Social Satisfaction, Loneliness, and Happiness before and during the COVID-19 pandemic

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Abstract

The COVID-19 pandemic resulted in governmental measures restricting the lives of people globally, increasing the psychological distress of the citizens. This study aimed to further investigate the constructs of happiness, social satisfaction, and loneliness by comparing pre- and during COVID-19 data among Dutch citizens. The data was retrieved from a true probability sample (N= 2876) selected by the Longitudinal Internet Studies for the Social sciences (LISS) panel. To analyse the mean differences, a Repeated Measures ANOVA as well as Cohen's d was computed, while the relationship between the variables was assessed with a multiple linear regression analysis. It was found that all three constructs remain rather stable despite the circumstances of a pandemic. Additionally, this study revealed that happiness can be predicted by the happiness score from the previous year. Social satisfaction and loneliness from the previous year also seemed to affect happiness but there is still room for interpretation whether the effects are large enough to declare them as relevant. Future implications include the further research in this area for example by looking into different demographics that might have influenced the outcome in order to get a deeper understanding of the pandemic's influence on the citizens. This is valuable to ensure a high well-being among the population and these insights are meaningful for future events and to counteract possible negative effects.

1. Introduction

COVID-19 and its restrictions in the Netherlands

The coronavirus SARS-CoV-2 also called COVID-19 affected and still affects various areas of peoples' lives since its outbreak in Wuhan in December 2019. The disease itself typically causes infected individuals to show respiratory symptoms that range from flu-like characteristics to severe cases that experience serious pneumonia (Lima, 2020). The latter patients run the risk of being hospitalized or even dying as a result of the disease. To illustrate the virus' contagiousness and deadliness in numbers, until now there have been approximately 543 million reported cases (6.3 million deaths) worldwide from which circa 8.3 million were detected in the Netherlands with 22.976 associated deaths (Johns Hopkins, 2022). That once more clarifies the immense health hazard that this virus poses.

In order to protect the population from that, governments fluctuate between different restrictive measures to stop the virus from spreading. In other words, the aim is to 'flatten the curve' which means preventing a steep peak of infections to reduce the healthcare burden (Thunström, 2020). While countries differ regarding the regulations' stringency, the

Netherlands in particular imposed the face mask duty, quarantine rules, traveling guidelines, and limitations regarding opening hours (Rijksoverheid, 2022). Other than that, there were several social distancing rules such as keeping 1.5 meters distance, cancelling mass gathering events, limiting sport facilities as well as school, university, and workplace closures (Rijksoverheid, 2022).

This new normality, namely living with those measures and their consequences, has been found to impact the physical as well as psychological health of individuals. Regarding possible bodily symptoms, da Silva et al. (2020) observed disruptions in sleeping and eating patterns caused by factors like barriers to healthy shopping due to restrictions, feelings of anxiety and fear, or changes in the biological rhythm. Also, problematic behaviour like drug and alcohol abuse, domestic violence, and internet addiction increased compared to times before the pandemic (Hsu & Henke, 2021; Sun et al., 2020). Besides the physical consequences, COVID-19 also impacts the psychological health and well-being of individuals. Research already discovered that negative constructs like frustration, boredom, loneliness, anxiety, worries, and uncontrolled fear increased in times of the pandemic compared to before (Serafini et al., 2020).

Now, this study aims at observing the changes in people's social integration and if those changes influence the populations' level of happiness. Those constructs have been chosen because COVID-19 and especially the imposed social restrictions changed the daily lives of people to a great extent and could possibly be one of the main reasons for the decrease in well-being that has been mentioned before. Meaning, people had to adapt to new routines since they could not stick to their usual social activities due to governmental policies. Thus, this study wants to investigate if there is a change of social satisfaction, loneliness, and happiness during the pandemic compared to before and if those variables affected the citizens' happiness level. In order to get a better understanding of what these variables include, they will be explained, and already existing literature will be presented.

Social integration in general

Both variables called social satisfaction and loneliness belong to the overarching construct of social integration. However, there is a need for clarification of this term because social integration can be interpreted in different ways. This study means social integration can be understood as interchangeable with terms like social support or social interactions. A definition that supports this view is from Holt-Lunstad and Lefler (2019) who conceptualize social integration as "the extent to which individuals participate in a variety of social

relationships, including engagement in social activities or relationships and a sense of communality and identification with one's social roles" (p.1). Two core parts of social integration are the individual's satisfaction with their social ties as well as their level of loneliness.

As the first part of social integration, there is the construct of social satisfaction. It includes the overall level of subjective contentment with the individual's social interactions instead of the actual quantity of social activities (Ferreira-Alves et al., 2014). Research in this area is consistent and highlights the importance of strong relationships and community integration for peoples' health (House et al., 1988). The lack of social contacts has been repeatedly found to be linked to mortality. Firstly, more isolated people are more likely to commit suicide (House et al., 1988). Secondly, people that have fewer social ties are at higher risk of dying from various diseases like heart failure, cerebrovascular and circulatory diseases, or cancer (Berkman, 1995). Reasons for those health-related deaths may be based on the fact that people with strong social networks are more likely to engage in positive health behaviours like cancer screening, higher adherence to treatment, or less smoking (Mermelstein et al., 1986; Steidl et al., 1980). Regarding COVID-19, a higher degree of social connectedness during the pandemic seems to buffer against COVID-19-related stress and worries as well as less fatigue compared to people with fewer social contacts (Nitschke et al., 2021). A study done by Cheng et al. (2020) reports a drop in social satisfaction comparing 2018 with January 2020.

Loneliness

As a second variable of social integration, the construct of loneliness has been introduced. Although loneliness can be perceived as subjective, researchers agree on understanding loneliness as feeling a discrepancy between the social relationships an individual aspires to have and the ones the person has at the moment (Heinrich & Gullone, 2006). Thus, there is no objective number of friends or social interactions where a person will feel lonely, but people differ in their threshold. This explanation of loneliness highlights that it is about an unfulfilling emotional state in which the affected individual might feel sad, depressed, empty, isolated, abandoned, bored, unattractive, ashamed, or insecure (Sønderby & Wagoner,2013). This unpleasant feeling is a predictor of psychological distress including depression or suicidal ideation and is generally associated with lower life satisfaction as well as lower subjective well-being (Mellor et al., 2008).

Already existing studies assessing the impact of COVID-19 on loneliness is inconsistent. Some researchers found no significant mean-level changes (Luchetti et al., 2020;

Peng & Roth, 2021). Meanwhile, other studies indicate a negative impact of the COVID-19 pandemic on loneliness (Ausín et al., 2021, Elran-Barak & Mozeikov, 2020; Groarke et al., 2020; Killgore et al., 2020). This suggests a necessity for more research. Nevertheless, one has to mention the limitation of many studies that lack pre-COVID data and for this reason rely on retrospective self-report of their perceived loneliness before the pandemic (Dahlberg, 2021). This risks a memory bias so that people have troubles indicating valid scores which will be prevented during this study because this LISS panel is a longitudinal study and participants indicated each year their momentary scores.

Happiness

After getting insight into what social integration is, it is valuable to see what impact the unique circumstances of the COVID-19 pandemic have on the public's level of happiness. Meaning, especially at times when exactly those healthy social interactions are restricted or even totally banned, it would be an obvious conclusion to suspect a decrease in happiness. Happiness as a construct has been chosen because of its meaningfulness. Nearly everyone claims to strive for happiness since it often stands as a synonym for a good mental state and a high life satisfaction thus indicating great psychological well-being (Veenhoven, 2012). However, compared to the terms 'life satisfaction' and 'well-being' it has been considered as generally better known across the population and therefore less prone to misunderstanding while assessing (Ng, 2015). A study done by Oishi et al (2013) compared the definition of happiness across 24 countries explaining happiness as feeling joy, gladness, euphoria, pleasure, contentment, and positive affect in addition to the lack of inconvenience, trouble, or negative emotions. There are countless definitions of happiness, but this study focuses on the one by Lu and Shih (1997) namely "an internal experience of a positive state of mind" (p.182).

Existing literature about the linkage of COVID-19 and happiness is, just like loneliness, inconsistent. The World Happiness Report 2021 mentions a relatively stable level of happiness regardless of lockdown, social restrictions, and changes in social activities (Helliwell et al., 2021; Petrovič et al., 2021). On the contrary, other studies found a reduction in happiness as a result of COVID-19 factors (Greyling et al., 2020; Zhao et al., 2020). These inconsistent findings propose a need for further research. Additionally, many of the studies were carried out in 2020 while there were a high number of COVID-19 cases and even complete lockdowns for a longer period of time in 2021 which might have affected the amount of happiness.

Relating happiness to the two concepts that were previously introduced namely social satisfaction and loneliness, literature shows a clear negative correlation between loneliness and

happiness. Meaning, higher levels of loneliness lead to decreased feelings of happiness (Heinrich & Gullone, 2006; Yavus, 2019). For social satisfaction, a positive relationship has been found thus more social support, is a predictor of higher rates of happiness (Frey, 2018; Holder & Coleman, 2009: Moeini et al., 2018).

This study

After the general finding that social satisfaction, as well as loneliness seem to affect happiness, it is relevant to see if this relation stays consistent in times of a pandemic or if changes can be detected among the Dutch citizens. In turn, this information is valuable to understand whether interventions might be needed to address happiness during pandemics, for instance by focusing on social interaction or loneliness. In contrast to already existing literature, this study has the advantage of a longitudinal design and also takes the year 2021 into account. This puts the scores from 2018, 2019, and 2020 into perspective and gives a better understanding if the variables really changed as a result of the pandemic. Additionally, random sampling and the inclusion of all age groups guarantee more generalizability. Considering the social restrictions, it is expected to negatively affect the three constructs, resulting in the Research Question: To what extent do social satisfaction, loneliness, and happiness change before and during the COVID-19 pandemic, and are social satisfaction and loneliness associated with happiness before and during the pandemic? To be precise, these six associated hypotheses are going to be tested:

H1: Happiness is lower during the COVID-19 pandemic than before.

H2: Social satisfaction is lower during the COVID-19 pandemic than before.

H3: Loneliness is higher during the COVID-19 pandemic than before.

H4: Happiness of the previous year is positively related to the happiness level of the year in question before and during the COVID-19 pandemic.

H5: Social satisfaction of the previous year is positively related to happiness before and during the COVID-19 pandemic.

H6: Loneliness from the year before is negatively related to happiness before and during the COVID-19 pandemic.

Methods

2.1 Design and Procedure

The data used in this study has been extracted from the *Longitudinal Internet Studies for the Social Sciences* (LISS) panel which is regularly conducted by the CentERdata research institute in Tilburg. This panel is an element of the MESS (Measurement and Experimentation in the Social Sciences) project funded by the Netherlands Organization for Scientific Research (NWO). For that, approximately 7.500 Dutch individuals have been selected via a true probability sampling method from the general population registered by Statistics Netherlands. Before taking part in the survey, every participant gave explicit informed consent. Then, the participants conducted the 15 to 30 minutes long online questionnaire every month either on their own device or they got equipped with a simple computer by the organisation. Non-respondents received a reminder to complete the survey twice. All members received a compensation of 15 euros per hour.

A unique feature of this panel is its longitudinal characteristic since it offers repeated measures of the variables over time which allows comparison. Despite a great range of topics that are covered by the LISS questionnaire e.g. health, family situation, work situation, or religion, this study focuses on the social integration and leisure as well as the personality data set. The independent variables *social satisfaction* and *loneliness* were selected from the social integration survey and *happiness* as the dependent variable was derived from the personality data set. The happiness level of the previous year will also be integrated as an independent variable to account for stability of the construct.

In order to investigate changes due to the pandemic, this study used the data from 2018 and 2019 as pre-COVID scores, and data derived in the years 2020 and 2021 count as scores during the pandemic. The questionnaires intended to measure the dependent variable called happiness always get administered around May (2018, 2019, 2020, 2021) while the questionnaires for social satisfaction and loneliness get carried out in October (2018, 2019, 2020, 2021). To ensure understandability of the paper and to prevent confusion, the waves of the same year have been combined and renamed to wave 2018, wave 2019, wave 2020, and wave 2021. For more information see Table 1.

Table 1.
Overview of Data Collection

Context		Variables	Data collection period	N invited	N complete (%)
Pre-COVID	Wave 2018	Happiness	May 2018	7039	5758 (81.8%)
		Satisfaction & Loneliness	Oct 2018	6586	5454 (82.8%)
	Wave 2019	Happiness	May 2019	6218	5021 (80.7%)
		Satisfaction & Loneliness	Oct 2019	5929	4972 (83.9%)
During COVID	Wave 2020	Happiness	May 2020	6969	5859 (84.1%)
		Satisfaction & Loneliness	Oct 2020	6680	5883 (88.1%)
	Wave 2021	Happiness	May 2021	6514	5309 (81.5%)
		Satisfaction & Loneliness	Oct 2021	6299	5006 (79.5%)

Note. N = number of respondents, % = percentage of respondents.

2.2 Participants

All in all, 2876 participants met the inclusion criteria for this study. These involved that one has to be at least 16 years old and constantly filled out the relevant questionnaires for wave 2018 to 2022. Regarding the sample population's characteristics, 1402 identified as male (48.7%) and 1474 as female (51.3%). The mean age in the baseline questionnaire (2018) was 57.9 (SD = 16.59) ranging from 19 to 103 years old.

Table 2.
Sample characteristics and descriptive statistics (N = 2876).

	N	%
Age in 2018		
15 – 24 years	113	3.9
25 – 34 years	243	8.4
35 – 44 years	285	9.9
45 – 54 years	419	14.6
55 – 64 years	615	21.4
65 years and older	1201	41.8
Gender		
Male	1402	48.7
Female	1474	51.3
Domestic situation		
Single	638	22.2
(Un)married couple living together, without child(ren)	1304	45.3
(Un)married couple living together, with child(ren)	721	25.1
Single, with child(ren)	114	4.0
Other	99	3.4
Education level		
Primary school	146	5.1
Intermediate secondary education (vmbo)	596	20.7
Higher secondary education (havo/vwo)	294	10.2
Intermediate vocational education (mbo)	690	24.0
Higher vocational education (hbo)	758	26.4

| University (wo) | 386 | 13.4 |

Note. N = number of respondents, % = percentage of respondents.

To check for selection effects, an independent t-test was computed for the year 2018 as a baseline. The means and standard deviation scores of the participants that filled out all relevant surveys in 2018 are compared to participants who have missing values. Although the differences between means were small throughout all variables (Table 3), it was found to be statistically significant for social satisfaction t (5294) = 2.23, *p* = .002 and happiness t (5673) = 3.561, *p* =.007 but not for loneliness t (3959) = -.05, *p* = .342. In other words, the means for happiness and social satisfaction are slightly higher for the people without missing values while there was no difference between the people for their loneliness scores. However, Cohen's d for happiness (d= -.09) and satisfaction (d= -.06) suggest that there that the difference is so small that one has to question its relevance, and the detected significance from the independent t-test may be explained by the large sample size.

Table 3.
Comparison participants 2018

	Selection bias	N	Min	Max	Mean	SD
Happiness	Participants with missing values	2799	0	10	7.40	1.32
	Participants without missing values	2876			7.52	1.24
Satisfaction	Participants with missing values	2420	0	10	7.20	1.61
	Participants without missing values	2876			7.29	1.51
Loneliness	Participants with missing values	1799	1	3	1.18	.33
	Participants without missing values	2162			1.18	.31

Note. N = number of respondents.

2.3 Materials

Happiness

The dependent variable happiness was assessed by a single item. It asked the participants to rate "On the whole, how happy would you say you are?" on a scale of zero to ten (0 = totally unhappy; 10 = totally happy). The participants also had the option to choose "I don't know". This happiness item has been derived from the European Social Survey (ESS) that gets administered in several different European countries where it also aimed to assess the population's happiness (Piper, 2015). Abdel-Khalek (2006) wrote about the psychometric properties of a single-item happiness scale and concluded good concurrent, convergent, and divergent validity as well as high test-retest reliability (0.86). The study also found that the item is significantly and positively correlated with the Oxford Happiness Questionnaire (Abdel-Khalek, 2006; Hill & Argyle, 2002).

Social Satisfaction

The first independent variable called social satisfaction has been assessed by one item too namely "How satisfied are you with your social contacts?". Participants could rate this item on a scale from one to ten (1 = not at all satisfied; 10 = completely satisfied). Prior to the display of the item, a short statement was given to clarify the term "social contacts" namely *"We understand social contacts in the following questions to be people you meet in 'real life', so not just on social media.".* Even though the LISS panel does not report any psychometric properties for this item, it can be compared with the item "How satisfied are you with your personal relationships?" which is derived from the Personal Wellbeing Index (PWI) (Tomyn & Cummins, 2011). A report about the PWI for the Netherlands shows good internal reliability with a Cronbach's alpha of 0.70 to .85 (Tomyn & Cummins, 2011; van Beuningen & de Jonge, 2011).

Loneliness

As a second independent variable, the participants' loneliness has been evaluated by several items. Originally, the items stem from the 11-item De Jong Gierveld Loneliness scale (De Jong Gierveld & Van Tilburg, 2006). However, the LISS panel used a 6-item short version of that scale with a two-factor structure measuring emotional loneliness (items 1, 5, & 6) and social loneliness (items 2, 3, & 4). As an instruction, a short text was shown saying "Can you indicate for each statement to what degree it applies to you, based on how you are feeling at present?". Next, six phrases were displayed that should be rated from one to three (1 = Yes; 2 = More or less; 3 = No). Some example items are "I have a sense of emptiness around me." or "There are enough people to whom I feel closely connected.". These examples show that it was necessary to recode several items since three items were positively while the others were negatively phrased before calculating the mean score of the participants. The psychometric properties indicate that the scale is a reliable and valid instrument across countries and age groups (De Jong Gierveld & Van Tilburg, 2006; De Jong Gierveld & Van Tilburg, 2010). The paper from De Jong Gierveld and Tilburg (2006) reports Chronbach's α coefficients that vary between .70 and .76 for the total adult population (N= 7244) which can be interpreted as acceptable. Moreover, it was found that the 6-item short loneliness scale correlates very highly (.95) with the 11-item original loneliness scale which means that the shortened scale has the advantage of time-effectiveness paired with good levels of reliability and validity (De Jong Gierveld & Van

Tilburg, 2006). This study reports a Cronbach's alpha of α = .78 for 2018 which can be interpreted as acceptable and α = .83 for 2021 which indicates a good internal consistency.

2.4 Data analysis

All analyses were conducted using the statistical package SPSS, version 26.0. After transferring the different waves into one dataset, all participants that did not meet the inclusion criteria or did not completely fill out all relevant surveys were excluded.

Starting the analysis, descriptive statistics (frequencies, means, standard deviations) were calculated to get an idea about the content of the data. There, broad changes in values can already be seen. For testing Hypothesis 1 to Hypothesis 3, Repeated Measures ANOVA (RMA) were computed to examine happiness, social satisfaction as well as loneliness at four time points (2018, 2019, 2020, 2021) and assess if there are significant differences across time. If Mauchly's test shows that the assumption of sphericity is violated, Greenhouse-Geisser epsilon will be used to correct the degrees of freedom when the epsilon value is below the cut-off value of .75 and the Huynh-Feldt epsilon value will be chosen if $\varepsilon > .75$. Next, the Bonferroni post hoc test reveals which changes in means over the years were significant (Tab. 4). To measure the effect size, Cohen's d was computed to retrieve a standardized mean difference and the effect was interpreted as trivial (d < .19), small (d= .20 - .49), medium (d=.50 - .79), or large (d > .80) (Téllez et al., 2015).

A Multiple Linear Regression was chosen to assess Hypotheses four, five, and six. The dependent variable is happiness, and the predictor variables are social satisfaction and loneliness from the year before as well as the previous year's happiness score. For interpreting the results, the beta coefficient will be considered and a significance of $p < 0.001$ will be interpreted as significant. This beta value's benefit is that the scores of the different variables are standardized against each other. Before carrying out this analysis, several assumptions for a multiple regression analysis were checked. Firstly, regarding the normality, the distributions were significantly non-normal for the variables happiness (W= .85, p< .001), social satisfaction (W= .85, p < .001), and loneliness (W= .64, p < .001) according to Shapiro-Wilk tests. The drawn histograms also indicate that there is no normality present because the distribution is skewed to one side, which normally suggests using nonparametric analysis. Although the assumption of normality is not met, several studies suggest using the dataset for a multiple linear regression anyway and question the importance of this assumption (Lumley et al., 2002; Williams et al., 2013).

Another assumption for using multiple linear regression analysis is that the relationship between the IVs and the DV can be characterised by linearity. Producing scatterplots for every relationship showed linear relationships for each IV with the DV. Next, multicollinearity among independent variables was ruled out because no correlation coefficient exceeded the cut-off score of 0.7 among two or more predictors considering the Pearson correlation as well as the Spearman's rho coefficients. The Collinearity statistics justify this interpretation. More precise, VIF values are never greater than the cut-off value of 10 and the Tolerance is never less than 0.1 (Happiness 2018: Tolerance= .81, VIF = 1.24; Social Satisfaction 2018: Tolerance =.67, VIF = 1.48; Loneliness 2018: Tolerance = .74, VIF = 1.36).

The following assumption is that the values of the residuals are independent. The Durbin-Watson statistic value should be close to 2 whereas values below 1 and above 3 give an indication for concern. The dataset met the assumption of independent errors (Durbin-Watson value = 1.995). The fourth assumption is homoscedasticity which means that the scatterplot of standardised residuals plotted against the standardised predicted values showed that the assumption was met in this study. Lastly, the P-P Plot of Regression Standardized Residual indicates that the dots appear to follow the regression line.

Generally, correlations are interpreted as very high (.91 to 1.00), high (.71 to .90), moderate (.51 to .70), low (.21 to .50) or very low (.00 to .20) in this study (Schmidt & Osebold, 2017).

Results

Change in Happiness

The Repeated Measures ANOVA (RMA) was calculated to investigate if there is a significant difference between the mean scores for the years 2018, 2019, 2020, and 2021. Mauchly's test shows that the assumption of sphericity is violated $\chi^2(3) = 114.54$, $p < .001$. Therefore, the degrees of freedom were corrected by using the Huynh-Feldt estimates ($\varepsilon = .97$). The RMA showed that there is an overall significant difference in means of happiness, $F (2.92, 8399.82) = 9.54$, $p < .001$. The pairwise comparison reveals that there is a significant change comparing 2018 to all the other time points (2019, 2020, 2021) (see Table 4). Interpreting these numbers would mean that happiness was highest in 2018 (M= 7.52) but then dropped significantly and stayed consistent during the next three years. As an alternative analysis, Cohen's d was calculated to determine the effect size of the difference between means. For happiness, Cohen's d ranged from d= .02 to d= .04 and can hence be considered negligible. The First Hypothesis

"H1: Happiness is lower during the COVID-19 pandemic (2020, 2021) than before (2018, 2019)" can be rejected.

Table 4.
Descriptive statistics N=2876

	Min	Max	Mean	SD	Mean differs compared to the year…
Happiness scores					
2018	0	10	7,52	1,24	2019, 2020, 2021
2019	0	10	7,47	1,3	2018
2020	0	10	7,45	1,31	2018
2021	0	10	7,42	1,34	2018
Social Satisfaction					
2018	0	10	7,29	1,51	2020, 2021
2019	0	10	7,27	1,55	2020, 2021
2020	0	10	7,16	1,76	2018, 2019
2021	0	10	7,19	1,71	2018, 2019
Loneliness					
2018	1	3	1.18	,31	2019, 2020, 2021
2019	1	3	1.17	,31	2018
2020	1	3	1.18	,32	2018
2021	1	3	1.17	,32	2018
Valid N (listwise)					

Note. SD= Standard Deviation; Bonferroni post-hoc test indicates which changes were statistically significant at the .05 level.

Change in Social Satisfaction

For the different time points of social satisfaction, the same applies to happiness namely that the Mauchly's test indicates a violation of sphericity ($\chi^2(3) = 123.11$, $p < .001$) and Huynh-Feldt estimates ($\varepsilon = .975$) will be used for correction. Here, $F (2.93, 8408.08) = 11.08$, $p < .001$ also indicates that the means of the different years differ significantly from each other. Again, analysing the pairwise comparison indicates that there was no significant change in social satisfaction from 2018 to 2019 as well as no significant change from 2020 to 2021. On the contrary, the decline in social satisfaction from 2019 to 2020 has been evaluated as significant which would indicate that the pandemic influenced the level of social satisfaction. Nevertheless, one must consider the considerably small amount of change and question the meaningfulness of the outcome. The calculation of Cohen's d verifies this in the way that even the change from 2019 to 2020 is irrelevant with d= .07. Therefore, the second Hypothesis "H2: Social satisfaction is lower during the COVID-19 pandemic (2020, 2021) than before (2018, 2019)" can be rejected.

Change in Loneliness

The RMA for all four time points of measuring loneliness found the same output as the two other variables. Mauchly's test indicates a violation of sphericity $\chi^2(3) = 70.29$, p < .001. Again, the ε > .75 suggests using the Huynh-Feldt estimates (ε = .971) for adjusting the degrees of freedom. The output claims another significant difference regarding loneliness across the different periods F (2.91, 4326.56) = 12.00, p < .001. The pairwise comparison shows that loneliness significantly decreased from 2018 to 2019 but all the following decreases were not found to be significant. The standardized mean difference defined by Cohen's d is so small that it cannot be considered as significant (d=.03). Thus, the third Hypothesis "H3: Loneliness is higher during the COVID-19 pandemic (2020, 2021) than before (2018, 2019)" can be rejected.

Relationship between social integration and happiness

To investigate the relationship between the independent variables and the dependent variable, a multiple linear regression as well as correlations are computed. The Pearson Correlation reveals that happiness of the previous year and the dependent variable happiness is always highly positively correlated, as an example the correlation of happiness 2018 and happiness 2019 is r(2876)= .71, *p* < .01. Although social satisfaction is significantly correlated with the dependent variable happiness as well, the size of the correlation is low and ranges from .42 to .45. Loneliness as an independent variable has a low and negative correlation with the dependent variable happiness ranging from -.31 to -.36.

The multiple linear regression analysis verifies the Pearson correlation outcome. It shows that happiness of the previous year can be seen as a predictor of happiness in the upcoming year. To be more specific, there has been an effect size of β = .59, p<.001 for 2019, β = .56, p<.001 for 2020, and β = .61, p<.001 for 2021. That means that the fourth hypothesis can be accepted and noted that the effect is quite strong. Next, social satisfaction is positively associated with happiness before COVID-19 in 2019 (β=.12, p<.001). Additionally, social satisfaction significantly affects happiness during the times of COVID-19 too, reporting β=.13, p<.001 for 2020 and β=.10, p<.001 for 2021. Leading to the acceptance of the fifth hypothesis but keeping in mind that the effect sizes are rather small ranging from β=.10 to b=.12. Regarding loneliness, there was a significant effect on happiness for 2019 (β= -.06, p<.001) as well as 2020 (β= -.09, p<.001) while the relationship in 2021 was not found to be significant (β= -.05, p = .018). Although the analysis indicates a significant relationship for the years 2019 and 2020, the beta coefficients are very small which means that one has to question its relevance.

Table 5
Pearson Correlation (N = 2876)

Variable	Happiness 2018	Social Satisfaction 2018	Loneliness 2018	DV: Happiness 2019
Happiness 2018	1			
Social Satisfaction 2018	.448**	1		
Loneliness 2018	-.319**	-.500**	1	
DV: Happiness 2019	.708**	.450**	-.314**	1

Variable	Happiness 2019	Social Satisfaction 2019	Loneliness 2019	DV: Happiness 2020
Happiness 2019	1			
Social Satisfaction 2019	.445**	1		
Loneliness 2019	-.357**	-.517**	1	
DV: Happiness2020	.691**	.445**	-.359**	1

Variable	Happiness 2020	Social Satisfaction 2020	Loneliness 2020	DV: Happiness 2021
Happiness 2020	1			
Social Satisfaction 2020	.438**	1		
Loneliness 2020	-.391**	-.482**	1	
DV: Happiness 2021	.701**	.416**	-.330**	1

Note. **. Correlation is significant at the 0.01 level (2-tailed).

Table 6.
Multiple Regression Analysis of Social Satisfaction and Loneliness for predicting Happiness (N = 2876)

Variable	B	SE	β	95% CI Lower	95% CI Upper	t	p
Happiness 2019							
Happiness 2018	.616	.018	.599	.581	.651	34.34	< .001
Social Satisfaction 2018	.106	.017	.122	.072	.138	6.37	< .001
Loneliness 2018	-.224	.066	-.062	-.352	-.095	-3.41	< .001
Happiness 2020							
Happiness 2019	.585	.019	.563	.548	.622	31.30	< .001
Social Satisfaction 2019	.106	.017	.126	.074	.138	6.430	< .001
Loneliness 2019	-.349	.072	-.093	-.491	-.208	-4.843	< .001
Happiness 2021							
Happiness 2020	.629	.020	.606	.590	.667	32.170	< .001
Social Satisfaction 2020	.078	.016	.098	.047	.109	4.962	< .001
Loneliness 2020	-.171	.073	-.046	-.314	-.029	-2.360	.018

Discussion

During the last years, individuals all over the world had to adapt to a new reality, including changes in their social life. Although everyone probably expects a decrease in

happiness and social satisfaction and an increase in loneliness due to the pandemic, this has to be proven. While the results for the variables happiness and loneliness clearly indicate no change comparing before and during COVID-19, the outcome for social satisfaction was indistinct. The first analysis (RMA) suggested a significant change in values from the year 2019 to 2020, which would lead to an acceptation of the hypothesis. However, calculating a standardized Cohen's d indicates that the effect is too low to label it as at significant. The overall conclusion therefore is that social satisfaction also did not significantly decrease due to the pandemic. Regarding the hypotheses about the relationship of the variables, one can conclude that the happiness level of the previous year had the strongest effect on the happiness year in the following year for all time points. Social satisfaction also significantly predicts happiness, but one has to question the small effect size. The same issue arises for the third variable called loneliness since the effect size is very small and even considered as not significant for 2021.

Summarizing the results, there are no significant differences between the means of happiness, social satisfaction, and loneliness comparing the different timepoints in regard to the pandemic. Firstly, the change in happiness levels was only significant from 2018 to 2019 which also means that the expected decrease from 2019 to 2020 was not detected. The standardized mean difference computed with Cohen's d justifies that the effect size is too small to be statistically significant. This can be interpreted in the way that happiness did not significantly decrease comparing before and during the pandemic. One could argue that happiness, in general, may be a quite stable construct and therefore the changes were not significant. Looking into that topic, there is a lot of debate around it. On the one hand, there is research that claims that not even a lottery win, or a spinal-cord injury will change the level of happiness in either direction (Brickman, Coates, & Janoff-Bulman, 1978). A particular theory behind that idea is the so-called set-point theory which states that solely our genetics and personality traits determine a person's individual level of happiness (Headey, 2008). The essence of that theory is that this determined happiness rate can fluctuate because of major live events but those deviations are only temporary, and people always bounce back to their natural set-point of happiness (Headey, 2008). On the contrary, there are also studies challenging this theory by reporting significant and long-lasting decreases in happiness after life events such as divorce, loss of a child, or constant unemployment (Lucas, 2007).

Concentrating on the context of a pandemic, this study's outcomes are verified but also contradicted by the previous scientific literature because research in this area is inconsistent too. Repeating the information from the introduction, there are some studies that actually found

a decline in happiness as a result of COVID-19 (Greyling et al., 2020; Zhao et al., 2020). While one could point out the flaw of Greyling et al. (2020) that they only included 128 participants, this would not account for the same results from Zhao et al. (2020) who have samples of approximately 4000 and 1500 randomly selected participants. Another thing one has to pay attention to is their sample from countries quite different from the Netherlands such as South Africa, New Zealand, Australia, and Hong Kong which questions comparability (Greyling et al., 2020; Zhao et al., 2020).

Whereas these papers report a difference, several studies argue that the construct of happiness remained stable despite the pandemic (Helliwell et al., 2021; Petrovič et al., 2021). All the mentioned studies that measured happiness in relation to the pandemic interestingly collected their data around March to May 2020 which is a clear difference from this study's survey publication in October 2020 ad 2021. An exception is Helliwell et al. (2021) who collected their data from March to December 2020, had a large sample size and the benefit of consulting 149 countries. The World Happiness Report from them is therefore the most reliable source to compare this study to (Helliwell et al., 2021). They also found that positive affect remained unchanged and life evaluation also seems to be stable (Helliwell et al., 2021). Linking all of these findings to this study, one has to question the impact of a pandemic on such a big construct like happiness. Also, there may have been unknown positive factors that buffer against negative consequences of the pandemic and the general level of happiness therefore evens out. Hence, there is a clear need for further research to investigate if changes in peoples' happiness levels are even possible and how serious a life event or circumstance must be to have an influence.

Regarding the means of social satisfaction, the analyses showed that the decline from 2019 to 2020 first seemed to be statistically significant but Cohen's d once again determined a very small effect size. In other words, social satisfaction rates also seem to be stable throughout the years despite the COVID-19 pandemic. As said before, this rejects the hypothesis that the COVID-19 disease influenced the level of social satisfaction and contradicts the findings of Van den Houte and Van der Heyden (2021). Their Belgian sample (N= 510) reported being less satisfied with their contacts comparing 2018 and July 2020. A downside of their study is that they only use these two measurement points but do not take 2019 into account which might be useful to put the outcome into perspective. Governmental restrictions that limited the social life of many people could have led to those changes. For instance, the limitations of working in home office, not being allowed to go to school/ university, sport activities/ concerts/ events being banned and places where people typically meet (restaurants, clubs, etc.) being closed

could have resulted in this alteration. Future research might investigate this link and find out about the factors that might play a role.

Lastly, the amount of loneliness was evaluated and revealed that loneliness decreased each year but was interpreted to be inessential. In other words, loneliness appears to be a stable construct despite the pandemic and its consequences. As mentioned in the introduction, some authors also claim no significant changes in loneliness (Luchetti et al., 2020; Peng & Roth, 2021). Other research found contracting evidence namely that loneliness in fact did increase already at the beginning of the pandemic (Van Tilburg et al., 2021; Williams et al., 2021). The fact that this is surprising is also due to the similarity between this study and the one from Van Tilburg et al. (2021). To be concrete, they had enough participants (N= 1679) who were collected from the LISS panel too, and also used the De Jong Gierveld Loneliness Scale Shortform thus similar circumstances to this study. In contrast to this study stands their age restriction of older adults (65 Years and older) which limits the comparability. Also, a flaw of all studies, despite their findings, is their lack of 2021 data which would have been good to examine the contrast or similarity for this year.

Looking at the relationship between the variables, one can say that social satisfaction of the year before influences the happiness level of the individuals before as well as during the COVID-19 pandemic. The world happiness report that has been mentioned before also claims a relation between connectedness and quantity as well as quality of social contacts with the construct of subjective wellbeing (Helliwell et al., 2021). In addition to that, loneliness of the year before has been found to predict happiness into two of the three years, but one has to question the small effect sizes which means that the variable might not be relevant. This is not in line with a previous study by Yavuz (2019) who looked into that relation and revealed that loneliness negatively relates to happiness. Nonetheless, this study consulted only adolescents and therefore other research that explores this relationship would be necessary to say something about this study's validity or generalizability.

A study by Kozma et al. (2000) found that the most powerful predictor of current subjective well-being (SWE) is prior SWE which can be confirmed by this study. Also, because happiness does count as one dimension of subjective well-being, one can compare this study to a good extend with this study. By including the happiness level of the year before, one also controls for the possibility that the values influence each other.

Strengths, limitations, and future research

Starting with the limitations of this study, an aspect that possibly affected the results is that happiness, as well as social satisfaction, was measured by single-item surveys. Those bring the risk of missing aspects of the construct and therefore not measuring a valid happiness or social satisfaction score (Diamantopoulos et al., 2012). On the other hand, loneliness is measured with a well-validated scale and also shows insignificant changes across time so this might not be the deciding factor. Even though several studies report the reliability and validity of different one-item surveys, measuring big constructs like happiness or social satisfaction may request multiple items to evaluate various facets of the constructs (Cheun & Lucas, 2014; Elo et al., 2003; Postmes et al., 2013).

A noticeable demographic characteristic is that younger people are underrepresented with only 3.9% of 15–24-Year-olds especially compared to the 55–64-Year-olds (21.4%) and 65+ Year-olds (41.8%). In comparison to other studies, there may be more older people because the LISS panel makes it possible that also people that do not own a device with an internet connection can participate by providing a simple PC. Elderly people are able to use them as well because of the simplicity of the design (Scherpenzeel, 2011). A lot of the research that already exists about age differences suggests that younger age is a predictor of higher loneliness which lead to questioning whether the outcome would have been different with a more even sample population (González-Sanguino et al., 2021; Groarke et al., 2020; McGinty et al., 2020). Although the last age group (65+ Years) seems to be highly represented, one has to take into account that the other age categories range 10 years, while this category has a wider age range and therefore includes potentially more participants. The LISS panel sends their questionnaires to the households which opens the possibility that mainly the household head fills out the surveys which is typically the oldest person in the home.

The domestic situation might also play a role when assessing loneliness. In this sample only 638 participants live alone while 2139 either have a partner or children with whom they live together. Former studies showed that the living arrangement does impact the loneliness level (Langenkamp et al., 2022; Ray, 2021). A hypothesis for future research could be that the loneliness level did not change significantly in this study because people is this sample predominantly live together with someone else and therefore do not experience the amount of loneliness a person who lives alone would feel.

Another limitation one could name is the time point of data collection. The LISS panel send the surveys in 2020 between the 4th of October and 26th of October which is exactly the time frame when the Dutch government introduced strict rules. Since this happened on the 13th of October, it would be important to see if there is a difference between the participants who

filled out the survey before these drastic measures and those who answered the questions while already being in lock-down.

Lastly, it is important to highlight that the LISS panel measures its variables only once a year. Thus, when this study claims that the variables rather remain stable comparing the years, that also means that individuals might have experienced a meaningful change in happiness, loneliness, or social satisfaction between days, weeks, or months which were simply not detected. Even when the yearly change has not been detected by this study, people might have had seasonal deviations due to lockdowns, restrictions, or other factors which is important to keep in mind.

Although there are some limitations, this study also adds knowledge to a very new research area and has various strengths. The newness of COVID-19 is a factor that explains the limited amount of research available at the moment. Every study that deals with this aspect adds new information that helps understand the pandemic and its impact on the population. An essential advantage is the longitudinal nature of the study which allows to compare data from multiple years and therefore assess the change in variables more reliable. Multiple other studies solely rely on retrospective self-report data, while this study asks the participants in the year of interest itself and consequently avoids memory biases. Studies with different contexts already claimed the issue of invalid retrospective reports because people intentionally or unintentionally remember things, events, experiences, or feelings wrongly after some time has passed (Bernard et al., 1984; Hardt & Rutter, 2004; Shachar & Eckstein, 2007).

Another point that also supports the generalizability of this study is that the LISS panel randomly selects participants out of the general Dutch population register and the gender or educational features are more evenly distributed than many other studies (Scherpenzeel, 2011). Moreover, the reminder sent after a few days is a useful tool to ensure high response rates. As already mentioned, many other studies that investigated COVID-19-related topics only considered data from 2019 and 2020 to make statements about changes related to COVID-19 while neglecting previous data (2018) and data from 2021. It was important to include these years too in order to put the findings into perspective.

Future research

As mentioned before, there is a clear need for further investigation into whether happiness can actually change during the individual's lifespan or if it is resistant to life events and circumstances like this study proposes. Till now, there is numerous contradicting evidence ranging from theories like the setpoint theory hence that happiness is a fixed score to

experiments that found a modification of happiness (Headey, 2008; Lucas, 2007). Another research subject would be to see whether there are possible confounding variables that influence the relationship between happiness and social integration which were not taken into account in this study. One could for example think about the living situation, socioeconomic situation, occupation, gender, or age as demographics that might be important. There is numerous research about those variables and their influence not only on well-being in general but also related to the pandemic, which shows that it might be sensible to also account for those in a regression (Hall & Zygmunt, 2021; Jacques-Aviñó et al., 2020; Salerno et al., 2021). Other than those, also personality factors (extraversion, agreeableness, etc.), emotion regulation or resilience might be useful to include (López-Núñez et al., 2021; Osimo et al., 2021). Another possible factor might be spiritual or religious beliefs since positive religious coping as well as spirituality was found to counteract the mental health burden of the COVID-19 pandemic and negative religious coping did the opposite and worsened depression and anxiety (Lucchetti et al., 2021; Pirutinsky et al., 2020; Xu et al., 2022). This highlights that various determinants could be beneficial to integrate in order to clarify the impact of COVID.19 on the population's happiness.

All in all, this study concludes that contrary to the expectations, all constructs can be considered as relatively stable despite the occurrence of a worldwide pandemic. Additionally, it showed that social satisfaction, loneliness, and happiness of the previous year predict happiness in the upcoming year. So, improving the happiness of the population can be achieved by working on the citizen's social integration. In turn, this proposes first ideas for governments where to start with interventions to increase the citizens' happiness. Concepts or interventions for reducing loneliness or increasing social satisfaction demonstrated their effectiveness in the past (Bessaha et al., 2019; Gardiner et al., 2018; Kozlowski, 2013; Masi et al., 2011). This is generally beneficial because happiness is known to positively influence concepts like work productivity, health, longevity, or prosocial behaviour which would be a two-sided advantage for the individual itself as well as the government (Diener & Chan, 2011; Kushlev et al., 2021; Zelenski et al., 2008).

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