

Optimism in crises

Examining the impact of Extraversion and Neuroticism on Optimism
in times of Covid-19

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Abstract

Research about the stability of optimism and its relation to human personality yielded inconclusive research outcomes. The enduring Covid-19 crisis and the constantly changing restrictions raise questions about the stability of optimism in times of hardship as well as the effects of extraversion and neuroticism in this context. The present study, therefore, investigated the stability of optimism before and during the corona pandemic. Further, it examined the relationship between optimism, its changes, and the personality traits of extraversion and neuroticism. The study is based on a longitudinal design and used data from 2017, 2019, 2020, and 2021 from the Dutch LISS panel (n=3439). Results indicated that overall optimism remained stable. Further, positive correlations between optimism and extraversion were found in all years except for 2017. Significant negative correlations were found between optimism and neuroticism in all years. Regarding the prediction of optimism, results suggested that before the pandemic, only neuroticism predicted peoples' level of optimism, while during the pandemic, both, extraversion and neuroticism served as a predictor. Similar results were found for the analyses of changes in optimism, indicating that before the pandemic, only neuroticism was related to peoples' changes in optimism, whereas, during the pandemic, extraversion and neuroticism were found to be statistically related to these changes. Hence, the results showed that optimism is a stable construct. Further, it offered a first indication that during the pandemic, the personality trait of extraversion becomes more important for peoples' outlook on the future. Overall, the findings of this study contributed to the existing research body by providing first insights into the stability of optimism and the impact of extraversion and neuroticism on peoples' optimism during the novel and enduring Covid-19 pandemic.

Keywords: Personality, Optimism, Extraversion, Neuroticism, Covid-19.

We live in a time of one of the largest public health crises in human history. In March 2020, the lives of humans around the globe changed dramatically. The outbreak of the COVID-19 pandemic has forced regimes worldwide to implement measures in an endeavour to stop the spread of the virus (Fang, Wang, & Yang, 2020). Lockdown restrictions such as closures of shops, schools, and recreation facilities limited people's mobility and their ability to physically interact with other individuals (Adams-Prassl, Boneva, Golin, & Rauh, 2020). From one day to the other, people were requested to engage in social distancing and to stay at home. The global pandemic is not only the cause of millions of deaths worldwide but also the source of psychological pressure for healthy individuals, generating fear all over the world (Duan & Zhu, 2020; Eva, Sari, & Andini, 2020). Due to the current pandemic, many people suffer from an increase in psychological complaints such as stress, panic, and depression (Qiu et al., 2020). Previous empirical evidence showed that especially the psychological construct of optimism influences how people react to adversity (Eva et al., 2020). For instance, research from Conversano et al. (2010) found that optimism is positively correlated to coping strategies as well as adaptivity in times of adversity, which in turn, eliminate stressors and negative emotions. Hence, it is plausible to assume that optimism plays a great role in the response to Covid-19 as it helps people not immediately fall into negative thinking loops, which also negatively impact their psychological well-being (Martínez-Correa, Reyes del Paso, García-León, & González-Jareño, 2006). However, since the Covid-19 pandemic is a relatively new form of adversity in human lives, little is known about the applicability of previous research findings. In general, most research in the field of optimism examined the outcomes of optimism, while its relation to human personality remains less explored (Peterson, 2000). Even though optimism is most often associated with the personality constructs of neuroticism and extraversion, results remain inconclusive (Boland & Cappeliez, 1997). Further, it is still questionable whether optimism is a stable psychological resource in times of hardship (Carver, Scheier, & Segerstrom, 2010). Therefore, this study will focus on investigating the relationship between optimism, extraversion, and neuroticism in times of Covid-19. Unlike most other studies that focused on optimism and personality, the current study is based on a longitudinal research design and thus, follows people before and during the pandemic.

Optimism

Optimism describes a positive attitude towards life and the expectancy of a bright and positive future (Scheier & Carver, 1985). It is supposed to have a lot of beneficial effects on individuals' psychological and physical health (Peterson, 2000; Scheier & Carver, 1985).

Optimism helps people to cope in times of hardship and to carry on striving toward their goals (Bailis & Chipperfield, 2012). Previous research found evidence that people high in optimism are less prone to develop depression and tend to recover faster after a trauma or an adverse life event (Carver et al., 2010; Prati & Pietrantonio, 2009; Fischer & Leitenberg, 1986).

Generally, optimism can be seen as a trait, or as a state (Kluemper, Little, & DeGroot, 2009). Thus, the two most widely known perspectives on the origin of optimism perceive it as either learnable or dispositional (Peterson & Seligman, 1984; Scheier & Carver, 1985). Peterson and Seligman (1984) refer to “learned optimism” (i.e., state view; optimism may fluctuate) as an attribute that individuals can acquire as a response to a difficult life event. According to this theory, optimists assign failure or crisis to the influence of fixed external factors and in turn, success, and positive outcomes to the influence of internal, stable factors (Peterson, 2000). As opposed to this, Scheier and Carver (1985) claimed that optimism is a dispositional expectancy of positive future outcomes and therefore, a general and stable belief (i.e., trait view).

Current research about the stability of optimism is still inconclusive. Contrary to the dispositional view of optimism, which proposed that optimism remains stable due to its dispositional properties (Carver et al., 2010), Sweeny, Carroll, and Shepperd (2006) claimed that optimism may change if people experience perceived threats and difficult life situations. This view on optimism is supported by Segerstrom (2007) whose research about the test-retest correlation of optimism showed a non-significant test-rest correlation, which in turn, indicated that optimism did not remain stable but changed for some people. Concerning the current humanitarian crisis, little is known about this phenomenon in times of Covid-19-

Antecedents of Optimism

Although the benefits of optimism are already extensively studied, its relation to other constructs such as personality traits remains less well known (Peterson, 2000). Nordivk (1996) claimed that personality traits can be perceived as stable and consistent over a person's lifetime and thus, might influence peoples' behavioural responses in times of hardship. Current research suggests that the character traits of extraversion and neuroticism seem to be the strongest predictors of optimism (Sharpe, Martin & Roth, 2011; Alarcon et al., 2013). However, at first, researchers suggested that optimism is solely related to these two constructs and thus, can be conceptualized as a simple combination of high levels of extraversion and low levels of neuroticism (Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992). Nevertheless, after decades of research, evidence was found that optimism is not just the mere combination of extraversion and neuroticism. Next to strong correlations with extraversion

(positive) and neuroticism (negative), optimism is also weakly associated with agreeableness and conscientiousness (Busseri & Choma, 2016; Rey & Extremera, 2014). Further, Miciuk, Jankowski, Laskowska, & Olés, (2016) found a weak association between optimism and openness, which is, however, not consistent, and thus, not generalizable. In line with this, results from Alarcon, Bowling, and Khazon (2013) indicated that optimism is associated with four facets of the Big-Five Factor model (all except for openness). However, since extraversion and neuroticism seem to have the strongest correlation with optimism (Sharpe et al., 2011; Alarcon et al., 2013), this study focuses on two of the Big-Five Factor facets.

Extraversion

Extraversion is one of the personality traits of the Big-Five Factor model which has been most often linked to optimism (Boland & Cappelliez, 1997). It reflects the tendency to which individuals are talkative, active, and socially engaged (Penley & Tomaka, 2002). Contrary to introverts who are rather quiet and submissive, extroverts are presumed to be excitement-seeking and dominant. They prefer the company of others over their own and like large social events (Kristof-Brown, Barrick, & Kay Stevens, 2005). Previous research found strong positive associations between extraversion and positive affect (DeNeve & Cooper, 1998; Lucas, Le, & Dyrenforth, 2008), positive experiences in life (Magnus, Diener, Fujita, & Pavot, 1993), subjective well-being (Lamers, Westerhof, Kovács, & Bohlmeijer, 2012), happiness (DeNeve & Cooper, 1998) and resilience in times of adversity (Caska & Renshaw, 2013). Consequently, it is assumed that people who score high on extraversion are more active and experience more positive life events, which in turn, make them happier and more satisfied compared to introverts (Jackson & Schneider, 2014). Next to experiencing more positive life events, extroverts also seem to experience more stressful life events (Magnus et al., 1993). However, people high on extraversion can focus on the positive features of the stressors (Hemenover & Dienstbier, 1996) and ask their social environment for help if needed (Amirkhan, Risinger, & Swickert, 1995).

Just like optimism, extraversion is associated with better coping and recovery abilities after a traumatic event and therefore, an important and interesting facet to study (Penley & Tomaka, 2002). Even though existing research found evidence that extraversion is positively correlated with optimism (Alarcon et al., 2013), the reasons for this correlation are not known. From the researchers' own rationale, one possible explanation might be rooted in extroverts' focus of attention and their social network. Extroverts are known to focus more on the positive aspects of stress and to make more use of their large social network (Hemenover & Dienstbier, 1996; Amirkhan et al., 1995), which in turn, might increase their level of

happiness, help them to have a more positive attitude towards life and thus, to be more optimistic.

Neuroticism

Neuroticism is another facet of the Big-Five Factor model and is known as one of the strongest determinants of individuals' physical and psychological health (Lahey, 2009). Low scores on the neuroticism dimension indicate emotional stability, whereas high scores indicate emotional instability (Ciccharelli & White, 2018). Neurotic individuals are often vulnerable to recurring negative emotions, which include suffering from low self-esteem, rumouring, and depressive episodes (Barlow, Ellard, Sauer-Zavala, Bullis & Carl, 2014). Further, they tend to be extremely anxious and have difficulties with impulse control, resulting in easily induced anger outbursts (Hannuschke, Gollwitzer, Geukes, Nestler, & Back, 2020). Lahey (2009, p.2) claimed that Neuroticism is associated with facets such as "anger, sadness, anxiety, worry, and hostility". This is in line with previous research findings which suggested that due to exaggerated fear, individuals scoring high on neuroticism respond more negatively to changes in their environment than their low-scoring peers (Hannuschke et al., 2020). Several researchers found similar results, such as Trierweiler, Eid, and Lischetzke (2002) who found evidence that neurotic individuals are prone to strongly convey negative emotions. Studies examining the emotional response of individuals who score low on the neuroticism dimension were found to be emotionally stable, composed, and not easily aroused (Ciccharelli & White, 2018).

Like the construct of optimism, neuroticism also affects how people interpret and evaluate specific events (Kassin, Fein, & Markus, 2013). Research revealed that neurotic individuals perceive and evaluate not only situations but also themselves more negatively (Kassin et al., 2013). Consequently, it is no surprise that neuroticism is presumed to be strongly inversely correlated with optimism (Alarcon et al., 2013). Even though no concrete rationale behind this correlation is known, it can be assumed that as neurotic individuals predominantly shift their focus towards negative aspects of life, they also develop a negative attitude towards their future and thus, are less optimistic.

Optimism in times of Covid-19

Especially in the face of the current humanitarian crisis, optimism seems to be an important psychological construct that helps people to cope with difficult life events (Nes, 2016; Nes & Segerstrom, 2006). However, there is still an ongoing debate about whether optimism remains stable in times of crises (Carver et al., 2010). On the one hand, optimism could remain stable due to its dispositional properties. On the other hand, optimism could

change if difficult life events are encountered. Hence, the enduring pandemic and the constantly changing Covid-19 measures might be perceived as 'severe enough' to change peoples' optimism, which accordingly, might be an individual matter. Research findings of Genç and Arslan (2021) indicated that Turkish adolescents experienced lower optimism, which in turn, negatively affects their well-being due to the corona crisis. Until now, more than two years after the outbreak of Covid-19, little is known about the effects of the persistent pandemic on optimism as well as on its association with different personality constructs.

Extraversion in times of Covid-19

Research has shown that different personalities cope differently with the Covid-19-related changes in their lives (Williams, Armitage, Tampe, & Dienes, 2020). Thus, some people seem to be more negatively affected by the pandemic, while others seem to be less affected. Khosravi (2020) claimed that personality traits impact how frightening people perceive the pandemic. Consequently, the influence of the pandemic and the subsequent social distancing measures might differ to a large extent depending on the personality type (Smillie et al., 2019; Zelenski et al., 2014). However, research on the extraversion trait during the pandemic is still inconclusive (Shokrkon & Nicoladis, 2021). On the one hand, some researchers claimed that extroverted people have more difficulties in adapting to a life with social distancing as they are energized by social interactions and the company of others (Shokrkon & Nicoladis, 2021). On the other hand, it is proposed that extroverts can more easily adapt to changing life circumstances and are happier in stressful situations (Steel, Schmidt, & Shultz, 2008). Further, it is assumed that extroverts have a larger social network which serves as a protective factor during the crisis, and thus, would be better able to cope in times of hardship (Harris, English, Harms, Gross, & Jackson, 2017). Studies have found that high levels of Extraversion are linked to lower levels of loneliness, anxiety, and depression because of pandemic-related changes (Nikčević, Marino, Kolubinski, Leach, & Spada, 2021). Moreover, Michinov and Michinov (2021) found a positive association between extraversion and optimism, meaning that people who score higher on the extraversion continuum experience higher levels of optimism during the pandemic.

Neuroticism in times of Covid-19

Researchers suggest that differences in the neuroticism continuum are linked to different attitudes toward fellowship and emotional stability (Smillie, Kern, & Uljarevic, 2019; Zelenski, Sobocko, & Whelan, 2014). Regarding the Covid-19 pandemic, Liu, Lithopoulos, and Zhang (2021) proposed that neurotic individuals are more prone to

experience greater distress not only due to the threat of the virus itself but also due to social restrictions. Further studies revealed that people who score high on the neuroticism continuum report lower levels of happiness and satisfaction in times of Covid-19 (Kroencke, Geukes, Utesch, Kuper & Back, 2020; Nikčević et al., 2021). Neurotic individuals tend to perceive the crisis as a tremendous disruption of their personal lives (Schmiedeberg & Thönnissen, 2021). In addition, study results from Aschwanden et al. (2020), as well as Weiss and Deary (2020), found evidence that higher levels of neuroticism are related to more worries and negative effects related to the pandemic. This is also in line with study results from Anglim, Horwood, Smillie, Marrero, and Wood (2020), who claimed that the personality trait of neuroticism is negatively influencing individuals' well-being during a crisis. Since previous researchers found a strong negative correlation between neuroticism and optimism (e.g., Alarcon et al., 2013), and claimed that neurotic individuals experience the pandemic more negatively (Liu et al., 2021), it is plausible to assume that this correlation also holds during the current Covid-19 pandemic.

Current study

The present study will investigate the relationship between optimism, extraversion, and neuroticism before and during the Covid-19 pandemic. Previous findings indicated that optimism is an important contributor to well-being and coping strategies in times of hardship (Carver et al., 2010). Especially the personality traits extraversion and neuroticism are presumed to be the strongest predictors of peoples' level of optimism (Sharpe et al., 2011). However, research about the stability of optimism is still inconclusive (Carver et al., 2010). On the one hand, optimism might remain stable due to its dispositional nature (Carver et al., 2010). On the other hand, optimism might change when experiencing a perceived threat (Peterson & Seligman, 1984). Due to these ambiguous findings, the constantly changing Covid-19 measures, and the fact that different personalities handle these changes differently, this study can be regarded as a natural experiment on the stability of optimism. Hence, it explores whether optimism is a stable construct in times of the enduring Covid-19 pandemic and which types of personalities are more inclined to experience a change in optimism. It, therefore, examines whether the situation in the light of the Covid-19 pandemic or individual differences regarding extraversion and neuroticism will serve as a determinant of optimism and the change in optimism. The following four research questions will be addressed:

1. *To what extent did the mean level of optimism change before the pandemic compared to the early and later stages of the pandemic?*

Due to inconclusive research findings on the stability of optimism and the relatively less researched Covid-19 pandemic, no hypothesis can be generated. On the one hand, optimism could be a stable trait in times of hardship but on the other hand, the now for two years lasting Covid-19 pandemic could have led to changes in optimism.

2. To what extent did the relative level of peoples' optimism change before the pandemic and during the pandemic?

Due to the beforementioned inconclusive research findings and the fact that the change in optimism might as well be an individual matter, no hypothesis can be generated.

3. To what extent are optimism levels before and during the pandemic related to extraversion and neuroticism?

Due to previous research findings, it is expected to find a positive correlation between optimism and extraversion and a negative correlation between optimism and neuroticism. It is reasonable to assume that these correlations remain stable before and during the pandemic.

4. To what extent can extraversion and neuroticism serve as predictors of optimism and its changes before and during the pandemic?

Due to previous findings, it is expected that extraversion and neuroticism predict levels of optimism before and during the pandemic. Considering the constantly changing Covid-19 measures that have been implemented as well as the fact that people who differ on the extraversion and neuroticism continuum handle these measures differently, it is reasonable to assume that these personality traits might also be related to peoples' changes in optimism.

Method

Design

This study made use of data from the Dutch Longitudinal Internet Studies for the Social Sciences (LISS panel), which has been administered by CentERdata (Tilburg University, The Netherlands). The randomly drawn sample consists of approximately 5,000 Dutch households and 7,500 individuals. Participants were asked to complete 15–30-minute online questionnaires every month. Households that did not have access to a computer and thus, could otherwise not participate in the study, were provided with both, a computer, and an internet connection. The LISS panel is a longitudinal study and gathered data since 2008. It is based on a true probability sample drawn from the population register. The panel is

categorized into different domains covering topics such as health, education, income, political views, work, leisure, and personality. The data used in the current study regarding optimism, extraversion, and neuroticism were selected from the personality domain. Due to a low response rate in 2018, the data was collected in May 2017 and 2019 before the pandemic as well as in May 2020 and 2021 during the pandemic.

Participants

The LISS panel is a longitudinal study from which the participants were allowed to withdraw at any time. Therefore, the sample sizes varied. In 2017 and 2019, overall, 6,099 and 5,021 participants filled out the personality questionnaires completely. In comparison, 5,859 and 5,309 people completely filled it out in the years 2020 and 2021. Due to the voluntary participation of the LISS panel, not all participants participated in all four years. Therefore, the current study only included participants who participated at all four measurement points. The final sample consisted of 3,439 participants (49.1 % male, 50.9% female) with a mean age of 43.43 years ($SD = 22.57$). Due to the reduced sample size, possible selection effects were analysed using several independent sample t-tests and a chi-square test. Hence, characteristics of the participants of the reduced sample (i.e., participants who completely participated at all four points in time) were compared to the initial, unreduced sample (i.e., participants who did not participate at all four points in time). Analyses showed that the unreduced sample consisted of almost equal gender distribution (49% male, 51% female) with a similar mean age of 44.6 years ($SD = 22.47$). Moreover, participants' average levels of extraversion, neuroticism, and optimism were compared through three independent sample t-tests. Results revealed that participants of both samples significantly differ in their level of extraversion ($M = 31.45$, $SD = 2.80$; $M = 31.28$, $SD = 2.65$; $t(6072) = 2.285$, $p = .022$, $d = .06$), in their level of neuroticism ($M = 26.05$, $SD = 7.07$; $M = 25.02$, $SD = 6.98$; $t(6072) = 5.660$, $p = .00$, $d = .14$), as well as in their level of optimism ($M = 20.40$, $SD = 3.62$; $M = 20.61$, $SD = 3.53$; $t(6009) = -2.318$, $p = .020$, $d = .05$). Hence, the reduced sample is less extraverted, less neurotic, and slightly more optimistic than the unreduced one. However, the effect sizes indicated that the differences between the two samples seemed to be minimal and therefore, the analyses of the current study were based on the reduced sample.

Measures

IPIP Big five-factor markers

To assess participants' personality composition, Goldberg's IPIP Big-five factor inventory was administered (DeYoung, Quilty, & Peterson, 2007). This study used the two subscales for the personality traits extraversion and neuroticism. The inventory for

Extraversion consists of ten items that need to be rated on a 5-point Likert scale from 1 (very inaccurate) to 5 (very accurate) (Goldberg, 1992). Five of these items are negatively formulated and thus, needed to be recoded. Example items are “I am the life of the party” or “I don’t talk a lot”. For the scoring, participants’ sum scores of their ratings were computed. Overall, participants were able to obtain a minimum score of 10 (least extroverted) and a maximum score of 50 (most extroverted). The inventory displayed good reliability with Cronbach’s alpha of 0.88 (2017), 0.88 (2019), 0.89 (2020) and 0.90 (2021).

The subscale for neuroticism consists of 10 items that represent statements such as "I am relaxed most of the time" or "I worry about things" (Goldberg, 1992). Participants are asked to rate these items on a 5-point Likert scale ranging from 1 (very inaccurate) to 5 (very accurate). In comparison to the extraversion scale, two items are positively phrased and needed to be recoded. Participants’ sum scores ranging from 10 (least neurotic) to 50 (most neurotic) indicate their level of neuroticism. Reliability analyses showed good and excellent reliability with Cronbach’s alpha of 0.89 (2017), 0.91 (2019), 0.89 (2020), and 0.89 (2021).

Optimism

Optimism was assessed by the Life Orientation Test-Revised (LOT-R) by Scheier, Carver, and Bridges (1994). The inventory measures dispositional optimism and consists of 10 items that need to be rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Optimism is assessed through two subscales, namely optimism (items 1, 4, 10) and pessimism (items 3, 7, 9). The other four items are filler items and therefore, not relevant. For the scoring, the three pessimism items needed to be reversed and then added to the optimism scores to receive the overall sum score. An overall sum score between 0-13 indicates low optimism, a score between 14-18 indicates moderate optimism and a score between 19-24 indicates high optimism (Scheier et al., 1994). For the scope of this study, sum scores for 2017, 2019, 2020, and 2021 were computed. The inventory displayed acceptable reliability with Cronbach’s alpha of 0.73 (2017), 0.73 (2019), 0.75 (2020) and 0.77 (2021).

Data analysis

The data was analysed using IBM SPSS Statistics, version 25. First, Shapiro-Wilk Tests were conducted to check the normal distribution of extraversion, neuroticism, and optimism at each time point. Results indicated significant Shapiro-Wilk scores for all variables in all four years ($p < .001$, $df = 3439$). Even though the data did not seem to be normally distributed, the analyses of this study were based on parametric tests since no differences between the comparison of Spearman and Pearson correlations were found.

Furthermore, the sample size could be considered large enough to conduct parametric analyses.

To answer the first research question and therefore, to examine whether the overall mean level of optimism remained stable from 2017 to 2021, a Repeated Measures ANOVA and Mauchly's test were conducted. Since Mauchly's test indicated that the assumption of sphericity was violated ($\chi^2(5) = 107.878, p < .001$), the degrees of freedom were corrected by using the Huynh-Feldt estimates ($\epsilon = .979$). Further, to assess the difference in the mean levels of optimism between the different waves, a posthoc analysis with a Bonferroni adjustment was conducted. With this, a pairwise comparison of the optimism levels of 2017 and 2019, 2019 and 2020, and 2020 and 2021 was possible. Cohen's *d* was computed to assess the effect size of the changes in mean level. A Cohen's *d* between .00 and .20 was interpreted as negligible, between .20 and .50 as small, between .50 and .70 as moderate, and from .80 as strong (Chen, Cohen, & Chen, 2010).

To answer the second research question, three Pearson correlations were used to assess the rank-order stability of optimism. In particular, the correlations between the levels of optimism in 2017 and 2019, 2019 and 2020, and 2020 and 2021 were analysed. To assess whether a person's relative position on the optimism continuum remained stable, the correlational coefficients were compared to the stability coefficients of the Big Five personality traits, which range from 0.63 (Agreeableness) as the lowest to 0.83 (Neuroticism) as the highest (Larsen, Buss, Wismeijer, Song, & Van den Berg, 2005). Consequently, if the correlational coefficients of optimism were found to lie in a similar range, it will be interpreted as more like a disposition, if found to be lower, optimism will not be interpreted as a disposition.

To examine the relation between optimism and extraversion and neuroticism before and during the pandemic in research question 3, another three Pearson correlations were conducted. To be more precise, the correlations between optimism of one wave and extraversion and neuroticism of the previous wave were analysed (i.e., optimism in 2019 with extraversion and neuroticism in 2017; optimism in 2020 with extraversion and neuroticism in 2019; optimism in 2021 with extraversion and neuroticism in 2020).

Lastly, for research question four, three multiple linear regression analyses were conducted to examine whether extraversion and neuroticism serve as predictors of optimism. Again, extraversion and neuroticism of the previous waves were used (e.g., optimism in 2019, extraversion and neuroticism in 2017). Standardized regression coefficients were computed and interpreted in the same way as the correlation coefficients (see above).

Furthermore, it was accounted for possible sociodemographic confounders, namely age, and gender. To examine whether extraversion and neuroticism also serve as predictors of the change in optimism, another three multiple regression analyses were performed. The Analyses contained the same as above mentioned variables but accounted for the change in optimism by adding the level of optimism from the previous wave as an additional independent variable (e.g., optimism in 2019, extraversion in 2017, neuroticism in 2017, age, gender, optimism in 2017).

Results

Descriptive Analyses

Mean values and standard deviations of participants' levels of extraversion, neuroticism, and optimism were calculated (see Table 1). The calculations were administered for each point in time separately. On average participants reported an optimism level of 20.79, which according to Scheier et al. (1994), can be categorized as a high level of optimism. Regarding the composition of their personality, people displayed on average an extraversion level of 32 out of a possible minimum score of 10 (least extraverted) and a maximum score of 50 (most extraverted). Further, participants displayed on average a neuroticism score of 24 out of a possible minimum score of 10 (least neurotic) and a maximum score of 50 (most neurotic).

Table 1

Mean Values (M) and Standard Deviations (SD) of the Variables

	Range	M	SD
Extraversion 2017	10-50	31.28	2.65
Extraversion 2019	10-50	31.89	6.56
Extraversion 2020	10-50	31.77	6.74
Extraversion 2021	10-50	31.88	6.69
Neuroticism 2017	10-50	25.02	6.98
Neuroticism 2019	10-50	24.32	6.36
Neuroticism 2020	10-50	24.48	7.09
Neuroticism 2021	10-50	24.59	7.02
Optimism 2017	0-24	20.61	3.53
Optimism 2019	0-24	20.83	3.63

Optimism 2020	0-24	20.82	3.58
Optimism 2021	0-24	20.88	3.63

Notes. n = 3,439.

For extraversion, the results only indicated significant age and gender differences in 2017, in which men and older people scored higher on the extraversion continuum (see Table 2). In all other years, no differences in the levels of extraversion were found.

In comparison, for neuroticism, significant age and gender differences were found for all four measurement points. The analyses showed that women were more neurotic than men. In addition, older age was accompanied by lower levels of neuroticism, indicating that younger people were more neurotic.

Regarding differences in optimism, the analyses showed that older people were more optimistic in all four years. In terms of gender differences, mixed results were found. Whereas significant correlations were found in 2019 and 2021, suggesting women to be less optimistic than men, no gender differences were found in 2017 and 2020. Overall, gender, as well as age might act as potential confounding variables.

Table 2

Gender and age in Relation to extraversion, neuroticism, and optimism at all four points in time using Pearson correlation

	Gender	Age
Extraversion 2017	-.063**	.041*
Extraversion 2019	.026	.006
Extraversion 2020	.018	-.017
Extraversion 2021	.004	-.018
Neuroticism 2017	.176**	-.184**
Neuroticism 2019	.121**	-.167**
Neuroticism 2020	.187**	-.175**
Neuroticism 2021	.172**	-.172**
Optimism 2017	-.014	.086**

Optimism 2019	-.039*	.039*
Optimism 2020	-.028	.034*
Optimism 2021	-.042*	.035*

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed)

Research Questions and Hypotheses

Research Question 1: To what extent did the mean level of optimism change before the pandemic compared to the early and later stages of the pandemic?

The results of the Repeated Measures ANOVA showed an overall difference in the means of optimism in 2017, 2019, 2020, and 2021, $F(2.951, 10110.053) = 12.982, p < .001$.

The posthoc analysis with a Bonferroni adjustment revealed that the mean level of optimism statistically increased from 2017 to 2019 (.206 (95% CI, -.328 to -.084), $p < .001, d = .06$). However, the effect size appeared to be minimal and thus, the difference seemed negligible. Further, the analysis did neither show a significant difference between participants' levels of optimism from 2019 to 2020, nor from 2020 to 2021.

Research Question 2: To what extent did the relative level of peoples' optimism change compared to the early and later stages of the pandemic?

Three Pearson correlations were conducted to assess the rank-order stability of optimism. Results indicated a strong positive correlation between optimism in 2017 and 2019, $r(3439) = .712, p < .001$, a strong positive correlation between optimism 2019 and 2020, $r(3439) = .758, p < .001$, and a strong positive correlation between optimism 2020 and 2021, $r(3439) = .772, p < .001$. All correlational coefficients laid in the range of the stability coefficients of the Big Five, suggesting optimism to be more like a disposition. Overall, these strong correlations suggested that a person's relative position on the optimism continuum remained stable. Hence, a person who scored high in 2017, also scored high in 2019, 2020, and 2021.

Research Question 3: To what extent are optimism levels before and during the pandemic related to extraversion and neuroticism?

The results of the three correlational analyses showed a significant moderately negative correlation between optimism in 2019 and neuroticism in 2017 (see Table 3). However, no significant correlation between extraversion in 2017 and optimism in 2019 could be substantiated. In comparison, optimism in 2020 was statistically correlated to both,

extraversion in 2019 and neuroticism in 2019. To be more precise, a weakly positive correlation with extraversion and a moderately negative correlation with neuroticism were found. Similar results were found for the level of optimism in 2021. Hence, optimism in 2021 is found to be significantly positively correlated with extraversion in 2020 and significantly negatively correlated with neuroticism in 2020.

Table 3

Pearson Correlation results between optimism, extraversion, and neuroticism

	Optimism 2019	Optimism 2020	Optimism 2021
Extraversion 2017	-.012	-	-
Neuroticism 2017	-.479**	-	-
Extraversion 2019	-	.323**	-
Neuroticism 2019	-	-.532**	-
Extraversion 2020	-	-	.287**
Neuroticism 2020	-	-	-.495**

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed)

Research Question 4: To what extent can extraversion and neuroticism serve as predictors of optimism and its changes before and during the pandemic?

The first multiple linear regression was performed to predict people's level of optimism in 2019 by extraversion in 2017, neuroticism in 2017, age, and gender (see Table 4). Results revealed a significant moderate negative effect for neuroticism in 2017. No statistically significant effect for extraversion in 2017 on optimism in 2019 could be substantiated. Further, gender has a statistically positive effect on optimism in 2019, whereas age has a statistically negative effect on optimism in 2019. Thus, older age led to less optimism in 2019, while being female led to higher optimism in 2019. Nevertheless, the standardized coefficients and therefore, the effect on the prediction of optimism in 2019 seemed to be small. Overall, optimism in 2019 can be predicted by neuroticism in 2017 as well as gender and age.

The second multiple regression was performed to predict people's change in optimism in 2019 by the same variables and, however, by additional optimism in 2017. The analyses revealed similar results as the first regression, indicating that neuroticism in 2017 and age displayed a significant negative effect, while optimism in 2017 showed a strong positive effect. Consequently, results indicated that only the personality trait of neuroticism in 2017 was related to the change in optimism in 2019.

Table 4

Multiple Regression Analysis predicting optimism 2019 by extraversion 2017, neuroticism 2017, gender, and age (Model 1), and optimism 2017 (Model 2) (N = 3438)

Variable	Beta Model 1	Beta Model 2
Extraversion 2017	-.022	-.009
Neuroticism 2017	-.496**	-.161**
Gender	.043**	-.006
Age	-.048**	-.045**
Optimism 2017		.633**

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed)

Regarding the prediction of people's level of optimism in 2020, results indicated significant effects for extraversion and neuroticism in 2019 (see Table 5). Whereas extraversion had a statically positive effect, neuroticism had a negative one. Hence, higher extraversion and less neuroticism in 2019 led to being more optimistic in 2020. Further, only a significant effect of the confounding variable age was found, suggesting that lower age predicted higher optimism in 2020. For gender, no significant effect could be substantiated.

Regarding the change in optimism, results revealed that extraversion in 2019, as well as neuroticism in 2019, were related to people's change in optimism from 2019 to 2020. A statistically positive effect was found for extraversion, a statistically negative effect for neuroticism. In comparison to the previous regression analysis, the significant effect of age disappeared while controlling for optimism in 2019.

Table 5

Multiple Regression Analysis predicting optimism 2020 by extraversion 2019, neuroticism 2019, gender, and age (Model 1), and optimism 2019 (Model 2) (N = 3438)

Variable	Beta Model 1	Beta Model 2
Extraversion 2019	.182**	.068**
Neuroticism 2019	-.491**	-.141**
Gender	.023	.011
Age	-.047**	-.015
Optimism 2019		.656**

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed)

Similar results were found for the prediction of optimism and its change in 2021. The analyses indicated a significant positive effect of extraversion in 2020, and a significant negative effect of neuroticism in 2020 (see Table 6). Further, a significant positive effect of gender and a significant negative effect of age were found. Consequently, extraversion in 2020, neuroticism in 2020, age and gender predicted people's level of optimism in 2021. Thus, a high level of extraversion in 2020, and a low level of neuroticism in 2020, being female and young, led to being more optimistic in 2021.

Concerning the change in optimism, extraversion in 2020 (positively), as well as neuroticism in 2020 (negatively), was related to the change in optimism from 2020 to 2021. The analysis showed that the effect of the confounding variables disappeared.

In sum, extraversion and neuroticism seemed to predict the level of optimism as well as the change in optimism in all years except for 2019. Hence, only the character trait of neuroticism in 2017 predicted the level of optimism in 2019 and its change. Generally, the coefficients revealed that neuroticism had a greater effect on the prediction of optimism and its change than extraversion. Further, mixed results were found concerning the influence of the confounding variables age and gender. Whereas younger age and being female statistically predicted higher optimism in 2019, and 2021, only age served as a predictor of the level of optimism in 2020. Nevertheless, the influence of the sociodemographic confounders disappeared in the analyses of the changes in optimism, indicating that age and gender were not related to these changes.

Table 6

Multiple Regression Analysis predicting optimism 2021 by extraversion 2020, neuroticism 2020, gender, and age (Model 1), and optimism 2020 (Model 2) (N = 3438)

Variable	Beta Model 1	Beta Model 2
Extraversion 2020	.175**	.037**
Neuroticism 2020	-.492**	-.134**
Gender	.043**	.001
Age	-.045**	-.012
Optimism 2020		.688**

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed)

Discussion

The present study aimed at investigating whether optimism remained stable in times of the current Covid-19 pandemic. Further, it provides insights into the relationship between optimism, its changes, and the personality traits of extraversion and neuroticism before and during the pandemic. Until now, research about the stability of optimism is inconclusive. Due to the relatively new topic of Covid-19, little is known about the relation between personality and optimism in times of the enduring humanitarian crisis.

The results of the study revealed that on average, the participants experienced a high level of optimism before as well as during the pandemic. The findings indicated a small but significant increase in the mean level of optimism from 2017 to 2019. Nevertheless, the analysis of the effect size showed that this increase seemed negligible. From 2019 to 2021, the people's average level of optimism remained stable. Since there is still an ongoing debate about whether optimism remains stable in times of hardship (Carver et al., 2010) and the fact that the current Covid-19 pandemic is still relatively less researched, no hypothesis about the stability of optimism was generated. Whereas some researchers perceived optimism as a dispositional construct that remains stable in times of hardship (e.g., Peterson & Seligman, 1984), others claimed that optimism may change if people encounter a perceived threat or difficult life situations (e.g., Sweeny et al., 2006). The findings of this study support the stable and dispositional view of optimism. The small but negligible increase might be explained by the fact that the study compared the levels of optimism from 2017 and 2019 and thus, skipped

one year due to a low response rate. It remains questionable whether this increase would have also been found when comparing optimism from 2018 to 2019. Another explanation of the findings might be related to the measurement instrument. Since optimism was measured using the Life Orientation Test-Revised (LOT-R), which measures dispositional optimism, the finding that optimism remained stable might be related to the kind of instrument used (Scheier et al., 1994).

The second research question assessed the rank-order stability of optimism. Existing research about the Big Five personality traits generated evidence that demonstrated the stability of individual differences across time with minimal fluctuations due to specific life events (e.g., Costa & McCrae, 1994). Previously conducted studies that examined the influence of changing life events yielded inconclusive research findings, in which optimism remained stable for some individuals (e.g., Helgeson, 1999; Schou, Ekeberg, Sandvik, & Ruland, 2005), but changed for others (Antoni et al., 2001; Kivimäki, Vahtera, Elovainio, Helenius, Sing-Manoux, & Pentti, 2005). The results of the current study found evidence that not only the mean level of optimism remained stable during the pandemic, but also the individual's relative position on the optimism continuum. Hence, people who scored high in optimism before the pandemic also scored high in optimism during the pandemic. Even though the enduring pandemic has a significantly disrupting impact on peoples' lives, it did not change peoples' optimism and thus, their expectancy of a positive future. Overall, these findings are in line with the studies that supported the dispositional view of optimism, claiming it to be more trait-like (Carver et al., 2010; Scheier & Carver, 1985)

The third and fourth research questions examined not only to what extent optimism levels are related to extraversion and neuroticism but also whether extraversion and neuroticism served as predictors of optimism before and during the pandemic. Based on previous literature, it was hypothesized to find a positive correlation between extraversion and optimism, a negative correlation between neuroticism and optimism, and both traits as a predictor of optimism before and during the pandemic (Sharpe et al., 2011). Regarding the correlations, the findings of this study showed that mostly, the correlations were as expected with one exception of extraversion and optimism in 2017. In 2017, before the pandemic, only neuroticism was related to optimism as a significant moderate correlation was found. The results could not substantiate a correlation between optimism and extraversion. Nevertheless, the results of the analyses during the pandemic (i.e., 2020, 2021) were in line with the hypothesis, indicating a weakly positive correlation between optimism and extraversion, and a moderately negative correlation between optimism and neuroticism. The analyses of the

prediction of optimism yielded similar findings revealing that the hypotheses could generally be confirmed with the same exception. Before the pandemic, only neuroticism, gender, and age served as a predictor of optimism, indicating that less neuroticism, lower age, and being female in 2017 led to more optimism in 2019. No significant effect for extraversion was found, suggesting that extraversion did not predict optimism before the pandemic. These findings are in contrast with previous research who claimed that extraversion and neuroticism are optimism's strongest predictors (Sharpe et al., 2011; Alarcon et al., 2013). Results indicated that both hypotheses are only applicable in times of crises or the current Covid-19 pandemic. A possible explanation for these findings might be that during the pandemic, the personality trait of extraversion becomes more important than before the pandemic. Previous research found that different personalities handle the constantly changing Covid-19 measures, including social restrictions such as social distancing, lockdowns, and curfews, differently (Smillie et al., 2019). Yet, research on the influence of extraversion during the pandemic is still inconclusive. On the one hand, extroverted people are presumed to have more difficulties with social distancing during the pandemic since they need the company of others (Shokrkon & Nicoladis, 2021). On the other hand, it is claimed that due to their large social network which serves as a protective buffer, extroverted characters are happier and can better cope in times of adversity (Harris et al., 2017). The findings of this study support the latter theory, indicating extraverted people were more optimistic during the pandemic. Hence, extraversion becomes an important predictor of optimism during the pandemic. However, even though extraversion and neuroticism were statistically related to optimism during the pandemic, neuroticism was a stronger predictor, suggesting that neuroticism plays a greater role in peoples' level of optimism than extraversion. Another explanation for the lack of correlations between extraversion in 2017 and optimism might be related to the measurement instrument. Extraversion was measured through the IPIP questionnaire which consists of only ten items (Goldberg, 1992). Researchers, such as Cook and Beckman (2006) showed that the reliability of a study can be greatly improved by an increased number of items. Hence, using a questionnaire that measures personality traits with more items, might have increased the reliability of the study and might have led to different results. Moreover, analyses examining the relationship between the personality constructs and optimism during the pandemic, revealed that next to extraversion, neuroticism, gender and age predicted peoples' optimism as well. Thus, being extraverted, less neurotic, female, and having a younger age, led to higher levels of optimism during the pandemic.

The results of the analyses of changes in optimism revealed that the hypothesis that extraversion and neuroticism are related to peoples' changes in optimism could generally be confirmed. In line with the findings from the previous research questions, results indicated that before the pandemic, only neuroticism is negatively related to people's changes in optimism from 2017 to 2019. No statistically significant effect for extraversion was found. However, during the pandemic (i.e., from 2019 to 2020; from 2020 to 2021), a significant effect of both character traits was found, in which extraversion was positively related to changes in optimism and neuroticism negatively. Moreover, results showed that the influence of the confounders, age, and gender disappeared, indicating that they were not related to changes in optimism. Compared to extraversion, the coefficient of neuroticism seemed to be bigger, suggesting that being neurotic, especially during the pandemic seemed to play a greater role in the prediction of optimism than being extraverted.

In sum, all results of the current study (i.e., mean level stability, rank-order stability, relations with extraversion, and neuroticism) point in the direction of the dispositional view of optimism and therefore, in the direction of stability of optimism with the sole exception that extraversion was not related to optimism before the pandemic.

Strengths and Limitations

There are several strengths and limitations of the current study that should be considered when interpreting the results. One major strength pertains to the nature of the study and the sample. The data of the current study was collected via random sampling of the LISS panel. The longitudinal nature of the study enabled the researcher to draw conclusions about the change in optimism before and during the pandemic. Since previous research is still inconclusive about the stability of optimism and since little is known about the interplay between optimism and different personality traits during the Covid-19 pandemic, the findings of this study are of great relevance (Carver et al., 2010; Sweeny et al., 2006). This study helped not only to gain an understanding of how the pandemic influenced human life, but also about the interplay between the pandemic, optimism, and different personalities. Further, the LISS panel itself can be seen as a strength of this study as its wide database enabled the researcher to focus the study on concrete personality facets. In addition, the LISS panel used well-validated instruments to measure optimism, extraversion, and neuroticism (DeYoung et al., 2007; Scheier et al., 1994). Consequently, high-reliability scores for the optimism, extraversion, and neuroticism scales for all years were found, confirming the high-reliability values of previous studies. Lastly, another strength of the present study relates to the inclusion of possible confounding sociodemographic variables, such as age and gender. Analyses

yielded small relations between optimism, extraversion, neuroticism, and individual sociodemographic variables.

Next to all the strengths, there are also some limitations apparent. The initial sample size was greatly reduced as the final sample only consisted of participants who completed the questionnaires in all four years. Hence, this might have reduced the validity and representability of the current study especially since the assessment of possible selection effects showed that the reduced sample showed significant differences regarding participants' personality compositions in terms of levels of extraversion and neuroticism. Nevertheless, the analyses of the effect size revealed that these differences were small. Another limitation of the study concerns the measurement points. Due to a low response rate in 2018, data from 2017, and 2019 were used as "before the pandemic" measurements. Therefore, the wave from 2018 was skipped and data from 2017 was directly compared to data from 2019, which could have altered the results. An analysis of the waves 2018, 2019, 2020, and 2021 might have been more valid and representative.

Recommendations for Future Research

Future research should continue investigating the stability of optimism not only during the Covid-19 pandemic but also before and after the crisis. For instance, the LISS panel could be used to further assess other waves before the pandemic on the stability of optimism. Since the current study skipped one wave, it is recommended to analyse consecutive waves. Due to a lack of data in 2018, consecutive waves might also be assessed with other longitudinal studies that are comparable to the LISS panel. Moreover, to substantiate the finding that only neuroticism is predicting optimism before the pandemic, it is advisable to examine the relation between optimism, extraversion, and neuroticism in other pre-covid waves. Next to the age and gender, a follow-up study should integrate additional confounders to explain the relation between optimism and its changes, extraversion, and neuroticism. Previous research claimed that high levels of extraversion are presumed to be associated with lower levels of loneliness, whereas high levels of neuroticism are claimed to be associated with higher levels of loneliness and less satisfaction because of pandemic-related changes (Nikčević et al., 2021). Consequently, it is advisable to include potential confounding variables such as the attitude concerning Covid-19 or its measures, loneliness, life satisfaction, or perceived stress. In addition, it is recommended to study potential mediating variables that might explain the relationship between personality and optimism during the pandemic. Hence, it might be worthwhile to investigate the impact of the experienced effects of the pandemic, which can differ from mild effects in which individuals' lives are not tremendously disrupted by the

pandemic to strong effects in which individuals might have lost one of their loved ones, became ill themselves or lost their job due to the collapsed economy. Lastly, it might be interesting for future research to replicate the current study in other countries to gain valuable insights into the differences and similarities of the influence of the Covid-19 pandemic nationwide and across cultures.

Conclusion

To conclude, the findings of the present study found evidence for the dispositional view of optimism, suggesting that optimism remains stable in times of hardship. Further, during the pandemic, extraversion (positively) and neuroticism (negatively) predicted peoples' optimism, whereas, under normal conditions, only neuroticism did. Hence, extraversion seemed to play an increasingly important role in the prediction of optimism during the pandemic. Accordingly, it can be assumed that extroverts are better able to cope with the persistent Covid-19 pandemic. People seemed to be well-adaptive in times of Covid-19, which is important information for future governmental responses to the pandemic. Implemented measures in an endeavour to stop the virus did not affect peoples' optimism, and thus, should be continued if needed. Overall, the findings of this study provided first insights into a novel research topic from which especially governmental institutions such as schools or universities could profit. For instance, actively trying to obstruct neuroticism and foster extraversion would not only increase peoples' optimism and their physical and psychological health but likewise also their motivation to take action to build a better future.

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Appendix

Appendix A

Goldberg's PIP' Big-Five factor markers

Factor I (Surgency or Extraversion)

- 10-item scale (Alpha = .87)**
- + keyed
Am the life of the party.
Feel comfortable around people.
Start conversations.
Talk to a lot of different people at parties.
Don't mind being the center of attention.
- keyed
Don't talk a lot.
Keep in the background.
Have little to say.
Don't like to draw attention to myself.
Am quiet around strangers.

Factor IV (Neuroticism)

- 10-item scale (Alpha = .86)**
- + keyed
Am relaxed most of the time.
Seldom feel blue.
- keyed
Get stressed out easily.
Worry about things.
Am easily disturbed.
Get upset easily.
Change my mood a lot.
Have frequent mood swings.
Get irritated easily.
Often feel blue.

Lot-R by Scheier et al. (1994)

To what extent do you agree or disagree with the following statements?

- In uncertain times, I usually expect the best.
- It's easy for me to relax.
- If something can go wrong for me, it will.
- I'm always optimistic about my future.
- I enjoy my friends a lot.
- It's important for me to keep busy.

- I hardly ever expect things to go my way.
- I don't get upset too easily.
- I rarely count on good things happening to me.
- Overall, I expect more good things to happen to me than bad.