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The Relationship of Personality and Subjective Wellbeing Before and During the COVID-19  
Pandemic

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### Abstract

**Background:** The COVID-19 pandemic has a great impact on the mental health of many people worldwide. Fear of illness, losing a loved one, and governmental restrictions have been the source of mental distress. This research focuses on subjective wellbeing (SWB) and the differences in personality traits. SWB contains the aspects, life satisfaction, positive affect, and negative affect. To measure individual reactions, the personality traits extraversion and neuroticism, are taken into consideration. This research aims to identify the influence of extraversion and neuroticism on SWB before and during the COVID-19 pandemic. Additionally, the change and stability of the variables are measured.

**Methods:** Data from the LISS panel, which collects data from a large sample, was used. A longitudinal design was used for four years, two years before the COVID-19 pandemic (2017 and 2019), and two years during (2020 and 2021). Life satisfaction was measured with the Satisfaction With Life Scale (SWLS). Positive and negative affect was measured with the Positive Affect and Negative Affect Scale (PANAS). Personality is measured using the Personality International Personality Item Pool (IPIP). Approximately 3.500 participants were included per questionnaire. Only respondents who have participated in all four years have been taken into account. A repeated measures analysis, correlation analysis, and regression analysis have been conducted.

**Results:** Life satisfaction, positive affect, and negative affect remained stable during the COVID-19 pandemic. Additionally, extraversion does not seem to play a great role in regression analysis as well. Also, neuroticism had a greater impact on SWB (particularly on negative affect) than extraversion.

**Conclusion:** The COVID-19 pandemic did not have any particular influence on the outcomes. Also, the influence of extraversion and neuroticism was not greater during the pandemic. Implications for future research are that research should focus on individuals high in neuroticism to improve their SWB. Implications for practice are that people high in neuroticism should receive more psychological support, particularly during stressful times.

*Key terms: Subjective Wellbeing, Personality, Extraversion, Neuroticism, COVID-19, pandemic.*

## **Introduction**

The most recently identified coronavirus, COVID-19, was first observed in Wuhan (China) in 2019. The COVID-19 virus is classified as a virus that belongs to the SARS and Middle East respiratory syndrome coronavirus (MERS-CoV, Usher, Durkin & Bhullar, 2020). The COVID-19 virus can be defined as zoonotic infections which arose in snakes, bats, and pangolins at the Wuhan wet markets (Ji, Wang, Zhao, Zai & Li, 2020). Since then, the virus has been rapidly spread across the world and was declared a pandemic on 11 March 2020 by the World Health Organization (WHO, Talevi, et al., 2020). This led to many infected people and many deaths, in particular older persons and vulnerable individuals (Centers for Disease Control and Prevention, 2021). Also, governments around the world took measures to limit and control the pandemic. The COVID-19 pandemic has been a cause of mental distress for many people around the globe (Usher, Durkin & Bhullar, 2020). This research focuses on the impact of the COVID-19 pandemic on mental health, in particular on subjective wellbeing (SWB). Besides, this study investigates the differences in individual reactions by personality differences during the COVID-19 pandemic.

### **The influence of the pandemic on mental health**

Mental health is defined by the WHO as “a state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make contributions to her or his community”. This definition underlines that mental health is more than the absence of mental illness. Mental illness received much attention during the COVID-19 pandemic. Mental illness is an important aspect, however, it is essential to consider positive mental health. As a matter of fact, Westerhof & Keyes (2009) suggest that mental health represents more than the absence of mental illness, and the study of wellbeing should be included. Therefore, this research concentrates on SWB. SWB is an individuals’ evaluation of his/her life. This form of evaluation can be in cognitive states, such as satisfaction with an individuals’ life, marriage, or work. Also, it can be evaluated in affect, such as the presence of positive/negative emotions and mood (Diener, Sapyta & Suh, 1998). So, in this research, the aspects life satisfaction, positive and negative affect are considered factors of SWB.

Past studies already investigated the influence of previous pandemics on mental health. Cheng & Cheung (2005) found out that during a pandemic people often tend to feel anxious and

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unsafe when their environment changes. As a consequence, hypervigilance could derive due to fear and anxiety. Eventually, this could lead to depression (Perrin, McCabe, Everly & Links, 2009). Individuals, families, and societies experience several emotions, such as hopelessness, despair, grief, bereavement, and the loss of purpose in life because of fears of getting infected with COVID-19 (Levin, 2019).

Based on the literature, several expectations of the COVID-19 pandemic can be formulated. According to Armour, McGlinchey, Butter, McAloney-Kocaman & McPherson (2020), it is expected that COVID-19 will affect the mental health of people currently, as well as in the future. They argue that many people will experience mental distress, during uncertain times when people were required to make drastic changes in their lives. Individuals with pre-existing vulnerabilities could reach a clinically significant level of mental discomfort, which could affect their day-to-day functioning. Due to the promptly changing and ambiguous conditions and the fears that individuals will have for themselves and their environment, it is expected that individuals will have increased mental discomfort. Furthermore, Gavin, Lyne & McNicholas (2020) also expects that psychological distress will rise. Based on their findings, they expect that this psychological morbidity will peak later and will endure longer than the physical health consequences of the pandemic. The first stages of the pandemic did not necessarily predict an increase in mental illness. However, according to Gavin, Lyne & McNicholas (2020), it is clear that accommodation to the new pandemic circumstances has increased workloads on the frontline of mental health care. They predict that the anticipated increase in mental illness is expected to occur in the mid-and post-pandemic stage.

Several studies have researched the actual effects of the COVID-19 pandemic on mental health. Yarrington et al. (2021) examined changes in the prevalence of self-reported positive and negative emotions and symptom measures of depression and anxiety in the United States in the first five months of the COVID-19 pandemic. According to their study momentary reports and symptoms of anxiety increased at the beginning of the pandemic, however, it returned to baseline weeks later. During the pandemic, sadness and depression increased. At the same time, feelings of stress and tiredness decreased. Taking positive emotions into consideration, calmness, happiness, and optimism decreased, however, calmness and happiness increased after a few weeks. Also, gratitude increased during the first five months of the pandemic. Even though sadness and momentary depression increased, it did not result in increased reports of depressed

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symptoms (Yarrington et al., 2021). Moreover, Wirkner et al. (2022) researched mental health during the COVID-19 pandemic in a recent literature review of 42 studies. They identified specific risk factors for poor mental health. According to their research, these risk factors are age-specific (young age), social (female, ethnical minority, loneliness), as well as physical and mental health-related factors (e.g. pre-pandemic illnesses). Also, several protective factors have been identified, such as social support, higher cognitive ability, resilience, and self-efficacy. They explained that some individuals are more vulnerable than others.

Changes in SWB during the COVID-19 have been researched. In the early stages of the pandemic (December 2019 until March 2020), Zacher & Rudolph (2021) discovered that, on average, life satisfaction, positive affect, and negative affect did not change significantly. However, these factors decreased between March and May 2020. Between March and May 2020, individual differences seemed to play a role. For instance, individual differences in life satisfaction were positively related to controllability appraisals, active coping, and positive reframing. At the same time, life satisfaction was negatively related to threat and centrality appraisals and planning. Also, concerning positive affect, a positive relation was found with challenge and controllable-by-self appraisals, active coping, using emotional support, and religion, and negatively related to threat appraisal and humour.

Governmental measures have been taken to combat the consequences of the pandemic, globally. The measures taken by governments affect the mental health of individuals (Rossi et al, 2020). In an Italian study, several consequences of the lockdown measures have been observed. For instance, high rates of PTSS, depressive symptoms, anxiety symptoms, insomnia, and perceived stress were found in the Italian population (Rossi et al, 2020). These consequences were linked with numerous COVID-19-related health risk factors. For example, being under quarantine, losing a loved one due to COVID-19, working activity disrupted due to lockdown measures, or experiencing other stressful circumstances (e.g. working, financial, relational, or housing issues, Rossi et al, 2020). Similar results were found by Khan, Mamun, Griffiths & Ullah (2020) in their study about the mental health impact of the COVID-19 pandemic across different cohorts. They found out that spatial distancing, self-isolation, quarantine, social and economic discord, and misinformation (especially on social media) are the most essential factors which lead to unusual sadness, fear, frustration, feelings of helplessness, loneliness, and nervousness. In fact,

in more severe cases, it could result in suicidal thoughts and attempts and, in particular cases, actually lead to suicide.

As aforementioned, mixed findings have been found in recent research about the influence of the COVID-19 pandemic on mental health. Many researchers found an increase in mental distress, such as depressive symptoms, while other research found an increase in positive symptoms, such as calmness, gratitude, and happiness. Also, the increase in positive emotions raises the question of how some people may experience an increase in depressive symptoms, while others learn to cope and experience increased positive emotions. This research zooms in on the influence, meaning, and differences of personality in relation to SWB.

### **Personality and the five-factor model**

Anglim, Horwood, Smillie, Marrero & Wood (2020) found out that personality traits are essential aspects of how we experience, approach, and appraise our lives. Personality can be described by the five-factor model which is mainly used to represent the human trait structure (Roccas, Sagiv, Schwartz & Knafo, 2002). The model contains five basic aspects which can explain most personality traits. These five basic factors are extraversion, neuroticism, agreeableness, openness to experience, and conscientiousness. The model has been used by researchers to describe individual differences in several settings, such as clinical, industrial, and organizational (Roccas, Sagiv, Schwartz & Knafo, 2002).

First of all, extraversion can be described as pursuing excitement, novelty, challenge, and the goals of stimulation values. Extraverted individuals are likely to be sociable, talkative, assertive, and active. On the other hand, more introverted people are retiring, reserved, and cautious. Furthermore, individuals that are high in neuroticism, are likely to be anxious, depressed, angry, and insecure. In contrary, people low in neuroticism tend to be calm, poised, and emotionally stable (McCrae and John, 1992), as well as showing warmth, gregariousness, assertiveness, activity, excitement-seeking, and positive emotions (Røysamb, Nes, Czajkowski & Vassend, 2017).

Moreover, agreeable individuals tend to be concerned about the welfare of people within their social environment. Agreeable people are good-natured, compliant, modest, gentle, and cooperative. In contrary, individuals low in agreeableness, are irritable, ruthless, suspicious, and inflexible. Agreeable individuals tend to be concerned about the welfare of people within their

social environment. Moreover, openness to experience is described as being open to new ideas and experiences. Also, understanding and tolerating all people and ideas and appreciating beauty and nature are aspects of openness to experience. Individuals who are open to experience indicate an individual to be intellectual, imaginative, sensitive, and open-minded. A low level of openness to experience suggests being down-to-earth, insensitive, and conventional. Lastly, conscientiousness, this factor can be defined as being careful, thorough, responsible, organized, and scrupulous. Individuals who are low in conscientiousness show irresponsible, disorganized, and unscrupulous behaviour (Roccas et al., 2002).

These individual traits and differences could contribute to SWB during the COVID-19 pandemic. Therefore, the question that arises is what could be the influence of personality on SWB.

### **Personality and SWB**

Research found that personality is associated with SWB. Anglim et al. (2020) provided meta-analyses of previous studies concerning the links between personality and SWB. They found out that there is a strong relationship between personality and SWB. They found evidence that extraversion and neuroticism have the strongest correlation of the personality factors, followed by conscientiousness, with SWB. Similarly, Diener (2009) researched the relationship between personality and SWB and concluded that extraversion is more strongly related to positive emotions, while neuroticism is more related to negative feelings. Furthermore, Anglim et al. (2020) researched correlations between the aspects of SWB and the facets of the five-factor model. They found correlations between extraversion & positive affect, neuroticism & negative affect, and openness & positive affect. According to Anglim et al. (2020), life satisfaction is less well predicted by personality compared with positive and negative affect. Openness to experience was found to be the best predictor of life satisfaction. In other words, a relationship between personality and SWB was found in the meta-analysis ( $n = 334.567$ ,  $k = 462$ ). Based on the meta-analysis (Anglim et al., 2020), it can be assumed that there is a relationship between SWB and personality.

### **Personality and SWB during the COVID-19 pandemic**

Studies investigated the influence of personality on SWB during the COVID-19 pandemic. For instance, Rossi, Bonanomi & Oasi (2021) researched, in a cross-sectional study, the influence of personality on SWB during the COVID-19 pandemic in Italy. According to them, individual personality differences played an essential role in perceived SWB during the pandemic. For instance, individuals high in neuroticism are vulnerable to perceiving negative affect. Similarly, Modersitzki, Phan, Kuper & Rauthmann (2020) studied, cross-sectional, personality and how it could predict individual psychological differences during the COVID-19 pandemic. They found out that facets of extraversion, neuroticism, and openness to experience are the strongest and most important indicators of SWB. Additionally, Kohút, Šrol & Čavojová (2022) concluded in their research that positive and negative affect was mainly predicted by extraversion. On the other hand, life satisfaction was mainly predicted by COVID-19 factors, such as perceived economic threat, unrealistic optimism, and trust in governmental regulations. Furthermore, a positive relation was discovered between negative affect to threat and centrality appraisals, denial, substance use, and self-blame, and negatively related to controllability appraisals and emotional support during the COVID-19 pandemic (Zacher & Rudolph, 2021).

Research found differences in the relationship between personality and SWB before and during the COVID-19 pandemic and these differences have been compared. According to Anglim & Horwood (2020), overall, the relationship between personality and SWB was not significantly different during the pandemic. The findings restate the importance of personality to SWB. Evidence was found that individuals' mood is influenced more by personality than by the general experience of the pandemic.

To create understanding in the case of future pandemics, it is crucial that the relationship between personality and SWB during the COVID-19 pandemic, which affected many lives worldwide, is researched. Due to the lack of longitudinal research on this topic, in particular large samples, this research could fill the gap in the literature. Due to the unique design of this study; longitudinal design, large sample size, and the timing in the COVID-19 pandemic, this research could add essential information about how personality influences SWB over a long period during the COVID-19 pandemic.

In sum, research outcomes suggest that the COVID-19 pandemic was not only the cause of a medical and economic crisis but also a psychological crisis, as individual differences seem to



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play a key role in the extent of SWB. Personality seems to be a determinant of individuals' SWB during the COVID-19 pandemic. Mixed results have been found about how personality determines SWB, however, extraversion and neuroticism seem to be the strongest predictors of SWB. As extraversion and neuroticism are the strongest predictors, this research will focus on the relationship between these two personality traits and SWB during the COVID-19 pandemic in the Dutch population. It is assumed that personality (extraversion, and neuroticism) is stable over time. Also, it is assumed that life satisfaction and positive affect decreased during the COVID-19 pandemic, while it is assumed that negative affect increased during this period. The main research question can be divided into three sub questions and 11 hypotheses, which are reported in table 1. The main research question is:

*“How are extraversion and neuroticism related to SWB before and during the COVID-19 pandemic in the Dutch population?”.*

*Table 1. Sub questions and hypothesis.*

<b>Question/Hypothesis</b>	
Sub question 1	Did SWB change during the COVID-19 pandemic in comparison to before the COVID-19 pandemic?
Hypothesis 1.1	Life satisfaction decreased during the COVID-19 pandemic
Hypothesis 1.2	Positive affect decreased during the COVID-19 pandemic
Hypothesis 1.3	Negative affect increased during the COVID-19 pandemic
Sub question 2	Did extraversion and neuroticism change during the pandemic?
Hypothesis 2.1	Extraversion did not change during the COVID-19 pandemic
Hypothesis 2.2	Neuroticism did not change during the COVID-19 pandemic
Sub question 3	What was the relationship between extraversion & neuroticism and SWB before and during the COVID-19 pandemic?
Hypothesis 3.1	Extraversion is positively related to life satisfaction before and during the COVID-19 pandemic.
Hypothesis 3.2	Extraversion is positively related to positive affect before and during the COVID-19 pandemic

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- Hypothesis 3.3 Extraversion is negatively related to negative affect before and during the COVID-19 pandemic
- Hypothesis 3.4 Neuroticism is negatively related to life satisfaction before and during the COVID-19 pandemic
- Hypothesis 3.5 Neuroticism is negatively related to positive affect before and during the COVID-19 pandemic
- Hypothesis 3.6 Neuroticism is positively related to negative affect before and during the COVID-19 pandemic
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### **Methods**

#### **Design**

This research makes use of data from the LISS panel of CentERdata, which is an internet panel for longitudinal Internet social studies. The LISS panel is controlled by CentERdata in Tilburg, which is located in The Netherlands. The participants are randomly drawn from the population registers and are paid for participating (Lisssdata, 2022). The participating households are required to complete online questionnaires every month, which contain several themes. (Lamers, Westerhof, Bohlmeijer, Ten Klooster & Keyes, 2010). The questionnaires are for instance about health, religion and ethnicity, personality, politics and values, and more. This research focused on the personality and SWB questionnaires. To compare the results of pre-COVID-19 pandemic outcomes with the outcomes during the COVID-19 pandemic four datasets have been chosen for this research. To investigate the results before the pandemic, the years 2017 and 2019 have been chosen. The year 2018 is excluded because this year significantly fewer respondents participated in the questionnaires. To research the outcomes during the COVID-19 pandemic the years 2020 and 2021 are analysed. All questionnaires were filled in, in the periods May until June in the following years, 2017, 2019, 2020, and 2020.

#### **Participants**

There are around 5.000 households and 7.500 participants in the panel. This sample contains 49% males and 51% females. The ages vary from 16 to 65 or older. The educational level varies from primary school to university. 6.7% of the participants finished primary school and, 67.5% of participants completed secondary education. Additionally, 19.5% of respondents completed

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higher vocational education, and 25.8% of individuals finished higher education. Concerning primary occupation, 37.7% of individuals have paid employment status, 21.5% of individuals are studying, whereas 16.3% of participants are retired. 6% of respondent takes care of the housekeeping, while 4.9% of people are autonomous professional, freelancer, or self-employed. Other participants are job seeking, partially working due to disability, or are involved in voluntary work (13.6%).

Moreover, 3487 participants filled in the questionnaires in all years to measure life satisfaction. Furthermore, 3443 respondents participated in the questionnaires in all years about positive and negative affect, while 3469 individuals answered the questionnaires in all years to measure extraversion and neuroticism. Only the respondents that filled in the questionnaires in 2017, 2019, 2020, and 2021 are used in this research.

To compare the respondents that participated in all four years, with the participants that only participated in the year 2017, a t-test has been conducted to compare the means. The mean of life satisfaction in 2017 was 0.36 lower compared to the sample used in this study, the difference found in life satisfaction is significant,  $T(6092) = -5.07$ ,  $p < 0.001$ . The same test has been performed to compare positive affect, the mean of the sample in 2017 was 0.57 lower than the overall mean. This finding was significant,  $T(6072) = -4.26$ ,  $p < 0.001$ . Non-significant result was observed in negative affect,  $T(6027) = 1.65$ ,  $p = 0.98$ . Also, a non-significant outcome was found in extraversion,  $T(6073) = -0.95$ ,  $p = 0.34$ . Lastly, a significant result was observed in neuroticism,  $T(6073) = 31.35$ ,  $p < 0.001$ . The mean of the sample in 2017 was found to be 2.04 higher than the overall sample.

### **Materials**

Some items had to be recoded to be suited for analyses. After that, new variables have been computed for life satisfaction, positive & negative affect, and extraversion & neuroticism for all your years.

Personality was assessed based on 50 items from the International Personality Item Pool (IPIP, Gow, Whiteman, Pattie & Deary, 2005). Every Big-Five factor (extraversion, agreeableness, conscientiousness, emotional stability, and openness) contains 10 items. Respondents used a seven-point Likert scale with ordinal answer possibilities to indicate how much they agree or disagree with the given statements (totally disagree to totally agree).

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Examples of the statements are “*I am the life of the party*”, “*I feel comfortable around people*”, and “*I do not have a good imagination*” (Whiteman, Pattie & Deary, 2005). This research only uses the personality traits extraversion and neuroticism due to that these personality traits have been shown in previous research to have the strongest relationship with SWB. To measure the reliability of the extraversion, the Cronbach’s  $\alpha$  has been calculated in SPSS, which resulted in a Cronbach’s  $\alpha$  of 0.879, which is considered to be good (Gliem & Gliem, 2003). Also, to measure the reliability of neuroticism a Cronbach’s  $\alpha$  has been calculated in SPSS. A Cronbach’s  $\alpha$  of 0.888 has been found, which is assessed as good reliability (Gliem & Gliem, 2003).

Life satisfaction was measured with the Satisfaction With Life Scale (SWLS, Whiteman, Pattie & Deary, 2005). The SWLS contains five statements, such as, “*In most ways my life is close to my ideal*”. Participants were asked to answer based on a seven-point Likert scale with ordinal answer possibilities to illustrate how much they agree or disagree with the particular statement (strongly disagree to strongly agree, Diener, Emmons, Larsen & Griffin, 1985). The Cronbach’s  $\alpha$  has been calculated in this research for the SWLS in SPSS. It resulted in an  $\alpha$  of 0.895, which can be considered good (Gliem & Gliem, 2003).

The Positive Affect and Negative Affect Scale (PANAS) was used to assess positive and negative affect. The scale has 20 statements, for instance, “*Indicate to what extent you feel, right now, that is, at the present moment*”. Participants are required to answer the statements using a seven-point Likert scale (not at all to extremely), to indicate how much they agree with the statements (Thompson, 2007b). The reliability has been assessed based on the Cronbach’s  $\alpha$  in SPSS, the Cronbach’s  $\alpha$  in this research for positive affect is 0.886, and for negative affect, it is 0.935. A Cronbach’s  $\alpha$  of above 0.8 is assessed as good reliability (Gliem & Gliem, 2003).

### **Analysis**

The data from the LISS panel is exported to IBM SPSS Statistics 25. In SPSS, several analyses are conducted. First of all, normality assumptions have been analysed, through a normality test. A Shapiro-Wilk’s test ( $p > 0.05$ , Shapiro & Wilk, 1965; Razali & Wah, 2011) and visual analysis of their histograms, normal Q-Q plots, and box plots illustrated that the variables’ scores were not normally distributed. Life satisfaction (2017) showed a skewness of -0.83 (SE = 0.03), and for positive affect (2017) a skewness of -0.41 (SE = 0.03) was found. Furthermore, negative affect (2017) showed a skewness of 1.17 (SE = 0.03), for extraversion a skewness of 0.03 (SE = 0.03)

was observed, and neuroticism (2017) showed a skewness of 0.21 (SE = 0.03). So, all performed distributions are not normally distributed. However, the sample size is large enough to perform reliable analysis. See the result section for the descriptive tables per psychological construct.

Sample and descriptive statistics have been employed concerning the SWB and personality variables, including the mean, standard deviation, and the number of participants. A repeated measures ANOVA has been computed to compare the elements of SWB and personality across time. Also, Bonferroni's post-hoc and Cohen's d tests have been computed, to calculate the mean differences across all years. In this way, the means can be compared before and during the COVID-19 pandemic to answer the hypotheses about the change of the variables, hypotheses 1.1, 1.2, 1.3, 2.1, and 2.2. A commonly used interpretation is to refer to effect sizes, in Cohen's d analysis, as small (0.2), medium (0.5), and large (0.8, Thompson, 2007a).

Correlation analysis has been conducted to research the strength of the correlation of the variables. A correlation analysis has been employed to analyse the possible correlations between personality and SWB, before and during the COVID-19 pandemic. Also, the SWB variables have been correlated with the same variable one year earlier to research whether the level of SWB is a predictor for the level of SWB one year later. Correlations between 0 and 0.2 are generally labelled as very weak correlations, correlations between 0.2 and 0.4 are weak correlations. Furthermore, correlations between 0.4 and 0.6 are moderate correlations, whereas correlations between 0.6 and 0.8 are good correlations, and higher correlations than 0.8 are excellent correlations (Schober, Boer & Schwarte, 2018).

Lastly, hypothesis 3.1 until hypothesis 3.6 are answered based on the correlation analysis and regression analysis. A regression analysis has been computed to research which variables impact and influence each other. The correlation and regression analysis are used to answer the hypotheses (hypothesis 3.1 until hypothesis 3.6) about how personality influences SWB.

## **Results**

### **Change and stability across time**

The first sub question was "*Did SWB change during the COVID-19 pandemic in comparison to before the COVID-19 pandemic?*". Table 2 displays the descriptive statistics of all variables in the years 2017, 2019, 2020, and 2021. A significant outcome of life satisfaction was observed in the repeated measures analysis, Wilks' Lambda = 0.99,  $F(3, 3487) = 11.59$ ,  $p = 0,00$ . In the table,

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the mean, the standard deviation, and the number of respondents are reported. The means of life satisfaction increased until 2020, in the year 2021 a slight decrease was found. The table shows that life satisfaction increased at first and in 2020 decreased during the COVID-19 pandemic. The effect sizes are rather small and suggest more stability than change. Hypothesis 1.1: *“Life satisfaction decreased during the COVID-19 pandemic”*, can be rejected.

The differences in positive affect across four years are investigated. Non-significance was found in the repeated measures analysis, Wilks’ Lambda = 0.99,  $F(3, 3443) = 4.19$ ,  $p = 0,06$ . Hypothesis 1.2: *“Positive affect decreased during the COVID-19 pandemic”*, can be rejected.

To answer sub question 1, the differences in negative affect are studied. A significant outcome was observed in the repeated measures analysis, Wilks’ Lambda = 0.99,  $F(3,3443) = 12.56$ ,  $p = 0.00$ . An increasing pattern was found from 2017 until 2020, 2021 showed a slight decrease. Negative affect reduced during the COVID-19 pandemic, however Cohen’s d statistic implicit that the effect size is rather small. Since the differences are small, hypothesis 1.3: *“Negative affect increased during the COVID-19 pandemic”*, can be rejected.

Sub question 2 was *“Did extraversion and neuroticism change during the pandemic?”*. To answer this question, differences in extraversion are taken into consideration. A significant outcome was found in the repeated measures analysis, Wilks’ Lambda = 0.86,  $F(3,3469) = 194.87$ ,  $p = 0.00$ . A decrease was observed in 2019, followed by an increase in 2020, and 2021. Extraversion changed during the COVID-19 pandemic, however, it seems to be relatively stable. Also, Cohen’s d effect size is rather small. Hypothesis 2.1: *“Extraversion did not change during the COVID-19 pandemic”*, can be accepted

A significant outcome was observed in the outcomes of the repeated measures analysis of neuroticism, Wilks’ Lambda = 0.78,  $F(3,3469) = 336.30$   $p = 0.00$ . The mean in 2017 was the highest compared to the following years. Neuroticism changed during the COVID-19 pandemic, nevertheless, Cohen’s d implicit a small effect size. Hypothesis 2.2: *“Neuroticism did not change during the COVID-19 pandemic”*, can be accepted, due to the small effect sizes. The greatest effect was before the COVID-19 pandemic.

Table 2. Descriptive statistics of the variables

	Mean	Std. deviation	N	Cohen’s d	Mean difference	Sig.
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2017	Life satisfaction	25.32	5.48	3487	-	-	-
	Positive affect	44.99	10.01	3443	-	-	-
	Negative affect	20.63	10.94	3443	-	-	-
	Extraversion	31.29	2.64	3469	-	-	-
	Neuroticism	26.95	5.00	3469	-	-	-
2019	Life satisfaction	25.39	5.79	3487	0.02	-0.07	1.00
	Positive affect	44.67	10.26	3443	0.03	-0.32	0.25
	Negative affect	20.69	10.67	3443	0.01	0.06	1.00
	Extraversion	30.61	5.61	3469	0.16	-0.68	*
	Neuroticism	24.78	6.70	3469	0.37	-2.17	*
2020	Life satisfaction	25.70	5.57	3487	0.05	0.31	*
	Positive affect	45.01	9.88	3443	0.03	0.34	0.12
	Negative affect	21.48	10.70	3443	0.07	0.79	*
	Extraversion	31.77	6.74	3469	0.19	1.16	*
	Neuroticism	24.48	7.02	3469	0.04	-0.30	*
2021	Life satisfaction	25.45	5.62	3487	0.04	-0.25	*
	Positive affect	44.62	10.13	3443	0.04	-0.39	0.03
	Negative affect	20.80	10.64	3443	0.06	-0.68	*
	Extraversion	31.89	6.66	3469	0.02	0.11	0.26
	Neuroticism	24.59	7.09	3469	0.02	0.11	0.63

*Note.* \* = significant. Mean difference = post-hoc tests.

**Correlation analysis**

Sub question 3 was “*What was the relationship between extraversion & neuroticism and SWB before and during the COVID-19 pandemic?*”. A correlation analysis has been conducted to investigate the correlations between personality and SWB. To limit the number of analysis, only extraversion and neuroticism in 2017 has been used to study the correlations between personality with SWB across all years.

As is reported in table 3, extraversion is weakly positively correlated with life satisfaction and positive affect. That means that a higher level of extraversion implicit a higher level of life satisfaction and positive affect. A non-significant correlation has been observed between extraversion and negative affect. Furthermore, higher negative correlations are observed between neuroticism and SWB, with weak to moderate correlations. A higher level of neuroticism suggests lower levels of life satisfaction and positive affect. Also, a higher level of neuroticism implicit a higher level of negative affect. Furthermore, moderate to high correlations were found between the variables and the same variables one year later to measure whether the variables are predicted by the variables one year earlier.

*Table 3. Correlation analysis*

Personality	SWB	Correlation	Significance
Extraversion (2017)	Life satisfaction (2017)	0.07	*
	Life satisfaction (2019)	0.05	*
	Life satisfaction (2020)	0.05	*
	Life satisfaction (2021)	0.03	*
	Positive affect (2017)	0.13	*
	Positive affect (2019)	0.09	*
	Positive affect (2020)	0.11	*
	Positive affect (2021)	0.09	*
	Negative affect (2017)	0.24	0.07
	Negative affect (2019)	0.02	0.17
	Negative affect (2020)	0.16	0.31
	Negative affect (2021)	0.02	0.36
Neuroticism (2017)	Life satisfaction (2017)	-0.31	*
	Life satisfaction (2019)	-0.27	*



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	Life satisfaction (2020)	-0.27	*
	Life satisfaction (2021)	-0.28	*
	Positive affect (2017)	-0.17	*
	Positive affect (2019)	-0.2	*
	Positive affect (2020)	-0.19	*
	Positive affect (2021)	-0.18	*
	Negative affect (2017)	0.47	*
	Negative affect (2019)	0.40	*
	Negative affect (2020)	0.41	*
	Negative affect (2021)	0.39	*
Extraversion (2017)	Extraversion (2019)	-0.02	0.89
Extraversion (2019)	Extraversion (2020)	0.85	*
Extraversion (2020)	Extraversion (2021)	0.87	*
Neuroticism (2017)	Neuroticism (2019)	0.72	*
Neuroticism (2019)	Neuroticism (2020)	0.83	*
Neuroticism (2020)	Neuroticism (2021)	0.84	*
Life satisfaction (2017)	Life satisfaction (2019)	0.71	*
Life satisfaction (2019)	Life satisfaction (2020)	0.74	*
Life satisfaction (2020)	Life satisfaction (2021)	0.75	*
Positive affect (2017)	Positive affect (2019)	0.57	*
Positive affect (2019)	Positive affect (2020)	0.62	*
Positive affect (2020)	Positive affect (2021)	0.64	*
Negative affect (2017)	Negative affect (2019)	0.57	*
Negative affect (2019)	Negative affect (2020)	0.62	*
Negative affect (2020)	Negative affect (2021)	0.64	*

Note. \* = significant

### Regression analysis

To answer sub question 3, a regression analysis has been performed. A regression analysis has been performed to research the relationships between personality traits and SWB before and during the COVID-19 pandemic. The personality and SWB variables of the year 2017 have been used to predict SWB in 2019. Similarly, 2020 has been predicted by the personality and SWB

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variables of 2019, and the SWB variables of 2021 are predicted by the personality and SWB variables in 2020.

**Life satisfaction**

The outcomes of life satisfaction are presented in table 4. The level of life satisfaction is best predicted by the level of life satisfaction one year before, in comparison to extraversion and neuroticism. A significant outcome has been found for life satisfaction, neuroticism, and extraversion (only in 2021). However, extraversion and neuroticism do not have such an impact as life satisfaction does. So, the higher life satisfaction is one year before, the higher it will be one year later. Since there is no positive relation between extraversion and life satisfaction before and during the COVID-19 pandemic, hypothesis 3.1 is rejected. Neuroticism is negatively related to life satisfaction across all years, hypothesis 3.4 is accepted.

*Table 4. Life satisfaction predicted by life satisfaction and personality one year earlier.*

	2019			2020			2021		
	Bèta	Sig.	R <sup>2</sup>	Bèta	Sig.	R <sup>2</sup>	Bèta	Sig.	R <sup>2</sup>
Life satisfaction	0.74	*	0.71	0.68	*	0.75	0.72	*	0.76
Extraversion	-0.02	0.45		-0.01	0.89		0.03	*	
Neuroticism	-0.06	*		-0.08	*		-0.06	*	

*Note.* \* = significant

**Positive affect**

As is reported in table 5, positive affect is best predicted by positive affect one year earlier. Noticeably, neuroticism seems to have a larger impact before the COVID-19 pandemic in 2019, while the impact of neuroticism during the COVID-19 pandemic is smaller than before. Also, the influence of extraversion is slightly greater than neuroticism during the COVID-19 pandemic.

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Hypothesis 3.2: *Extraversion is positively related to positive affect before and during the COVID-19 pandemic*, is rejected because a non-significant result was found before the pandemic.

Hypothesis 3.5: *Neuroticism is negatively related to positive affect before and during the COVID-19 pandemic*, which is accepted because significant results were found before and during the pandemic.

*Table 5. Positive affect predicted by positive affect and personality one year earlier.*

	2019			2020			2021		
	Bèta	Sig.	R <sup>2</sup>	Bèta	Sig.	R <sup>2</sup>	Bèta	Sig.	R <sup>2</sup>
Positive affect	0.57	*	0.58	0.56	*	0.63	0.62	*	0.65
Extraversion	0.07	0.13		0.13	*		0.12	*	
Neuroticism	-0.20	*		-0.10	*		-0.07	*	

*Note.* \* = significant

**Negative affect**

Table 6 shows that neuroticism as well as negative affect influence negative affect one year later, the impact of negative affect is the largest. The impact of negative affect is the greatest before the COVID-19 pandemic, while during the COVID-19 pandemic, the impact of negative affect becomes greater. However, the influence of neuroticism becomes smaller during the COVID-19 pandemic. No significant effect was found between extraversion and negative affect, hypothesis 3.3 is rejected. Hypothesis 3.6 is accepted, positive relation was found between negative affect and neuroticism.

*Table 6. Negative affect predicted by negative affect and personality one year earlier.*

	2019			2020			2021		
	Bèta	Sig.	R <sup>2</sup>	Bèta	Sig.	R <sup>2</sup>	Bèta	Sig.	R <sup>2</sup>
Negative affect	0.49	*	0.59	0.49	*	0.65	0.52	*	0.66

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Extraversion	<0.01	0.94	*	0.06	-0.04	0.16
Neuroticism	0.36	*	0.36	*	0.27	*

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Note. \* = significant

### Discussion

This research aimed to examine the relationship between personality and SWB before and during the COVID-19 pandemic in the Dutch population. This study was employed to create understanding and knowledge about the influence of a pandemic on SWB, based on individual personality traits. The research questions which were formulated before can be answered on the bases of the outcomes of this study.

The main research question was: “*What was the relationship between extraversion & neuroticism and SWB before and during the COVID-19 pandemic?*”, can be answered based on these results. SWB and personality were stable over time as well as their interrelations. Extraversion does not seem to influence SWB before or during the COVID-19 pandemic. However, since positive correlations were found, it could be the case that extraversion is a protective factor for maintaining SWB during the COVID-19 pandemic. The pandemic does not influence this relationship. The relationship between neuroticism and SWB is found to be greater, especially between neuroticism and negative affect. SWB is better predicted by the level of SWB one year earlier.

### Change and stability across time

To assess change and stability across time, two sub questions were formulated. The first one is: “*Did SWB change during the COVID-19 pandemic in comparison to before the COVID-19 pandemic?*”. Life satisfaction, positive affect, and negative affect remained stable. First of all, life satisfaction increased until the year 2020 and decreased in 2021. Also, the effect size suggests small changes in means and therefore changes are observable during the COVID-19 pandemic. However, the differences are small and therefore it can be concluded that there is more stability than change. Secondly, positive affect did not change significantly, which implies that positive affect remained stable. Thirdly, a similar pattern to life satisfaction was observed in negative affect, negative affect increased until 2020 and decreased in 2021. However, the effect size shows

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a minimal change. So, even though a change is observed, there is more stability than change. Thus, negative affect remained stable during the COVID-19 pandemic.

Life satisfaction is found to be stable. However, according to Saris (1995), life satisfaction can be both stable as well as transient. Steger & Kashdan (2006) found in the literature that life satisfaction is fairly stable over time. However, they conducted a longitudinal study over one year and found that life satisfaction appears to be malleable over time. They found that life satisfaction is less stable than reported in previous studies. They suggest that life satisfaction appears to increase with age, similar results were found in the current study, which was beyond the scope of this research. The difference with this study is the research period.

Positive affect was found to be stable. This is in line with the findings of Charles, Reynolds & Gatz (2001), who researched the stability of positive affect in a longitudinal study over 23 years. Younger and middle-aged groups, concerning people from adolescence until their mid-50s, barely showed change over time. Significant differences in positive affect were only found in older adults. The age group of 60 until 85 years old showed a gradual decline in positive affect. The decline was considered to be significant and small (Charles, Reynolds & Gatz, 2001). As mentioned before, the difference with this study is that this study only researched four years.

Furthermore, small changes were observed in negative affect. Thus, there is more stability than change in negative affect, which is in line with the findings of Watson & Walker (1996). They found a moderate level of stability in negative affect. Nevertheless, Charles, Reynolds & Gatz (2001) found decrease in negative affect, in a longitudinal study over 23 years. They described that negative affect decreased with age. The possible differences in outcome compared to the current study could be the large research time. They studied 23 years, whereas this study only measured four years.

The second sub question is: “*Did extraversion and neuroticism change during the pandemic?*”. It can be concluded that extraversion and neuroticism did not change much during the COVID-19 pandemic. Extraversion changed slightly, nevertheless, based on the effect size, the differences are small. According to John & Srivastava (1999), extraversion is defined as a stable personality dimension. Extraversion was found to be stable over many years (Magnus, Diener, Fujita, & Pavot, 1993). Some studies found significant changes in extraversion. Bleidorn et al. (2021) researched the phenomenon of changes and stability in personality traits. According

to them, a growing body of research shows that the assumption that personality traits are unchangeable is wrong. Personality traits continue to change throughout a lifetime, in some cases, influenced by environmental changes (Bleidorn, Hopwood & Lucas, 2018).

As mentioned before, neuroticism remains relatively stable. Even though neuroticism decreased in 2019, the effect sizes are rather small. The findings are in line with the study of Ormel, Rosmalen & Farmer (2004). They concluded that neuroticism is stable over time. Furthermore, Steunenbergh, Twisk, Beekman, Deeg & Kerkhof (2005), found that neuroticism remains stable in middle and older adulthood, with an increase in late life. However, other studies found significant changes in neuroticism. For example, neuroticism could be influenced by environmental changes (Bleidorn, Hopwood & Lucas, 2018). Additionally, Bleidorn, et al. (2020) found out that if expressions of new or modified personality-relevant states are sufficiently repeated, this could result in habits, and eventually into lasting trait changes. The research time of a lifetime could be an explanation for the different outcomes compared to this study, whereas the current study researched four years.

### **Relationship personality and SWB**

The third research question is: “*What was the relationship between extraversion & neuroticism and SWB before and during the COVID-19 pandemic?*”. It can be concluded that the role of extraversion is small, whereas the influence of neuroticism on SWB is significantly greater. As mentioned before, in the literature was found that extraversion influences life satisfaction and positive affect. A possible explanation for this discrepancy is that the variance in the standard deviation of extraversion seems to be relatively great, which could be the cause of the outcomes of extraversion. Another explanation could be that this study used the IPIP, which contains 50 items. According to Anglim et al. (2020), the most reliable scales are long-form measures, such as the HEXACO 200, IPIP 300, and NEO-PI-R 240. These scales contain more items and measure more factors of personality. Lastly, the relationship between personality and SWB was not significantly different during the COVID-19 pandemic, which is in line with the findings of Anglim & Horwood (2020), as mentioned before.

### **Strengths and limitations**

This research contains several strengths. The longitudinal design has numerous advantages. For instance, it offers the ability to identify events, such as COVID-19, about particular aspects, such as personality traits, and to further define the personality traits with regards to presence, timing, and chronicity. It also offers the possibility to follow change over time in particular individuals (Caruana, Roman, Hernández-Sánchez & Solli, 2015).

Another strength of this research is the large sample of this study. The panel consists of 7.500 individuals, approximately 3500 individuals participated in all four years. These individuals are based on a true probability sample of households drawn from the population register by Statistics Netherlands (Lisdata, 2022). However, the participants have been compared to the sample that only participated in 2017, and some differences in representativeness were observed. For instance, a significant difference in representativeness was found in life satisfaction, positive affect, and neuroticism. Negative affect and extraversion seem to be more representative of the overall sample. The sample in 2017 scored lower in life satisfaction and positive affect, whereas they have a higher level of neuroticism compared to the overall group. Negative affect and extraversion did not differ significantly from the overall group. This finding suggests that the sample that participated for four years had a higher level of SWB and a lower level of neuroticism. So, the sample in this research is not representative of the whole population.

A limitation of this study is that only two of the five traits of the Big-five personality model are investigated. Due to time limits and the narrow scope of this research, the other three traits have been left out. Since this research found the unexpected finding that extraversion has a smaller influence on SWB than was expected before, it would be recommended to research the other three personality traits (altruism, conscientiousness, and openness). Future research should focus on these three personality traits concerning SWB, in a longitudinal study, before and during the COVID-19 pandemic. In this way, the influence of all personality traits on SWB could be assessed. Also, further research could focus on demographical factors in relation to SWB as well. Demographical analysis was performed, which was beyond the scope of this research, and signs were found that gender, age, and origin could play a significant role in the level of SWB. Further studies could research this more in-depth.

Another limitation is that the sample may not be representative of the whole population. When comparing the means of the participants and people who only participated in 2017 it is

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clear that the difference is that the people who participated across all years were more satisfied with their lives, had a higher level of positive affect, and had a lower level of neuroticism. It could be the case that if the excluded participants would respond across all years, the means of life satisfaction and positive affect would be lower and the mean of neuroticism would be higher.

### **Conclusion**

This study researched the relationship between personality traits on SWB before and during the COVID-19 pandemic. The conclusion is that the COVID-19 pandemic did not have any significant influence on SWB. The COVID-19 years, 2019 and 2020, did not show any increase in negative affect, decrease in positive affect, or extraversion. Also, the two personality factors do not seem to play a greater role during the COVID-19 pandemic. The most surprising outcome is that neuroticism has a greater influence on SWB, and the role of extraversion seems to be minimal. Also, it was not expected that individuals would be more satisfied with their lives during the COVID-19 pandemic, due to fear of illness, and social impediments forced by governments. It was expected that individuals would experience more negative affect.

Implications for research could be to focus on individuals high in neuroticism and interventions to enhance their SWB. Implications for practice are to give more psychological support to people high in neuroticism, especially during stressful times, such as a pandemic.



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