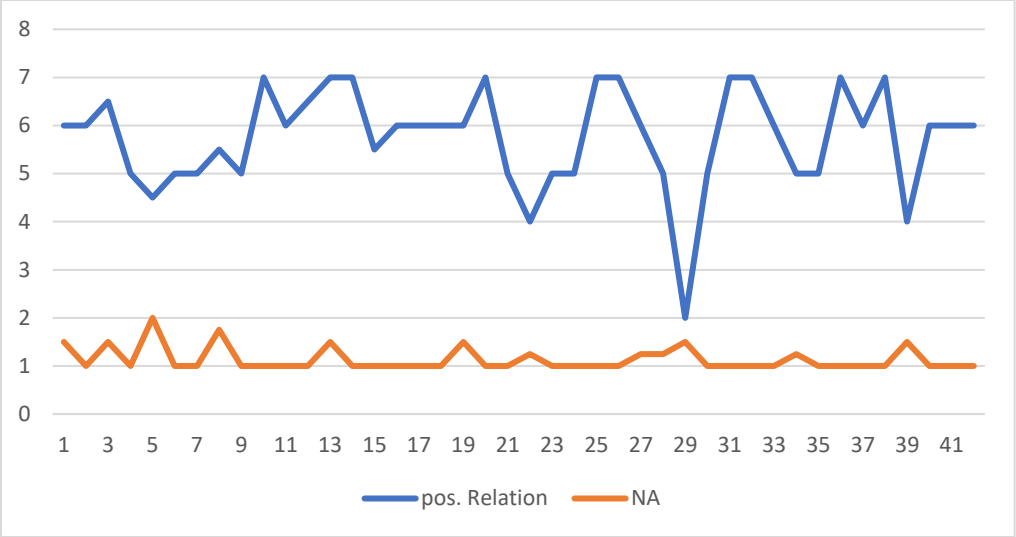
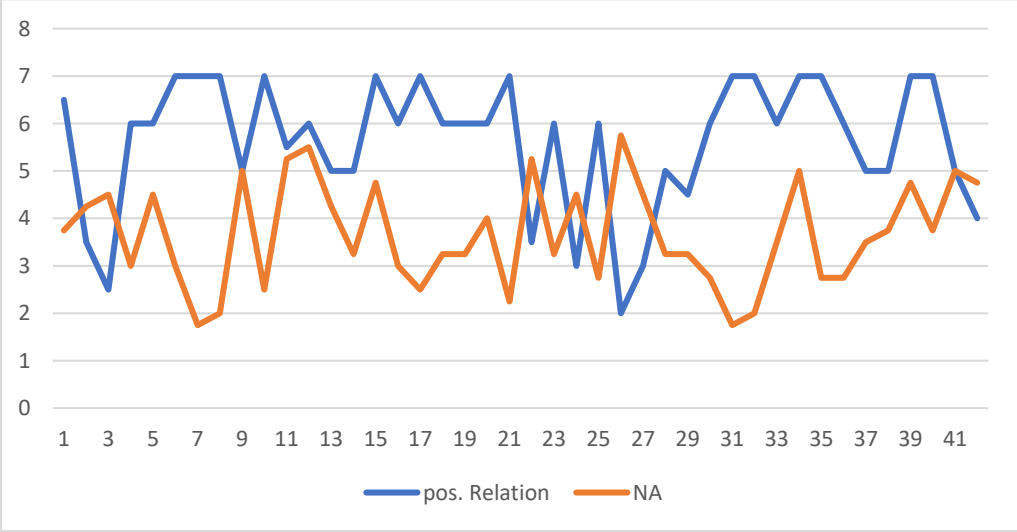


Figure 5

Individual negative affect and positive relations scorings over time for participant #44881



Discussion

This research aimed to investigate the associations between momentary negative affect and perceived positive social contact in the same moment as well as over time. The results showed negative associations between the perceived positive contact and state negative affect at the same moment. Consequently, people experiencing a positive contact showed less negative affect simultaneously. Investigating the association between negative affect and spending time with different types of contact showed that contact to romantic partners was associated most strongly negative with negative affect. Followed by the contact to friend these two types of contact were outstanding in their association to negative affect in comparison to other contact types like family members, coworkers/fellow students and others.

Main findings

The first research question addressed this basic association what the relation between momentary positive relations and state negative affect is. It was hypothesized, that there might be a negative association between both constructs. The results confirm this expectation. Steyer at al. (1999) state that individual state differences can be explained due to differences in the situations and person-situation interactions. This can be supported by the results of this study assuming that the different situations with different social contacts are one possible explanation for the affect states. The concrete associations and probable explanations for the states based on the social contacts as situations are explained in more detail in the following.

The results show that the association between state negative affect and positive social contact is – as expected – negative. This is in line with Rivera et al. (2020) whose ESM study indicates that osteoarthritis pain patients with more social interactions feel less negative affect. Also, Brown et al. (2011) found that social contact is associated negatively with negative affect. The current study adds that the contacts were perceived as positive in most moments when participants reported low negative affect.

Furthermore, the results are in line and can be connected with the PERMA model (positive emotion, engagement, relationships, meaning and accomplishment) by Seligman (2011) who integrates among others positive emotions, i.e. less negative affect, and relationships as key elements of well-being. This study confirms the model by Seligman (2011) when thinking about the elements of well-being as elements that decrease negative affect (Seligman, 2018). Participants who experience positive relationships showed less negative affect. The results might extent Seligmans PERMA model (2011) to a PEPMA-model (positive emotion, engagement, positive relationships, meaning and accomplishment) with positive relationships contributing to wellbeing more than relationships in general. To

verify this statement, further analyses about the association to wellbeing with this study's variables need to be conducted. The distinction between positive social relationships and general relationships might be useful since relationships could also be harmful for instance with bullying people etc. Therefore, asking about the supportive functions (Malecki & Demaray, 2003; Wills & Shinar, 2000) of a specific contact could give a better understanding about the meaning and function of a contact.

Also in the self-determination theory by Deci and Ryan (2012) social relationships are stated as basic psychological need, i.e. connectedness that one can feel when surrounded by nice people can foster motivation and is necessary for human functioning. This study adds that people that have meaningful relationships and might feel connected in moments spending in these relationships feel less negative affect in the same moments. It is conclusive that little negative affect contributes to functioning and thus this study provides an underlying explanation or complement to the self-determination theory.

While the first research question looked at people's social contact in general, the second research distinguished between contact types, i.e. family members, friends, romantic partners, coworkers and fellow students as well as others and whether these different types of positive social contact are related differently from each other with state negative affect. Here, it was hypothesized that the contact to romantic partners would be more strongly correlated with negative affect than other contact types.

In this study, the results show a significant but low negative association of romantic partners and friends with state negative affect. Rogers et al. (2018) found that greater involvement with friends and family was connected to less negative affect. Berry and Willingham (1997) confirm the negative association between romantic partners and negative affect as well as Bao (2012) which is in line with the current study's findings. The other types of contacts' correlations were low negative but non-significant. Interestingly, only the association between contact to family members and state negative affect was positive which means that participants who experiences a contact to a family member, tended to show an increased negative affect at the same time. This correlation was very low and non-significant so that it is not definitely contrary to Rogers et al. (2018) who found that contact to family members is connected to less negative affect as well. In this study the association was low and non-significant.

There are many studies that examine the aspects under which people choose their friends (e.g. Simpson & Gangestad, 1992 or Pahl & Pevalin, 2005). Generally, friendships are a crucial factor of well-being (Diener & Seligmann, 2002) which is also connected to less

negative affect (Dodge et al., 2012). This distinction between explicitly chosen people like romantic partners and friends might be one reason for the different association in comparison to people that one cannot choose like coworkers or family members.

Furthermore, romantic partnerships as strongest association with negative affect in this study can be explained by psychobiological factors. Since romantic partners have more physical contact with each other than in most other relationships, the oxytocin level increases during this contact due to physical touch (Holt-Lunstad et al., 2008). This can lead to an increased wellbeing (Ishak et al., 2011) and hence might lead to less negative affect and increased positive affect. Additionally, the soothing system (Gilbert, 2009) might be activated in moments of affection and care like when participants spent time with their romantic partners. Participants might manage their negative emotions or distress in general by affection (Gilbert, 2009) which might be a coping strategy. Consequently, positive feelings are increased in these moment and negative ones could be decreased as possible explanation for the decreased negative affect in moments with romantic partners. Romantic partner's dyadic coping might contribute to the presence of less negative affect in moments spent with romantic partners (Papp & Witt, 2010).

Since negative affect can be used as indicator for psychological health because of its association to several mental disorders (Brown et al., 1998, Mineka et al., 1998; Stanton & Watson, 2014), the study's sample might be on average psychological healthy with low negative affect. The results show on average low levels of negative affect and high levels would be an indicator for low levels of psychological health (Koopmans & Lamers, 2005). The current study shows a similar pattern of decreased negative affect in moments when having a perceived positive contact like Brown et al. (2011) showed. They support the assumption that depressive symptoms are associated with negative affect, decreased positive affect and increased isolation. Supporting that, Brown et al. (2011) found that being with close social partners correlates with a decrease in negative affect and an increase in positive affect.

Strengths and Limitations

As main strengths of the study, the use of ESM can be identified since it allows unique insights into the participants real-moment negative affect and momentary social contact. Due to these measures in the real world, ESM measures are representative and are therefore claimed to be high in terms of ecological validity (Myin-Germeys & Kuppens, 2021). Several additional benefits of an ESM study like overcoming the retrospective bias (Althubaiti , 2016) of traditional studies are explained in the introduction already.

Another strength is the very high response rate of on average above 80 % (for included participants) in this study. This lies far above the recommended cut-off response rate of 50 % (Conner & Lehman, 2012). Therefore, one can argue that the sample was motivated and committed to the study.

As first limitation, it is noteworthy, that the results of this study cannot be generalized since the average age is 25 and more than 50 % of the sample are students. The gender is not distributed equally as well with 70 % female participants. Therefore, one cannot expect the same results when conducting the study in the whole population with all ages, genders and occasions represented.

Second, another aspect is that in this study affect is described as dependent variable. Nevertheless, one can also argue that affect influences relations, respectively that the relationship might be reciprocal. Thus, on cannot conclude which variable causes the other without further testing for instance in a randomized controlled trial (RCT). For instance, using the above described broaden-and-build theory (Fredrickson, 2004) which assumes that positive emotions broaden the view which could also include the view on the social environment. Also, Algoe (2019) described that positive emotions foster positive interpersonal processes and therefore might influence relationships positively. Consequently, we cannot conclude that positive social contact causes negative affect. It could also be the other way around. Simultaneously, one cannot detect in this study whether the social contact or the affective state occurred first because the questionnaires about both constructs are triggered at the same time. This issue could be overcome by using lagged variables.

Third, since the data collection took place during increased Covid-19 measures in winter 2021, one should have distinguished between online and offline contact. Due to the risks of Covid and lockdown measures many people changed their behavior, i.e. reduced offline contacts (Jarvis et al., 2021). A distinction between online and “real-world” contacts would be helpful since people might behave different and the contacts might affect them differently regarding to intensity and duration of a social contact, for instance because people have more time to think about text messages in a chat conversation than in a real conversation where one might react more spontaneous. Especially in this sample with mainly students who had online lectures etc. due to Covid restrictions, a distinction would be appropriate.

Furthermore, one can argue that the threshold of values under four on the positive social contact scale indicate having a non-positive contact is questionable. People might also feel that a contact rated with 3 is positive but not that strongly positive. Therefore one needs to keep in mind that the positive contacts reported in the results might be “very” positive

contacts and that less positive contacts could have a less strong association with negative affect.

Implications and future research

This study's results about the daily association between positive social contact and negative affect can be implemented into real-life.

Since there is already research on strengthening relationships, the results of this study support the worth of improving relationships. In positive psychology there are already approaches to strengthen relationships. For instance, O'Connell et al. (2015) found that positive psychology activities (PPAs) that foster interpersonal constructs like social kindness and gratitude strengthen relationship satisfaction significantly. Fostering the awareness for the effects of PPAs can be combined with the results of this study since they also show that increasing positive social contacts can benefit the reduction of negative affect and in a next step psychopathology which is associated with negative affect (Brown et al., 1998, Mineka et al., 1998; Stanton & Watson, 2014).

One can also conclude implications for applied psychology, namely in clinical practice. In therapy settings, the focus on positive social contacts could be improved as well since – next to negative affect – depressive symptoms are often associated with social impairment in daily life (Brown et al., 2011) and therefore might play role in therapy. In line with that, it is important to do research on the investigated constructs in a clinical setting to investigate whether the idea about the role of social contacts in therapy holds true. This is recommended because social contact plays a role in many disorders like depression with social withdrawal, social phobia, autism that are classified by DSM-V (American Psychiatric Association, 2013). Additionally, patients in clinics or in prison, where the duration might be even longer, have a high risk of social isolation afterwards (Western et al., 2015) which again increases the risk for relapse for people with mental disorders (Tate et al., 2004; Stewart, 2004). Therefore, with these long-term patients working on positive social contacts to decrease negative affect is important.

Future studies could ask more questions about the social contacts experienced by participants. For instance, there could be differences between different phases of a romantic partnership since affection might change in the progress of a romantic partnership (Nieder & Seiffge-Krenke, 2001) which might affect the outcome variable negative affect as well. Additionally, the current study delimits to the association with positive contacts and thus is very selective since people do not have only positive contacts in their daily lives. The duration of a friendship might also influence the results since friendships may be more intense when

they progress (Hays, 1985). Additional questions whether these contacts took place online or offline could also benefit future studies like described above.

An event-based ESM (Myin-Germeys & Kuppens, 2021) would be more appropriate for measures like contact because participants might have more than one contact between the three daily measurement points. Affect might change more quickly than three times per day as well. In more extensive and combined future studies one could use for example bio tracking like described by ter Hamsel et al. (2021) to measure arousal and trigger questionnaires about the current contact when high arousal is detected for instance by heart rate. This could for instance help detecting moments when social contact is not associated with less negative affect but with higher negative affect. These insights would increase the knowledge about associations with social contact and negative affect in general and not only limited to perceived positive contacts.

To gain a deeper understanding of the association between negative affect and positive social contact, a lagged study design (Myin-Germeys & Kuppens, 2021), where some variables shifted and correlated to the next measurement, could give more information and more clear implications could be derived from such a study. Disentangling between and within-person associations would also give a more detailed insight into the underlying fluctuations per person. That means to not only analyze whether associations differ between participants but also identify specific patterns within the data of one individual, for instance whether there are always higher associations in the evening. As the figures 4 and 5 in the result section show, there is a lot of variability behind the reported average sample estimates. Kraiss et al. (2022) for instance showed that there is much variability in individuals that is not always represented in the estimated presented by models about the sample as a whole. This could be the case for this study as well and needs to be investigated in future research.

Another idea for future studies would be to conduct a RCT to find out more about cause and effect of negative affect and positive social contact. For instance, one could conduct one ESM before an intervention that fosters social contacts like friendships and one ESM afterwards. The results of both ESMs could be compared regarding to probable changes in fluctuations, patterns and associations in general. This could be linked to a network analysis (Borgatti et al., 2009) which is a method in social science to understand complex networks and how individuals behave in it with each different relationships and interactions to other people and things within a network. Linking the topic of this study to a network analysis might help detecting other important factors that could explain fluctuations negative affect

next to positive social relationships. Furthermore, it could give insights on why different social contacts are associated differently to negative affect.

Conclusion

The purpose of the study was to explore the daily fluctuations of state negative affect in the presence of perceived positive relationships and to explore their interrelationship. This goal was achieved. The results indicate that positive social contact is associated negatively with state negative affect. Particularly, positive contacts with friends or romantic partners correlate significantly with less negative affect. Due to its probable influence on affect, it is relevant to do further research on it and to foster possibilities of having positive contacts continuously.

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