The Association Between Gratitude and the Perception of Daily Events: A Secondary Analysis of an Experience Sampling Study

Master Thesis

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Abstract

Background: Currently, gratitude is drawing attention in positive psychological research. Due to many promising studies which suggest the positive outcomes of gratitude (e.g. improved resilience, high life satisfaction and prompting further positive emotions), gratitude training is becoming widely influential as a therapeutic tool as well as gaining popularity among laypeople. Previous research suggests that gratitude might be associated with the pleasant perception of daily events. This could be a potential mechanism to improve the subjective wellbeing of individuals. Thus, this study aims to explore the association between gratitude and event perception over time. Additionally, anxiety due to potentially affecting event perception is considered as well.

Method: To explore the association between gratitude and the perception of daily events, the data of an experience sampling study were analysed. 45 individuals answered three daily questionnaires over a period of fourteen days regarding their current level of anxiety, gratitude and perception of daily events in terms of pleasure. As statistical analyses, several linear mixed models (LMM) were conducted to analyse the correlation between gratitude and positive event perception. This was done at the group level and along, at the within-person and between-person levels. Lastly, the hypothesis of gratitude as a potential moderator for the association between anxiety and event perception was tested.

Results: A significant positive association between gratitude and the perception of positive events was found at the group level (B = .06, p <.001). Moreover, exploring the relation in more depth, both, the within-person (B = .09, p = <.001) as well as the between-person level (B = .02, p = .012) showed a significant positive relation. Against the hypothesis, both relations pointed at the same direction. In fact, the within-person effect was stronger. Lastly, it was found that gratitude was a significant moderator for the significant negative correlation between anxiety and pleasant event perception (B = .02, p = <.001).

Discussion: Most of the findings were in line with previous research. Strikingly, the stronger effect at the within-person level suggests that individuals themselves can increase gratitude levels which might enhance pleasant event perception as well. Moreover, the significant moderating role of gratitude in the context of anxiety and event perception enables the usage of gratitude in a therapeutic context. Future research should further investigate the relation between gratitude and event perception on account of the promising possibilities of using gratitude exercises to boost peoples' subjective wellbeing through pleasant event perception.

Keywords: gratitude, experience sampling, event perception, anxiety, positive psychology

Introduction

Through the emergence of positive psychology as a new subfield in psychology, research has shifted from mainly focusing on maladaptive behaviour and mental illness to integrating mental health, quality of life and flourishment (Gable & Haidt, 2005). Positive psychology includes various areas such as self-compassion, optimism, positive relations and gratitude. Generally, studies found that positive psychological factors have a positive influence on health and wellbeing (Vázquez et al., 2009). For instance, people scoring high on positive psychological states are more likely to have resources for life-threatening adversities as well as being protected from physical diseases emerging (Vázquez et al., 2009).

Based on these promising findings, it might be useful to explore the effects of various positive psychological factors in more depth. One influential factor might be gratitude. However, various conceptions of gratitude co-exist in literature. Whereas some researchers associate gratitude with the emotion that arises after receiving prosocial behaviour, other researchers suggest that gratitude is more than a sheer emotion which is related to the behaviour of other people, namely a life orientation (McCullough et al., 2001; Wood et al., 2010). Wood et al. (2010) argue that gratitude can be defined as 'noticing and appreciating the positive in the world' (p. 891). Specifically, the researchers suggest that gratitude is a factor which is composed of eight individual aspects, ranging from positive social comparison to appreciating others to recognising that life can be short.

Despite the missing conceptualisation, gratitude is associated with various beneficial (mental) health outcomes. For instance, people scoring high on gratitude tend to appreciate positive aspects in the world, the future and themselves. As depressed people are prone to think negatively about themselves, the world and the future, it suggests that gratitude might prevent depressive symptoms due to forming a positive triad of the three described components (Wood et al., 2016). According to Emmons and Stern (2013), gratitude might be a major factor for high life satisfaction due to prompting positive emotions, better coping mechanisms during stressful periods in life and resulting improved resilience. In turn, these effects positively influence the mood of individuals. Several studies found that participants reported higher levels of positive affects when they journaled about daily events they were grateful for (Emmons & Stern, 2013).

Moreover, the Broaden-and-Build theory by Fredrickson (2013) describes how positive emotions broaden the ability to think or behave which builds new resources (e.g., knowledge, skills or relations). In turn, this process leads to enhanced health and flourishing in life. Eventually, a positive spiral emerges since more positive emotions are experienced. Thus, gratitude might even promote more positive emotions. The circle of experiencing more positive

emotions could also act as a resilience mechanism which ensures positive mental health (Jans-Beken et al., 2019). Since the perception of positive emotions leads to developing long-term plans and finding positive meaning during difficult times, resilience is improved by positive emotions (Fredrickson & Joiner, 2002). Furthermore, the Broaden-and-Build theory describes that gratitude, as an other-directed emotion, stimulates prosocial behaviour and finding creative ways to express affection (Jans-Beken et al., 2019). Thus, gratitude could improve personal wellbeing by creating deep reciprocal connections with other individuals. Shabrina et al. (2020) also describe how gratitude is associated with positive thoughts about the future despite experiencing adversities which ultimately boosts resilience for upcoming difficult situations. In their study, it was found that gratitude might be a significant predictor of resilience in adolescents who experienced parental divorce (Shabrina et al., 2020).

Besides, gratitude is also found to have physical benefits. For instance, individuals high on gratitude tend to have better quality of sleep, i.e. reducing impaired sleep. This relation might be explained by the mediating role of positive pre-sleep thoughts (Wood et al., 2009). Grateful people tend to have more positive thoughts before sleep instead of being trapped in worries and fears. Besides, gratitude is found to improve immune functions and lowering blood pressure (Emmons & Stern, 2013). All these benefits highlight the importance of gratitude in the context of physical and mental health.

Although gratitude and its beneficial outcomes concerning wellbeing have already been studied, it is still unclear how and to what extent gratitude is associated with the perception of daily events in terms of pleasure. Based on the ABC model by Ellis, cognitions lead to the interpretation, i.e. arising emotions, of events (Muran, 1991). Thus, events are not by virtue pleasant or unpleasant but the way people think about them is decisive. Since a mechanism of gratitude entails that individuals high on gratitude tend to interpret events positively, it may be likely that grateful individuals are more likely to perceive daily events as pleasant. According to Watkins et al. (2004), this relation can be explained by a positive memory bias for people scoring high on gratitude. According to Jans-Beken et al. (2019), a high level of gratitude correlates with positive perceptions of daily events in the upcoming time. The researchers describe this process as a ‘self-sustaining cycle’ similar to positive memory bias (p. 2).

Additionally, gratitude may release a positive spiral (Watkins et al., 2004). If individuals experience gratitude, they are more likely to be aware of positive events which results in enjoying those positive events. In the long run, this process increases positive emotions and wellbeing. Further, individuals tend to interpret behaviour of others as prosocial, which triggers resilience during difficult periods by stimulating a cycle of reciprocal prosocial behaviour. This

process, in turn, increases gratitude levels again (Watkins et al., 2004). For instance, due to the amplification of the positive spiral, gratitude can promote positive events as well as prosocial behaviour. Based on literature, gratitude might decrease depressive symptoms by means of experiencing more positive events (Blonski et al., 2016). A study from various countries by Disabato and colleagues (2017) found that subjectively experienced positive events mediate the relation between gratitude and depression after a period of three months.

Based on the premise of the Broaden-and-Build theory that positive emotions lead to increased attentional flexibility (Fredrickson, 2013), it may be that gratitude enables individuals to experience daily events in a more positive light due to highlighting various aspects of a situation without defining an event by one negative feature. Thus, it may be that gratitude triggers a broader scope of attention during events. For instance, Lambert et al. (2009) found that gratitude leads to positive perception by the mediating role of positive reframing, i.e. seeing negative events in a positive light. Additionally, it was found that low-arousal positive emotional states, such as gratitude, are more likely to broaden attention. Thus, gratitude might lead to finding positive meaning more easily during events by stimulating novel ways of thinking and taking new perspectives (Jans-Beken et al., 2019). Harmon-Jones et al. (2012) argue that low-approach motivated positive affects broaden cognitions. Emotions with low motivational intensity are not focused on goal completion in comparison to high motivational intensity emotions. During goal completion, individuals should not be distracted, thus, cognitive distraction is reduced by narrowing attention to peripheral aspects (Harmon-Jones et al., 2012). However, since gratitude is a positive affect which is not high in approach motivation, it does broaden the cognitive scope to find new opportunities for goals.

According to cognitive psychology, various studies confirmed that the interpretation of an event depends on the prior expectations of an individual (Massad et al., 1979; Zacks et al., 2001). The researchers argue that information processing is based on biases in coding information (Massad et al., 1979). Individuals tend to focus on the information that is consistent with prior expectations. Based on prior experiences, a predictive coding framework is created that sorts stimuli to come to an interpretative conclusion of a situation (O'Callaghan et al., 2017). Thus, past experiences form expectations for the present which lead to perception and interpretation. Barret and Bar (2009) also highlight the importance of the individual's affective mood during perception. According to the researchers, the emotional reaction which is linked to an event in the past helps to predict current perception. If one links these findings to gratitude and the perception of daily events, the 'self-sustaining cycle' of interpreting events as positive

could explain why individuals high on gratitude are more likely to code and select information which fit their prior expectation of viewing events as positive (Jans-Beken et al., 2019, p. 2).

However, other factors may also affect the perception of events. A relevant predictive variable might be anxiety. According to Barry et al. (2015), high levels of anxiety are associated with biased perception. Individuals high on anxiety are more likely to be focused on potential negative triggers in their surroundings. This tendency is based on attentional biases. Humans do not have the capacity to constantly focus on all stimuli in their environment. Therefore, some stimuli and triggers need to be prioritised. Two selection procedures determine the focus of attention, namely top-down processing and bottom-up processing (Barry et al., 2015). Top-down processing means that individuals are actively and voluntarily searching for desired triggers in their environment. Bottom-up processing means that individuals automatically and involuntarily focus on specific triggers in their environment. Individuals high on anxiety are more likely to incorporate bottom-up processing by focusing automatically and unconsciously on triggering events in their surroundings. This can be seen as protective behaviour to avoid threats and danger. However, due to this biased attention, it might be that individuals high on anxiety are less likely to perceive events as pleasant.

In addition to the tendency of bottom-up processing, individuals with high levels of anxiety also tend to narrow their attention to the most relevant cues in their surrounding. Najmi et al. (2012) describe that anxious people experience cognitive narrowing to prepare for a possible fight-or-flight response in regard to a threat. Narrowing the attention allows anxious individuals to solely pay attention to potentially dangerous stimuli. Thus, all attention is reserved for alarming triggers to avoid disturbance by other information in the environment. A related study also found that anxious individuals are more likely to have narrowed attention on the global-local task (Najmi et al., 2012). The researchers suggest that anxious people have more difficulties with changing the focus in their visual area from narrow to wide. Thus, both processes suggest that anxiety might be less likely related to a positive perception of events.

Still, it might be that gratitude moderates the relation between anxiety and the perception of events. Based on research by Petrocchi and Couyoumdjian (2015), gratitude is known to shift attention ‘to the benefits that one has received’ (p. 191). Moreover, Wood et al. (2010) describe how gratitude might lead to a persistent shift of attention to the positive things in the environment. As gratitude might simultaneously be known to decrease anxiety, it could possibly moderate the relation between anxiety and the perception of events (Petrocchi & Couyoumdjian, 2015).

Since not much research has been done on the relation between gratitude and the perception of daily events in terms of their pleasure, it may be wise to investigate the association in more depth. New insights could better assess if gratitude interventions should be incorporated into treatment for anxious and/or depressed people, who deal with a negative and/or threatening perception of their surroundings. Although research generally suggests that gratitude interventions might improve the positive appreciation of situations, some reviews did not come to this conclusion (Cregg & Cheavens, 2021; Davis et al., 2016; Seligman et al., 2005).

Moreover, there are some limitations regarding the study methods of existing literature focusing on gratitude. Many studies used a cross-sectional study design to analyse gratitude (Caputo, 2015; O'Connell & Killeen-Byrt, 2018; Lambert et al., 2009). However, this might result in various disadvantages. Results from cross-sectional study designs only represent a specific moment in time. Choosing a longer study period could lead to more accurate results (Levin, 2006). Besides, cross-sectional studies do only allow for between-person analyses. However, aggregating between and within-person levels could lead to vastly different results (Curran & Bauer, 2011).

Instead, the *Experience Sampling Method* (ESM) might be able to overcome some of the mentioned limitations. Experience sampling is a longitudinal design, which tries to capture behaviours, thoughts and emotions in everyday life by using (digital) self-reports (Myin-Germeys & Kuppens, 2021). This procedure has the advantage of more precise insights into the variances of variables and patterns in behaviour, feelings and thoughts over time. Individuals are not required to recall emotions for a longer period as done in retrospective recalls, which might lead to wrong representations of positive or negative feelings (Myin-Germeys & Kuppens, 2021). Participants also have the opportunity to stay in their natural environment, i.e. increasing ecological validity (Larson & Csikszentmihalyi, 2014). Based on technological developments, ESM is easily applicable in many populations as well as inexpensive as opposed to laboratory studies (Myin-Germeys & Kuppens, 2021). Thus, the repeated measurements in real-time assessing the current state of participants allows gaining precise information on a group and individual level regarding the relation between gratitude and the perception of daily events. Even patterns in the relation of the variables could become visible which would not be possible for a study design with one measurement point in time.

Based on the longitudinal study design, ESM offers the possibility to analyse different types of associations. For instance, the disaggregation of within-person and between-person effects can be analysed on the basis of time-varying covariates (Myin-Germeys & Kuppens, 2021). The possibility of analysing both levels allows focusing on individuality in research.

Oftentimes in psychological research, the between-person effects are studied, which captures the differences between various individuals. The between-level focuses on 'the individual differences in the average frequency' of experiencing gratitude in everyday life (Wood et al., 2008, p. 281). For instance, it could be that individuals high on gratitude are on average more likely to perceive daily events as pleasurable. On the other hand, the within-person effect refers to the temporary state of an individual. This effect is less often analysed in research due to the need for longitudinal study designs. Generally, research has shown that the two levels do not necessarily point in the same direction, i.e. being non-ergodic (Curran & Bauer, 2011). For instance, Curran & Bauer (2011) describe how individuals are more likely to suffer from a heart attack while exercising. At the same time, individuals who regularly exercise are less prone to suffer from a heart attack. This example shows how one cannot easily refer from one level to the other and vice versa.

A similar difference could be applicable to the relation between gratitude and the perception of events. Although it is expected that individuals high on gratitude are more likely to perceive events as pleasant at the between-person level, individuals could differ in the perception of events if they feel more or less grateful than normally, i.e. their own average. Dejonckheere et al. (2022) describe societal pressure in Western countries to experience happiness. The positivity movement argues that individuals are responsible for their own happiness. However, this can also put enormous pressure on people (Sinclair et al., 2020). The inconsistency between social expectations to feel good and one's own feelings might foster negative emotions as a consequence of perceived failure (Dejonckheere & Bastian, 2021). The constant pressure to perceive events as positive to be happy could indeed diminish actual gratitude levels (Held, 2002). Thus, individuals who report being less grateful than they normally are might still indicate to experience positive events. This could also act as a negative spiral: The more positive events are reported, the less gratitude is experienced. In a study with participants who had depressive symptoms, Siegel and Thomson (2017) found that focusing on positive events, such as receiving help, declines gratitude due to the experience of negative emotions, such as blame or self-criticism. Certainly, this study did not focus on the general population as a result of the depressive tendencies of the participants. However, since the pandemic started, various meta-analyses found an increase in individuals with depressive symptomatology (Bueno-Notivol et al., 2022; Zhang et al., 2021). Bueno-Notivol et al. (2022) describe that in 2017 around 3.44 % of the population show depression. Since the pandemic started, this percentage was suggested to rise to 25 %. Thus, it might be likely that this also affects the relation between gratitude and positive event perception as described by Siegel and

Thomson (2017). Moreover, due to the pandemic, individuals were less likely to experience social contact. However, McGuire et al. (2019) found that higher states of gratitude are more likely correlated with interpersonal positive events. If individuals experience more non-interpersonal positive events due to social restrictions, it might even decline gratitude due to a lack of experience sharing with other individuals. Thus, the societal pressure, the increase of depressive symptoms and fewer interpersonal positive events due to the pandemic could lead to differences at the two levels.

Overall, the present study used a longitudinal study design to analyse the relation between participants' feelings of gratitude and the perception of daily events in terms of pleasure over time. Moreover, the moderation of gratitude regarding the relation between anxiety and the perception of daily events was investigated. Thus, the study dealt with three research questions. Firstly, the general relation between gratitude and the perception of daily events was analysed: 'To what extent is gratitude associated with the perception of daily events regarding their pleasure over time?'. The second question dealt with the differences of the within-person and between-person level: 'To what extent is gratitude associated with the perception of daily events regarding pleasure on a between and within-person level?'. The last question addressed the moderation of gratitude: 'To what extent does gratitude moderate the relation between anxiety and the perception of daily events in terms of pleasure?'.

Hypotheses

Based on previous described literature, a hypothesis per research question was formulated.

H1: Gratitude and the pleasant perception of daily events are positively correlated (see Figure 1). This is based on the findings by Jans-Beken et al. (2019) that gratitude leads to more positive interpretations of daily events.

H2: Gratitude and the pleasant perception of daily events differ at the between-person vs. within-person level. Generally, most studies describe that gratitude tends to be correlated with a pleasant perception of events (Catalino & Fredrickson, 2011; Jans-Beken et al., 2019). However, according to Dejonckheere and Bastian (2021) and Sinclair et al. (2020), individuals might feel pressure to perceive events as positive, which is ultimately associated with a decline of positive emotions (e.g. gratitude). The pandemic might also lead to a decline of gratitude levels despite perceiving positive events (Siegel and Thomson, 2017; Bueno-Notivol et al., 2022). Thus, it is expected that gratitude is positively related to the pleasant event perception at the between-person level and negatively related at the within-person level.

H3: Gratitude moderates the negative relation between anxiety and the pleasant perception of daily events (see Figure 2). Based on the literature, it is mentioned that anxiety might be associated with less positive perceptions of events (Barry et al., 2015). Additionally, gratitude could act as a moderator since it could shift the attention to the positive features in each situation as well as decrease anxiety (Petrocchi and Couyoumdjian 2015; Wood et al., 2010).

Figure 1

The Expected Effect of Gratitude on the Perception of Events

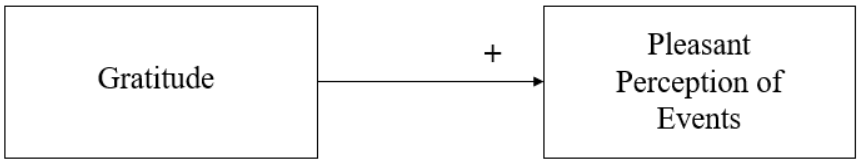
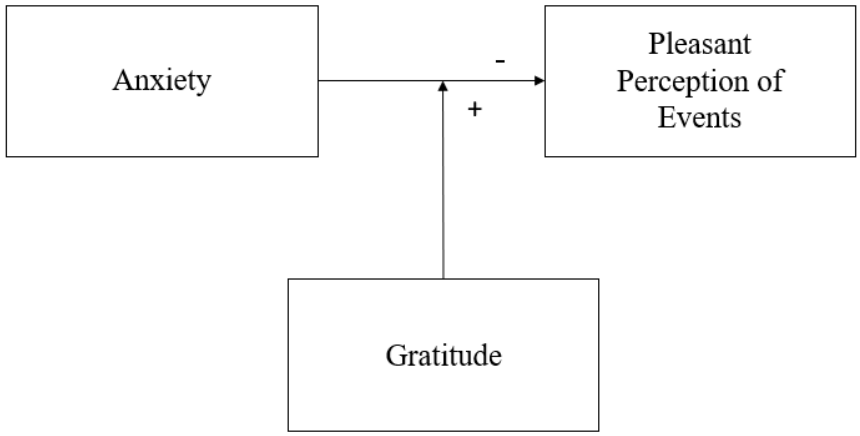


Figure 2

The Expected Effects of Anxiety and Gratitude on the Perception of Events



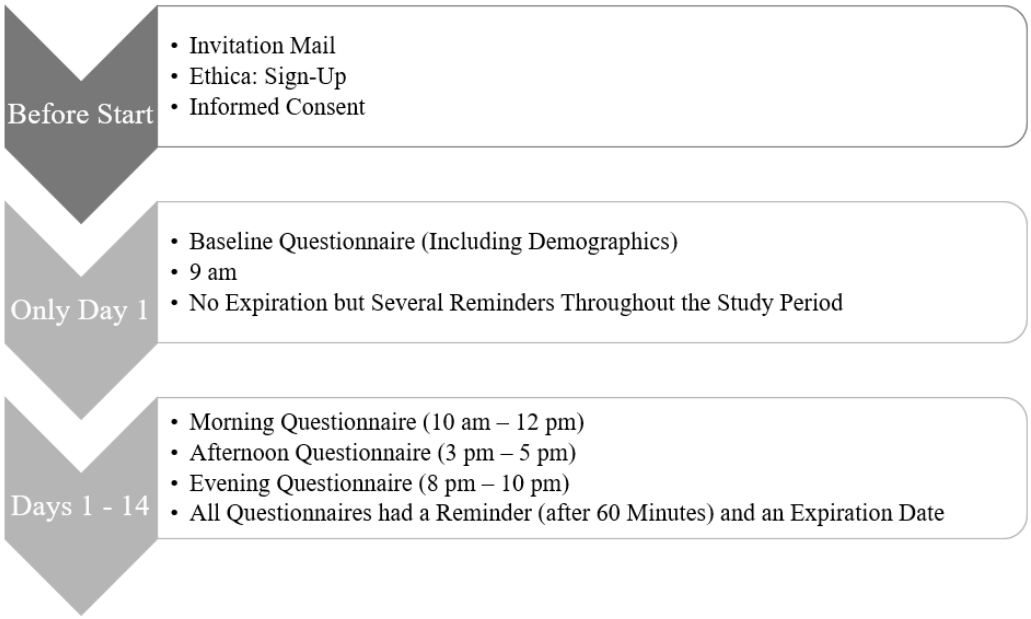
Method

Design

To answer the research questions, a secondary data analysis of an ESM study was conducted. Originally, the study belonged to a broader research project dealing with mental health and related processes. The study was approved by the Ethics Committee at the University of Twente (Case number: 211225). The starting day of the study was the 22nd of November 2021. In total, the data collection took 14 days. Thus, the last day of collection was the 5th of December 2021. The length adheres to the average length of ESM studies. According to Conner and Lehmann (2012), ESM studies should not exceed a period of two weeks since the ethical burden for participants would be too high as answering several questionnaires per day can be intensive (Myin-Germeys & Kuppens, 2021). Additionally, a longer study design could lead to too much missing data, resulting in biases in statistical models and threats to validity, especially if data is not missing at random (McLean et al., 2017). In total, the participants received 43 questionnaires, including three questionnaires per day and an additional baseline questionnaire at the beginning. Signal-contingent sampling with fixed intervals was used as sampling type, meaning that the questionnaires were triggered at a random time point within a set interval of several hours (see Figure 3). The morning interval was set between 10 am and 12 pm. The second questionnaire was triggered between 3 pm and 5 pm and the last survey was conducted between 8 pm and 10 pm. This sampling type prevented participants from anticipating the questionnaires at specific time points per day as well as increasing ecological validity due to capturing a wider variety of moments (Larson & Csikszentmihalyi, 2014). Alliger and Williams (1993) argue that the benefit of this sampling type is the reduction of biased answers due to retrospective recall. Simultaneously, participants get used to expecting questionnaires within the three periods of time per day, potentially preventing extensive missing answered questionnaires.

Figure 3

The Study Plan per Day



Participants

To select participants, non-probability convenience sampling was used. This form of sampling has several advantages such as low costs or the ease of selecting participants since there are no strict inclusion criteria (Etikan et al., 2016). Moreover, ESM studies do not aim to generalise the outcomes. In total, 69 individuals participated in the study. The average sample size mean for ESM studies lies around 53 participants (Van Berkel et al., 2017). Thus, 69 individuals seemed to be sufficient. To take part in the study, individuals needed to have a smartphone, a mail address and sufficient linguistic proficiency in German or English since the questionnaires were conducted in one of these two languages. Additionally, a minimum age of 18 years was required.

Before the start of the data collection, participants had to give active informed consent which briefed them that the study was voluntary and that participants could withdraw at any time (see Appendix A). Participants were also informed about the purpose of the study and asked to answer the questionnaires as soon as possible. Otherwise, individuals did not get further instructions.

Procedure

Participants were asked to download the app 'Ethica' for the study via an invitation mail which they received. Ethica can be used to measure behaviours, feelings and moods of participants. Before the study started, the researchers conducted a pilot study to test all functions such as triggering logics, the notifications and the expiration times. Since the study was administered in two languages, the participants could choose one language after they registered. Participants were also given the mail addresses of the researchers in case questions arise during the data collection.

On the first day of data collection, the participants received a questionnaire covering demographics and baseline questions. If the patients did not answer the questionnaire at the beginning, several reminders were sent. The momentary questionnaires per day had an expiration date of two hours with a reminder after 60 minutes. The notifications by means of push messages should increase compliance of participants. The questionnaires were repeated for 14 consecutive days. Per questionnaire, the same questions were asked. They were also administered in the same order to facilitate the answering process for participants after they have got used to the questions.

Measurements

As already described, participants received a first questionnaire covering demographics and baseline. Regarding the demographics, participants were asked for their age, gender, nationality, occupation, highest degree obtained and if applicable, for their SONA-ID if they wanted to get credit points for their participation.

The baseline questionnaire focused on mental health and psychopathology constructs. Participants' mental health, anxiety, positive relations, gratitude and self-compassion were measured. Anxiety was measured via the GAD-7. This is a short self-report questionnaire with seven statements. According to Löwe et al. (2008), the scale is a valid and reliable test to assess anxiety in the general population. Participants could choose between four different answer categories: 'not at all', 'several days', 'more than half the days' and 'nearly every day'. These categories were coded from 0 to 3, respectively. To interpret the scores, sum scores were calculated. In total, the scores could range between 0 and 21. Sum scores between 0 and 4 were interpreted as minimal anxiety, scores between 5 and 9 were seen as mild anxiety, scores between 10 and 14 were described as moderate anxiety and lastly, scores between 15 and 21 were depicted as severe anxiety (Spitzer et al., 2006). In the current sample, Cronbach's alpha was acceptable (.77).

Gratitude was measured by the Gratitude Questionnaire (GQ-6), consisting of six statements on a 7-point Likert scale ranging from 1 (‘strongly disagree’) to 7 (‘strongly agree’) (McCullough et al., 2002). An example statement was ‘I have so much in life to be thankful for’. The categories were coded from 1 to 7, respectively. In total, the scores could vary between 6 and 42. A higher mean score indicated a higher level of gratitude. Various studies from various countries verified the validity and reliability of the test (Garg et al., 2021; Gouveia et al., 2021). Cronbach’s alpha in the present study was good (.83).

The daily questionnaires also numerous various constructs. The relevant questions for the mentioned research questions revolved around the state of gratitude, the state of anxiety and the perception of a striking event in terms of pleasure. All three constructs were measured by one question. Starting with gratitude, the participants were asked the following question: ‘How grateful do you feel right now?’. A 7-point Likert scale from 1 (not at all) to 7 (very much) was used. Participants could indicate their current feeling of gratitude, whereas a higher score equalled a higher form of state gratitude. The item was derived from several other ESM studies which used the item ‘I feel grateful’ to assess the current state of gratitude (Jans-Beken et al., 2019; Visserman et al., 2018). However, since ESM studies explicitly focus on the current moment, the item was adjusted by adding a time component, i.e. right now (Myin-Germeys & Kuppens, 2021). Despite the missing single definition, there was no clarification regarding the concept of gratitude, allowing a personal interpretation of gratitude by all participants.

The second relevant item measured the perception of daily events. The participants were given the instruction of thinking about the most striking event or activity since the last questionnaire. However, the participants did not have to specify the striking event. Then, the question was asked: ‘How (un)pleasant was this event or activity?’. The answer possibility ranged from -3 (very unpleasant) to +3 (very pleasant). Thus, the question captured two dimensions, i.e. pleasantness and unpleasantness. Bylsma et al. (2011) also conducted an ESM study investigating the appraisal of events in terms of (un)pleasantness and neutrality. Further previous studies also measured the appraisal of events using similar items (Jans-Beken et al., 2019; Peeters et al., 2003). For the statistical analyses, the continuous variable was recoded into a dichotomous variable. Events were coded as pleasant if they used the answer categories between 0 and 3. Thus, if the event was seen as neutral by answering with 0, the event was still seen as positive. This was done since other studies also used this coding system (Bylsma et al., 2011; Geschwind et al., 2011). If participants answered -1 to -3, the event was coded as unpleasant. A 1 was coded for pleasant events and a 0 was coded for unpleasant events.

Lastly, the current state of anxiety was measured by the question: 'How anxious do you feel right now?'. A 7-point Likert scale from 1 (not at all) to 7 (very much) was used again. The item is part of various items which measure negative affect, i.e. anxious, insecure, guilty and down. A higher score equalled a higher anxiety level. Geschwind et al. (2011) also used this item in an ESM study.

Data Analysis

SPSS (Version 27) was used to analyse the data. Since some participants had insufficient response rates, a suitable cut-off point was aimed for. Based on the premise of Conner & Lehmann (2012), it was decided to exclude participants who answered less than fifty per cent of the questionnaires, i.e. answering less than 21 out of the 42 daily questionnaires.

All relevant variables were transformed into z-scores to have standardised regression estimates. To interpret the unstandardised and standardised estimates, the conventions of Cohen (1988) were used. Coefficients were interpreted as weak (≥ 0.10), moderate (≥ 0.30) and strong (≥ 0.50). The daily measures of anxiety, gratitude and the perception of daily events were visualised via Excel to observe the average feelings over time. Pearson correlation coefficients between the baseline measure and the ESM measure of gratitude and anxiety, respectively, were computed to assess the validity. Further, split-half reliability analyses were performed for anxiety and gratitude, respectively. Per participant, the measurement points were divided in half.

To analyse the data, a series of linear mixed models (LMM) was conducted. This seemed appropriate since LMM can deal with the dependencies of responses, i.e. nested data (Yang et al., 2014). Myin-Germyes and Kuppens (2021) describe that the data can be seen as hierarchical since observations are nested within one day and within one individual. Hence, the observations are not independent from each other. Additionally, LMM can handle missing data at random. For the series of models, the time variable was used as repeated measurement and the participants' ID was applied as the subject variable. An autoregressive covariance structure AR(1) was used since it controls the assumption that associations between observations within individual participants exponentially decline over time. Thus, two observations within one participant which are taken at the same time will be highly related whereas two observations with a temporal distance of 14 days will show more variability (Kinacid, n.d.). As cut-off point for statistical significance, an alpha of 0.05 was used.

To answer the first research question regarding the association between gratitude and the perception of daily events in terms of pleasure, the gratitude variable was used as a fixed covariate and the event variable as the dependent variable.

For the second research question focusing on the relation between gratitude and events in more depth, the within-person and between-person associations were disaggregated. For the gratitude variable, a person-mean (PM) and a person-mean centred score (PMC) were created. This was done by aggregating all momentary scores per participant to obtain the person's mean. Afterwards, the person mean was subtracted by the momentary scores per participant to receive the person-mean centred scores. The person-mean score equalled the average score of an individual whereas the person-mean centred score was seen as the time-dependent score (Curran & Bauer, 2011). The two computed variables were used as fixed covariates. The event variable was again used as dependent variable.

Concerning the potential moderating role of gratitude, the third variable regarding anxiety was included. The anxiety variable was used as fixed covariate, the event variable as the dependent one and the gratitude variable was integrated as interaction effect, i.e. a moderator.

Results

Sample Characteristics

In sum, 69 participants started the study. After excluding participants with insufficient response rates, 45 participants remained for the analysis. Some of the excluded participants fulfilled the response rate of at least 50 % but they either did not meet the required age of 18 years (N=1) or did not fill out the baseline/demographics questionnaires (N=4). The final data set consisted of 33 females (73.3 %) with an age range between 18 and 57 years (M = 25.31, SD = 9.98). Further characteristics can be found in Table 1.

Table 1

The Participants' Characteristics in Absolute Numbers and Percentages

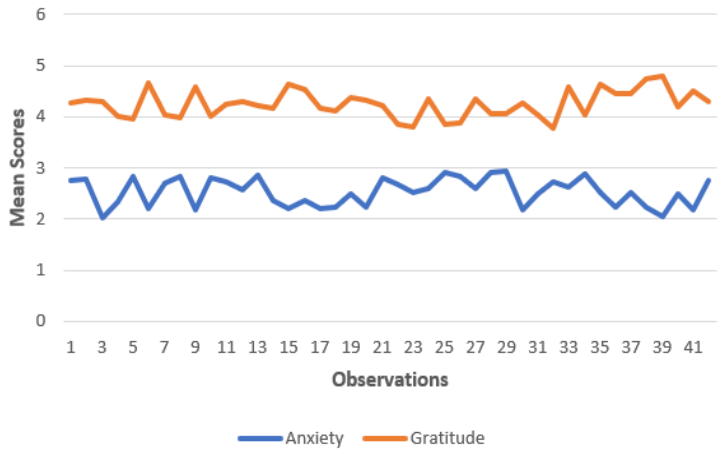
		N	%
Gender	Female	33	73.3
	Male	12	26.7
Nationality	German	24	53.3
	Dutch	16	35.6
	Other	5	11.1
Occupation	Student	21	46.7
	Working and Studying	14	31.1
	Employed	7	15.6

	Self-employed	3	6.7
Highest degree	High School	23	51.1
	Bachelor's degree	14	31.1
	Master's degree	7	15.6
	Other	1	2.2

Most events that participants experienced were perceived as pleasant: 82.2 % of the events were seen as positive and only 17.8 % of the events were interpreted as unpleasant. The means of the measured levels of anxiety and gratitude per point of observation (N=42) did not vary greatly (see Figure 4). The mean of gratitude per point of observation varied between 3.77 and 4.79 (M = 4.24, SD = 1.64). Thus, the mean scores centred around the upper middle of the 7-point Likert scale, demonstrating average levels of gratitude. Regarding anxiety, the mean of anxiety per timepoint varied between 2.02 and 2.94 (M = 2.53, SD = 1.52), showing that the scores indicated lower levels of anxiety. In total, for anxiety, gratitude and events, more than 80 % of the data was complete after excluding insufficient response rates.

Figure 4

The Mean Scores of Anxiety and Gratitude per Point of Observation



Validity and Reliability

For gratitude, a positive correlation between the mean of the trait gratitude (GQ-6) and the ESM measure was found, r = .23, p <.001. The correlation between trait anxiety (GAD-7) and the ESM measure of anxiety was also found to be positive, r = .21, p <.001.

Regarding reliability, the split-half reliability analysis for reliability showed a positive correlation between the two measurement halves of gratitude (r = .51). The relation between the first and second half of anxiety ESM measures was positive as well (r = .39).

Gratitude and the Perception of Positive Events

A significant overall association between gratitude and the pleasant perception of daily events was found (B = .06, *SE* = .01, *F*(1, 1005.88), *p* <.001). Thus, high levels of gratitude were correlated with pleasant event perception. As a follow-up analysis, the relation at the between-person and the within-person level was analysed. At the between-person level (B = .02, *SE* = .01, *F*(1, 505,89), *p* = 0.12) as well as at the within-person level (B = .09, *SE* = .01, *F*(1, 1524.87), *p* <.001), a significant but weak positive association was found. This means that participants who were more grateful on average also perceived more events as pleasant. At the same time, participants who were more grateful than they usually were, i.e. their own average, also perceived more events as positive than usual.

Anxiety and the Perception of Positive Events With Gratitude as Moderator

The main effect of anxiety on the pleasant perception of daily events was significant (B = -.13, *SE* = .02, *F*(1, 1359.61), *p* <.001*).* This indicates that individuals who were more anxious perceived fewer positive events. However, the main effect of gratitude was non-significant (B = .01, *SE* = .01, *F*(1, 1048.33), *p* = .72), meaning that individuals who were more grateful did not perceive more positive events. The interaction effect of gratitude and anxiety was significant (B = .02, SE = .01, *F*(1, 1410.66), *p* <.001). Thus, the level of gratitude affects the association between anxiety and the perception of positive events. The negative association between anxiety and positive events is weaker for individuals with a higher level of gratitude. Differently stated, gratitude weakens the negative relation between anxiety and positive events.

Table 2

The Estimates of the LMMs with Unstandardised Values as Well as the Standardised Estimates

Dependent variable	Parameter	B Estimate	β Estimate	Standard Error	Df	t	Sig.	95 % Confidence Interval	
								Lower Bound	Upper Bound
Positive Events	Gratitude	.06	.25	.01	1005.88	9.38	<.001*	.05	.07
	PM Gratitude	.02	.07	.01	505.89	2.53	.012*	.01	.04
	PMC Gratitude	.09	.26	.01	1524.87	10.61	<.001*	.07	.10
	Gratitude	.01	.20	.01	1048.33	.36	.72	-.02	.02
	Anxiety	-.13	-.23	.02	1359.61	-8.21	<.001*	-.16	-.01
	Gra*Anx	.02	.11	.01	1410.66	4.55	<.001*	.01	.02

Note. The abbreviation Gra refers to gratitude and Anx stands for anxiety. The CLs refer to the unstandardised estimates.

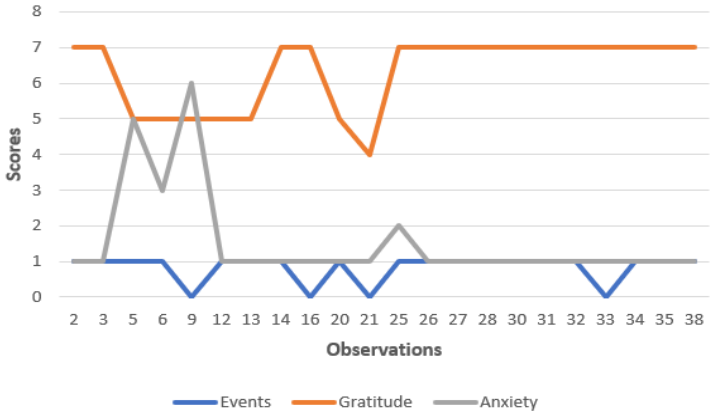
*p<0.05

The Illustration of Individual Differences

To demonstrate individuality per participant, four participants were selected to show their personal scores. Firstly, participant 44 was chosen as this individual showed stable scores for all three variables except for the first points of observation. Here, the level of anxiety was distinctly higher whereas the level of gratitude was particularly lower than on average (see Figure 5). At the same time, the individual indicated that the striking event was perceived as negative. Based on the argumentation of Barry et al. (2015), it might be that the high level of anxiety negatively affected the perception of daily events. The same happened again after some points of observation where the low level of anxiety remained stable but the score of gratitude decreased after two negatively perceived events.

Figure 5

Individual Scores per Point of Observation for Participant 44 Showing Gratitude, Perception of Events and Anxiety



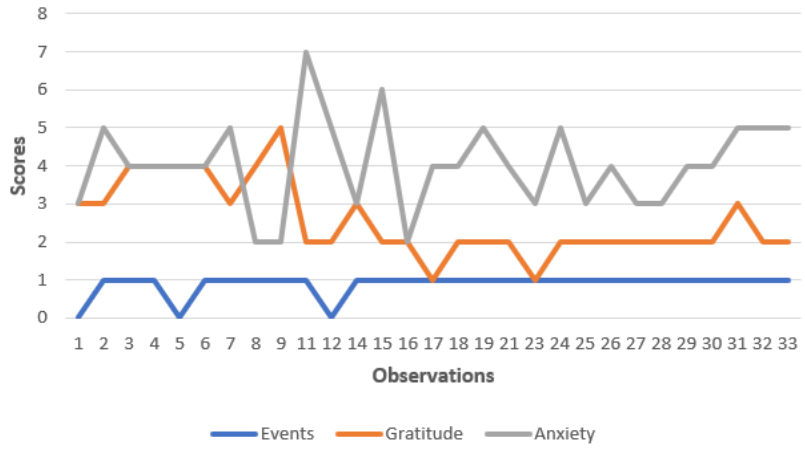
Note. Event = 1 refers to a pleasant event.

Secondly, participant 45 was chosen. Similar to the former participant, most events were perceived as positive (see Figure 6). Only three events were interpreted negatively. Opposed to the first participant, the individual demonstrated rather declining scores of gratitude despite perceiving events as positive. At the start, the scores of gratitude centred around the middle of the scale while they slowly decreased over time. Based on the argumentation of Held (2002) and Dejonckheere and Bastian (2021), it might be that the participant felt social pressure to

show positivity for the event variable which declined gratitude levels at the within-person level. The scores for anxiety changed throughout the observations. Most of the time, they were average to high. In contrast to the first participant, one sees more variation in answers. In contrast to the hypothesis that positively perceived events were correlated with high levels of gratitude, the participant showed that events were positively perceived despite being low on gratitude.

Figure 6

Individual Scores per Point of Observation for Participant 45 Showing Gratitude, Perception of Events and Anxiety

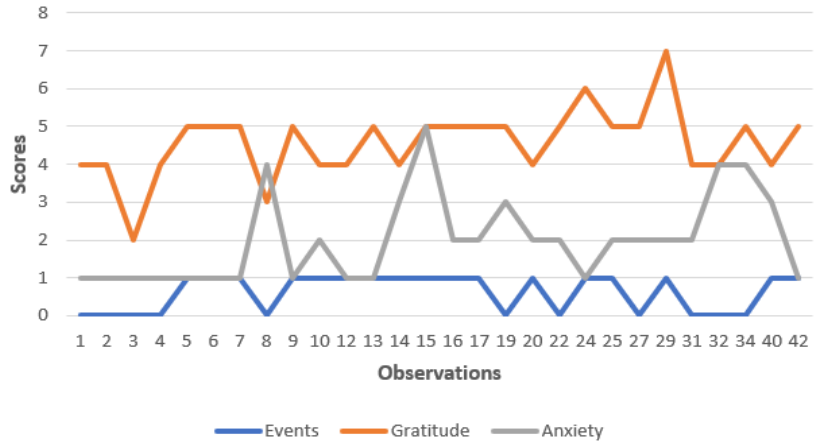


Note. Event = 1 refers to a pleasant event.

Participant 3 showed more variation in the perception of striking events. Although most events were still positively perceived, there were many events which were seen negatively (see Figure 7). Interestingly, the scores of gratitude remained high despite the changes in perception of the events. Around the end of the points of observation, many negative events were described and the scores for gratitude even increased with a peak at observation point 29. The scores of anxiety seemed to be rather unstable with fluctuations. It also seemed as if the anxiety scores were on average higher when the gratitude scores were lower. If one would search for an explanation, the high levels of gratitude could act as a coping mechanism for negatively perceived events (Fagley, 2018).

Figure 7

Individual Scores per Point of Observation for Participant 3 Showing Gratitude, Perception of Events and Anxiety



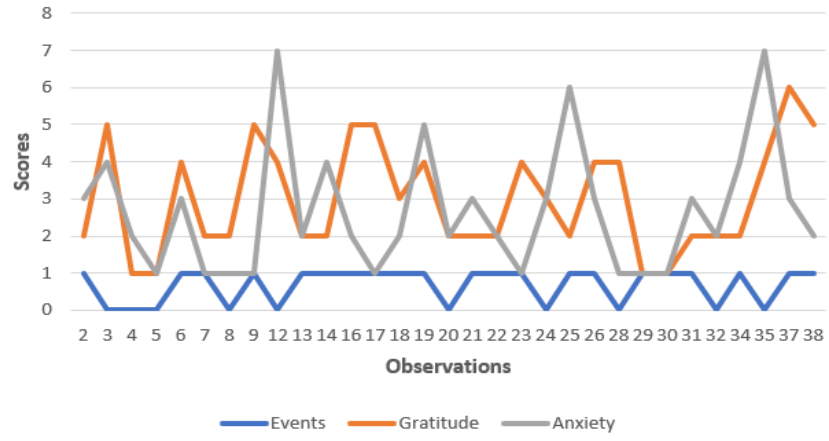
Note. Event = 1 refers to a pleasant event.

Lastly, participant 5 also displayed variation in the perception of events. However, this participant, opposed to the former, showed rather low values of gratitude which also fluctuated over time (see Figure 8). Additionally, the scores of anxiety also varied highly with some peaks centring around the negative events as well. For this participant, the high levels of anxiety could indeed have affected the perception of events as Barry et al. (2015) argued.

Taking all individual graphs into account, there was a great variety for all three variables, indicating that there could be differences at the within-person and between-person level as Sinclair et al. (2020) and Dejonckheere and Bastian (2021) demonstrate with their argumentations.

Figure 8

Individual Scores per Point of Observation for Participant 5 Showing Gratitude, Perception of Events and Anxiety



Note. Event = 1 refers to a pleasant event.

Discussion

This study aimed to explore the relation between gratitude and the perception of daily events in terms of pleasure over time. It was found that there was a significant relation for the mentioned variables. Deeper explorations by aggregating the within-person and between-person levels also demonstrated that there were significant relations at both levels. Although they both pointed at the same direction, they varied in strength. The relation at the within-level seemed to be stronger than the relation at the between-level. A moderation analysis revealed that gratitude significantly moderated the negative relation between anxiety and the perception of positive events.

Main Findings

At first, it was investigated to what extent there was an association between gratitude and the perception of positive events. As hypothesised, there was a significant positive relation found but the correlation could still be considered as weak. Research focusing on the Broaden-and-Build theory suggested that the cognitive broadening created by positive emotions would affect the perception of events (Wood et al., 2010). The finding of the current study was also in line with the research of Jans-Beken et al. (2019), who found in an ESM study that there was a significant positive relation between positive emotions such as gratitude and positive events.

Based on the Cognitive Framework of Alkozei et al. (2017), it is argued that gratitude leads to a positive cognitive style by two biases, namely a positive attentional bias and a positive interpretation bias. While individuals high on gratitude are more likely to pay attention to positive aspects, they are also more likely to interpret stimuli in a positive light. In turn, these two biases lead to a positive memory bias which is mirrored in neural changes. Alkozei et al. (2017) also discuss that individuals high on gratitude might be more likely to encode positive events instead of memorising them better. The positive attentional bias allows individuals to encode the positive events, which in turn enhances the memorability. Experimental studies confirmed this hypothesis by finding that individuals high on gratitude were more likely to remember positive events (Alkozeil et al., 2017). This explanation would fit the high number of positively coded events in the current study. Thus, the first hypothesis could be accepted and the study did not contradict findings of other studies or influential theories.

However, the premise that positive emotions always create cognitive expansion as suggested by the Broaden-and-Build theory should be interpreted with caution. Although the present study confirmed the relation between the former, it could be that it is not the positive emotion per se as predicted but the motivational intensity behind the positive emotion. Harmon-

Jones et al. (2013) suggested that emotions, regardless of the positive or negative affective state, which are low in motivational intensity are associated with cognitive broadening. In their study, it was found that positive states which are low in motivational intensity and negative states which are high in motivational intensity lead to cognitive widening. If one controls the affective valence, it was found that low motivational intensity is the determining factor for cognitive widening regardless of the former (Harmon-Jones et al., 2013). In the current study, gratitude can be considered a positive state which is low in motivational intensity since no desire for goal attainment is created by experiencing high levels of gratitude. Thus, it is not possible to argue if gratitude is associated with positive events by broadening cognition due to being a positive emotion or by being low in motivational intensity. Additionally, Harmon-Jones et al. (2013) also highlight the difference between motivational intensity and arousal as critical factor for inducing cognitive broadening. In their argumentation, it is said that emotions which are high on arousal while being low in motivational intensity such as amusement are associated with cognitive widening. However, the current study cannot be used to test this assumption since the study focused on correlation, and gratitude is considered as low on arousal and motivational intensity simultaneously. To conclude, the finding of the present study was in line with the Broaden-and-Build theory as well as with other positive psychological studies focusing on the association between positive emotions and cognitive broadening. Still, one cannot determine if the positive state of gratitude per se was the critical factor. The motivational intensity of gratitude could lead to the positive relation between gratitude and the pleasant event perception.

Next, to have a deeper understanding of the relation, the between-person and within-person associations were examined. It was hypothesised that there could be differences at both levels. In particular, it was suggested that there would be a positive relation at the between-person level, whereas there might be a negative relation at the within-person level (Jans-Beken et al., 2019; Dejonckheere and Bastian, 2021). Against expectations, the effects pointed at the same direction. For the between-person as well as for the within-person association, significant positive relations were found. Since there were no studies known that focus on the distinction at the two levels for the present topic, it was not possible to compare the outcome to similar studies.

However, the outcome would go against the finding of Dejonckheere and Bastian (2021), who argued that societal pressure to be happy would lead to a decline in positive emotions (including gratitude). In line with this argumentation, the assumption that knowledge that happiness derives from the own perception of the world could pressure individuals to interpret events as positive, was also not supported (Sinclair et al., 2020). Besides, the suggested

effect of the social restrictions during the pandemic was neither supported (Bueno-Notivol et al., 2022; Siegler and Thomson, 2017). The current study could not find a significant association between decreased gratitude and positive event perception. Instead, it might be that certain events were considered as more special during the pandemic which increased gratitude levels. Another explanation might be that individuals high on trait positive emotionality are more likely to experience 'event-specific gratitude' which refers to levels of gratitude released after experiencing a positive event (Harding et al., 2019, p. 102). Trait positive emotionality refers to the tendency to be optimistic about the future as well as encountering joy in life. The researchers found that trait positive emotionality fosters positive rumination which refers to a cognitive process whereby individuals experience positive aspects of situations more intensely (Harding et al., 2019). This process leads to an intensification of positive emotions and an attentional bias to further positive aspects in situations. Thus, the finding of the current study was in line with the premise of the Broaden-and-Build theory that positive emotions foster a positive spiral of positive event perception and further positive emotions (Fredrickson, 2013).

Indeed, the effect size of the standardised estimate showed that the within-person association was even stronger than the association at the between-person level, indicating that there were differences at the individual level in terms of strength. The individual graphs also demonstrated variety per individual. Although some individuals' gratitude levels decreased despite perceiving many positive events, which would be in line with the argumentation of Dejonckheere and Bastian (2021), some participants showed high levels of gratitude correlated with positively perceived events. However, based on the statistical analyses, the hypothesis that there were differences in regard to the pointed direction at the between-person and within-person level could not be accepted. But if one solely focuses on the standardised estimates of the strength of the associations, they significantly differed as they did not seem to overlap. The finding showed that if individuals were more grateful than they normally are, there was a greater association to perceiving events as pleasant. Thus, the within-level association was indeed stronger than the between-level association. As explanation, the positive spiral of gratitude, described by the Broaden-and-Build theory, might have widened and intensified the attentional scope to perceive events as positive when individuals showed higher gratitude levels than usually (Fredrickson, 2013).

This finding has important implications since it suggests that individuals themselves, at the within-person level, can increase the perception of positive events by enhancing the level of gratitude. Perceiving events as pleasant can be considered a form of life satisfaction. Life satisfaction can be defined as having positive feelings about the 'conditions of your life'

(Prasoon & Chaturvedi, 2016, p. 25). This includes being satisfied with one's life events. Diener et al. (1997) confirmed the link between high levels of subjective wellbeing and the positive perception of events. Since various studies demonstrate the effectiveness of gratitude exercises to boost gratitude levels, this mechanism might be promising to improve subjective wellbeing (Emmons & McCullough, 2003; Megawati et al., 2019; Sadeghi & Pour., 2015).

Lastly, it was hypothesised that gratitude could also act as a moderator for the relation between anxiety and the perception of events. Gratitude was indeed a moderator for this relationship. Wood et al. (2010) suggested that gratitude allows individuals to pay attention to positive aspects of their surroundings by allowing cognitive broadening and attention widening. For the present study, it would mean that the cognitive broadening of gratitude stimulated individuals to perceive events as positive. Indeed, the negative association between anxiety and the positive perception of events weakened when higher levels of gratitude were present to perceive more positive events. A possible explanation might be that the focus on threats and dangers, which is created by high levels of anxiety, is reduced by high levels of gratitude. Thus, the finding was in line with previous research in literature (Petrocchi & Couyoumdjian, 2015; Wood et al., 2010).

Based on evolution, Baumeister et al. (2001) argue that throughout history humans tend to focus mostly on the negative aspects of life such as danger or threats to survival. Negative affects alarm people to protect themselves. If an individual does not pay attention to a positive stimulus or emotion, there are no detrimental consequences. However, the opposite is the case for threats or negative emotions. Thus, the researchers argue that individuals are more likely to pay attention to their negative emotions (Baumeister et al., 2001). However, the current study found that high levels of gratitude indeed had an effect on the relation between anxiety and the perception of positive events by potentially diminishing the focus on threats and dangers in life. Additionally, other researchers found that gratitude had the ability to interrupt streams of negative thoughts such as anxious thoughts by shifting attention to positive aspects in life, i.e. moderating the relation between anxiety and event perception, which could be an explanation for the finding of the current study (Wood et al., 2010).

This finding has potential implications for therapeutic settings. If high levels of gratitude can decrease the negative relation between anxiety and positive events, psychotherapists could use this mechanism for patients with anxiety disorders. For instance, Lau & Cheng (2011) found that gratitude training could indeed decrease death anxiety in patients. Gratitude training such as writing expressive letters or gratitude affirmations might help patients to perceive more events as pleasant. Korb (2015) argues that brains are focused on functioning in the same way.

If highly anxious patients start to be more attentive to positive stimuli in their surroundings, it is likely that anxiety levels are reduced and subjective wellbeing is boosted. This can be achieved by the moderating role of gratitude. Thus, the finding of the moderating role of gratitude in the context of anxiety and event perception might be a tool for therapeutic strategies.

Strengths and Limitations

The current study had several strong points. Firstly, the study used a longitudinal study design which allowed monitoring variables over time by capturing a variety of moments (Larson & Csikszentmihalyi, 2014). Thus, the study allowed for more insights than a cross-sectional study design with just one measurement point in time. Additionally, ESM enables to analyse various types of associations (Curran & Bauer, 2011). The analysis at the within-level is not often done in psychological research due to the need for longitudinal study designs. The insights of the individual graphs allow exploring varieties in more depth as well. Moreover, the participants could stay in their natural environment, which increases ecological validity (Larson & Csikszentmihalyi, 2014). Lastly, after the exclusion of insufficient response rates, more than 80 % of the relevant items for the present study were answered. The average response rate of ESM studies is estimated at 78 % (Rintala et al., 2019). Thus, this study had a slightly higher average response rate. A possible explanation for the high response rate might be that participants had only three measurement points per day as well as plenty of time to answer each questionnaire. Moreover, the correlation between the ESM measure of gratitude and the baseline measure is in line with the finding of McCullough et al. (2004) who also found a moderate correlation between the two measures.

However, next to these strong points, there were some limitations. Although the participants who were more grateful reported to perceive more events as pleasant, participants with higher gratitude could also be more likely to experience pleasant events. The current study cannot confirm if participants high on gratitude are more likely to perceive the same event as more pleasant than an individual low on gratitude. Moreover, the sample was homogenous in nature since most participants were students or had an academic degree. Thus, the participants were highly educated opposed to the average population. One cannot generalise the outcomes for the general population based on the sample characteristics. Moreover, the GQ-6 and the GAD-7 demonstrated that the participants had rather average levels of anxiety and lower levels of gratitude (see Appendix B). Since the study was conducted during the pandemic, individuals might have been affected by these circumstances. Thus, the association between gratitude,

positive events and anxiety might be different for another population. For instance, it might create a difference when a person experiences high momentary gratitude despite being low on gratitude on a trait level in terms of perception of events. Individuals who are in general more grateful might be less affected by a high momentary gratitude level due to the two being 'overlapping constructs' which may influence each other (Harding et al., 2019, p. 103). Thus, a decline in the relation between gratitude and positive events might be a possible consequence. The same applies to the relation between the level of anxiety and positive events. Lastly, the question regarding the striking events was not highly elaborated due to a missing specification of the event. It was not possible to interpret which types of events were perceived as pleasant more often by individuals to analyse differences.

Future Research

For future research, it might be interesting to further study the association between gratitude and the perception of striking events in daily life. In particular, it might be useful to further explore the association at the between-person and within-person level due to contradicting findings in this study opposed to outcomes in literature. Moreover, one could specify the striking events in a follow-up study by creating various categories of events. As already argued, it might be that the types of events perceived also affect the association between gratitude and the perception of events. McGuire et al. (2019) conducted a study where momentary gratitude was linked to various types of events. In particular, interpersonal and non-interpersonal events were distinguished, highlighting the social aspect of some events. Furthermore, it was distinguished between dependent and independent events. A dependent event was defined as dependent on prior causes and actions of a person (e.g. cooking for a neighbour) whereas an independent event occurs without own actions (e.g. receiving flowers without any reason) (McGuire et al., 2019). The researchers found that the highest momentary gratitude was found for independent-interpersonal positive events. This would mean that events on a social basis which were not expected due to prior activities were most likely to elicit high gratitude levels. It might be interesting to further explore the relation between specific event categories and gratitude. For instance, one could further specify interpersonal events by distinguishing between groups of people (e.g. colleagues, friends or strangers).

Additionally, it might be useful to further explore the field of event perception in relation to low and high-arousal affects. Gratitude is generally described as a low-arousal positive affect that widens attention (Jans-Beken et al., 2019). In contrast, anxiety is an emotion with high arousal that narrows attention. Previous research mostly focused on negative emotions in

relation to perception and attention as argued by Fernandes et al. (2011). However, many negative emotions are automatically high in arousal. It might be useful to integrate further high- and low-arousal affects in the study of event perception to have broader knowledge about the factors of emotions which might be associated with event perception. The two factors of arousal and valence could be taken into account. A first study by Fernandes et al. (2011) found that both factors might be related to attention. In contrast, Harmon-Jones et al. (2013) suggest that independent of arousal and valence, motivational intensity might be the triggering factor. Further research could give more clarification.

Conclusion

To conclude, this study was able to confirm most findings from previous studies. Gratitude was found to be correlated with the perception of positive events. The relation at the within-person level was particularly strong, indicating the possibility to use gratitude training (in therapeutic contexts) as an option to change the perception of events in terms of pleasantness by high levels of gratitude. In general, gratitude is a topic which slowly starts to receive more attention in everyday life. Many studies show promising results regarding the potential of gratitude. Hence, it might be useful to further explore the positive effects of gratitude. Gratitude might be a mechanism to improve quality of life by perceiving the positive aspects of events. To sum up, gratitude is a promising factor in positive psychology, which should be further investigated.

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Appendix A

The Digital Informed Consent in English

Dear participant,

Thank you for your participation in this study. Before you participate, it is important that you understand the goal of this research and what the study will ask from you. The purpose of this study is to find out how wellbeing is related to several positive psychology constructs. To explore this relationship, we want to measure fluctuations in mental health in daily life to gather a more detailed picture of the dynamics of mental health.

For this study, we will ask you to fill in several questionnaires on your mobile phone. All questionnaires will be completed in the Ethica app. The study will start with a questionnaire concerning your demographics and general mental health. This initial questionnaire will take about 10 minutes to complete. Afterwards, you will receive three daily questionnaires per day for a period of two weeks. Notifications will remind you about the next questionnaire. The questionnaires will be provided in the morning, afternoon and evening. One daily questionnaire takes approximately 3 minutes to complete. It is important that you answer the questionnaires as soon as possible. *Please make sure that you turn on the notifications for the Ethica app on your mobile device*.

The information that we collect from this research project will be kept confidential. This means that only the researchers have insight into your answers. All personal data (such as age, gender etc.) will be anonymized and will not be published and/or given to a third party. Your participation in this study is voluntary. You are free to withdraw from this study at any time and without giving a reason.

Contact information

If you have any questions regarding this study, you can contact the researchers of this project Amelie Schleich and Allegra Passmann.

Consent

I have read and understood the information provided and had the opportunity to ask questions. I understand that my participation is voluntary and that I am able to withdraw at any time, without a reason or cost. I hereby voluntarily agree to take part in this study.

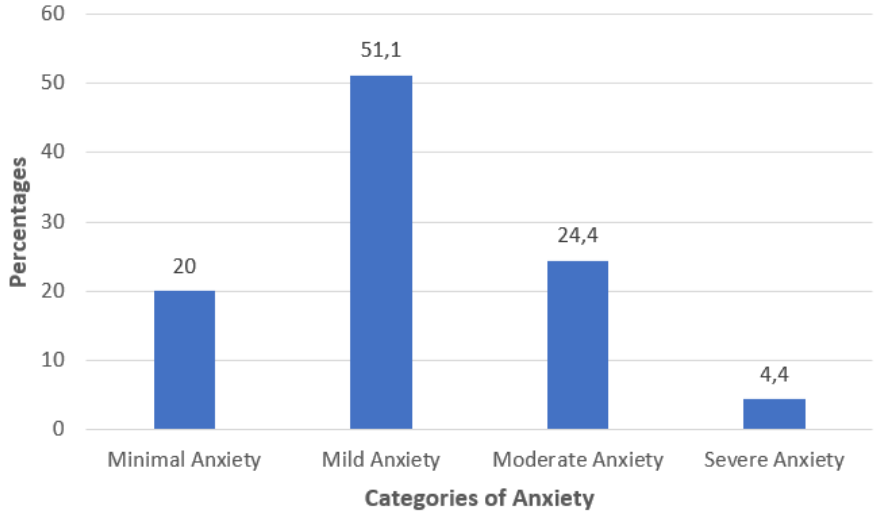
Appendix B

Anxiety and Gratitude on a Trait Level

According to the GAD-7, the sample showed a great variety in the trait anxiety: 20 % of the participants displayed minimal anxiety, 51.1 % had mild anxiety, 24.4 % showed moderate anxiety and lastly, 4.4 % demonstrated severe anxiety. Thus, most of the participants were indicating mild to moderate anxiety on a trait level.

Figure B1

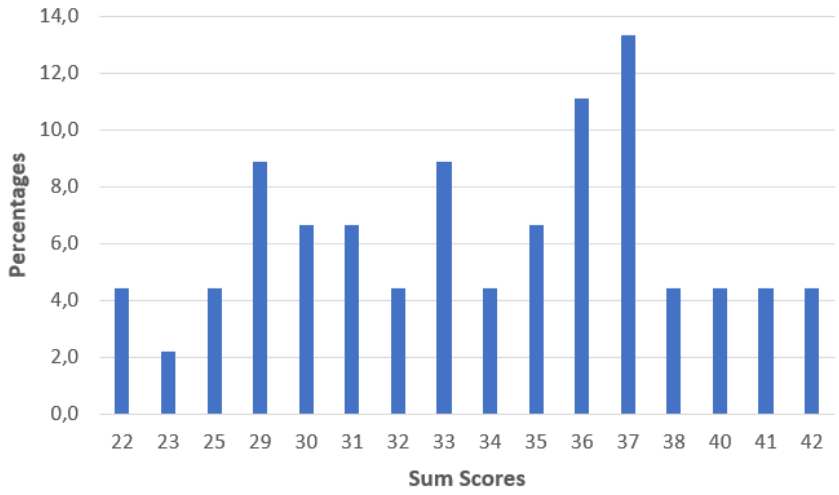
The Distribution of Anxiety (GAD-7) Divided Into Categories in Percentages



Referring to gratitude, the GQ-6 revealed that most participants were not highly grateful: 51.1 % of the individuals scored lower than 75 % of the test-takers according to the norm sample by McCullough et al. (2002). 82.2 % of the respondents' scores were lower than 50% of the reference group. Only 8.8 % of the participants scored higher than 75 % of the test-takers in the norm sample. Thus, in total, the sample displayed rather low levels of gratitude and mild to moderate levels of anxiety.

Figure B2

The Distribution of Sum Scores of Gratitude (GQ-6) in Percentages


14,0
12,0
10,0
8,0
6,0
4,0
2,0
0,0
Percentages
22 23 25 29 30 31 32 33 34 35 36 37 38 40 41 42
Sum Scores