The Relationship between Openness to Experience and Well-being in times of Corona

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Abstract

Background. Previous crises have shown that personal differences, such as the personality trait openness, can influence the individual's level of well-being. Hence, the present study investigates the relationship between the personality trait openness to experience and emotional, social, psychological and overall well-being, as well as the aspects of optimism, creativity, and adherence to regulations during the Corona pandemic.

Methods. A cross-sectional empirical quantitative survey design was conducted, using data provided by the Longitudinal Internet Studies for the Social Sciences (short "LISS") with a representative sample of 462 participants. A correlational and multiple mediation analyses were conducted to investigate the relationship between openness and well-being in times of Corona.

Results. The results displayed significant positive correlations between openness and emotional, social, psychological, and overall well-being. Within the mediation model, optimism fully explained the relationship between openness and emotional and social well-being and explained, to some extent, the relationship between openness and psychological and overall well-being. Oppositely, creativity was not found to be a significant mediator. Adherence to governmental COVID-19 regulations did not show any significant correlations with the included variables.

Conclusion. Overall, openness was found to be significantly related to all dimensions of well-being during the Corona pandemic and represented robustness before and during the pandemic. Regarding the current study's results, aspects to consider are extraneous variables and differences in studies, such as utilized questionnaires, the samples' characteristics, and the studies' time frames.

Keywords. COVID-19, pandemic, well-being, optimism, creativity.

Introduction

The current Coronavirus (COVD-19) was found for the first time in 2019 in Wuhan, China, and has placed a global threat on the individual and society as a whole (Adams-Prassl et al., 2020; van Zyl, 2021). The Coronavirus is an infectious virus that can cause milder symptoms, such as cough and fever, but can also substantially affect the individual, leading to respiratory problems (Ita, 2021). Due to this new and uncertain virus and its unknown spreading mechanism, various countries (e.g., Germany, Netherlands, USA) enforced lockdowns. These lockdowns are characterized by closing down schools, universities, sports clubs, leisure and culture facilities to limit the spread by encouraging people to stay home (Adams-Prassl et al., 2020). While trying to limit infections and its physical threats caused by the Coronavirus, as well as relieving pressure off of the health system, the Coronavirus was, and still is, impacting the individual's well-being (Adams-Prassl et al., 2020; van Zyl, 2021).

Crisis in the past and recent studies during Corona have shown that specific personality traits and individuals' attitudes have positively or negatively impacted their way of dealing with challenging situations (Audet et al., 2021; Riolli et al., 2020; Sutin et al., 2020). Audet et al. (2021) found that individuals who were more open during the Corona pandemic showed better adaptability to change, higher well-being, and more intrinsic motivation. Hence, the current study focuses on the personality trait of openness in the new context of the Corona pandemic. In this manner, it can be investigated which aspects of open individuals, such as optimism and creativity, help them deal with difficult situations. This gained knowledge could help researchers, but also health institutions in future crises and guide school education by enhancing and teaching children helpful traits and attitudes.

Positive Psychology and Well-being

With the relatively new approach of Positive Psychology, studies on well-being have increased. As the name suggests, positive psychology focuses on the positive aspects of an individual, the individual's strengths, and an overall maximization of well-being (Froh, 2004; Seligman & Csikszentmihalyi, 2014; Sheldon & King, 2001). Well-being is crucial in terms of living a fulfilling life, coping with stressors, preventing the onset and relapse of mental illnesses, as well as functioning and working effectively (Lamers et al., 2011; Surya et al., 2017; Thieme et al., 2015; World Health Organization, 2018). In accordance, Schotanus-Dijkstra et al. (2019) emphasize the positive impact that higher mental well-being can have on the individual's recovery from mental illnesses.

Keyes (2002) explains well-being in terms of emotional, social, and psychological well-being. Emotional well-being is defined by positive affect and life satisfaction (Keyes, 2002). Psychological well-being, in turn, is determined by the individual's autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (Keyes, 2002). Lastly, social well-being is defined by the individual's social aspects in life, such as social acceptance, actualization, contribution, coherence, and integration (Keyes, 2002).

Well-being during Corona

One aspect that can harm the individual's well-being is the new and unpredictable situation of the Coronavirus (Brailovskaia & Margraf, 2021). According to Yang and Ma (2020), the individual's well-being has been negatively impacted by the Corona pandemic through concerns, such as getting infected with the virus, missing social relationships, working from home, homeschooling, and fear of losing the workplace. With a decrease in well-being, individuals suffer in their daily lives, and society suffers from unproductivity and

increasing economic burdens (Doran & Kinchin, 2019; Sobocki et al., 2006). Lades et al. (2020) found that during the Corona pandemic, an individual's emotional well-being decreased due to the use of social media, homeschooling of children, and news about the Corona pandemic. However, the Coronavirus does not only impact the individual's emotional but also psychological well-being. Due to the uncertainty caused by the Coronavirus, Brailovskaia and Margraf (2021) emphasize a perceived loss of control in individuals, which can decrease the individual's psychological well-being. Along with increases in stigmatizations, specifically towards the Asian population, individuals reported decreases in social well-being through rejection of social acceptance (Sonekar & Ponnaiah, 2020). Overall, the Corona pandemic is impacting all dimensions of well-being. This opens up the question of what other factors may contribute to well-being and whether differences and aspects of personality play a significant role.

Openness and its Relationship with Well-being

Anglim and Horwood (2020) emphasize a robust positive relationship between well-being and an individual's personality trait. How resilient an individual is, and the individual's coping strategies can depend on individual differences (Archontaki et al., 2013; Asselmann et al., 2020; Chen & Bonanno, 2020). The Big Five Personality traits, namely openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism, indicate the individual's pronounced personality trait (Rothmann & Coetzer, 2003).

Individuals with a pronounced personality trait of openness to experience are characterized by being open and interested in new situations and generally desire diversity, growth, and sensation (Anglim & Horwood, 2020; McCrae & Sutin, 2009; Roberti, 2004; Zoellner et al., 2008). Moreover, openness to experience is often linked to creativity, curiosity, adaptability, appreciation, and independence (McCrae, 1993; Kaufman, 2013).

Openness to experience gives, to a certain extent, the direction of one's life and well-being in a way that open individuals often value and desire aspects, such as autonomy, stimulation, novelty, diversity, growth, and sensation (Anglim & Horwood, 2020; Roberti, 2004). Open individuals are often flexible to adapt and constructively change new situations in a solution-focused manner which enforces their personal growth (Asselmann et al., 2020; Williams et al., 2009; Zoellner et al., 2008). These are crucial factors that demonstrate resilience and self-regulatory skills (Williams et al., 2009; Zoellner et al., 2008).

Previous studies found that the personality trait openness to experience was not only connected to overall well-being, but also to aspects, such positive emotions, personal growth, and independence (Anglim & Horwood, 2020; Anglim et al., 2020; Dong & Ni, 2020). Moreover, various studies identified positive correlations between openness to experience and emotional well-being, in particular the dimension of positive affect (Anglim & Horwood, 2020; Anglim et al., 2020; Keyes, 2002; Steel et al., 2008). In addition, previous research has shown that open individuals often experience higher psychological well-being, specifically autonomy, personal growth, and purpose in life (Keyes, 2005; Meléndez et al., 2019; Roccas et al., 2002). In addition, Anglim and Horwood (2020) found that openness functioned as a predictor for autonomy, personal growth, purpose in life, and self-acceptance, which are the key propositions of psychological well-being. Further positive correlations were found between openness and social well-being (Dong & Ni, 2020; Hill et al., 2012). Hill et al. (2012) suggest that this association might be due to the more artistic nature of open individuals who, in turn, have a sense of contributing to society through their creative and artistic work. These individuals seem to have a more pronounced ability to think creatively "out of the box" and find solutions to arising problems (Harzer & Ruch, 2015).

Openness and its Relationship with Well-being during the Corona Pandemic

Previous research has shown that openness to experience is linked to higher emotional, social, psychological, and overall well-being. Recent studies also found relations between openness and well-being during the current Corona pandemic (Zhang et al., 2020). Open individuals have been found to be better adapters to new situations, as well as better problem-focused copers when exposed to stressful situations, such as the Corona pandemic (Agbaria & Mokh, 2021; Zhang et al., 2020).

Even though recent studies investigated the relationship between the personality trait openness to experience and overall well-being, little research has been conducted on the relationship between openness and all dimensions of well-being (emotional, social, psychological, overall). Considering the positive effects that openness can have on well-being, it is essential to investigate further its relationship with well-being in the context of the Corona pandemic, which will be examined in the following.

Optimism and Creativity as possible Mediators on the Relationship between Openness and Well-being during the Corona Pandemic

Various studies identified a relationship between optimism and creativity with the personality trait openness to experience (Abdel-Khalek, 2019; Silvia et al., 2009; Ivcevic & Brackett; 2015). In addition, optimism and creativity were found to be related to the individual's well-being (Conversano et al., 2010; Helzer & Kim, 2019; Segerstrom et al., 2017; Silvia et al., 2009; Riolli et al., 2020). Hence, the current study will examine whether optimism and creativity are functioning as mediating factors in the relationship between openness and well-being in the context of the Corona pandemic.

Optimism is defined as seeing the positive and the chances in uncertain and adverse times, as well as acting solution-oriented and has been found to be positively related to higher

well-being (Conversano et al., 2010; Segerstrom et al., 2017). Essential aspects of optimism are to positively infer the future and belief in oneself and one's ability to control adverse situations (Ferguson et al., 2010; Scheier & Carver, 1985). Since the aspect of control positively impacts the individual's psychological well-being and resilience, optimism seems to be a crucial buffering factor in times of crisis, such as the Corona pandemic (Grote et al., 2007). Exemplarily, previous crises, such as the Kosovo Crises in 1999, showed that optimism and openness functioned as buffering factors against psychological stress (Riolli et al., 2020). Based on these studies, open individuals seem to experience higher well-being through an optimistic outlook in difficult times such as the Corona pandemic (Conversano et al., 2010; Segerstrom et al., 2017).

Various studies emphasize multiple domains of creativity, such as creative thinking, hobbies, and arts (Silvia et al., 2009). Thus, in unknown and challenging times, such as the current Corona pandemic, individuals who are more open to experience are more creative and flexible to find solutions and make the most out of adverse situations (Asselmann et al., 2020). Moreover, Anderson et al. (2020) examined that teachers who creatively and flexibly adapted to the new Corona situation showed higher levels of emotional well-being. Considering the presented studies, being resilient and able to cope with unknown situations through creative solutions and optimistic views, can relate to better overall well-being.

Adherence to governmental COVID-19 Regulations as a possible Confounder

There have been debates about whether open individuals are more or less compliant regarding governmental regulations, such as enforced lockdowns. In recently conducted studies, it was found that open individuals were more likely to practice good hygiene behaviour and were more likely to avoid social gatherings, thus adhering to governmental COVID-19 regulations (Beier & Ackerman, 2003; Milad & Bogg, 2020; Ludeke et al., 2021).

Further, Wright et al. (2020) emphasize the aspect of control regarding adherence since they found that more control from the government was related to more compliant citizens. Oppositely, other studies did not find relationships between openness and adherence to governmental COVID-19 regulations (Abdelrahman, 2020; Blagov, 2021; Schmeisser et al., 2020). Concerning the relation between adherence and well-being, a study conducted by Shah et al. (2021), found significant positive relations between well-being and adherence. Other studies reported a decrease in well-being among individuals due to the Corona pandemic and its corresponding COVID-19 regulations (Fried, 2020; Stieger et al., 2020; van Zyl).

The present Study

The present cross-sectional study is unique due to its representative study sample of individuals of different ages, household forms of living, and educational backgrounds. The present study's focal aim is to investigate whether participants who are more open to experience encounter higher well-being during Corona (RQ 1). It is hypothesized that more open individuals experience higher emotional, social, psychological, and overall well-being. Since optimism and creativity seem to be important factors that can enhance the individual's resilience and coping skills in times of crises and, in turn, enhance the individual's well-being, it is of importance to further explore these aspects and their relationship to openness to experience. Therefore, the second aim is to investigate whether open individuals are more optimistic and creative and whether this, in turn, is related to higher well-being in times of Corona (RQ 2). It is expected that optimism and creativity are each mediating the relationship between openness to experience and well-being. Current literature debates the correlation between adherence to governmental COVID-19 regulations, openness and well-being. Hence,

the third aim is to investigate whether adherence to governmental COVID-19 regulations functions as a possible confounder on the mediation model (RQ 3).

Methods

Design

The present study was operated using existing data from the Longitudinal Internet Studies for the Social Sciences (short "LISS ") using a quantitative empirical and cross-sectional survey design. Further, the LISS panel comprises 5.000 Dutch households with individuals over the age of 16 years. The LISS panel is based on a true probability sample with a random selection of Dutch municipal registrations (Lamers et al., 2011). From the 11 Modules of the LISS Panel, this study utilized the Modules "Background Variables" (Module 1), "Personality" (Module 7), "Effects of the Outbreak of COVID-19" (Wave 1) and the well-being module (Wave 1). The different data of the mentioned Modules were collected during different time frames. Thus, the collected background variable from the LISS panel was from January 2021, for the personality variable from May to June 2020, the effects of the COVID-19 outbreak were measured in March 2020, and lastly, the individual's well-being was measured in May 2020.

Procedure

Every month, participants were asked to fill out questions concerning various constructs (i.e., "Modules" or "Core Studies") and were receiving monetary compensation for filling out the 15–30-minute online surveys. Due to the potential lack of computers and internet access, the participants were provided with a computer and internet connection to fill out the online LISS panel surveys (Lamers et al., 2011). The random sampling contributed to

a representative sample of various age groups, socio-economic status, household status, and educational status (Sharma, 2017).

Participants

A total sample of 462 participants answered all relevant questions needed for the present study regarding well-being, openness, adherence, optimism, and creativity. The distribution between men and women was relatively equally distributed, with 48.5% men and 51.5% women (Table 1). The reported mean age of participants from the final sample was 55.8 (Age_{SD}= 16.1), and most participants reported living with a (un)married partner and without children (N= 181, 39.2%). In addition, most participants reached a secondary (N= 107, 23.2%) and higher (N= 106, 22,9%) vocational education. Whereas the participants from the Final sample (N= 462) were coded with 1, participants from the Personality Module sample (N= 5.264) were coded with 0. Thus, a comparison could be drawn between these two samples by excluding the Final subsample (N= 462) from the Personality Module sample (N= 5.264). Overall, the Final sample and the Personality Module sample appear to be relatively similar in gender distribution, age, household form of living, and educational status (Table 1).

Table 1.

Demographics of the Final sample (N= 462) and Personality Module Sample (N= 5.264)

Item	Category	Final sample (N= 462)	Personality Module sample (N= 5.264)
Gender, n (%)	Female	238 (51.5)	2.855 (54.2)

	Male	224 (48.5)	2.409 (45.8)
Age, M (SD)		55.8 (16.1)	52.4 (18.5)
Household form of living, n (%)	Single	106 (22.9)	1.282 (24.4)
	Living with (un)married partner, without child/children	181 (39.2)	1.913 (36.3)
	Living with (un)married partner, with child/children	125 (27.1)	1.597 (30.3)
	Single with child/children	35 (7.6)	315 (6.0)
	Other	15 (3.2)	157 (3.0)
Educational status, n (%)	Primary school	17 (3.7)	130 (2.5)
	Preparatory secondary vocational education	89 (19.3)	897 (17.0)
	General secondary education	57 (12.3)	369 (7.0)
	Secondary vocational education	107 (23.2)	1.251 (23.8)
	Higher vocational education	106 (22.9)	1.579 (30.0)
	University	73 (15.8)	958 (18.2)
	Other	13 (2.8)	80 (1.6)

Note. A chi-square and t-test could not be conducted due to technical issues.

Materials

Mental Well-being

The 14-item Mental Health Continuum Short Form-Revised (MHC-SF) was used to measure the individual's level of well-being (Figure 1, Appendix A). The three dimensions of well-being, namely emotional well-being (e.g., "In the past week, of often did you feel I am happy"), social well-being (e.g., "In the past week, of often did you feel I belong to a group of people"), and psychological well-being (e.g., "In the past week, of often did you feel I accept myself as I am") were assessed with scores ranging between 0 ("Never") and 5 ("Almost always) on a 6-point Likert scale (Keyes et al., 2008; Lamers et al., 2011). Even though the MHC-SF is a well-established questionnaire, its usability within the mental health field has been criticized for its complex response format, abstractedness of the well-being construct, and difficult comprehendible formulation (Westerhof & ten Klooster, 2020). Thus, a revised version of the MHC-SF was proposed and modified according to the MHC-SF creator, Professor Corey Keyes.

The revised version of the MHC-SF has changed in terms of a revised response format (the revised version asks for the past week instead of the past month) and the use of estimated frequencies (e.g., "Often" instead of "Almost every day"). The overall score of the MHC-SF was used, but also the three different scores of the three dimensions of well-being were examined further. The MHC-SF is a well-established questionnaire with good construct validity and an acceptable internal consistency above .70 (Keyes et al., 2008; Lamers et al., 2011). To investigate whether the items load together onto the three constructs, namely emotional, social, and psychological well-being, an exploratory factor analysis with an Oblimin rotation has been conducted, which presented a three-factor structure (Guttman, 1954; Kaiser, 1960; Table 2, Appendix B).

A reliability analysis examined Cronbach's Alpha for each of the MHC-SF-R scales. Thus, the emotional well-being scale showed an internal consistency with a Cronbach's Alpha of α= .89, the social well-being scale α= .78, and the psychological well-being scale presented a Cronbach's Alpha of α= .86. The full MHC-SF-R scale had an excellent Cronbach's Alpha of α= .91. A Cronbach's Alpha is considered to be acceptable above α= .6 or .7 (van Griethuijsen et al., 2015). Thus, even due to revisions, the MHC-SF-R still provides good and well-established psychometric properties (Lamers et al., 2011; Schotanus-Dijkstra et al., 2016). The emotional, social, psychological, and overall well-being scores were separately computed by calculating the mean scores for all three dimensions of well-being ranging from 0 to 5 and one mean score for the total amount of well-being.

Personality trait Openness to Experience

To examine the individual's score on the personality trait openness to experience, this study utilized Module 7 on Personality (Wave 12) from the LISS panel (Figure 2, Appendix A). Within the LISS Panel, items from the International Personality Item Pool (IPIP) were used. The IPIP was developed as an open-source pool in which over 3.000 items have been collected to measure various constructs and individual differences, such as the Big Five personality traits (Goldberg, 1999; Goldberg et al., 2006). The ten items from the LISS Module 7 on Personality were scored on a 5-point Likert scale, ranging from 0 ("very inaccurate") to 4 ("very accurate"). A mean score of all ten items was computed for further analyses. A factor analysis was conducted and presented a one-factor structure (Guttman, 1954; Kaiser, 1960; Table 3, Appendix B). On the IPIP Website, the items from the construct openness to experience were used with an Alpha level of α= .89 (Goldberg, 1999; Goldberg et al., 2006). However, since the LISS panel used only ten out of 20 items from the IPIP, a different Cronbach's Alpha appeared lower with α= .80.

Optimism

In order to analyze whether the construct of optimism functions as a mediator between the individual's personality trait openness to experience and well-being, the Life Orientation Test-Revised (LOT-R) was used within the LISS Module 7 on Personality from the time May 2020 (Wave 12). The LOT-R consists of ten items, such as "In uncertain times, I usually expect the best", ranging from 0 ("strongly disagree") to 4 ("strongly agree") with some items that needed to be reverse coded (Scheier et al., 1994; Figure 3, Appendix A). The mean score ranges from 0 to 4 (0= low optimism; 4= high optimism). Further, the LOT-R contains four filler items, which needed to be excluded for the analysis (Scheier et al., 1994). A factor analysis was conducted and revealed a one-factor structure (Table 1, Appendix B). The reliability of the current study's sample with the exclusion of the four filler items was α= .75. Thus, the participants' optimism score was conducted by computing the mean score of the six LOT-R items.

Creativity

To analyze whether the value of creativity functions as a mediating factor between the individual's openness to experience and well-being in times of Corona, the Rokeach Value Survey (RVS) was used within the LISS Module 7 on Personality. This survey measures individual differences in terms of their values (Rokeach, 1973; Figure 4, Appendix A). In addition, the RVS represents a relatively good test-retest reliability (Rokeach, 1973; Vinson et al., 1977). For the present study, only the item on creativeness was used (cp19k116 "creative"). The respondents rated the importance on a scale from 1 ("extremely unimportant") to 7 ("extremely important") to what extent creativity is acting as a crucial and guiding value in their life.

Adherence to governmental COVID-19-Regulations

In order to measure the individual's tendency to adhere to governmental COVID-19-regulations, the questionnaire "Corona outbreak in the Netherlands" ("Corona-uitbraak in Nederland") was used. This survey was established by the "COVID-19 ImpactLab" and was incorporated in March 2020 on the LISS panel (Figure 5, Appendix A). Within this questionnaire, the question "Which of the following recommendations did you act upon in the past week?" with the following answers: (1) avoid crowded places, (2) avoid public spaces, (3) Keep a distance from others (1.5 meters) were utilized to measure the participants extent of adherence to governmental COVID-19 regulations. The questionnaire initially consists of seven items. However, due to the low reliability of $\alpha = .26$, only the three aforementioned items were used, which increased the reliability to $\alpha = .40$. The answer to this question was dichotomous; thus, the participant answered with 0 ("no") and 1 ("yes"). A total score was computed, ranging from 0 (low adherence) to 3 (high adherence).

Statistical Analysis

For the present study, the statistical software SPSS Version 26 was used. First, the data sets on personality, MHC-SF-R, and the LISS panel background data were combined and merged into one file. Then, the data was examined for its normal distribution employing the Kolmogorov-Smirnov and Shapiro-Wilk normality tests and checking the respective histograms and normal Q-Q plots (Table 1 & Figure 1, Appendix C). The Kolmogorov-Smirnov and Shapiro-Wilk normality tests did not confirm normal distributions of the variables; however, a relatively large sample can lead to significant falsified results ($p < .05$). Thus, a further examination concerning the histograms and Q-Q plots was conducted and confirmed the normal distribution of the variables, besides the variable adherence to governmental COVID-19 regulations (Table 1 & Figure 1, Appendix C).

Subsequently, a two-tailed Pearson correlation analysis was conducted to explore the correlations between well-being (emotional, social, psychological, and overall well-being) in times of Corona, openness to experience, optimism, creativity, and adherence to COVID-19 regulations (Senthilnathan, 2019). To correctly interpret the resulting correlation, $r = 0.1$ is considered to be a small correlation, $r = 0.3$ is considered moderate, and $r = 0.5$ is interpreted as large (Cohen, 1998; Cohen et al., 2013).

Lastly, multiple mediation analyses were administered to test whether the variables optimism and creativity each function as significant mediators in the relationship between openness to experience and well-being during the Corona pandemic (Figure 1). For this purpose, Hayes's (2013) program 'PROCESS' was utilized within the statistical software SPSS. Five main variables were used for the mediation analyses. Openness to experience was the independent variable (IV), whereas emotional, social, psychological, and overall well-being functioned as the dependent variables (DV). The variables creativity and optimism each acted as mediators (M) to test whether they are each mediating the relationship between openness to experience and all dimensions of well-being during Corona (Figure 1). Further, it was investigated whether the variable adherence to governmental COVID-19 regulations functioned as a confounding variable (C) on the relationship between openness and well-being with creativity as a possible mediating factor (Figure 3). A complete mediation effect was identified by a significant relationship between (1) openness to experience and well-being during Corona (path c, total effect of X on Y), (2) openness to experience and creativity/optimism (path a, effect of X on M), (3) creativity/optimism and well-being during Corona (path b, effect of M on Y), and (4) that the effect of openness to experience decreased after the inclusion of the two mediating variables (path c′, direct effect of X on Y while including M; Baron & Kenny, 1986). Next to the fulfilment of these four steps, Hayes (2013) and Baron and Kenny (1986) emphasize that the 95% confidence interval should not contain

the value of zero for the indirect effect. In order to examine the significance level of the indirect effect, bootstrapping procedures were carried out (n= 5000 bootstrapping resamples).

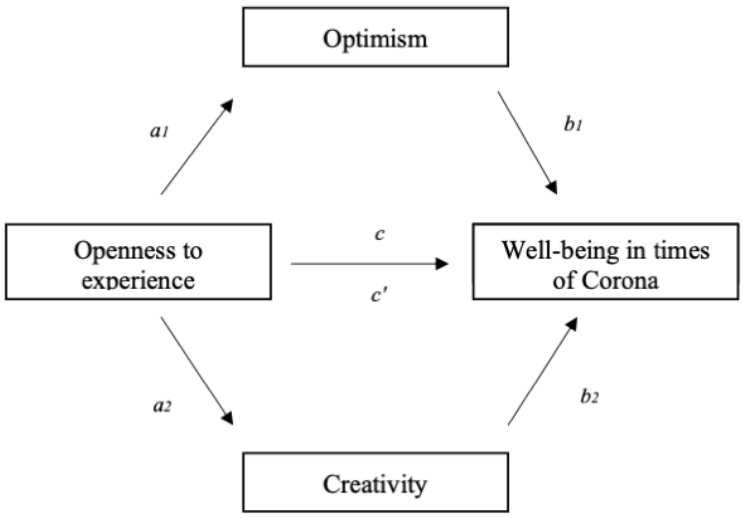

Figure 1. Schematic overview of Optimism and Creativity as mediators in the relationship between Openness to Experience and Well-being in times of Corona.

Results

First, the descriptive statistics of the 462 participants were calculated (Table 2). Among the participants, the level of emotional well-being was highest compared to the other dimensions of well-being. Openness, optimism, and creativity represented relatively medial to higher values. With a relatively high average mean score in adherence to COVID-19 regulations, this variable represented slight variance in the dataset. Besides the variable adherence to COVID-19 regulation, all variables presented a normal distribution, and therefore, a Pearson correlation analysis was conducted.

Table 2.

Overview of Descriptive Statistics (N= 462)

Variables	M	SD	Range
1. Well-being	2.82	.77	0-5
2. Emotional Well-being	3.34	.98	0-5
3. Social Well-being	2.35	.85	0-5
4. Psychological Well-being	2.96	.87	0-5
5. Openness	3.50	.54	1-5
6. Optimism	3.45	.62	1-5
7. Creativity	4.93	1.38	1-7
8. Adherence to COVID-19 regulations	2.85	.44	0-3

Openness and its Relationship with Well-being

In order to get an impression of the correlations between well-being (emotional, social, psychological, overall) openness, as well as optimism, creativity, and adherence, a Pearson correlation analysis was conducted (Table 3). The Pearson correlation analysis revealed small significant positive correlations between openness and emotional, social, psychological, overall well-being. Optimism displayed moderate significant correlations between all dimensions of well-being and small significant positive correlations with openness. Creativity showed to have one moderate significant positive correlation with

openness. Lastly, adherence to governmental COVID-19 regulations did not display any significant correlations.

Table 3.

Pearson Correlations between Variables

Variables	1	2	3	4	5	6	7	8
1. Well-being								
2. Emotional Well-being	.81**							
3. Social Well-being	.86**	.55**						
4. Psychological Well-being	.92**	.68**	.66**					
5. Openness	.22**	.12**	.16**	.26**				
6. Optimism	.52**	.49**	.39**	.49 **	.26**			
7. Creativity	.07	.02	.06	.07	.33**	.05		
8. Adherence to COVID-19 regulations	-.06	-.09	-.02	-.06	.02	-.08	-.03	

Note. ** p <.01, * p <.05, N=462

Optimism and Creativity acting as Mediators between Openness and Well-being

The mediation analyses showed that creativity was not found to be a significant mediator in all of the conducted mediation analyses. Optimism, in turn, displayed to be a significant mediating factor; the confidence intervals did not include zero (emotional: CI [.14, .32]); social: CI [.09, .22]; psychological: CI [.11, .27]; overall: CI [.11, .28]). Whereas optimism fully explained the relationship between openness and emotional and social well-being, it could not fully explain the relationship between openness and overall and psychological well-being (Figure 2 & Table 4).

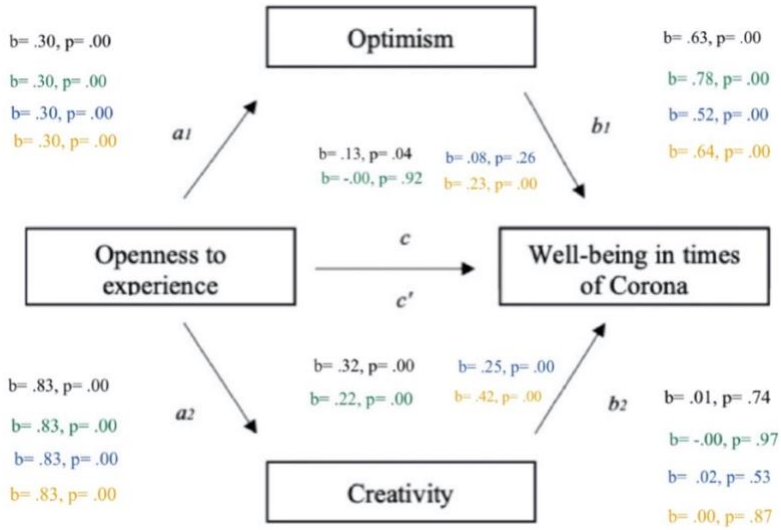

Figure 2. Overview of the Mediation Analyses results of Optimism and Creativity as Mediators in the relationship between Openness to Experience and emotional (green), social (blue), psychological (orange), and overall (black) Well-being in times of Corona.

Table 4.

Multiple Mediation Analyses involving Optimism and Creativity as Mediators on the Relationship between Openness to Experience and Well-being in times of Corona

Parameter	b	SEb	Confidence Interval	
			Lower Bound	Upper Bound
Overall Well-being				
Indirect effect optimism	.19	.04	.11	.26
Indirect effect creativity	.01	.02	-.03	.05
Indirect effect total	.19	.04	.11	.28
Emotional Well-being				
Indirect effect optimism	.23	.05	.14	.32
Indirect effect creativity	-.00	.03	-.05	.05
Indirect effect total	.23	.05	.12	.34
Social Well-being				
Indirect effect optimism	.15	.03	.09	.22
Indirect effect creativity	.01	.02	-.03	.06
Indirect effect total	.17	.04	.09	.25
Psychological Well-being				
Indirect effect optimism	.19	.04	.11	.27
Indirect effect creativity	.00	.24	-.04	.05
Indirect effect total	.19	.05	.10	.29

Note. N= 462; b= unstandardized regression coefficient.

The Relationship between Openness and Adherence to governmental COVID-19 regulations

The Pearson correlation analysis did not display a significant correlation between openness to experience and adherence to governmental COVID-19 regulations with a correlation value of r= -.09 (Table 3). To define adherence as a confounding variable, adherence needs to be significantly related to openness and well-being (Figure 3). However, these requirements were not met; thus, adherence to governmental COVID-19 regulations could not be established to be a confounding variable and the results of the mediation analysis did not change.

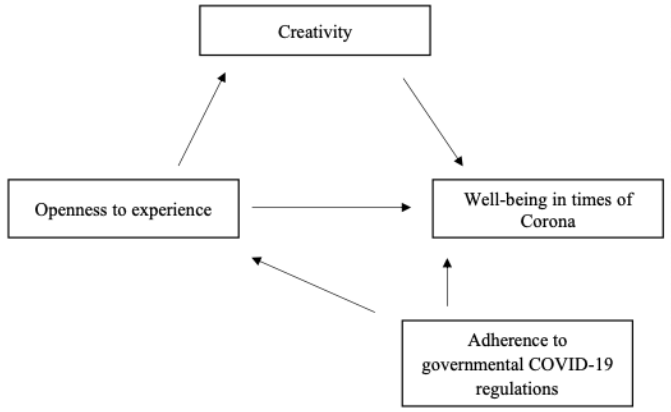

Figure 3. Schematic overview of Adherence to governmental COVID-19 Regulations as a possible Confounding Variable.

Discussion

The present study aimed to examine the overall relationship that the personality trait openness to experience has with well-being during the Corona pandemic. Further, the current study aimed to investigate whether the variables optimism and creativity functioned as mediating factors on the relationship between openness and well-being. It was also examined whether adherence to governmental COVID-19 regulations acted as a confounding variable

on the relationship between openness and well-being. The analyses were based on recently collected data during the Corona pandemic. They confirmed the expected outcomes that openness to experience is significantly correlated to emotional, social, psychological, and overall well-being during the Corona pandemic. The mediation analyses revealed that creativity did not function as a significant mediator. However, optimism mediated, to an extent, the relationship between openness and overall and psychological well-being and fully mediated the relation between openness and emotional and social well-being. Adherence to governmental COVID-19 regulations was not found to be a significant confounding variable.

The significant relationships between openness and emotional, social, psychological, and overall well-being as found in the current study, align with other studies and the researcher's expectations. Various studies identified positive relations between openness and emotional, social, psychological, and overall well-being (Anglim & Horwood, 2020; Anglim et al., 2020; Hill et al., 2012; Keyes, 2005; Roccas et al., 2002; Steel et al., 2008). Researchers emphasize that open individuals are better adapters and solution-focused copers, which help them deal with the Corona pandemic (Agbaria & Mokh, 2021; Zhang et al., 2020). Overall, studies conducted before and during the Corona pandemic reveal that the personality trait of openness to experience seems to be robust and related to all dimensions of well-being.

The current study's results reveal the importance of considering possible extraneous variables and aspects, which might have impacted the results. Optimism did not fully explain the relationship between openness and psychological and overall well-being, which might be due to another extraneous variable also explaining the relationship (Flannelly et al., 2014). One possible extraneous variable is psychological flexibility since it is related to openness, well-being, and optimism (Arslan et al., 2020; Asselmann et al., 2020; Kashdan, & Rottenberg, 2010; Reed, 2016). Psychological flexibility is defined as the ability to perceive

and adapt to new situations, along with maintaining an overall life balance and shifting one's mindset (Kashdan, & Rottenberg, 2010). One example given by Jesuthasan et al. (2020) explained how major companies, such as the shoe brand New Balance, started to produce medical face masks, which shows high flexibility and openness. Another possible extraneous aspect is the social desirability of the participants. Exemplarily, most participants in the present study answered adhering to the governmental COVID-19 regulations. The participants might have felt the obligation to answer that they adhered to all COVID-19 regulations since this is seen as socially acceptable (Zerbe & Paulhus, 1987). Hence, the results regarding adherence had slight variance, which might have led to non-significant relationships.

Next to possible extraneous variables, the difference between the current and other studies, such as used questionnaires, the time frame, and the sample characteristics might have impacted the results. Exemplarily, in the present study, the measure of adherence to governmental COVID-19 regulations was higher compared to other studies, which might be due to the use of different questionnaires (Milad & Bogg, 2021). For the measure of adherence to governmental COVID-19 regulations, the used questionnaire represented low reliability and used different measures compared to studies that found significant relationships between adherence and openness (Milad & Bogg, 2021).

The consideration of the utilized questionnaire also accounts for the measure of creativity. Creativity did not show to be significantly correlated with well-being, which might have been due to the questionnaire's nature. Since the utilized questionnaire only contained one item on the value of creativity, there might not have been enough information to establish significant results. Further, the creativity measure might have been impacted by the participants characteristics and the studies' conducted time frames. Exemplarily, the present study had a higher average age and a different time frame than other studies. Whereas the

current study was conducted during the uncertain Corona pandemic, other studies were conducted before the pandemic. Since creativity has been shown to decline with age and in stressful situations, these aspects might have impacted the results (Ruth & Birren, 1985; Shanteau & Dino, 1993).

Strengths and Limitations

The present study represents strengths and limitations which need to be considered. First of all, the use of the LISS panel and well-validated questionnaires, such as the MHC-SF and LOT-R, can be seen as one strength of the present study. The use of the LISS panel can be seen as a strength because it provides an extensive and well-represented database, which is free of charge for research purposes (Scherpenzeel, 2010). However, one limitation is the low reliability score in the scale measuring adherence to governmental COVID-19 regulations and using only one item for measuring creativity. Here, the researcher would have chosen better-fitting questionnaires for the adherence and creativity measures, such as the Creativity Styles Questionnaire-Revised (CQS-R; Kumar et al., 1997).

The use of a quantitative survey design can be seen as a strength due to its good replicability, generalizability, and transferability (Friedhoff et al., 2013; Hulme, 2007). Further, quantitative research promotes and simplifies the comparability between groups and studies (Hulme, 2007). However, quantitative surveys frequently involve close-ended questions and are usually structured, which was the case in the current study and might have limited the outcomes (Chetty, 2016). One example might be the results of the present study regarding the variable adherence to governmental COVID-19 regulations. Here, close-ended questions only giving the option between “yes” or “no” might have caused people to often say “yes”, namely always adhering to COVID-19 regulations. With an optional qualitative

field, participants might have given more information concerning the context of adhering to COVID-19 regulations.

The participants from the LISS panel receive monetary compensation for filling out the questionnaires. This can be seen as one strength since it can show appreciation of the individual's participation in the LISS panel. Further, this can also attract more participants to filling out the questionnaires and, in turn, maintaining or increasing the database. On the other side, it can also be one limitation that might have impacted the study's results due to a possible extrinsic motivation. Since the LISS panel provided monetary compensation to the participants for filling out the questionnaires, the participants might have rashly filled out the questionnaires for receiving money rather than intrinsically for research purposes (Ryan & Deci, 2000).

Future Implications

There are some future implications worth noting. Since the present study was conducted using a cross-sectional and self-report survey design, it is of interest to conduct a longitudinal study. The Corona pandemic is still ongoing, and more extended amounts of time are needed to fully recognize its damage and implications on both individuals and societies. Along with this, data before the pandemic is needed to most accurately examine and evaluate the associations between the Corona pandemic and an individual's well-being and level of openness.

It could be interesting to look at the different personality traits, such as neuroticism, extraversion, conscientiousness, and agreeableness, and how they respond. Furthermore, since all participants were Dutch, there might have been cultural aspects that could have impacted the study's results due to differences in Western and Eastern cultures (Notar, &

Padgett, 2010; Chua, & Zremski, 2016). Hence, one future application is to consider cultural differences in future studies.

The present study showed that the personality trait of openness to experience is related to well-being during the Corona pandemic. Hence, it is of importance to further promote openness in individuals. Since openness is linked to diversity, independence, and stimulation, it can be advantageous to promote these aspects at work or in school through incorporating creative tasks, providing different perspectives, and leaving room for independence (Anglim & Horwood, 2020; Anglim et al., 2020; Roberti, 2004).

Since this current study found that optimism mediated, to some extent, the relationship between openness and psychological and overall well-being, it would be interesting to evaluate the impact of other extraneous variables for future research, such as psychological flexibility (Flannelly et al., 2014). The present study's results also show the importance and advantage of increasing and supporting the individual's level of optimism. It would be crucial that schools start focusing on optimism already during childhood. Shatte et al. (1999) conducted a learned optimism program in which children are stimulated to challenge pessimistic thoughts and reattribute them into more optimistic views. Since a government's COVID-19 response includes closed schools, the learned optimism program could also be implemented online.

During the research process, the researcher noticed a lack of questionnaires measuring adherence to COVID-19 regulations. Hence, another implication for future research is to establish a well-validated questionnaire measuring the individual's extent of adhering to governmental COVID-19 regulations. Furthermore, other possible aspects that might have impacted the study's results, such as the timing and the samples' characteristics, but also social desirability need to be considered and controlled for a while interpreting the data (Zerbe & Paulhus, 1987). Lastly, it can also be interesting to conduct research on the possible

positive effects of the Corona pandemic on the individual's personality traits and well-being. This might also give insights into which aspects during challenging times can promote well-being and strengthen personality traits.

Conclusion

The present study confirmed previous studies and the researcher's expectations regarding significant relationships between openness and emotional, social, psychological, and overall well-being during the Corona pandemic. Oppositely, creativity and adherence to governmental COVID-19 regulations did not function as significant mediating and confounding variables on the relationship between openness and all dimensions of well-being. Optimism did not fully mediate the relationship between openness and psychological and overall well-being. The results emphasize the importance of considering possible extraneous variables, as well as the differences in studies concerning utilized questionnaires, time frames, and the samples' characteristics. The personality trait of openness has been shown to be relatively robust before and during the Corona pandemic. This indicates its importance to promote this personality trait at, for instance, work and in school. Future implications are to control for possible extraneous variables, considering differences in studies, and incorporating vital aspects, such as openness and optimism, within the educational program.

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Appendix

Appendix A. Questionnaires

MHC-SF-R by Westerhof and ten Klooster (2020)

Figure 1.

MHC-SF revised version with a revised response format

In the past week, how often did you feel…

1. … that you were happy?
2. … that you were interested in life?
3. … that you were satisfied with life?
4. … that you had something important to contribute to society?
5. … that you belonged to a community (like a social group, or your neigborhood?)
6. … that your society is becoming a better place for people?
7. … that people are basically good?
8. … that the way our society works makes sense to you?
9. … that you liked most parts of your personality?
10. … that you had experiences that challenged you to grow and become a better person?
11. … that you were good at managing the responsibilities of your daily life?
12. … that you had warm and trusting relationships with others?
13. … that you were confident to think or express your own ideas and opinions?
14. … that your life has a sense of direction or meaning to it?

0	1	2	3	4	5
never	rarely	sometimes	regularly	often	Almost always

IPIP by Goldberg (1999)

Figure 2.

Sub-scale Openness to Experience

1. Have a rich vocabulary.
2. Have difficulty understanding abstract ideas.
3. Have a vivid imagination.
4. Do not have a good imagination.
5. Use difficult words.
6. Have excellent ideas.
7. Am quick to understand things.
8. Spend time reflecting on things.
9. Am full of ideas.
10. Am not interested in abstract ideas.

1	2	3	4	5
Very inaccurate	Moderately accurate	Neither inaccurate nor accurate	Moderately accurate	Very accurate

LOT-R Questionnaire by Schreier et al. (1994)

Figure 3.

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

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.

1	2	3	4	5
Strongly disagree	disagree	neutral	agree	Strongly agree

Rokeach Value Survey (RVS)

Figure 4.

Which values act as a guiding principle in your life and which values are less important to you?

… creative

1	2	3	4	5	6	7
Extremely unimportant	2	3	4	5	6	Extremely important

Questions to measure "adherence to governmental COVID-19 regulations" from the Module "Effects of the Outbreak of COVID-19" of the LISS Panel

Figure 5.

Which of the following recommendations did you act upon in the past week?

1. Avoid crowded places
2. Avoid public spaces
3. Keep a distance from others (1.5 meters)

0	1
No	Yes

Appendix B. Factor Analyses

KMO and Barlett Test

Table 1.

Kaiser-Meyer-Olkin Measure of Adequacy (KMO-Test) and Bartlett Test for Sphericity.

	MHC-SF-R	Openness	Optimism
KMO-Test	.917	.812	.758
Bartlett Test	$X^2(91) = 3365.785^{***}$	$X^2(45) = 1189.207^{***}$	$X^2(15) = 657.519^{***}$

Note. ** p <.01, * p <.05, *** p < .001

Factor Analysis MHC-SF-R

The KMO test, as well as the Barlett test, confirmed adequacy and sphericity (Table 1, Appendix B). The factor analysis was conducted with three factors (Table 2, Appendix B). The scree-plot and the Kaiser Guttman criteria presented a three-factor structure (Guttman, 1954; Kaiser, 1960). The exploratory factor analysis revealed that twelve items loaded onto the three respective constructs. The remaining two items did not load onto the respective constructs. Item 8 ("…that the way our society works makes sense to you?"), loaded onto the psychological well-being construct instead of the respective social well-being constructs, and item 12 ("… that you had warm and trusting relationships with others?"), which loaded onto the social well-being rather than the respective psychological well-being construct (Table 2, Appendix B). However, regarding the scoring, both items were kept with the usual constructs, thus item 8 with the social well-being construct and item 12 with the psychological well-being construct, which made the comparison with other studies possible.

Table 2.

Exploratory Factor Analysis with three-Factor Extraction with Oblimin Rotation on the MHC-SF-R items

Construct	MHC-SF-R items			
Theoretical dimension		Factor Loading		
	In the past week, how often did you feel …	E	S	P
Emotional Well-being (E)				
	1. … that you were happy?	**.77**	.49	-.60
	2. … that you were interested in life?	**.64**	.49	-.64
	3. ... that you were satisfied with life?	**.72**	.48	-.64
Social Well-being (S)				
	4. … that you had something important to contribute to society?	.46	**.68**	-.41
	5. … that you belonged to a community (like a social group, or your neigborhood?)	.32	**.77**	-.38
	6. … that your society is becoming a better place for people?	.02	**.82**	-.39
	7. … that people are basically good?	-.12	**.73**	-.52
	8. … that the way our society works makes sense to you?	-.27	.54	**-.64**
Psychological Well-being (P)				

9. … that you liked most parts of your personality?	.12	.48	**-.80**
10 … that you had experiences that challenged you to grow and become a better person?	.26	.32	**-.81**
11. … that you were good at managing the responsibilities of your daily life?	.32	.47	**-.80**
12. … that you had warm and trusting relationships with others?	.16	**.62**	-.50
13. … that you were confident to think or express your own ideas and opinions?	.20	.43	**-.76**
14. … that your life has a sense of direction or meaning to it?	.44	.54	**-.73**

Note. **Bold** = Highest factor loading for the respective item.

Factor Analysis IPIP

The KMO and Barlett test showed adequacy and sphericity (Table 1, Appendix B). The scree plot, as well as the Kaiser-Guttman criteria with an eigenvalue above < 1, supported the structure of a one-factor analysis (Guttman, 1954; Kaiser, 1960).

The factor analysis showed that item 4 ("Do not have a good imagination") and item 10 ("Am not interested in abstract ideas") were negatively loading onto the openness construct (Table 3, Appendix B). Hence, for further analyses, these two items were reverse coded.

Table 3.

Exploratory Factor Analysis with one-Factor Extraction on the IPIP Openness items

IPIP items on Openness	
Item	Factor Loading
1. Have a rich vocabulary	.68
2. Have difficulty understanding abstract ideas.	.64
3. Have a vivid imagination.	.55
4. Do not have a good imagination.	**-.35**
5. Use difficult words.	.57
6. Am quick to understand things.	.62
7. Have excellent ideas.	.74
8. Spend time reflecting on things.	.55
9. Am full of ideas.	.69
10. Am not interested in abstract ideas.	**-.59**

Note. **Bold** = negative factor loadings which needed to be reverse coded

Factor Analysis LOT-R

The KMO and Barlett tests verified adequacy and sphericity (Table 1, Appendix B). Even though the scree-plot and the eigenvalues represented two constructs (i.e., optimism and pessimism), it was reasonable to use a one-factor structure since the reverse-coded items have been used for pessimism; thus, all items should measure the optimism construct. Thus, an exploratory factor analysis with a one-factor extraction with Varimax Rotation examined one construct of the LOT-R, namely optimism. After using the reverse coded items, all items loaded positively onto the one optimism construct (Table 4, Appendix B). Overall, the LOT-R presents reliability with an acceptable Cronbach's Alpha of α=.70 (Glaesmer et al., 2012).

Table 4.

Exploratory Factor Analysis with one-Factor Extraction with Varimax Rotation on the LOT-R items with the reverse-coded items and the exclusion of the four filler items

LOT-R items	
Item	Factor Loading
1. In uncertain times, I usually expect the best.	.56
3. I hardly ever expect things to go my way.	.71
4. I am always optimistic about my future.	.64
7. I rarely count on good things happening to me.	.74
9. If something can go wrong for me, it will.	.66
10. Overall, I expect more good things happen to me than bad.	.69

Note. Items 2, 5, 6, 8 were filler items and were excluded from the analysis.

Appendix C. Tests of Normality

Table 1.

Kolmogorov-Smirnov and Shapiro-Wilk tests of normality

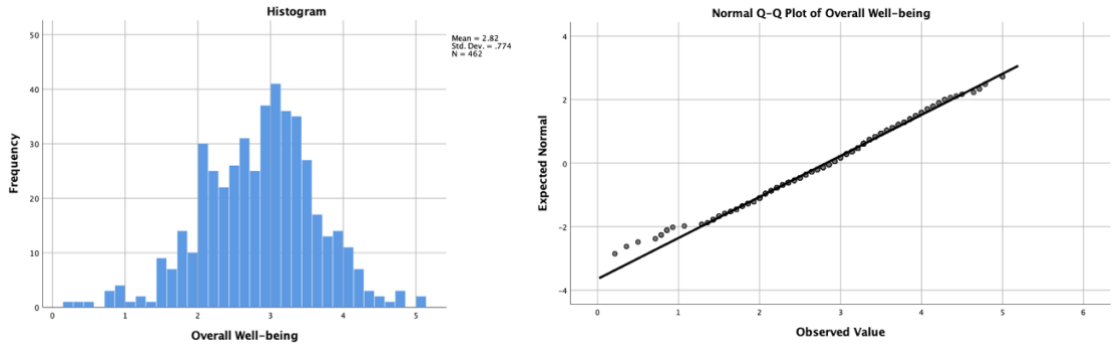
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total Well-being	.06	462	.00**	.10	462	.02*
Emotional Well-being	.18	462	.00***	.10	462	.00***
Social Well-being	.07	462	.00***	.10	462	.00**
Psychological Well-being	.07	462	.00***	.98	462	.00***
Openness to experience	.05	462	.02*	.10	462	.02*
Optimism	.07	462	.00***	.10	462	.00**
Creativity	.15	462	.00***	.93	462	.00***
Adherence to governmental COVID-19 regulations	.51	462	.00***	.37	462	.00***

Note. ***p < .001** p <.01, * p <.05, N=462

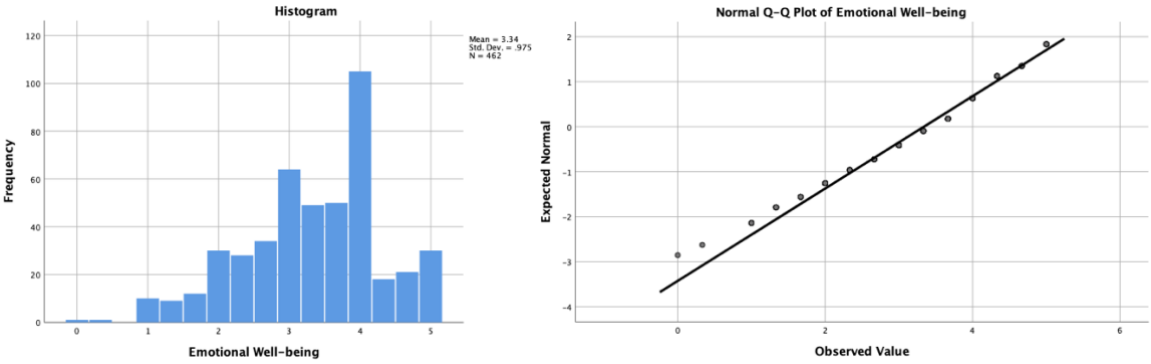
Figure 1.

Histograms and Normal Q-Q Plots

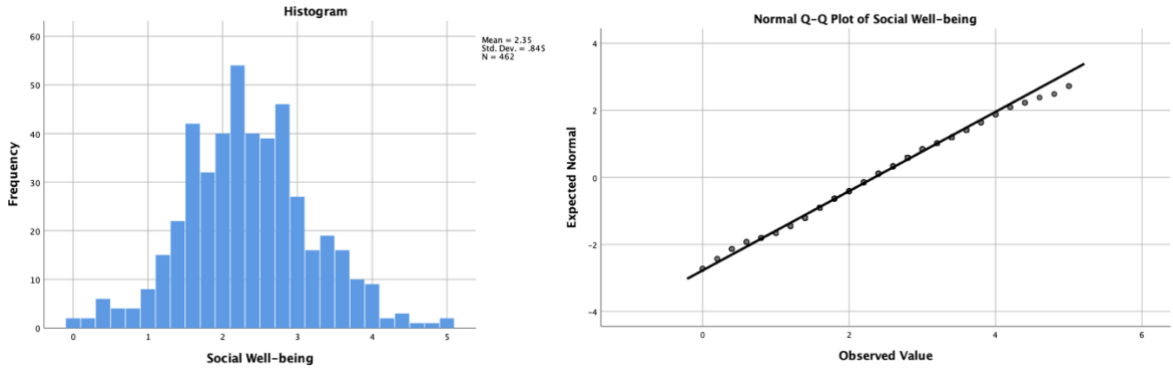
Overall Well-being



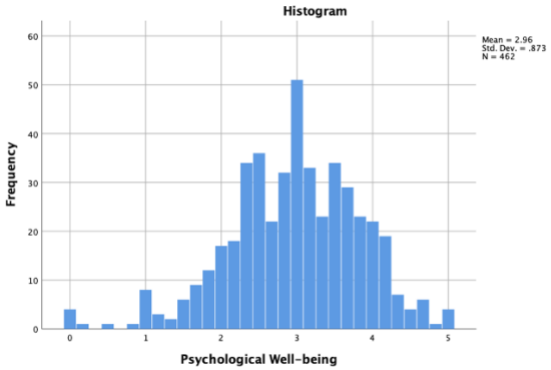
Emotional Well-being

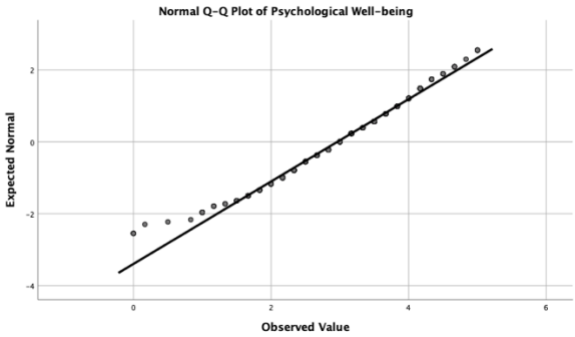


Social Well-being

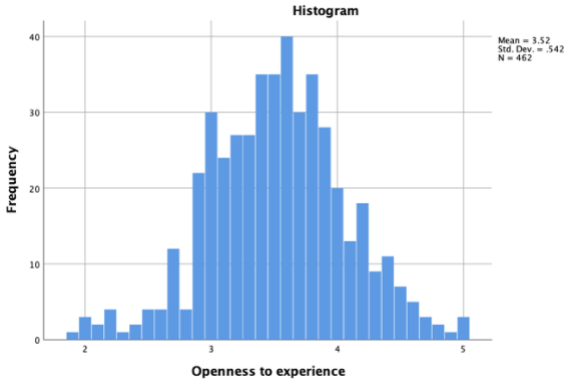


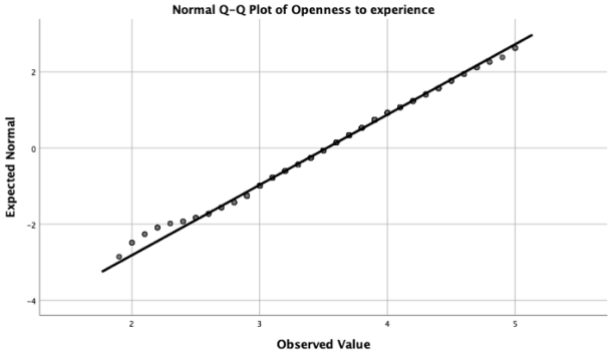
Psychological Well-being



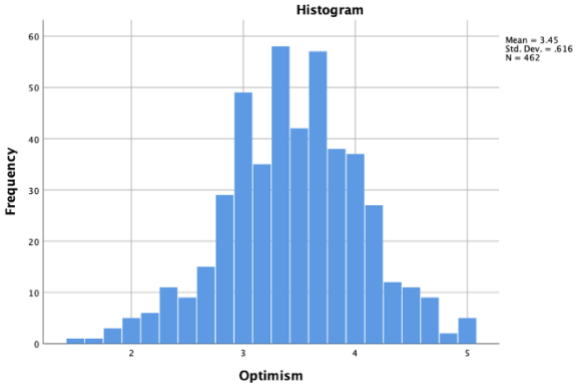


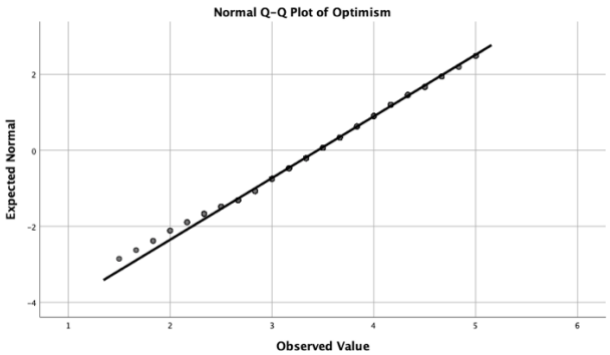
Openness to experience



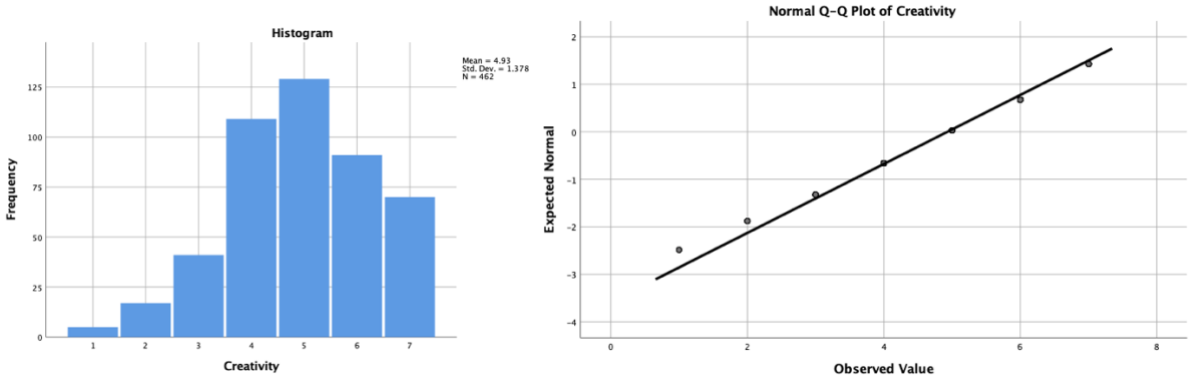


Optimism





Creativity



Adherence to governmental COVID-19 regulations