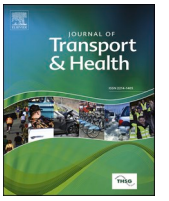
Journal of Transport & Health 30 (2023) 101600

Contents lists available at ScienceDirect

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth



The relationship between subjective well-being and individual characteristics, personality traits, and choice of transport mode during the first lock-down in Milan, Italy

Lorenzo Mussone *, Farzaneh Changizi

Politecnico di Milano, Department of Architecture, Building Environment and Civil Constructions, Piazza L. da Vinci 32, Milano, Italy

ARTICLE INFO

Keywords:
COVID-19 pandemic
Survey
Subjective well-being
Personality traits
Multinomial regression models
Choice of transport mode

ABSTRACT

Introduction: Concerning the adverse effect of COVID-19 virus pandemic on subjective well-being and daily travel, this research sought to analyse which personal characteristics, personality traits, and transport modes are related to positive and negative affect, and satisfaction with life during the first lock-down in Milan, Italy.
Method: In the spring of 2020, an online survey was conducted in Milan, and 1025 responses were collected. Then, three Multinomial Ordinal Regression models (MNOR) are carried out to examine the relationship between the data.
Results: Results show that women were more likely to feel fewer positive emotions than men. More physical activity, and income were positively associated with the models. Significant relevance of personality traits with subjective well-being is reported Regarding daily mobility during the pandemic, transport mode after lock-down, satisfaction with public transport, and worry about using public transport were found relevant to subjective wellbeing.
Conclusions: Whereas the feeling of worry about using public transport increased the negative affect. Transport mode during lock-down was not related to subjective well-being, though the preferred mode of transport after lock-down was related to satisfaction with life. Respondents who chose to use private cars more than other modes of transport were more likely to have higher satisfaction with life. Findings are discussed to improve transport and mobility planning during pandemics.

1. Introduction

In early 2020, due to the COVID-19 virus, several restrictive measures were applied to avoid contagion among people. However, the changes imposed on people's daily lives raised many concerns about the psychological impact of quarantine and social isolation during the pandemic (Campisi et al., 2021). Until now, several adverse effects of the lock-down on subjective well-being have been reported (Foa et al., 2020; Facal et al., 2022).

The current study sought to assess what individual characteristics (e.g., socio-demographic characteristics, and personality traits), and travel attributes are associated with subjective well-being during the pandemic. In addition, two hypotheses have been tested. Firstly, it is assumed that certain individual factors such as age, health condition, physical activity, and hours of working could

* Corresponding author.
E-mail addresses: lorenzo.mussone@polimi.it (L. Mussone), farzaneh.changizi@mail.polimi.it (F. Changizi).

https://doi.org/10.1016/j.jth.2023.101600
Received 6 July 2022; Received in revised form 28 November 2022; Accepted 7 March 2023
Available online 15 March 2023
2214-1405/© 2023 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

positively enhance subjective well-being during the pandemic. Secondly, it is supposed that subjective wellbeing during the pandemic is related to some travel attributes such as the choice of transport mode during, and after the lock-down. To examine these hypotheses, an online survey was carried out in May 2020 in Milan and collected data were used to build some regression models, namely Multinomial Ordinal Regression models-MNOR.

This paper contains six sections. After the Introduction, in Section 2, the Literature review is presented. In Section 3 the survey and the methods for analysing the data are described. Section 4 is devoted to the results and outcomes of the models of subjective well-being, and, in Section 5, results are discussed, and the last reflections are drawn as the conclusion in Section 6.

2. Literature review

2.1. Subjective well-being (SWB)

2.1.1. SWB (components and predictors)

Subjective well-being is usually defined as the affective and cognitive evaluation of an individual about his or her life (Diener et al., 2002). The affective dimension is constituted by two constructs of *positive affect* (positive feelings), and *negative affect* (negative feelings). The cognitive dimension refers to the evaluations of an individual about his/her life which is referred to as *satisfaction with life* (Diener, 1984). For measuring the affective component of SWB, the positive and negative affect schedule (Watson et al., 1988), and for the cognitive aspect, the satisfaction with life scale (Diener et al., 1985) can be used (see Pavot et al. (2018) for the review of SWB measures).. Besides the relevance of demographic variables (e.g., gender, and age) with SWB, some factors such as good income, physical activity, and health condition contribute positively with SWB (Diener and Biswas-Diener 2002; Ngamaba, 2017; Diener et al., 2018). The importance of personality to SWB judgements is also evident (Ng and Kang, 2022). The personality traits are openness, conscientiousness, extraversion, agreeableness, and neuroticism, which are mostly measured by the five-factor model (Gosling et al., 2003). Among all, neuroticism, extraversion, and conscientiousness are significantly related to SWB (Steel et al., 2008; Anglim et al., 2020).

2.1.2. SWB during pandemic

During the COVID-19 pandemic, a general decline in positive affect and satisfaction with life and, an increase in negative affect are reported (Anglim, and Horwood, 2021; Foa et al., 2020; Facal et al., 2022). Thus, many scholars have analysed the determinants and predictors of SWB during the pandemic (Duong, 2021; Rogowska et al., 2021; Kohút et al., 2022; Fields et al., 2022). For instance, many studies show that people with a higher income had significantly higher satisfaction with life than those with a lower income (Rogowska et al., 2021; Duong, 2021; Kohút et al., 2022). Mostly it is reported that younger people had relatively higher reduction in life satisfaction compared with older and retired individuals (Kuhn et al., 2021), though there are some studies with different results (Fields et al., 2022). And, women experienced a higher degree of worry, depression, and anxiety than men during the pandemic (Laufer, and Shechory Bitton, 2021; Kolakowsky-Hayner et al., 2021).

In addition, during COVID-19, the association between personality traits and SWB is investigated (Mazza et al., 2021; Ng and Kang, 2022). It is reported that there is a relationship between personality traits, personal perceptions, and perceived stress (Nikčević et al., 2021). For instance, Liu et al. (2021) found that a higher level of stress during the pandemic was related to greater neuroticism and extroversion, and it implies that people with higher neuroticism experienced higher levels of stress due to perceived risk. Agbaria and Mokh (2022) found that problem-focused coping is higher among people with high openness, extraversion, conscientiousness, and agreeableness, whereas it is lower for neuroticism. Neurotic individuals tend to be anxious, easily upset, and depressed (Steel et al., 2008). As a consequence of COVID-19 pandemic and limited social contacts and social relationships (Rajabifard et al., 2021), neurotic individuals tend to show more mal adaptive coping strategies in response to negative feelings caused by the pandemic (Kuntz, 2021))

2.2. Mobility and travel behaviour during the pandemic

The lock-down was associated with reduced mobility, and transport mode change during the pandemic (Chen et al., 2022; Abdullah et al., 2020). In many countries all over the world, there was a shift from public transport to private car and active mode (Das et al., 2021; Abdullah et al., 2020). The reduction of public transport use was influenced by negative perceptions, fear of infection risks, and contamination while travelling (Chen et al., 2022; Nelson, and Bergeman, 2020; Beck et al., 2021; Abdullah et al., 2020).

During previous decades, several travel attributes (e.g., transport mode, duration of travel, and travel purpose), and some individual factors (e.g., personal characteristics and preferences) are found relevant to travel behaviour (Das et al., 2021). However, owing to pandemic impacts, the significance and relevance of these parameters could have been influenced. Abdullah et al. (2020), based on an online survey conducted in May 2020 in various countries, stated that in addition to socio-demographic characteristics (e.g., age, employment), some travel attributes such as travel purpose, mode choice, and travel frequency changed during the pandemic.

2.3. SWB and travel behaviour before and during the pandemic

Literature before COVID-19 shows that some travel-related factors are associated with SWB (Nie and Sousa-Poza, 2018). It is reported that car ownership influences cognitive SWB but has a minor effect on affective SWB (Gan et al., 2018). Active travel, compared with private car and public transport, is found related to both aspects of SWB (Ettema et al., 2016).

During COVID-19, the decline in mobility was related to lower SWB (Devaraj and Patel, 2021). Mars et al. (2022), April 2020,

carried out a web-based survey in Spain. They reported that a certain degree of mobility (moderate value of times leaving home per week) is positively related to SWB. Whereas, immoderate mobility (a low or high value of times leaving home per week) was related to higher discomfort and lower SWB.

In addition, studies showed that negative individual perceptions were related to SWB (Downey et al., 2021). Mouratidis and Yiannakou (2022), discuss that before COVID-19, public transport accessibility was related to better health and higher life satisfaction in Greece. Whilst, the positive association between these parameters disappeared during the pandemic which might be due to the risk perception of COVID-19 while using public transport (Neuburger and Egger, 2021).

Chen et al. (2022), based on a Dutch context, reported that travel attributes (which significantly impact travel behaviour in normal situations such as cost and length of the journey become less significant, and travel preferences during the pandemic are significantly related to factors of fear of infection, social responsibility, and travel anxiety. Their findings indicate that public transport was an insecure means of transport compared with other private modes.

Downey et al. (2022), based on an online survey in Scotland, showed that in addition to individual characteristics such as age and employment, several factors like travel choices before the lock-down, and perceived risk of virus notably influenced the use of future public transport.

Despite emerging literature on the influence of the pandemic on SWB and travel behaviour (see Chen et al., 2022; Mars et al., 2022), still there are some gaps in understanding. First, there are very few works that analyse the correlation between travel behaviour and SWB during lock-down. Second, most of the findings refer to the fear and perceived risk of using transport modes and little is known about the relevance of travel and individual factors to SWB. Third, to date, no equivalent analysis has studied the association of SWB with travel mode during, and after lock-down and individual factors such as personalities. To fill these gaps, the current study, based on empirical evidence, seeks to understand which individual factors (such as socio-demographic characteristics, and personalities) and travel attributes are related to SWB during lock-down.

3. The survey and the models

This work is based on an online survey conducted in May 2020 in Milan which involved a total of 1025 respondents.

The questionnaire was made available for the official channels of the Politecnico di Milano, the Association of Engineers of Milan, the Municipality of Milan, the Lombardy Region, and students living in Milan. A basic hypothesis for participation is that the interviewee lived or worked in Milan.

The sample includes different categories of people regarding demographic factors (such as age, gender, and income), and the use of transport modes. Furthermore, the participants were mostly employees, and they experienced a change in their travel behaviour due to staying-at-home measure and smart working.

Table 1
Overview of the variables used in the study.

	Variables	Description and statistics
Personal characteristics	Gender	60%: men, 40%: women
	Age	15–20 years old: 2%, 21–30 years old: 13%, 31–40 years old: 19%, 41–50 years old: 29%, 51–60 years old: 22%, 61–70 years old: 11%, more than 71 years old: 4%
	Monthly income	Less than 1000€: 5% between 1000 and 2000€: 47%, between 2000 and 3000€: 26%, more than 3000€: 23%
	Hours spent out of home before LD	Less than 4 h: 10%, 4–8 h: 12%, 8–10 h: 41%, more than 10 h: 37%
	Improvements in personal life during LD	Not at all: 11%, a little: 23%, somewhat: 32%, very: 24%, extremely: 9%
	The desire to change lifestyle	Less than three:22%, between 4 and 5: 44%, between 6 and 7: 34%
	Physical activity during LD	No physical activity: 28%, less than 15': 23%, between 15 and 30': 26%, between 30 and 60': 18%, more than 60': 5%.
	Health condition (self-reported)	Between 1 and 3: 10%, between 4 and 5: 38%, between 6 and 7: 53%
	Hours of studying/working during LD	More than 6 h: 88%, less than 6 h 12%
Transport	Transport mode during LD	Auto: 47%, public transport: 7%, active mode: 46%
	Transport mode after LD	Auto: 49%, public transport: 16%, active mode: 35%
	Satisfaction with public transport	Not at all: 8%, a little: 21%, somewhat: 36%, very: 25%, extremely: 10%
	Worry about using public transport	No worry: 8%, a little: 12%, somewhat: 27%, a lot: 29%, extremely: 24%
Personality	Extraversion	1-3: 24%, 4–5: 50%, 6–7: 26%
	Agreeableness	1-3: 2%, 4–5: 28%, 6–7: 70%.
	Conscientiousness	4-5: 15%, 6–7: 85%.
	Emotional stability	1-3: 5%, 4–5: 30%, 6–7: 65%.
	Openness to experiences	1-3: 6%, 4–5: 56%, 6–7: 38%.
SWB	Positive affect (PA)	5-10: 1%, 10–15: 8%, 15–20: 72%, 20–25:19%
	Negative affect (NA)	5-10: 12%, 10–15: 66%, 15–20: 21%, 20–25: 1%.
	Satisfaction with life (SWL)	5-18: 17%, 18–28: 62%, 28–35: 21%

The data used include subjective well-being, individual characteristics, personality traits, and the transport mode during and after the lock-down. The transport mode used after the lock-down refers to the transport mode that the respondents preferred to use after the lock-down. Also related to the COVID-19 situation, the degree of *Satisfaction with public transport* (T9) and *Worry about using Public Transport* (T11) is measured. The list of variables used in this study and the description of the data is presented in Table 1.

A multinomial ordinal regression (MNOR) model is used to analyse the relationships between data. This type of model is suitable to check hypotheses about relations between an ordinal (also categorical, and nominal) dependent variable and categorical (or continuous) explanatory variables and it has been in use for many years (Barnhart and Sampson, 1994). Through this model, we can obtain the estimated probability of certain categories of data and the estimate of the odds ratio and net effects of independent variables with a high level of reliability. One issue for the evaluation of these models is that the variance of a categorical or ordinal variable cannot be defined. However, the results can be measured by three general tests: the goodness of fit of the process, the overall test of the fit of the model, and the ability to anticipate outcomes (McCullagh et al., 1989). Specifically, for example, they are based on pseudo R square values (also Nagelkerke et al. (2005) proposed a new one), likelihood ratio tests, and classification tables. The model for probabilities p_i (i = 1,2,3) for an MNOR model, with three classes in output as the dependent variable and five explanatory or independent variables, is as follows:

$$ln\left(\frac{p_1}{1-p_1}\right) = ln\left(\frac{p_1}{p_2+p_3}\right) = \propto_1 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (1)$$

$$ln\left(\frac{p_1+p_2}{1-p_1-p_2}\right) = ln\left(\frac{p_1+p_2}{p_3}\right) = \propto_2 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \quad (2)$$

where, for both equations, X_i is the explanatory variable. α_1, α_2, $ß_{ij}$, are parameters, estimated by the maximum likelihood method.

Three models are developed separately for positive and negative emotions as affect and satisfaction with life as the cognitive aspect of subjective well-being (Table 2).

For affective aspect of subjective well-being, the short version of PANAS which is the I-PANAS-SF is used, due to its brevity and clearness (Watson et al., 1988). The scale asked participants ten questions regarding positive and negative feelings and emotions on a five-point Likert scale. For measuring the cognitive aspect, the 5-item Satisfaction With Life Scale (SWLS) on a seven-point Likert scale is used (Diener et al., 1985).

Also, explanatory factors including socio-demographic variables, and personal information such as *Health condition* (self-reported) (G9), *Hours of studying/working during LD* (G10), and *Physical activity during LD* (G8) were asked. Further, the last part of the questionnaire included the Big-Five personality domains (Gosling et al., 2003). This part asked participants ten questions regarding five main aspects of personality traits, on a seven-point Likert scale, that are used as independent variables in the models. The list of explanatory variables used in the models is listed in Table 3.

4. Results

According to the three components of Subjective Well-Being (SWB), we have three dependent (response) variables: (1) Positive Affect (PA), (2) Negative Affect (NA), and (3) Satisfaction With Life (SWL). For positive and negative affect, the range of values is between 5 and 25. So, we classified the range of responses into four equally spaced groups, from the least to the highest scores: [5,10],]10,15],]15, 20], and]20, 25]. Similarly, the classification of satisfaction with life with values ranging from 5 to 35 is: [5,18],]18,28], and]28,35]. With this classification, we used multinomial regression for ordinal responses (MNOR) analysis which is more suitable for more than two categories of dependent variables. In the following, the models of PA, NA, and SWL are presented. In Table 10, the p-values of variables and the sign of their coefficients for the three models are reported as well.

4.1. Positive affect (PA)

The Positive Affect (PA) is the dependent variable of PA model. The range of PA values is in the interval [5, 25] with four classes. The Multinomial ordinal regression model is used for modelling. Equations (3)–(5) show the proportional odds model.

$$\ln\left(\frac{P(PA \le 10)}{P(PA > 10)}\right) = 2.5189 - 0.4429 * G_2 - 0.1578 * G_3 - 0.1681 * G_6 - 0.1783 * G_8 - 0.5072 * G_{10} - 0.1366 * T_9 - 0.2477 * P_1 - 0.6157 * P_3 - 0.1654 * P_5 \quad (3)$$

Table 2
Set of the developed models.

Subjective well-being		
Affective		Cognitive
Positive affect (PA)	Negative affect (NA)	Satisfaction with life (SWL)

Table 3
Explanatory variables.

Category	Variable code	Variable name	Variable type	min-max
Personal characteristics	G2	Gender	Nominal	0–1
	G3	Age	Categorical	1–7
	G4	Monthly income	Categorical	1–4
	G5	Hours spent out of home before LD	Categorical	1–4
	G6	Improvements in personal life during LD	Categorical	1–5
	G7	The desire to change lifestyle	Categorical	1–7
	G8	Physical activity during LD	Categorical	1–5
	G9	Health condition (self-reported)	Categorical	1–7
	G10	Hours of studying/working during LD	Categorical	1–4
Transport	T4	Transport mode after LD	Nominal	1–12
	T9	Satisfaction with public transport	Categorical	1–6
	T11	Worry about using public transport	Categorical	1–5
Personality	P1	Extraversion	Categorical	1–5
	P2	Agreeableness	Categorical	1–5
	P3	Conscientiousness	Categorical	1–5
	P4	Emotional stability	Categorical	1–5
	P5	Openness to experiences	Categorical	1–5

$$\ln\left(\frac{P(PA \leq 15)}{P(PA > 15)}\right) = 6.4679 - 0.4429 * G_2 - 0.1578 * G_3 - 0.1681 * G_6 - 0.1783 * G_8 - 0.5072 * G_{10} - 0.1366 * T_9 - 0.2477 * P_1 - 0.6157 * P_3 - 0.1654 * P_5 \quad (4)$$

$$\ln\left(\frac{P(PA \leq 20)}{P(PA > 20)}\right) = 10.9103 - 0.4429 * G_2 - 0.1578 * G_3 - 0.1681 * G_6 - 0.1783 * G_8 - 0.5072 * G_{10} - 0.1366 * T_9 - 0.2477 * P_1 - 0.6157 * P_3 - 0.1654 * P_5 \quad (5)$$

The confusion matrix for the ordinal multinomial regression model is shown in Table 4. The accuracy of the PA model is equal to 70% and the precision and recall indices are reported in the table for each class. Table 5 reports the statistical performance indices of the model. In this model, the intercepts (when significant) are positive and all the independent variables have negative coefficients (equal for the three equations). This means that when all variables are set to zero, the probability of the last class (PA> 20) is lower than the sum of the probability of all other classes, and conversely, the probability of the first class (PA≤ 10) is higher than or equal to the sum of all others. By increasing the value of whatever variable, the log of every equation becomes smaller and then the probability to be in the highest classes of PA increases.

Considering the marginal effects of variables, *Gender* (G2) has a negative effect on positive feelings and emotions. This implies that women are more probable to have fewer positive feelings and emotions than men. Given all else equal, a unitary increase in *Gender* (G2) (shifting from women to men) means that the probability of the first class (PA≤ 10) decreases by 1.6 times, and the probability of the last class (PA> 20) increases of the same quantity given all else is equal. Higher values of *Improvements in personal life during LD* (G6), *Age* (G3), and *The physical activity during LD* (G8) increased the probability of higher PA. Regarding *Hours of studying/working during LD* (G10), respondents who were working/studying more hours are more probable to report higher positive feelings 1.7 times.

Also, regarding public transport variables, the contribution of *Satisfaction with public transport* (T9) is relevant too. When *Satisfaction with public transport* (T9) increases the log of odds to be in the highest class increases, and, conversely the log of odds to be in the first class decreases by 1.1 times. Therefore, we can say that the more satisfied people with public transport during the pandemic, the more likely they have higher positive feelings and emotions.

Moreover, the three personality traits of *Extraversion* (P1), *Conscientiousness* (P3), and *Openness to experiences* (P5) have negative coefficients. The implication is that as people are more extroverted, and open to experiences, they are 1.3 and 1.2 times more probable to have higher positive feelings and emotions during lock-down, respectively. The most significant effect in this model is the personality of conscientiousness. As respondents are highly conscientious, they reported a higher degree of positive feelings and emotions during the lock-down. Given all else equal, a unitary increase in *Personality* (e.g. *Conscientiousness* (P3)) means that the probability to be in the first class (PA≤ 10) decreases by 1.9 times, and conversely the probability to be in the last class increases by the same quantity.

Table 4
Confusion matrix for ordinal multinomial regression model of PA.

	Recall	0%	80%	74%	47%	Precision
True class	PA = [5,10]	0	0	2	0	0%
	PA =]10,15]	1	4	77	0	4%
	PA =]15,20]	38	1	699	10	93%
	PA =]20,25]	23	0	161	9	4%
		PA = [5,10]	PA =]10,15]	PA =]15,20]	PA =]20,25]	
		Predicted class				

Table 5
Statistical performance indices of MNOR model for PA.

Estimated dispersion	Deviance of the fit	Accuracy
0.8861	1.3161e+03	0.6976

The effect of a unitary change on PA output for all explanatory variables is shown in Fig. 1.

4.2. Negative affect (NA)

In this model, the Negative Affect (NA) is the dependent variable. NA values range in the interval [5, 25] with four classes. The Multinomial ordinal regression model is used for modelling. Equations (6)–(8) show the proportional odds model.

$$\ln\left(\frac{P(NA\leq 10)}{P(NA>10)}\right) = -11.021 + 0.3158*G_2 + 0.2561*G_9 - 0.3446*G_{10} - 0.2303*T_{11} + 0.1957*P_1 + 0.4202*P_2 + 0.2937*P_3 + 0.8187*P_4 \quad (6)$$

$$\ln\left(\frac{P(NA\leq 15)}{P(NA>15)}\right) = -6.5611 + 0.3158*G_2 + 0.2561*G_9 - 0.3446*G_{10} - 0.2303*T_{11} + 0.1957*P_1 + 0.4202*P_2 + 0.2937*P_3 + 0.8187*P_4 \quad (7)$$

$$\ln\left(\frac{P(NA\leq 20)}{P(NA>20)}\right) = -2.5775 + 0.3158*G_2 + 0.2561*G_9 - 0.3446*G_{10} - 0.2303*T_{11} + 0.1957*P_1 + 0.4202*P_2 + 0.2937*P_3 + 0.8187*P_4 \quad (8)$$

The confusion matrix for this model is presented in Table 6. The accuracy is equal to 71% and the precision and recall indices are presented in the table for each class. Table 7 reports the statistical performance indices of the model.

In this model, the intercepts are negative and most of the independent variables have positive coefficients. This means that when all variables are set to zero, the probability of the last class (NA> 20) is higher than the sum of the probability of all other classes. Conversely, the probability of the first class (NA≤ 10) is lower than the sum of all others. Higher values of variables with positive coefficients are associated with a higher probability of low negative feelings and emotions. Outcomes indicate that women are (1.4) more probable to have higher negative feelings and emotions than men. Also, people with a better status health condition were feeling less negative than people with a lower level of health condition. More *Hours of studying and working* (G10) and higher *Worry about using public transport* (T11) increased the probability of NA 1.4 and 1.3 times, respectively. Besides, the model finds four *Personality traits of Extraversion* (P1), *Agreeableness* (P2), *Conscientiousness* (P3), and *Emotional stability* (P4) with positive coefficients. Indicating that as people are highly extraverted, agreeable, conscientious, and emotionally stable, they reported a lower degree of negative feelings and emotions. For instance. Given all else equal, a unit increase of *Emotional stability* (P4) increases the probability of the first class (NA≤ 10) 2.3 times; on the other side, the probability of the last class (NA>20) decreases by the same quantity.

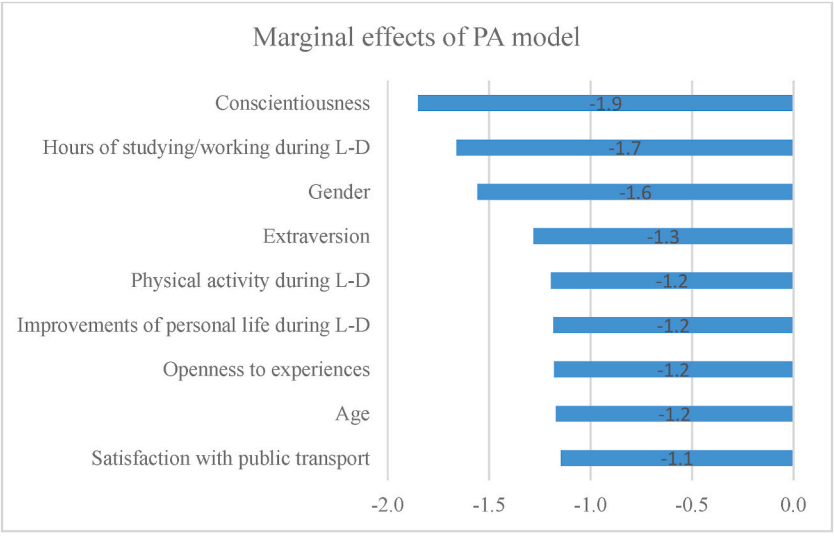


Fig. 1. Marginal effects (*) for PA models.
(*) the values refer to how many times output increases (+) or decreases (−) when the input variable has a unitary increase.

Table 6
Confusion matrix for ordinal multinomial regression model of NA.

	Recall	60%	73%	62%	50%	Precision
TRUE CLASS	NA = [5,10]	21	96	5	0	17%
	NA =]10,15]	13	624	36	0	93%
	NA =]15,20]	1	132	83	1	38%
	NA =]20,25]	0	2	10	1	8%
		NA = [5,10]	NA =]10,15]	NA =]15,20]	NA =]20,25]	
		PREDICTED CLASS				

Table 7
Statistical performance indices of MNOR model for NA.

Estimated dispersion	Deviance of the fit	Accuracy
0.9577	1.455e+03	0.7112

Two variables showed a negative influence on the model. *Hours of studying/working during LD* (G10), and *Worry about using public transport* (T11) have a negative coefficient. Respondents who spent more hours studying or working during lock-down, and were more worried about using public transport, were 1.3 times more likely to have a higher degree of negative feelings. The effect of a unitary change on NA output for all explanatory variables is shown in Fig. 2.

4.3. Satisfaction with life (SWL)

In this model Satisfaction With Life (SWL) is the dependent variable ranging in the interval [5, 35]with three classes. The Multinomial ordinal regression model is used for modelling. Equation 9, and 10 show the proportional odds model.

$$\ln\left(\frac{P(SWL \le 18)}{P(SWL > 18)}\right) = 3.138 + 0.2136*G_3 - 0.4037*G_4 + 0.1283*G_5 - 0.2875*G_6 + 0.1734*G_7 - 0.21704*G_9 + 0.3448*T_4 - 0.1695*T_9 - 0.133*P_1 - 0.1791*P_2 - 0.1704*P_3 - 0.2821*P_4 \quad (9)$$

$$\ln\left(\frac{P(SWL \le 29)}{P(SWL > 29)}\right) = 6.5885 + 0.2136*G_3 - 0.4037*G_4 + 0.1283*G_5 - 0.2875*G_6 + 0.1734*G_7 - 0.1704*G_9 + 0.3448*T_4 - 0.1695*T_9 - 0.133*P_1 - 0.1791*P_2 - 0.1704*P_3 - 0.2821*P_4 \quad (10)$$

The confusion matrix for this model is presented in Table 8. The accuracy of the model is equal to 60% and the precision and recall indices are presented in the table for each class. Table 9 reports the statistical performance indices of the model.

In this model, the intercepts are positive and independent variables show both positive and negative coefficients. Positive coefficients mean that when all variables are set to zero, the probability of the last class (SWL> 28) is lower than the sum of the probability of the other class, and conversely probability of the first class (SWL≤ 18) is higher than or equal to the sum of other class.

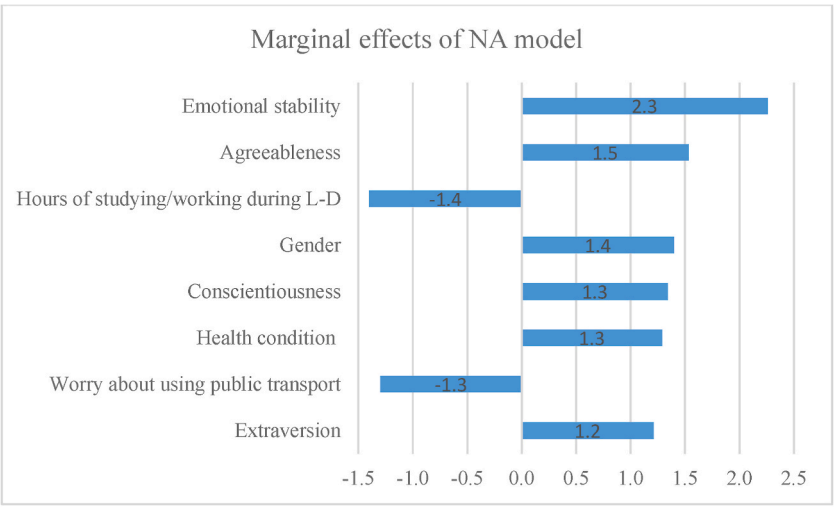


Fig. 2. Marginal effects (*) for NA models.
(*) the values refer to how many times output increases (+) or decreases (−) when the input variable has a unitary increase.

Table 8
Confusion matrix for ordinal multinomial regression model of SWL.

	Recall	%	%	%	Precision
TRUE CLASS	SWL = [5,18]	24	144	2	%
	SWL =]18,28]	58	569	17	%
	SWL =]28,35]	15	166	30	%
		SWL = [5,18]	SWL =]18,28]	SWL =]28,35]	
		PREDICTED CLASS			

Negative coefficients mean that by increasing the value of SWL, the log of odds to be in the highest class increases. Considering the marginal effects of variables, *Monthly income* (G4) has a negative coefficient. Given all else equal, a unitary increase of monthly income decreases the probability of the first class (SWL $\leq$18) 1.5 times. On the other side, the probability of the last class (P $>$ 28) increases in the same quantity. Higher values of *Improvements in personal life during LD* (G6), *Health condition* (G9), and *Satisfaction with public transport* (T9) increased the probability of higher life satisfaction with life. For instance, people who reported a higher level of improvements in personal life and health condition are 1.2 times more likely to be more satisfied with their life. Also, three personality traits of *Extraversion* (P1), *Agreeableness* (P2), and *Emotional stability* (P4) are related to SWL. They all have negative coefficients, and then as they increase also SWL increases.

In the model, there are also six explanatory variables with positive coefficients, such as *Age, Hours spent out of home before LD* (G5), and *The desire to change the lifestyle* (G7). A unitary increase in *Age* means that the probability of the first class (SWL $\leq$18) increases by 1.2 times and the probability of the last class (SWL $>$28) decreases of the same quantity (then SWL becomes lower). Besides, for *The desire to change the lifestyle* (G7), SWL declines as the value of this variable increase 1.2. Regarding transport use, two variables are related to satisfaction with life during lock-down. Higher satisfaction with public transport increases the probability of lower SWL 1.2 times. Also, the transport mode that the respondents preferred to use after the lock-down is relevant. Results show that people who preferred to use private car are 1.4 times more probable to have a higher level of satisfaction with life compared with other transport modes of public transport and active modes. The effect of a unitary change on SWL output for all explanatory variables is presented in Fig. 3.

5. Discussion

In this study, three models for evaluating the effect of personal characteristics and travel attributes on positive and negative affect, and satisfaction with life during pandemic are presented. The statistically significant independent variables with their p-values are summarized in Table 10. From this table, it is easy to see the very different structure of the three models because of the different variables included or the different signs of their coefficients. Another interesting point concerns just the values of those coefficients whose marginal effects have been analysed in detail in the previous section of Results. The variables with the highest coefficient (and hence marginal effect) are *Conscientiousness* (P3), *Emotional stability* (P4), and *Monthly income* (G4), respectively, for the PA, NA, and SWL models. We can advance the hypothesis that it is not by chance that the PA and NA models are more affected by a Personality variable and the SWL model by a Personality Traits variable.

5.1. SWB and individual factors

Results regarding *Gender* (G2), *Age*(G3), and *Monthly income* (G4) are in line with some previous studies during the pandemic, indicating that women were experiencing lower affective SWB during the pandemic (Laufer, and Shechory Bitton, 2021; Kolakowsky-Hayner et al., 2021). Older adults were experiencing more positive affect and less satisfaction with life (similar to Fields et al., 2022). Also, results show that higher households' monthly income increased their level of satisfaction with life (similar to Duong, 2021; Rogowska et al., 2021; Kohút et al., 2022).

The models indicate that a higher level of *Health condition* (G9) is associated with a lower negative affect and higher satisfaction with life which is consistent with previous studies (Bakkeli, 2021; Aymerich-Franch, 2020). Due to the COVID-19 spread and the increasing health issues, negative feelings and emotions have increased (Frade et al., 2021). Also, pandemic measures such as stay-at-home orders limited social interactions (Rajabifard et al., 2021) which has the most indirect effect on SWB (Lamu, and Olsen, 2018).

Physical activity during lock-down (G8) was positively related to PA. Due to low daily mobility during the lock-down, higher physical activity contributes to SWB as a protective factor to reduce covid-19 associated health problems such as stress, anxiety, and depression (Utamayasa et al., 2022).

Hours of studying/working during lock-down (G10) was positively related to PA and NA. Earlier studies suggest that long working

Table 9
Statistical performance indices of MNOR model for SWL.

Estimated dispersion	Deviance of the fit	Accuracy
1.0014	1.5864e+03	0.6078

Table 10
Independent variables and p-value class for all SWB models.

Category	Variable code	Variable Description	PA	NA	SWL
Intercepts		Intercept 1	* ▲	** ▼	* ▲
		Intercept 2	** ▲	** ▼	** ▲
		Intercept 3	** ▲	* ▼	na
General	G2	Gender	* ▼	* ▲	-
	G3	Age	* ▼	-	** ▲
	G4	Monthly income	-	-	** ▼
	G5	Hours spent out of home before LD	-		* ▲
	G6	Improvements in personal life during LD	* ▼	-	** ▼
	G7	The desire to change lifestyle	-	-	** ▲
	G8	Physical activity during LD	* ▼	-	-
	G9	Health condition (self-reported)	-	** ▲	** ▼
	G10	Hours of studying/working during LD	** ▼	* ▼	-
Transport	T4	Transport mode after LD	-	-	* ▲
	T9	Satisfaction with public transport	* ▼	-	* ▼
	T11	Worry about using public transport	-	** ▼	-
Personality	P1	Extraversion	** ▼	** ▲	* ▼
	P2	Agreeableness	-	** ▲	* ▼
	P3	Conscientiousness	** ▼	** ▲	* ▼
	P4	Emotional stability	-	** ▲	** ▼
	P5	Openness to experiences	* ▼	-	-

Legend: Var iables are shown in rows, models in columns and p-values inside the table; the up arrow▲ indicates a positive coefficient, the down arrow▼ a negative one; minus sign – means a non-significant variable, one-star * means $p < 0.05$, two stars ** means $p < 0.001$; na = not applicable, LD = lock-down.

time has an adverse effect on well-being (Choi et al., 2021). Also, smart working caused more complexity to the effect of working hours. Although in our research smart-working was not related to SWB, the working hours could be impacted by both negative effects (such as higher home-office constraints, loneliness and stress), and positive effects (e.g., higher work-life balance, schedule flexibility, and saving transportation time) of smart-working (Grant et al., 2013; Palumbo, 2020; Yu et al., 2022).

The desire to change lifestyle (G7) negatively influenced SWL. Restrictions on non-essential work forced many people into an unplanned lifestyle change. It is shown that a healthy lifestyle has a substantial effect on SWL (Headey et al., 2010), while during the pandemic, the lifestyle behaviours of participants had mainly changed into a sedentary lifestyle with low social connection, poor diet and exercise (Brindal et al., 2022), which can lead to lower satisfaction with lifestyle and the desire to change it.

Hours spent out of home before lock-down (G5) negatively influenced SWL. Time out of home is related to cognitive status, physical ability and emotional state which is related to SWB (Petersen et al., 2015). For instance, less time spent outside the home is associated with higher loneliness, and social isolation which negatively influenced SWB (Lucier, 2022).

Improvements in personal life during lock-down (G6) was positively related to PA, and SWL. This is because people's responses to the negative impacts of staying at home are different (Munsell et al., 2020) People who use better coping strategies in response to the pandemic measures could have higher improvements in life than the general population during the lock-down (Kuntz, 2021).

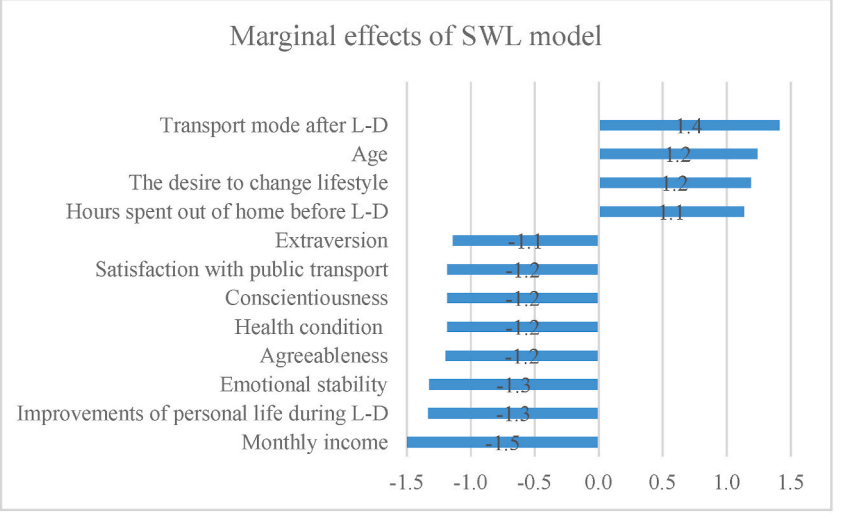


Fig. 3. Marginal effects (*) for SWL models.
(*) the values refer to how many times output increases (+) or decreases (−) when the input variable has a unitary increase.

Extraversion (P1) and *Conscientiousness* (P3) were significant predictors of affective and cognitive SWB which is consistent with previous studies (Steel et al., 2008; Anglim et al., 2020; Mazza et al., 2021; Ng, and Kang, 2022). In general, extraverts (who are more social, optimistic, and active) experience high levels of positive affect, and they are more reactive to positive emotional stimuli rather than introverts during the pandemic (Mazza et al., 2020). Also, highly conscientious people are goal-directed, and it mostly contributes to achieving happiness and psychological adjustment in life. This will make them to be more grateful for their life, and, it is found relevant in predicting SWB (Tanksale, 2015; Zaiedy Nor and Smith, 2019).

Agreeableness (P2) was positively related to SWL and negatively associated with NA which is consistence with earlier findings (Quan et al., 2021; Mazza et al., 2021). Agreeable individuals tend to be helpful, friendly, less competitive and more skilful at obtaining social support and this personality is found as a protection factor for SWL (Fors Connolly and Johansson Sevä, 2021).

Emotional stability (neuroticism) (P4) was related to lower NA and higher SWL. In contrary with recent results (Anglim et al., 2020; Ng, and Kang, 2022; Brindal et al., 2022), we found a positive relation between neuroticism and SWB. Neurotic individuals tend to be anxious, easily upset, and moody or depressed (Steel et al., 2008), and they are more reactive to unpleasant emotional stimuli than stable individuals (Mazza et al., 2020). Given the current findings, it could be related to positive and negative reactions of individuals to the negative emotions caused by a disastrous event such as COVID-19. In other words, some individuals may adopt maladaptive coping strategies in response to the stress caused by the pandemic, while others frame the adverse event as an opportunity to grow and thrive, rather than a threat to well-being (Kuntz, 2021). Our findings could be due to the latter reaction mentioned above, and it is closely related to the resiliency during the pandemic (Shakespeare-Finch et al., 2020).

Openness to experiences (P5) was only related to PA. Openness describes how open someone is to a variety of experiences or how concretely or abstractly someone thinks about things and it is positively associated with SWB (Anglim et al., 2020; Anglim, and Horwood, 2021).

5.2. SWB and travel attributes

Transport mode after lock-down (T4) was related to cognitive SWB. Results demonstrate that respondents who used private car were more likely to have a higher SWL compared with public transport, shared and active modes. Our findings are similar to recent studies (Shamshiripour et al., 2020; Das et al., 2021). However, these results cannot be generalized as some researchers found the same popularity for both active modes and private car during the pandemic (Dingil and Esztergár-Kiss, 2021).

Satisfaction with public transport (T9) increased the probability of higher PA and SWL. Earlier researches show that SWB is related to satisfaction with travel (Bergstad et al., 2011). Travel can have an indirect effect on life satisfaction as it enables people to participate in out-of-home activities (De Oña et al., 2016). However, negative perceptions concerning the COVID-19 virus can adversely influence satisfaction with travel by shared modes during the pandemic (Dong et al., 2021; Beck et al., 2021).

Worry about using public transport (T11) was positively associated with negative affect. As expected, people with a higher degree of worry about using public transport are more probable to experience a higher degree of negative feelings and emotions during the pandemic. Several studies have approved the relevance of worry about COVID-19 and negative affect (Chen et al., 2022; Nelson, and Bergeman, 2020; Beck et al., 2021; Abdullah et al., 2020).

5.3. Research hypotheses: potential, limitations and future work

In this research, two hypotheses were offered. In the first hypothesis, it is assumed that certain individual factors such as age, health condition, physical activity and hours of working could positively enhance SWB during the pandemic. The results confirm more physical activity, and having good health contribute positively to SWB. However, being in older age, in particular, showed various effects, as it increased affective SWB, yet diminished the cognitive SWB. Besides, hours of working increased both positive affect and negative affect. In the second hypothesis, SWB was not related to transport mode during the lock-down, While, the model support the association between SWB and transport mode after the lock-down, indicating that private car use was positively associated with higher SWL compared with public, shared, and active modes.

Overall, this study provides a new insight into the relationship between SWB and individual factors. This study reveals that (i) in addition to demographic characteristics (such as gender, age, income, and health condition), other factors like hours of studying/working, and physical activity during lock-down are related to SWB. The findings of this study have added to the existing evidence that (ii) the higher the degree of worry about using public transport the higher the probability of higher negative affect. This indicates that people who were more worried about using public transport were more likely to experience higher negative feelings and emotions. Besides, (iii) the higher the degree of satisfaction with public transport the higher the log value of positive affect, and satisfaction with life. (iv) preferred transport mode after lock-down is related to satisfaction with life. Finally, among personality traits (v) extraversion and conscientiousness are related to all three models. The higher the degrees of personality traits the larger the probability of high positive affect, and satisfaction with life, whereas they diminished the probability of negative affect.

This research, however, is subject to several limitations. Firstly, the data are only collected during the first lock-down, and we did not have the access to the same participants during other lock-downs and after the pandemic. Acquiring information from the same participants during other lock-downs could give us useful information about the changes in SWB. Secondly, due to the constraint we faced with the length of the questionnaire, we could not obtain more detailed information about the daily travel behaviour of participants. Some specific information (such as the duration of using active modes, and their satisfaction with each transport mode) could also provide more comprehensive data regarding the perceptions and quality of transport modes during the lock-down. In addition, our participants under study were mostly employees and students, considering a wider range of people in the study could help us in

generalising the data to the whole population of the city. And, consequently, offer optimal outcomes for local policy-making and future decision-making.

Moreover, future research should take into account the importance of individuals' characteristics, perceptions, and personalities in travel behaviour during extraordinary situations. We only focused on The Big-Five personality traits, though other qualities could also play a role in daily travel choices.

So far, most researchers have analysed the negative impacts of COVID-19 on travel behaviour. Yet, focusing on the possibilities and opportunities of pandemic measures such as encouraging mode changes during the lock-down, could possibly open new avenues in research and policy. Travel behaviour change encouraged many countries such as Italy and Greece to provide some infrastructure for walking, and cycling (Nikitas et al., 2021) to promote active mode over motor traffic modes (Campisi et al., 2021; Kyriakidis et al., 2023). These new perspectives should be considered in future studies.

6. Conclusions

This study aims at contributing to the understanding of the relationship between subjective well-being and individual characteristics, personality traits, and transport choice, during the first lock-down in Milan. Three Multinomial Ordinal Regression models are applied for positive and negative affect and satisfaction with life. According to the results, women compared to men were more likely to feel fewer positive affect and higher negative affect. In addition, older adults were more likely to experience higher positive affect and lower satisfaction with life. Higher values of physical activity and working and studying increased the probability of a higher degree of positive affect during the lock-down. The higher value of health condition increased the probability of lower negative affect and higher satisfaction with life. Moreover, the feeling of worry about using public transport increased the probability of higher negative affect. Other factors, such as improvements in personal life during lock-down, monthly income, and the desire to change lifestyle, are related to subjective well-being models. The findings of the present study provide evidence that personality traits, especially extraversion and conscientiousness, contribute to affective (positive and negative emotions) and cognitive (satisfaction with life) components of subjective well-being.

Credit author statement

Lorenzo Mussone: Conceptualization, Methodology, Software, Writing, Reviewing and Editing.
Farzaneh Changizi: Conceptualization, Methodology, Writing, Reviewing and Editing.

Financial disclosure

The Authors did not receive any specific funding for this work.

Acknowledgements

Thanks are due to Regione Lombardia, in the person of Elena Foresti and Dante Scoccianti, for their support to the survey and helpful suggestions; to PierGiorgio Lugaresi, Comune di Milano for his support to promote the survey; to the Society of Engineers of Province of Milan for their committed participation; and to all people of Politecnico di Milano who allow us to carry out the survey and seriously filled up the questionnaire.

References

Abdullah, M., Dias, C., Muley, D., Shahin, M., 2020. Exploring the impacts of COVID-19 on travel behavior and mode preferences. Transp. Res. Interdiscip. Perspect. 8, 100255.

Agbaria, Q., Mokh, A.A., 2022. Coping with stress during the coronavirus outbreak: the contribution of big five personality traits and social support. Int. J. Ment. Health Addiction 20 (3), 1854–1872.

Anglim, J., Horwood, S., Smillie, L.D., Marrero, R.J., Wood, J.K., 2020. Predicting psychological and subjective well-being from personality: a meta-analysis. Psychol. Bull. 146 (4), 279.

Anglim, J., Horwood, S., 2021. Effect of the COVID-19 pandemic and big five personality on subjective and psychological well-being. Soc. Psychol. Personal. Sci. 194855062098304.

Aymerich-Franch, L., 2020. COVID-19 Lockdown: Impact on Psychological Well-Being and Relationship to Habit and Routine Modifications. PsyArXiv. Retrieved from. https://psyarxiv.com/9vm7r.

Bakkeli, N.Z., 2021. Health, work, and contributing factors on life satisfaction: a study in Norway before and during the COVID-19 pandemic. SSM-Population Health 14, 100804.

Barnhart, H.X., Sampson, A.R., 1994. Overview of multinomial models for ordinal data. Commun. Stat. Theor. Methods 23 (12), 3395–3416. https://doi.org/10.1080/03610929408831454.

Beck, M.J., Hensher, D.A., Nelson, J.D., 2021. Public transport trends in Australia during the COVID-19 pandemic: an investigation of the influence of bio-security concerns on trip behaviour. J. Transport Geogr. 96, 103167.

Bergstad, C.J., Gamble, A., Gärling, T., Hagman, O., Polk, M., Ettema, D., Olsson, L.E., 2011. Subjective well-being related to satisfaction with daily travel. Transportation 38 (1), 1–15.

Brindal, E., Ryan, J.C., Kakoschke, N., Golley, S., Zajac, I.T., Wiggins, B., 2022. Individual differences and changes in lifestyle behaviours predict decreased subjective well-being during COVID-19 restrictions in an Australian sample. J. Publ. Health 44 (2), 450–456.

Campisi, T., Basbas, S., Al-Rashid, M.A., Tesoriere, G., Georgiadis, G., 2021. A region-wide survey on emotional and psychological impacts of COVID-19 on public transport choices in Sicily. Italy. Transact. Trans. Sci. 2, 1–10.

Chen, C., Feng, T., Gu, X., 2022. Role of latent factors and public policies in travel decisions under COVID-19 pandemic: findings of a hybrid choice model. Sustain. Cities Soc. 78, 103601.
Choi, E., Choi, K.W., Jeong, H.G., Lee, M.S., Ko, Y.H., Han, C., Han, K.M., 2021. Long working hours and depressive symptoms: moderation by gender, income, and job status. J. Affect. Disord. 286, 99–107.
Das, S., Boruah, A., Banerjee, A., Raoniar, R., Nama, S., Maurya, A.K., 2021. Impact of COVID-19: a radical modal shift from public to private transport mode. Transport Pol. 109, 1–11.
De Oña, J., de Oña, R., Eboli, L., Forciniti, C., Mazzulla, G., 2016. Transit passengers' behavioural intentions: the influence of service quality and customer satisfaction. Transportmetric. A Transport Sci. 12 (5), 385–412.
Devaraj, S., Patel, P.C., 2021. Change in psychological distress in response to changes in reduced mobility during the early 2020 COVID-19 pandemic: evidence of modest effects from the US. Soc. Sci. Med. 270, 113615.
Diener, E., 1984. Subjective well-being. Psychol. Bull. 95 (3), 542–575.
Diener, E.D., Emmons, R.A., Larsen, R.J., Griffin, S., 1985. The satisfaction with life scale. J. Pers. Assess. 49 (1), 71–75.
Diener, E., Lucas, R.E., Oishi, S., 2002. Subjective well-being: the science of happiness and life satisfaction. Handbook Positive Psychol. 2, 63–73.
Diener, E., Biswas-Diener, R., 2002. Will money increase subjective well-being? Soc. Indicat. Res. 57 (2), 119–169.
Diener, E., Lucas, R.E., Oishi, S., 2018. Advances and open questions in the science of subjective well-being. Collabra. Psychology 4 (1).
Dingil, A.E., Esztergár-Kiss, D., 2021. The influence of the Covid-19 pandemic on mobility patterns: the first Wave's results. Transport. Lett. 13 (5–6), 434–446.
Dong, H., Ma, S., Jia, N., Tian, J., 2021. Understanding public transport satisfaction in post COVID-19 pandemic. Transport Pol. 101, 81–88.
Downey, L., Fonzone, A., Fountas, G., Semple, T., 2021. Impact of COVID-19 on Travel Behaviour, Transport, Lifestyles and Location Choices in Scotland. *arXiv preprint* arXiv:2104.10440.
Downey, L., Fonzone, A., Fountas, G., Semple, T., 2022. The impact of COVID-19 on future public transport use in Scotland. Transport. Res. Pol. Pract. 163, 338–352.
Duong, C.D., 2021. The impact of fear and anxiety of Covid-19 on life satisfaction: psychological distress and sleep disturbance as mediators. Pers. Indiv. Differ. 178, 110869.
Ettema, D., Friman, M., Gärling, T., Olsson, L.E., 2016. Travel mode use, travel mode shift and subjective well-being: Overview of theories, empirical findings and policy implications. In: Mobility, Sociability and Well-Being of Urban Living. Springer, Berlin, Heidelberg, pp. 129–150.
Facal, D., Rodríguez-González, R., Martínez-Santos, A.E., Gandoy-Crego, M., 2022. Positive and negative feelings among Spanish young–old and old–old during the lockdown of the COVID-19 first wave. Clin. Gerontol. 45 (1), 31–35.
Fields, E.C., Kensinger, E.A., Garcia, S.M., Ford, J.H., Cunningham, T.J., 2022. With age comes well-being: older age associated with lower stress, negative affect, and depression throughout the COVID-19 pandemic. Aging Ment. Health 26 (10), 2071–2079.
Foa, R., Gilbert, S., Fabian, M.O., 2020. COVID-19 and Subjective Well-Being: Separating the Effects of Lockdowns from the Pandemic. *Available at SSRN 3674080*.
Fors Connolly, F., Johansson Sevä, I., 2021. Agreeableness, extraversion and life satisfaction: investigating the mediating roles of social inclusion and status. Scand. J. Psychol. 62 (5), 752–762.
Frade, F., Jacobsohn, L., Gómez-Salgado, J., Martins, R., Allande-Cussó, R., Ruiz-Frutos, C., Frade, J., 2021. Impact on the mental and physical health of the Portuguese population during the COVID-19 confinement. J. Clin. Med. 10 (19), 4464.
Gan, Z., Feng, T., Yang, M., 2018. Exploring the effects of car ownership and commuting on subjective well-being: a nationwide questionnaire study. Sustainability 11 (1), 84.
Gosling, S.D., Rentfrow, P.J., Swann Jr., W.B., 2003. A very brief measure of the Big-Five personality domains. J. Res. Pers. 37 (6), 504–528.
Grant, C.A., Wallace, L.M., Spurgeon, P.C., 2013. An exploration of the psychological factors affecting remote e-worker's job effectiveness, well-being and work-life balance. Employee Relat. 35, 527.
Headey, B., Muffels, R., Wagner, G.G., 2010. Choices Which Change Life Satisfaction–Revising SWB Theory to Account for Change, 302. SOEP Paper.
Kohút, M., Šrol, J., Čavojová, V., 2022. How are you holding up? Personality, cognitive and social predictors of a perceived shift in subjective well-being during COVID-19 pandemic. Pers. Indiv. Differ. 186, 111349.
Kolakowsky-Hayner, S.A., Goldin, Y., Kingsley, K., Alzueta, E., Arango-Lasprilla, J.C., Perrin, P.B., Constantinidou, F., 2021. Psychosocial impacts of the COVID-19 quarantine: a study of gender differences in 59 countries. Medicina 57 (8), 789.
Kuhn, U., Klaas, H.S., Antal, E., Dasoki, N., Lebert, F., Lipps, O., et al., 2021. Who is most affected by the Corona crisis? An analysis of changes in stress and well-being in Switzerland. Eur. Soc. 23 (Suppl. 1), S942–S956.
Kuntz, J.C., 2021. Resilience in times of global pandemic: steering recovery and thriving trajectories. Applied Psychology= Psychologie Appliquee 70 (1), 188.
Kyriakidis, C., Iliadis, C.F., Nikitas, A., Bakogiannis, E., 2023. Evaluating the public acceptance of sustainable mobility interventions responding to Covid-19: the case of the Great Walk of Athens and the importance of citizen engagement. Cities ume 132, 103966. https://doi.org/10.1016/j.cities.2022.103966.
Lamu, A.N., Olsen, J.A., 2018. Yes, health is important, but as much for its importance via social life: the direct and indirect effects of health on subjective well-being in chronically ill individuals. Health Econ. 27 (1), 209–222.
Laufer, A., Shechory Bitton, M., 2021. Gender differences in the reaction to COVID-19. Women Health 61 (8), 800–810.
Liu, S., Lithopoulos, A., Zhang, C.Q., Garcia-Barrera, M.A., Rhodes, R.E., 2021. Personality and perceived stress during COVID-19 pandemic: testing the mediating role of perceived threat and efficacy. Pers. Indiv. Differ. 168, 110351.
Lucier Ma, K.L., 2022. Effects of social isolation on wellbeing: undergraduate student engagement in positive and negative coping behaviours during the coronavirus pandemic. Electro. Theses Dissertat. 8820. Retrieved from. https://scholar.uwindsor.ca/etd/8820.
Mars, L., Arroyo, R., Ruiz, T., 2022. Mobility and wellbeing during the covid-19 lockdown. evidence from Spain. Transport. Res. Pol. Pract. 161, 107–129.
Mazza, C., Ricci, E., Biondi, S., Colasanti, M., Ferracuti, S., Napoli, C., Roma, P., 2020. A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: immediate psychological responses and associated factors. Int. J. Environ. Res. Publ. Health 17 (9), 3165.
Mazza, C., Marchetti, D., Ricci, E., Fontanesi, L., Di Giandomenico, S., Verrocchio, M.C., Roma, P., 2021. The COVID-19 lockdown and psychological distress among Italian parents: influence of parental role, parent personality, and child difficulties. Int. J. Psychol. 56 (4), 577–584.
McCullagh, P., Nelder, J.A., 1989. Generalized Linear Models. Chapman and Hall, New York.
Mouratidis, K., Yiannakou, A., 2022. COVID-19 and urban planning: built environment, health, and well-being in Greek cities before and during the pandemic. Cities 121, 103491.
Munsell, S.E., O'Malley, L., Mackey, C., 2020. Coping with COVID. Educ. Res.: Theor. Pract. 31 (3), 101–109.
Nagelkerke, N., Smits, J., le Cessie, S., van Houwelingen, H., 2005. Testing goodness-of-fit of the logistic regression model in case-control studies using sample reweighting. Stat. Med. 24 (1), 121–130. https://doi.org/10.1002/sim.1997. PMID: 15619270.
Nelson, N., Bergeman, C., 2020. Daily stress processes in a pandemic: the effects of affect, worry, and age. Innovat. Aging 4 (Suppl. 1), 941.
Neuburger, L., Egger, R., 2021. Travel risk perception and travel behaviour during the COVID-19 pandemic 2020: a case study of the DACH region. Curr. Issues Tourism 24 (7), 1003–1016.
Ng, W., Kang, S.H., 2022. Predictors of well-being during the COVID19 pandemic: the importance of financial satisfaction and neuroticism. J. Community Psychol. Early Publish, 1–19.
Ngamaba, K.H., 2017. Determinants of subjective well-being in representative samples of nations. Eur. J. Publ. Health 27, 377–382.
Nie, P., Sousa-Poza, A., 2018. Commute time and subjective well-being in urban China. China Econ. Rev. 48, 188–204.
Nikčević, A.V., Marino, C., Kolubinski, D.C., Leach, D., Spada, M.M., 2021. Modelling the contribution of the Big Five personality traits, health anxiety, and COVID-19 psychological distress to generalised anxiety and depressive symptoms during the COVID-19 pandemic. J. Affect. Disord. 279, 578–584.
Nikitas, A., Tsigdinos, S., Karolemeas, C., Kourmpa, E., Bakogiannis, E., 2021. Cycling in the era of COVID-19: lessons learnt and best practice policy recommendations for a more bike-centric future. Sustainability 13 (9), 4620.
Palumbo, R., 2020. Let me go to the office! An investigation into the side effects of working from home on work-life balance. Int. J. Public Sect. Manag. 33, 771–790.

Pavot, W., Diener, E., Oishi, S., Tay, L., 2018. The cornerstone of research on subjective well-being: valid assessment methodology. In: Handbook of Well-Being. Noba Scholar Handbook Series: Subjective Well-Being. DEF Publishers, Salt Lake City, UT.
Petersen, J., Austin, D., Mattek, N., Kaye, J., 2015. Time out-of-home and cognitive, physical, and emotional wellbeing of older adults: a longitudinal mixed effects model. PLoS One 10 (10), e0139643.
Quan, F., Yang, R., Xia, L.X., 2021. The longitudinal relationships among agreeableness, anger rumination, and aggression. Curr. Psychol. 40 (1), 9–20.
Rajabifard, A., Paez, D., Foliente, G., 2021. COVID-19 Pandemic, Geospatial Information, and Community Resilience: Global Applications and Lessons. Taylor & Francis.
Rogowska, A.M., Ochnik, D., Kuśnierz, C., Jakubiak, M., Schütz, A., Held, M.J., Cuero-Acosta, Y.A., 2021. Satisfaction with life among university students from nine countries: cross-national study during the first wave of COVID-19 pandemic. BMC Publ. Health 21 (1), 1–19.
Shakespeare-Finch, J., Bowen-Salter, H., Cashin, M., Badawi, A., Wells, R., Rosenbaum, S., Steel, Z., 2020. COVID-19: an Australian perspective. J. Loss Trauma 25 (8), 662–672.
Shamshiripour, A., Rahimi, E., Shabanpour, R., Mohammadian, A.K., 2020. How is COVID-19 reshaping activity-travel behavior? Evidence from a comprehensive survey in Chicago. Transp. Res. Interdiscip. Perspect. 7, 100216.
Steel, P., Schmidt, J., Shultz, J., 2008. Refining the relationship between personality and subjective well-being. Psychol. Bull. 134 (1), 138–161.
Utamayasa, I.G.D., Hanafi, M., Putra, I.B., Kusuma, A.I., Rohman, U., 2022. Nutritional intake and physical activity during a pandemic: heritage fitness group. J. Pharm. Negat. Results 13 (3), 455–462.
Watson, D., Clark, L.A., Carey, G., 1988. Positive and negative affectivity and their relation to anxiety and depressive disorders. J. Abnorm. Psychol. 97 (3), 346.
Yu, Y., Lau, M., Lau, J.T., 2022. Working from home and positive/negative experiences due to social distancing as interacting factors of depressive symptoms during the COVID-19 pandemic in a Chinese general population. Soc. Psychiatr. Psychiatr. Epidemiol. 57 (6), 1235–1246.
Zaiedy Nor, N., Smith, A.P., 2019. Psychosocial characteristics, training attitudes and well-being of students: a longitudinal study. J. Educat. Soc. Behav. Sci. 29 (1), 1–26.