Investigating Life Satisfaction before and during the Corona Pandemic

Master Thesis Positive Clinical Psychology and Technology, Faculty of Behavioural, Management and Social Sciences

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Abstract

Background

The COVID-19 pandemic caused a worldwide extraordinary situation. While a major focus is set on the physical health consequences the virus has, mental health is less regarded. Life satisfaction is an important part of subjective well-being and has been found to be decreasing in 2020. Yet, these studies are mostly relying on cross-sectional study design with a small sample size based on convenient sampling.

Aim

The study aims to use longitudinal data of a large representative sample to investigate life satisfaction over time with gender, age and corona attitude.

Method

This study used a longitudinal design with a large sample (n=3759) from the Dutch LISS panel. Used data from these questionnaires encompassed demographic data, the satisfaction with life scale (SWLS) and a specifically for 2020 created questionnaire to examine the attitude of participants on corona related regulations. Repeated measures ANOVAs were computed to test for significant effects of different variables and life satisfaction over time.

Results

It was found that life satisfaction was significantly different over time and increased from 2018 until 2020. Age was also found to have significant differences over time. There was no interacting effect between age group and SWLS scores found, however. Further, more positive corona attitudes were related to more life satisfaction, but again no significant effect could be noticed. Gender was not found to have any significant effect.

Conclusions

Study findings indicate that life satisfaction is much less influenced by situational factors as the corona pandemic, illustrating that personological variables deserve more attention in future research. Despite the higher risks when contracting COVID-19, older adults appear to be more satisfied with life than younger adults. Elaboration of research in this field could yield practical benefits, such as providing resources to shield from the adverse mental health implications of the pandemic.

Introduction

The coronavirus SARS-CoV-2 or COVID-19 is a virus that affects the respiratory systems. The virus was first causing a series of acute atypical respiratory diseases in Wuhan, China (Yuki, Fujiogi, & Koutsogiannaki, 2020). From the outbreak in Wuhan in December 2019, the virus has rapidly spread on a global level and the World Health Organisation (WHO) declared it a global pandemic. The pandemic has forced authorities of nations to enter a lockdown state that aims to prevent the further spread of the virus and gain some control over it. The lockdown entails a shutdown of ordinary life, regulating people to stay at home, work from home, minimize social contacts and renounce most of their past daily life activities. Thus, the pandemic has more impact on an individual than only the direct health implications caused by an infection with COVID-19. While vaccines are being developed and administered to give people immunity against the virus, other problems created through the pandemic tend to be less addressed. One affected area is psychological health and life satisfaction is an important factor of the latter. In this thesis, the possible changes in life satisfaction before and during the pandemic will be assessed.

Life Satisfaction as a part of subjective well-being

Life satisfaction has been recognized as an important distinct part of subjective well-being. In recent years positive psychology has become an important new direction for psychology. Contrary to the traditional focus on negative emotions it instead focuses on positive emotions. Aligning with the growing relevance of positive psychology in research is the focus on the experience of happiness or subjective well-being (Pavot, & Diener, 2008). Subjective well-being relates to a person's cognitive and affective evaluation of life as a whole. This evaluation includes emotional reactions to events, cognitive judgements of satisfaction and fulfilment. Mostly, subjective well-being is associated with a hedonistic approach (Deci & Ryan, 2008). Life satisfaction is an important and distinct construct of subjective well-being, forming its structure together with positive affect and negative affect. Life satisfaction represents evaluative judgement, as it is conceptualized as a cognitive evaluation of one's life. Furthermore, although related to the affective aspects of subjective well-being it is partially independent of the latter (Pavot & Diener, 2008).

Variables in the context of Life satisfaction

Previously, different variables could be associated with life satisfaction. These include, but are not limited to, health, social contact, activity, social support, coping style and personality,

but also demographic variables such as age. Heller, Watson and Ilies (2004) have put forward two basic theoretical approaches: the top-down and bottom-up approach. The top-down approach emphasizes the role of personological variables, while the bottom-up approach focuses on a situational explanation encompassing the role of situations, events, and context (Heller, Watson & Ilies, 2004). In previous life satisfaction research, bottom-up models were quite popular, but due disappointing findings for bottom-up factors, together with new emerging behavioural genetic data and stability findings, a shift has taken place more towards the top-down approach (Heller, Watson & Ilies, 2004). Yet, Heller, Watson & Ilies (2004) rate this shift as "premature" and do note that there still one potentially important bottom-up factor in life satisfaction: "individual differences in domain satisfaction". Domain satisfaction relates to a certain domain of life, influenced by objective situational factors, which one can feel satisfied about (e.g., job or marriage) and has been found to be substantially associated to life satisfaction (Argyle,
2001).

In their own study, Heller, Watson and Ilies (2004) stated evidence suggest that the top-down approach is much more influential on a person's life satisfaction than the situational nature of the bottom-up approach. Findings revealed that deviations from one's usual life patterns can change an individual's life satisfaction. Yet, this change seems to be only temporary and even when facing extreme hardships or great success people seem to adapt, resulting in only little long-term change of life satisfaction (Heller, Watson & Ilies, 2004). Proposed by the adaptive calibration model (ACM), individuals who use positive coping strategies will adapt to stressful situations and environments quicker and better, resulting in an improvement of psychological health and well-being (Del Guidice, Ellis, & Shirtcliff, 2011). This further shows that the top-down approach has a great influence on our life satisfaction. Based on the top-down approach, Heller, Watson and Illies (2004) also found that four out of five Big Five traits are substantially associated with life satisfaction. These traits are neuroticism, extraversion, agreeableness, and conscientiousness. Thus, the situational impact on life satisfaction of the bottom-up approach appears to be there but only minor, when compared to the top-down approach. Nevertheless, the situational influence of the pandemic should not be disregarded completely, as it could have impact on several life satisfaction domains.

Personological factors seem to play an important part in keeping life satisfaction in place during challenging situational events. Attitude is another personological factor that could be associated with life satisfaction. Attitude relates to an individual's overall evaluation

of something in their life and influences their behaviour as well (Maio, Haddock, & Verplanken, 2018). For example, the effect of knowledge and attitude about ageing could be traced to have a significant effect on life satisfaction in a Korean sample (Suh, Choi, Lee, Cha, & Jo, 2012). Further, in a study conducted by Iyer and Muncy (2016) not consumption itself, but the attitude of consumption was found to be related to life satisfaction.

Two demographic characteristics that have been studied in the light of life satisfaction are age and gender. Age has been found to be consistently related to life satisfaction. Earlier results of how age and life satisfaction are related appear to be mixed. In one study, aging was associated with a decrease of life satisfaction explained by the author as a cohort effect due to the controlled nature of the study (Chen, 2001). In another, older individuals were found to be more satisfied with life than younger individuals, indicating a positive relationship between age and life satisfaction, this difference is according due to a different cognitive evaluation in higher age (Lewinsohn, Redner, & Seeley, 1991). Gender has been found to only have small to no direct effect on life satisfaction. However, not gender but the adherence to gender roles have been identified as a significant part of life satisfaction in adults (Matud, Bethencourt, & Ibanez, 2014). It has been found that men and women with a self-concept including conventional attributes related to masculine and feminine gender roles have greater life satisfaction. Another explanation for gender differences is linked to the social role theory (SRT). It states that gender benefits differently from positive coping. Men are more likely to be optimistic, active and responsible when faced with adversity. Females, on the other hand, tend to be more emotional, rely on others and hold negative expectations during difficult times (Li, Wang, Cai, Sun, & Liu, 2021). Regarding life satisfaction, this means that women are less satisfied compared to men due to their differences in coping. There are also other demographic characteristics that appear to have an association with life satisfaction. These are for example education, wealth, and physical attractiveness. However, this association appears to be only of weaker nature (Lewinsohn, Redner, & Seeley, 1991).

COVID-19 and Consequences for Mental Health

While COVID-19 poses a threat to an individual's physical health, one's psychological health does not remain unharmed either. Generally, public health emergencies can affect the health, safety and well-being of individuals and communities. These implications can include but are not limited to, insecurity, emotional isolation, insecurity, work and school closures or economic loss (Pfefferbaum & North, 2020). Now, these implications can translate into a range of consequences ranging from emotional reactions, unhealthy behaviours to non-

compliance with public health directives. Previous research engaged in disaster mental health found that emotional reactions, including for example distress or psychiatric conditions, are ubiquitous in affected populations (Pfefferbaum & North, 2020). Individuals are not only psychologically affected by the virus itself but also measures taken by the government such as mass home-confinement directives. The numerous emotional outcomes of people being quarantined can include stress, depression, irritability, insomnia, fear, confusion, anger, frustration, boredom or stigma linked to being quarantined, a review conducted by Brooks et. al (2020) shows. It was also found that these outcomes may not only last while quarantine measures are in place but also post quarantine. In addition, stressors that are not solved by lifting the lockdown may cause further distress. Financial loss that is caused by people being unable to work during the lockdown was found to be a risk factor for symptoms of psychological disorder, evoking both anger and anxiety in individuals several months post quarantine (Brooks et. al, 2020).

In accordance, other conducted research reveals that the psychological effects of COVID-19 are vast and could have a lifelong psychological impact on the population (Rahman, Muralidharan, Quazi, Saleem, & Khan, 2020). In their paper, Rahman, Muralidharan, Quazi, Saleem and Khan (2020) imply that more extensive research on the psychological effects of the pandemic would be valuable. Most initial studies find that the pandemic can take a great toll on an individual's mental health (Pfefferbaum & North, 2020; Brooks et. al, 2020; Cullen, Gulati, & Kelly, 2020; Dong, & Bouey, 2020; Rahman, Muralidharan, Quazi, Saleem, & Khan, 2020).

Life Satisfaction and the COVID-19 Pandemic

Life satisfaction, as a part of subjective well-being, is a considerable factor during a crisis and research has shown that public health emergencies can have a great impact on people's well-being. However, because life satisfaction relates to a subjective life evaluation of an individual, it can also remain stable during these events. Stress, illness, and various evoked problems are objective factors that indeed play an important risk factor to mental health, but do not necessarily impact our life satisfaction in a similar way. Thus, it remains an interesting question how life satisfaction affects or is affected in a crisis such as the corona pandemic. Previous studies found that life satisfaction indeed takes up an important role during the pandemic. Satisfaction with life was associated with lower perceived stress, weakening the effect of stress on oneself, leading to more health beneficial positive behaviours and therefore also to better physical health (Gori, & Di Fabio, 2020). In their study, Gori and Di Fabio

(2020) investigated factors that could aid in strengthening the role of variables, which could protect from the distress caused by the pandemic. The study examined sample of 1102 Italian respondents, experiencing the measures of the lockdown in 2020. They could confirm previous findings that life satisfaction acts as a protector against corona related stress. Similarly, related to the COVID-19 situation greater satisfaction with life led to overall better mental health outcomes (Trzebiński, Cabański, & Czarnecka, 2020).

Yet, in accordance with the previously found negative effects of the pandemic on general mental health, research has also found negative effects on life satisfaction. One study found that the fear associated with COVID-19 can diminish life satisfaction. The fear of COVID-19 was not only associated with a decrease in life satisfaction but also with an increase in depression, anxiety and stress (Satici, Gocet-Tekin, Deniz, & Satici, 2020). Another study found that the lack of social participation due to mass home confinements was associated with lower life satisfaction levels (Ammar et. al, 2020). Generally, research suggests that life satisfaction has declined in 2020 compared to before the pandemic. In a Norwegian study, adolescents were invited to conduct an online survey. Results showed a marked reduction in life satisfaction after the introduction of COVID-19 related restrictions (Von Soest, Bakken, Pedersen, & Sletten, 2020). Another study compared Canadian life satisfaction scores using large sample surveys. They found a decline in life satisfaction among Canadian residents, comparing scores from 2018 with scores from 2020. They report that the change is making up one-third of the difference between the highest and lowest national life satisfaction averages stated in the World Happiness Report (Helliwell, Schellenberg, & Fonberg, 2020).

Research that has to some extend also investigated demographic variables in particular, such as age or gender. One study found that examining older individuals, they did, contradictory to expectations, rate their quality of life, well-being, life satisfaction and quality of sleep better during the pandemic than younger control groups (Bidzan-Bluma et al., 2020). In another study, adolescents were found to show a significant decrease in life satisfaction and an increase in anxiety and depression symptoms from before the pandemic until 2 months into it (Magson, et al., 2021). Age was not found to be a moderating factor for change in anxiety or depression variables, however. One could expect that older individuals are more susceptible for fear of higher lethal consequences when contracting the corona virus. After all, fear of COVID-19 was found to be a major factor in the decline of life satisfaction (Satici, Gocet-Tekin, Deniz, & Satici, 2020). Contrary and in support of research findings, it could be argued that, aside from the virus, other consequences that followed the pandemic are not

affecting older individuals very much. The regulatory steps taken by the government mostly affected younger and middle-aged adults. Older adults are usually retired and do not follow a regular work routine anymore. Thus, they are less likely to be confronted with the fear of financial loss or their adjustment to home office. They do also not take part in as many social activities as younger people do for example. It could also be, that due to their high age they are more satisfied having lived a long life already, being not exposed to worrying about the future. Also, because they have the most life experience, they are able to stay more composed when faced with hardships.

Gender was found to be a moderator between self-compassion, positive coping and life satisfaction, thus indirectly influencing life satisfaction during the pandemic (Li, Wang, Cai, Sun & Liu, 2021). According to previous research, females are more emotional, relying on others and holding more negative expectations during difficult events, which would result in females being less satisfied during the pandemic. Men on the other hand, have been found to more optimistic, active, and responsible resulting in a better way of coping during adversity, leading to higher life satisfaction than females (Li, Wang, Cai, Sun & Liu, 2021).

It is suggested, even essential, that our knowledge is expanded further on the topic. Although previous study made some useful investigations, most of the studies are limited to life satisfaction in a combination with other constructs such as coping, stress or defence mechanisms. One benefitting addition to research would be a longitudinal study with a large representative sample because most existing studies have been cross-sectional. For example, Ammar et al. (2020), although making an important investigation with a survey over several continents, criticize their research for being of cross-section design and due to the use of preliminary data, not studying for any moderation effects of demographic or cultural variables. Unfortunately, studies comparing life satisfaction from before and during the pandemic are rare, and sometimes also rely on a limited sample, such as only studying life satisfaction of adolescents (Von Soest, Bakken, Pedersen, & Sletten, 2020; Magson, et. al, 2021). The profound investigation could also reveal more information about the relation to demographic variables such as age and gender. As previous research suggested for gender, examining a moderating role of age and gender between time and life satisfaction could be valuable. Finally, this study will also examine how attitude regarding the lockdown could influence life satisfaction. Attitude is tied directly to our behaviour (Maio, Haddock, & Verplanken, 2018) and thus, attitude related to the pandemic shapes also behaviour of following and adhering to rules and guidelines during the pandemic. These might entail wearing a mask, keeping distance or staying at home. Research on the matter could give

important insights on individual differences in perception of the pandemic and how it is related to one's life satisfaction.

This study could provide valuable resources for designing interventions to preserve psychological health during and after the pandemic. After all, life satisfaction has been identified to be a beneficial factor in buffering distress related to COVID-19 (Gori, & Di Fabio, 2020). For instance, Ammar et al. (2020) suggest in their study, to mitigate the negative effects of mass home confinement, promoting social inclusion through ICT-based solutions would be beneficial. Investigating related variables further has not only the benefit to add more knowledge but also to tailor possible interventions better to target groups. Explanatory, an intervention approach would vary depending not only on basic characteristics of target groups but also how their state of subjective well-being relates to the pandemic situation. Middle-aged people may have different needs and worries to address during the pandemic such as fear of losing their job, being unable to remain financial liquidity or providing adequate care for their children during home office work times. Thus, designing an intervention for people to aid them with the psychological toll the pandemic demands, more specific knowledge can provide a better fit for the respective target group. Thus, the aim of this study is not only to examine life satisfaction during the COVID-19 pandemic but also to research the effects of two demographic variables in that relationship (age and gender) and lastly what role corona related attitude could play. Consecutively, four research questions have been put forward:

RQ1: How is life satisfaction associated with the COVID-19 pandemic?
RQ2: What individual differences in level and change of life satisfaction are found between different age groups?
RQ3: What individual differences in level and change of life satisfaction are found between different genders?
RQ4: What individual differences in level and change of life satisfaction are found between different corona related attitudes?

Methods

Design

To examine the research questions a longitudinal study design has been used. This study used data from the Dutch LISS (Longitudinal Internet Studies for the Social Sciences) panel, giving access to data for a large random sample size. Questionnaires in the LISS panel are filled out on a monthly basis by participants. In this study, modules from 2018, 2019 and 2020 have been used. Data was selected from the "Background Variables", "Personality" and finally the "Effects of the outbreak of COVID-19" modules. From the "Personality" and "Background Variables" modules, three LISS panel data sets have been used in this study. The "Wave 12" set, which was measured from 04-05-2020 until 30-06-2020, a time period where the first corona lockdown was endured. The second set, "Wave 11" originated from the previous year measured from 06-05-2019 until 28-05-2019. The final dataset "Wave 10" consists of data that was measured from 27-05-2018 until 26-06-2018.

Participants

The LISS panel is part of the MESS project, consisting of 5000 independent households comprising around 7500 individuals (lissdata.nl). The panel is based on a true probability sample of households drawn from the population register of statistics Netherlands. Participants that have no access to the internet or a computer have been provided with such. While participants usually complete an online survey every month, the personality questionnaire, which is relevant for this study, is completed on a yearly basis. For this study, the overall sample was reduced to a size of 3759 participants. This size consists of all participants who consistently filled out the relevant questionnaires over three years, from 2018 until 2020.

Table 1: Characteristics of participants

Characteristics of participants (n=3759)	
Sex	
Male	1776 (47.2%)
Female	1983 (52.8%)
Age in 2018 (years)	
Mean (*SD*); range	53.92 (17.33); 16-100
Age in groups (years, n)	
Young Adults (18-35)	686
Middle Aged Adults (36-55)	1091
Old Adults (>55)	1982
SWLS Scores 2018	
Mean (*SD*)	25.30 (5.59)
SWLS Scores 2019	
Mean (SD)	25.35 (5.75)
SWLS Scores 2020	
Mean (SD)	25.61 (5.63)

The characteristics table (table 1) shows the gender composition of the sample. The distribution is not equal, as female participants were more present. Also, the table shows the mean age and range in years of participants. Older people were mostly present in this study, followed by middle-aged adults and lastly younger adults. The "SWLS Scores x" row indicates the mean measured life satisfaction for each of the 3 years respectively.

The possibility of selection effects was also analysed. In comparison in 2018, a total of 5792 participants filled out the relevant “Personality” module and the related SWLS questions. In this sample an age mean of 51.32 was measured and 2651 (45.8%) participants

were male, while the majority was female with 3141 (54.2%) participants. In the module, the mean of the total SWLS scores was measured at 25.17 (sd=5.65). The quite similar distributions of the complete sample from the 2018 module and the reduced sample of this study indicate that there is no selection effect.

Measures

Beyond questions that are relevant for demographic data, for life satisfaction, the Satisfaction with Life Scale (SWLS, Diener et al., 1985) has been used in the surveys to measure the construct of life satisfaction. The instrument consists of 5 items making it quite short. Despite its brevity, the instrument has shown to possess good psychometric properties (Pavot & Diener, 2008). Also, significantly strong associations could be established with other measures of well-being, confirming convergent and divergent constructs validity of the instrument. To test for internal consistency in this study, reliability analyses were computed for the SWLS at each time point. Cronbach's Alpha ranged from 0.90 in 2018, 0.91 in 2019 and lastly 0.91 again in 2020. All these Cronbach's Alphas relate to an excellent internal consistency (Pallant, 2013). The SWLS asks the respondents to rate 5 items on a Likert response scale ranging from "1=strongly disagree", "2= disagree", "3= slightly disagree", "4= neither agree nor disagree", "5= slightly agree", "6= agree", to "7= strongly agree." The 5 to be rated statements are as following: "In most ways my life is close to my ideal", "The conditions of my life are excellent", "I am satisfied with my life", "So far I have gotten the important things I want in life", and finally "If I could live my life over, I would change almost nothing". To compare the impact of corona to previous years without corona, the SWLS was administered at three points in time.

Besides life satisfaction, related variables, gender, age and corona attitude variables were also selected for analysis from the data sets.

Age was divided into age groups, from younger adults (18 to 35 years), middle aged adults (36 to 55 years), and older adults (older than 55 years). These age ranges were set on the basis of a study from the field of psychology (Petry, 2002).

Gender was categorized in female and male participants. Therefore, participants could answer with either "Male" or "Female".

The corona attitude variable was comprised of 7 questions whether a respondents would follow corona related regulations (for example: "Avoid crowded places, change school or work arrangements, keep a distance from others"). Questions could be answered by "Yes"

or “No”. Further the question “Would you stay at home?” was added into the variable. This question could be answered by “Yes”, “I myself work in a crucial profession” or “No”. These questions were recoded and then summed into the “Corona Attitude” variable ranging from a possible score of 0-9. The scores were then categorized into “negative attitude” (ranging from 0-3), “neutral attitude” (ranging from 3-6) and “positive attitude” (ranging from 7-9). For this scale, a reliability analysis resulted in a Cronbach's Alpha of 0.53 which relates to poor internal consistency. Although as items of this scale are below 10, it is more difficult to reach a high Cronbach's Alpha (Pallant, 2013). Generally, Cronbach’s Alpha should be at least >0.5 for scales with less than 10 items, which this scale just passes. In addition, a factor analysis was conducted resulting in a Kaiser-Meyer-Olkin (KMO) measure of 0.67 and a significant Bartlett’s test (p=0.000, df=28). These values appear appropriate for a factor analysis. The suggested minimum KMO value for a factor analysis is >0.6 (Pallant, 2013).

Table 2: Factor Analysis Correlation Matrix

Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Which of the following recommendations did you act upon in the past week? Avoid crowded places (1)	1	0.37	0.32	0.08	-.02	0.01	-.41	-.06
Which of the following recommendations did you act upon in the past week? Avoid public places (2)	0.37	1	0.22	0.07	0.04	0.09	-.20	-.09
Which of the following recommendations did you act upon in the past week?	0.32	0.22	1	0.03	-.02	-.01	-.36	-.02

Keep a distance from others (1.5 meters) (3)								
Which of the following recommendations did you act upon in the past week? Change school or work arrangements (4)	0.08	0.07	0.03	1	0.12	0.03	-.09	.07
Which of the following recommendations did you act upon in the past week? Quarantine yourself because you have symptoms (5)	-.02	0.04	-.02	0.12	1	0.13	-.03	-.02
Which of the following recommendations did you act upon in the past week? Quarantine yourself even if you do not have symptoms (6)	0.01	0.09	-.01	0.03	0.13	1	-0.05	-.12
Which of the following recommendations did you act upon in the past week? None of the above (7)	-.41	-.03	-.34	-.09	-.03	-.05	1	0.07

Would you stay at home? (8)	-.06	-.09	-.03	0.07	-0.2	-.12	0.07	1

Notes. Extraction method; principal components; Rotation method; Direct oblimin.

The correlation matrix shows that no item has good factor values with all items. The highest factor loadings are at 0.37 with item 1 and 2. The lowest measured items are item 7 and 1 with a value of -0.41. Generally, most factor loadings are close to zero. The correlation matrix determinant was measured to be 0.55.

Analysis

The statistical program for social sciences (SPSS, version 26) was used to analyse the collected data. First, frequency distributions have been computed to get more insight into demographics and scores on the SWLS over the years.

The normal distribution of SWLS variables at each time point was checked and resulted in Shapiro-Wilk scores that are significantly different and thus do not indicate a normal distribution ($p=0.00$, $df=3759$). To examine life satisfaction on three points in time, repeated measures anovas (RMA) were created. Although the RMA presumes a normal distribution, which the Shapiro-Wilk scores did not show, RMAs are robust in handling non-normal data, especially for larger sample size they are still able to produce relatively valid p-values. Further the Q-Q plots for each time point showed reasonable and sufficiently normal distribution.

The testing for the differences in variance between all pairs of groups indicates a p-value of 0.001. This indicates the assumption of sphericity is not met. The Greenhouse-Geisser Epsilon was measured (0.996) to be able to correct for the failed sphericity assumption by Mauchly's Test of Sphericity. Therefore, the Wilk's Lambda value will be used as a determinant for significance.

The variables that were examined consisted of one independent variables with three values for time (time points as for the years 2018, 2019 and 2020), one independent variable with three categories for age groups, one independent variable with two categories for gender and one independent variable for the measure of corona attitude. Three dependent variables were the total SWLS scores measured each year. RMAs were executed to answer each of the respective research questions. That is comparing means of SWLS over time (withing subject factors) and testing for significant differences and interacting effects of age, gender and

corona attitude (solely and combined) on life satisfaction as between-subject factors. Cohen's d was computed to analyse the strength of effects in SWLS scores. RMAs are an adequate tool of analysis to test for changes in mean scores at different time points.

Results

The Effect of Life Satisfaction over Three Years

How is life satisfaction associated with the COVID-19 pandemic? The multivariate tests yielded a significant Wilks' Lambda value ($F=12.634$; $df=2$; $p<0.001$) for the effect of time. Comparing the mean score from *table 1*, SWLS means increased by 0.05 from 2018 to 2019. This positive effect is continued by an increase of 0.26 from 2019 until 2020. Thus, the total increase from 2018 until 2020 makes up a 0.31 difference in SWLS mean scores. Therefore, life satisfaction is significantly higher in 2020, during the pandemic, than in previous years. Yet, the computing of Cohen's d indicates only a small effect of time on life satisfaction (Cohen's $d= 0.055$).

The Effect of Gender, Age and Corona Attitude on Life Satisfaction over Three Years

What individual differences in level and change of life satisfaction are found between different genders? The results for the Between-Subject-Effects test indicate a non-significant result of SWLS scores over time with gender ($F=0.02$; $df=1$; $p=0.89$). The interaction effect of gender with time was also not found to be significant ($F=0.5$, $df=2$, $p=0.61$). These findings indicate that men and women do not differ in terms of life satisfaction.

Table 3: Comparing Means of SWLS scores with Gender

Comparison of Gender and SWLS scores (n=3759)	
Gender	**SWLS**
Male	**Mean (sd)**
2018	25.29 (5.46)
2019	25.34 (5.59)
2020	25.67 (5.49)
Female	
2018	25.30 (5.70)
2019	25.36 (5.75)
2020	25.57 (5.75)

In table 3 the significant effect of time can again be observed. SWLS scores rise over the years, yet due to not being significant there are no found differences between genders. To conclude, there have been no individual differences in level and change of life satisfaction between genders identified.

Table 4: Comparing Means of SWLS scores with Age groups

Comparison of Age groups and SWLS scores (n=3759)	
Younger Adults	**SWLS mean (sd)**
2018	25.33 (5.48)
2019	25.29 (5.59)
2020	25.29 (5.77)
Middle-Aged Adults	
2018	24.81 (5.67)
2019	24.91 (5.81)
2020	25.34 (5.64)
Older Adults	
2018	25.56 (5.56)
2019	25.62 (5.80)
2020	25.88 (5.56)

What individual differences in level and change of life satisfaction are found between different age groups? With age groups as a between-subject variable in the analysis indicates a significant (F=6.04, df=2, p= 0.002) effect. Older age was found to be associated with higher SWLS mean scores. The Cohen's D of this effect is 0.05 and can therefore also be only considered small. Analysing the possible interaction effect of age group and SWLS scores, the measured value was not significant (F=2.25, df=4, p=0.062). Table 4 shows how life satisfaction scores are distributed in the respective age groups. Some differences are apparent, yet again these values are not significant. Thus, age groups significantly differ from each other in SWLS scores, but age does not interact as a moderator with SWLS over time.

What individual differences in level and change of life satisfaction are found between different corona related attitudes? In the next analysis, the corona attitude variable was added as a between-subjects factor for time. Examining the attitude towards corona related regulations and life satisfaction indicates a significant p-value (F=5.67, df=7, p=0.000002). In the interaction analysis, no interaction effect could be observed however (F=1.73, df=14, p=0.29). These findings indicate that corona related attitude is mostly positively associated to life satisfaction yet does not appear to be a moderator interacting with SWLS scores over time.

Table 5: Comparing Means of SWLS scores with Corona Attitude Scores

SWLS means and corona attitude scores of participants (n=3759)		
Year 2020	**Attitude Category (n)**	**SWLS mean (sd)**
	Negative (433)	24.43 (6.05)
	Neutral (3044)	25.78 (5.55)
	Positive (282)	25.68 (5.52)

Table 5 gives insight into a respondent's attitude regarding corona measures together with life satisfaction scores. The positive attitude category relates to high adherence to corona measures while the negative attitude score is related to not following or only partly following COVID-19 regulations. Most participants scored in the “Neutral” category which also relates to the highest SWLS mean score of all three categories.

Finally, examining the four-way interaction effect of age, gender and time also show no significant p-value (F=1.015, df=8, p=0,42).

Discussion

The aim of this study was to research the effect of the corona pandemic on life satisfaction. Life satisfaction was examined, using data from the LISS panel, over three years from 2018 until 2020, where the first lockdown took place. Additionally, several variables were included, namely gender, age and corona attitude. It was found that life satisfaction was overall the highest in 2020, compared to the previous years. Age, which was categorized into age groups, had a significant effect on life satisfaction. Higher age was found to be associated with higher life satisfaction, while younger participants had lower life satisfaction scores. Gender, however, was not found to have any significant effect on life satisfaction. Finally, the corona attitude appears to have a significant effect on life satisfaction, a lower corona attitude score was associated with lower life satisfaction, while higher scores related to higher life satisfaction.

Overall, the findings of this study seem to be only partly consistent with previous research. First, according to previous research, it was expected that in 2020 life satisfaction could be lower compared to previous years. Interestingly, it was found that life satisfaction was not declining, but rather increasing over the years, being the highest in 2020. This might relate to the bottom-up versus top-down approach debate, which was explained with the earlier study of Heller, Watson and Illies (2004). They proposed that personality variables are much more influential on life satisfaction than situational variables. The deviation of usual life patterns can change one's life satisfaction, but this change was observed to be only temporary and had little long-term effect on life satisfaction. After all, people are very adaptive and even when facing the hardest challenges, they can adjust to their new reality quite quickly. For example, during the lockdown, most people were not able to follow their usual work routines. They might see themselves confronted with worries about financial matters, especially those who could not work or engage in home office. Perhaps, because the lockdown was quite short, when measured, participants did perceive the drawbacks in a more positive light. Home-office work could be perceived as vacation and results also in more time that can be spent with the family. Another explanation could be that personological variables are indeed leading to the better scores, therefore the corona pandemic as a situational event does not have so much impact. Higher life satisfaction might be contributed by several personological factors that led to increase or stabilize life satisfaction in 2020 of the studied Dutch sample. During the circumstances of the corona pandemic in 2020, life satisfaction was recognized as possessing protecting qualities against a decline of mental health (Gori, & Di Fabio, 2020). On the other hand, subjective well-being appears to also decline due to fear of

COVID-19 (Satici, Gocet-Tekin, Deniz, & Satici, 2020). These mixed earlier findings, together with findings of this study lead to an increased interest on how life satisfaction might change throughout the rest of the pandemic. Previous research further found that life satisfaction is related to some demographic variables.

Investigations of age with life satisfaction showed that higher age was related to higher life satisfaction (Lewinsohn, Redner, & Seeley, 1991).
In this study, age and life satisfaction were associated similarly as in the findings of Bidzan-Bluma et al. (2020), where older aged participants had higher life satisfaction than younger or middle-aged respondent. Previous research did show that younger people struggle with life satisfaction during the pandemic, which could explain their differences compared to the higher scores of older and middle-aged people (Von Soest, Bakken, Pedersen, & Sletten, 2020; Magson, et al., 2021; Bidzan-Bluma et al., 2020).

Gender, on the other hand, was found to have no direct effect (Matud, Bethencourt, & Ibanez, 2014). Nevertheless, gender roles seem to have accounted for a moderating role in the relationship, between positive coping and life satisfaction (Li, Wang, Cai, Sun, & Liu, 2021 Adding to previous research, gender was not found to have a significant association with satisfaction with life over time and also there was no interaction effect of gender found. Previous research hinted that gender acts as a moderator variable in some circumstances (Li, Wang, Cai, Sun, & Liu, 2021). The SRT proposed that males are more optimistic, active and responsible during difficult times, while females are more emotional, rely on others and tend to hold negative expectations, leading males to have higher life satisfaction scores and females lower (Li, Wang, Cai, Sun, & Liu, 2021). However, it must be noted that in their study the differences found were related to an examination of gender roles and not gender itself. Therefore, it is difficult to compare these findings directly with this study.

The final research question aimed to examine how corona attitude can impact or is impacted by life satisfaction. The corona attitude was applicable to the year 2020 when the first lockdown took place. In this study, a significant effect between life satisfaction and corona attitude was observed. There is no interaction with time found, however. It remains to question, how they both are associated in detail. Previous research suggests that attitude impacts life satisfaction (Suh, Choi, Lee, Cha, & Jo, 2012; Iyer, & Muncy, 2016). Attitude shapes behaviour, which in this case is the following and adherence to rules such as wearing a mask in shops or keeping distance. Results show that individuals who are following these guidelines of the government are more satisfied than those who do not. On the other hand, people who feel resistance against those rules might be less satisfied with their new situation.

They might be more unwilling to give up their personal freedom and struggle with adapting to it resulting in lower life satisfaction. Meanwhile, people who do adhere to guidelines are perhaps more satisfied because they are able to adapt to this change. The ability to adapt to change (ACM) was found to be related to life satisfaction (Del Guidice, Ellis, & Shirtcliff, 2011).

Personological factors might also play a role here. Heller, Watson and Ilies (2004) argued that the Big-5 are related to life satisfaction. Agreeableness, for example, was in a higher state found to be associated with higher life satisfaction. Perhaps, individuals who are less agreeable and thus less satisfied with their lives do not accept the novel corona situation. Participants with neutral or positive attitudes might have a greater sense of common understanding for the lockdown, which is to protect risk groups.

Perception could also be a factor that plays a role, as life satisfaction belongs to the subjective part of well-being. Adults who score lower on the life satisfaction scale might worry more about themselves, their restriction of freedom and feel forced by the state to do something against their will, thus perceiving the lockdown as something vastly negative, a problem that is causing them more distress and leading to an even less satisfied state with life. On contrary, adults who score high might understand the common purpose of protecting the risk groups and therefore perceiving the measures as something positive and thus increasing their life satisfaction. Their positivity and satisfied state with life might provide them with more energy to endure and face the lockdown eventually. Finally, people who are part of the risk group could view the corona measures as something to protects them, even enhancing their life satisfaction in a way. This is especially, important because a large quantity of the sample consisted of older individuals making them more prone to a dangerous course of disease.

Strengths and Limitations

The large representative sample and longitudinal nature of the lisspanel dataset are advantageous compared to earlier studies on the matter that often relied on cross-sectional and convenient sampling study designs. The usage of data from the lisspanel adds valuable information on how life satisfaction changed with the beginning of the pandemic. Many studies focus on life satisfaction in combination with other constructs and how they interact with each other. The research adds important information by investigating multiple variables with a special focus set only on life satisfaction. Hereby, two variables were examined with life satisfaction and also a novel variable that was specifically created for the corona pandemic.

In this study, some limitations have to be considered as well. Most of the sample consisted of older-aged individuals (1982), followed by middle-aged individuals (1091) and lastly younger individuals which were only 686. This might influence the findings because older individuals appear to be more represented than younger ones. Another limitation was that the sample consisted only of participants who completed all necessary questionnaires over three years. However, compared to the 2018 data with all participants there is no big deviation, thus it should not be of great concern. Furthermore, the reliability and validity of the corona attitude scale were only measured to be just appropriate, which indicates that it might be good to develop a scale designed to specifically measure corona attitude in the future with better psychometric qualities. Lastly, data used from the pandemic year 2020 was drawn quite early when the lockdown just started, which makes any conclusion about life satisfaction during the pandemic to be taken carefully. Further, it might be difficult to discern or measure the impact of the pandemic it this early stage of the pandemic.

Future recommendations

For future research, it is suggested to keep investigating the phenomenon within the corona pandemic with life satisfaction as it is an important part of subjective well-being. To expand our knowledge, more variables could be studied. Demographic variables such as income or education, which have been found to influence life satisfaction as well. Also, profoundly investigating personological variables, for example, personality traits of the Big Five, could be valuable. As research showed before, extreme situations do not change life satisfaction on the long term, as life satisfaction is more relying on personological variables. To extent knowledge on the top-down versus bottom-up approach, domain satisfaction could be studied specifically, such as job satisfaction under pandemic circumstances. It would also be beneficial to execute research with the same variables, such as gender and age in order to confirm or refute findings of this study. Cross-cultural research might give more insight into how these findings could be more generalisable. Additionally, studying each age group separately and searching for additional variables that might have an influence and could explain the respective scores during the pandemic. Gender roles, instead of gender, could be studied to test for the results that Li, Wang, Cai, Sun and Liu (2021) found in China. Further, this study was conducted with data coming from the first lockdown, which suggests that more studies should be conducted using data from different time points of lockdowns. It would be interesting to see how life satisfaction changed under the light of the third lockdown, for example, as more lockdowns should result in less acceptance of the latter. Perhaps throughout

2020 to 2021, multiple shifts and levels of life satisfaction can be observed. To examine corona attitude better, a scale should be created, with acceptable psychometric qualities to measure the attitude related to corona and lockdown rules. Corona attitude and supposedly related variables, such as personality, for example, might offer interesting and valuable findings when studied. Finally, more engagement in studies about how subjective well-being functions, can result in practical benefits. So far there is a large focus on the physical health consequences of the virus and treatments with vaccines. Yet, there should also be a focus on how we can shield people from the psychological effects. Similar as it has been of concern in the study of Ammar et al. (2021). The better understanding of life satisfaction during the pandemic is the more it can help us to tailor and develop interventions to counter the negative psychological effects of the pandemic. By identifying the responsible factors for elevating life satisfaction, it is possible to mobilize life satisfaction as a resource to protect against adversity caused by the pandemic. Positive psychology in general could be able to benefit one's subjective well-being. Revealed by previous research and concluding to this study, it was found that younger individuals appear to have the lowest life satisfaction during the corona pandemic. This would provide evidence for a target group to focus on and provide them with resources such as positive coping skills or similar resources that shape their subjective evaluation in positive way. Exercises to help with gratefulness, such as the 3 good things exercise, the gratitude list, or exercises to benefit self-compassion such as the visualization or expressive writing task could provide an answer to the negative consequences implied by the pandemic. As these exercises actively engage the client with the help of positive emotions, it could indirectly shape their life satisfaction in a positive way. The higher life satisfaction can then unfold its protective qualities to further buffer mental health in adverse events, such as the pandemic.

Conclusion

This study gives new insights on well-being under the unique circumstances the world faces. Life satisfaction of people was found to significantly change over time, being the highest in 2020. Contrary to some previous studies, life satisfaction in 2020 was not lower compared to previous years. Age and corona attitude was observed to have a positive influence on life satisfaction. Gender, however, was not found to have any direct or indirect influence. Overall, findings suggest that indeed personological variables tied to a top-down approach might be more relevant to life satisfaction than the situational bottom-up approach. The pandemic can be regarded as a situational event, and findings add to the debate that personological factors

appear to have more impact on life satisfaction. The precise factors that may have influenced the life satisfaction scores in this sample, have yet to be determined. This needs to be retested with more studies conducted at later pandemic timepoints. Life satisfaction remains an important part of mental well-being, possessing protective qualities against adversity. Therefore, elaborately studying life satisfaction might be helpful in coming up with novel interventions to profit from the protective qualities of life satisfaction in the future.

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