



The psychological impact of the COVID-19 pandemic on the sense of life changes: The moderation effect of personality traits

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Abstract

The main goal of the study was to enquire into the moderating role of personality characteristics for relationships between the impact of the COVID-19 pandemic and one's assessment of life changes experienced during the two-year period of the pandemic. Personality traits, as an internal system regulating ways of interpreting various life events, may play a role of a buffer in predicting the way an individual perceives these changes (positive vs. negative). Responses to an online survey were acquired from 492 adults of several nationalities. Most of them were Polish, Ukrainian, British and Brazilian. The study covered participants in the 18–70 age range ($M = 34.14$, $SD = 13.17$). The following research tools were used: the COVID-19 Sense of Life Changes Questionnaire, the Revised Impact of Event Scale, the Ten Item Personality Inventory. The demographic and medical data were gathered. The participants assessed that the pandemic time caused rather negative modifications in their lives. Negative perception of life changes co-occurred with a higher intensity of hyperarousal, avoidance and intrusion. A relationship between a lower tendency for intrusions or avoidance and positive evaluation of changes in some life domains was identified among respondents with low or moderate Conscientiousness and Agreeableness and low level of Emotional stability. These relationships were not observed in respondents with high levels of these personality traits. Personality is considered as substantial buffering factor for relationships between the impact of the pandemic as a traumatizing event and the feeling of life changes.

Keywords Big Five personality traits · Avoidance · Hyperarousal · Intrusion · Life changes · COVID-19

Introduction

People throughout the world have recently experienced the after effects of the COVID-19. Individuals, in their specific ways, have been giving meaning to and making sense of the changes resulting from this unexpected and difficult situation (Modersitzki et al., 2021; Schmiedeberg & Thönnissen, 2021; Zacher & Rudolph, 2021). The effects of the COVID-19, as numerous studies have shown, are associated with various types of losses,

however some positive aspects of the situation have also been observed (Anjankar Ashish et al., 2020; Finstad et al., 2021; Krajewski et al., 2021). Some losses are objective and easily measurable (e.g. increased unemployment, inflation, and mortality). Other losses relate to the subjectively experienced sense of resignation, decreased life satisfaction, grief or distress caused by death of the loved ones, staying at home or loss of a job (Modersitzki et al., 2021; Schmiedeberg & Thönnissen, 2021). The positive aspects of the pandemic are linked to such factors as the chance of home office, enhancement of digital competences, increase in resilience, return to previously abandoned interests (Finstad et al., 2021; Krajewski et al., 2021; Takiguchi et al., 2022). Most investigations conducted during 2020–2022 suggest that perception of the pandemic in terms of gains and losses results from complex interactions of different factors: intensification of negative emotions, age, personality traits, socio-cultural contexts, from the level of trust to restrictions which were introduced in most

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countries and the dynamics of the pandemic (Anglim & Horwood, 2021; Modersitzki et al., 2021; Zacher & Rudolph, 2021).

Intrusion, hyperarousal and avoidance at the onset of the COVID-19

Societies encountered a lot of unclear, often contradictory data about the course and causes of the COVID-19. Because of this, people were more likely to follow information and seek explanations (Zacher & Rudolph, 2021). Just as in any confusing and potentially anxiety-inducing situations, many individuals encountered intrusive thoughts, hyperarousal or a tendency to avoid risky situations (Arredondo & Caparrós, 2021; Mourelatos, 2021). In connection with the recommendations of The World Health Organization and the local prescriptions referring to behaviours over the pandemic (e.g. washing hands frequently, social distancing), these behaviours and things were a normal and natural response to the potential danger and became an everyday element of our lives. The function of these behaviours and thoughts was to help to cope with unfavourable or unexpected situations. The factors contributing to the greater intensity of these characteristics included losses of a relative (Arredondo & Caparrós, 2021), information overload, media vicarious traumatization and infodemic (Xu & Liu, 2021). The high intensity intrusive thoughts, hypervigilance and tendency to avoid risky situations may adversely affect life satisfaction and general well-being, and lead to disruptions in mental health (Finstad et al., 2021; Sanchez-Gomez et al., 2021). The COVID-19 time is considered as a “potentially traumatic event” because it may be associated with the emergence of PTSD symptoms (Shevlin et al., 2020; Wathelet et al., 2021). Although the intrusive thoughts, hypervigilance and tendency to avoid risky situations correspond to symptoms typical of PTSD, for the latter mental health, keeping track of changes in life, the severity and duration of such symptoms are of critical importance (McMillen et al., 2000). It has been established that the temporal dynamics of these traits may have a different trajectory (Sveen et al., 2016).

While in the initial stage of the pandemic, researchers noted high rates of PTSD, others have emphasized the diversity of psychological reactions to the pandemic (Rajkumar, 2022; Wathelet et al., 2021) but also inconsistency in the use of terms to describe mental problems (PTSD, COVID stress syndrome, COVID traumatic event). A meta-analysis of data from 2020 and 2021 showed the stability of PTSD characteristics (Cénat et al., 2022), and some reports indicated a significantly lower percentage of people whose symptoms met the criteria for PTSD (Rajkumar, 2022).

Personality and perception of life over the pandemic time

The linkage between personality and stress has been analysed in several psychological conceptions (Luo et al., 2022). It was pointed out that the occurrence of PTSD symptoms (their type and severity) may depend on personality factors, but on the other hand, personality traits may mediate the connection between the psychological impact of PTSD symptoms and subjective perception of difficult situations (Aschwanden et al., 2021). Personality traits are responsible for patterns of reactions specific to a given individual, and for the way various events are perceived and interpreted by that individual (Costa & McCrae, 2004; Oniszczenko, 2021). For this reason, personality affects the way life changes are interpreted in cognitive and emotional terms (Aschwanden et al., 2021). The commonly used concepts related to this issue include the Five Factor Model, which defines Agreeableness, Conscientiousness, Extraversion, Openness to experience and Emotional Stability as major personality characteristics (Costa et al., 2019) which can predict how people perceive their lives, for example in terms of well-being or life satisfaction (Malvaso & Kang, 2022) and changes in their lives due to the COVID-19 time (Anglim & Horwood, 2021; Modersitzki et al., 2021). These personality characteristics are linked to a variety of behaviours and feelings. Therefore, they are supposed to have various impacts on the subjective assessment of life changes connected with the COVID-19 (Luo et al., 2022). Extroverts are prone to perceive new and ambiguous circumstances as challenges, and are able to more effectively cope with adverse circumstances by seeking, for example, social support (Corr et al., 2013; Shokrkon & Nicoladis, 2021). Individuals with low level of Emotional stability have lower self-esteem and satisfaction with their lives. Moreover, they concentrate on the negative aspects of life which make them susceptible to perceiving the situation as exceeding their resources to cope with them. Individuals with low Emotional stability are also subject to repetitive negative thoughts (Luo et al., 2022). Conscientiousness, Openness to experience, Agreeableness correlate positively with overall life satisfaction (Malvaso & Kang, 2022) and some of its aspects, e.g., satisfaction with partner, interpersonal relationships, job or free time. In turn, the link between Extroversion and satisfaction with life is significant, but weak.

During the COVID-19 pandemic, extroverts scored higher for well-being and ability to adapt to changing living conditions (Shokrkon & Nicoladis, 2021). Individuals with lower levels of Emotional stability tend to experience ruminations and intrusive thoughts and are

more likely to be pessimistic in their appraisal of their own lives (Hervas & Vazquez, 2011). More pronounced neuroticism and emotional instability were associated with a sense of the adverse influence of the pandemic on one's experiences (Gori et al., 2021). Conscientiousness, on the other hand, was conducive to the positive evaluation of life changes, as it is associated with the ability to formulate long-term goals and to subordinate intentional activity to them (Ziapour et al., 2018). Highly conscientious individuals were more likely to use adaptive defense mechanisms during the pandemic, compared to those low in conscientiousness (Fink et al., 2021; Gori et al., 2020). Agreeableness fosters an advantageous perception of life changes, because agreeable people tend to be likeable and cooperative, and can count on others for help in difficult circumstances (Agbaria & Mokh, 2022). A high level of Agreeableness was related to a willingness to observe epidemic rules during the pandemic, whereas a greater intensity of Openness was correlated with ingenuity in finding solutions to difficult situations and a willingness to experiment with new behaviours (Al-Omiri et al., 2021). Although some findings show that personality has only a minor effect on behaviours and beliefs associated with the pandemic, several conducted between the 2020 and 2022 suggest that personality is indeed related to the perception of the threat induced by the pandemic time (Fink et al., 2021; Gori et al., 2021; Luo et al., 2022; Modersitzki et al., 2021; Rammstedt et al., 2022). Certain personality traits (e.g., low level of Emotional stability, low degree of Agreeableness) may contribute to the onset of PTSD symptoms, and owing to their association with a tendency to assign motivational meanings to different events, are likely to shape people's beliefs about changes in their lives (Aschwanden et al., 2021; Corr et al., 2013; Oniszczenko, 2021).

Given these considerations, we expect that our work contributes to the comprehending of the psychological influence of the COVID-19 time on the perception of life changes in connection with personality factors. The designed study investigated three goals. Firstly, we intended to estimate whether the psychological impact of the COVID-19 pandemic, reflected by the intensity of intrusions, avoidance and hyperarousal, is associated with evaluation of changes brought about in many domains of life by the ongoing pandemic in a cross-cultural context in the years 2020–2021. Secondly, we tried to recognize if the personality traits are associated with a perception of changes during the COVID-19 time. We assumed that the experience of intrusion, hyper-vigilance and avoidance was common to all of us and could affect the assessment of life changes during the pandemic. We also assumed that personality may be related to the subjective assessment of life changes, which is consistent with some reports (Aschwanden et al., 2021; Oniszczenko, 2021).

Thirdly, we attempted to identify if personality traits moderate the associations between the psychological impact of the pandemic and the sense of life changes. We hypothesized that the intensity of personality traits moderates the relationships between hyperarousal, avoidance, intrusion and the sense of life changes during the COVID-19.

Methodology

Participants

The sample of adults consisted of 492 individuals between 18 and 70 years ($M = 34.14$; $SD = 13.17$) of four nationalities: Polish, Ukrainian, British and Brazilian. 73.6% of respondents were women ($n = 362$) and 26.4% were men ($n = 130$). Educational level was described as lower (primary and secondary; 42.3% of participants, $n = 208$) and higher (university degree or PhD; 57.7%, $n = 284$). Most participants (96.3%, $n = 474$) were employed or were university students, only 3.7% of subjects ($n = 18$) were pensioners, retirees or unemployed. In addition, the group predominantly contained adults who lives with somebody close (87.6%, $n = 431$). Subjects predominantly reported their financial status as average (75%, $n = 415$), only 7.5% ($n = 37$) indicated it as significantly poorer or 8.1% ($n = 40$) reported their financial status as significantly better. A total of 69.1% ($n = 340$) were already vaccinated with the CoronaVac, and 30.1% ($n = 152$) didn't receive the injection. About 61% of participants ($n = 300$) reported their health status as without any medical conditions, 31.1% ($n = 153$) mentioned mild problems and 7.9% ($n = 39$) indicated the presence of some type of chronic medical conditions. Most participants (69.7%, $n = 343$) didn't have a pre-existing the COVID-19 history, 30.3% ($n = 149$) had the disease, but only 2.1% stayed in a hospital. Almost half of the respondents indicated cases of COVID-19 disease in the family (49.8%, $n = 245$). No such incidents in the family were reported by 50.2% of the subjects ($n = 247$).

The Impact of Event Scale-Revised (IES-R)

Psychological impact of the COVID-19, treated as the presence of PTSD symptoms was assessed by the IES-R (Weiss, 2007). It comprises 22 statements referring to three clusters of symptoms: intrusion (e.g. interfering thoughts, insomnia, anxiety), avoidance (e.g. numbing of responsiveness, avoiding of feelings, situations) and hyperarousal (e.g. irritability, problems with concentration, anger). Individuals estimated their experiences considering the 2020–2021 period on a scale from 0 (not at all) to 4 (extremely). A raw scoring range of 0 to 88 points. Obtaining at least 33 points is treated as the indicator of a plausible diagnosis of PTSD.

The coefficients α Cronbach in the present study were as follows: 0.89 for total IES-R, 0.87 for Intrusion, 0.79 for Avoidance and 0.86 for Hyperarousal.

The Ten Item Personality Inventory (TIPI)

TIPI was applied to assess personality characteristics distinguished in the Five Factor Model (Costa & McCrae, 2004; Gosling et al., 2003). Agreeableness, Conscientiousness, Emotional stability, Extraversion, Openness to experience and were assessed by selecting one of the responses on a scale ranging from 0 (disagree strongly) to 7 (agree strongly). Ten Item Personality Inventory (TIPI) includes 10 items comprising five scales: Agreeableness (e.g. *quarrelsome*), Conscientiousness (e.g. *dependable*), Emotional Stability (e.g. *easily upset*), Extraversion (e.g. *enthusiastic*), Openness to experience (e.g., *creative*; Sorokowska et al., 2014). Satisfactory psychometric properties were shown for our study by calculating the α Cronbach value for TIPI subscales (0.84–0.91).

The COVID-19 Sense of Life Changes Questionnaire (COVID-19 SLCHQ)

SLCHQ was developed by authors on the basis of the Recent Life Changes Questionnaire (RLCQ; Miller & Rahe, 1997) and the COVID-19 Pandemic on Quality of Life: COVID-19-QoL (Repišti et al., 2020). Participants were asked to assess whether the COVID-19 influenced their life when they considered 2020 and 2021 years. Subjects assessed changes in eleven aspects of life (mental efficiency, social activity work, health self-care, hobby, interpersonal relationships mental and physical health, political interest, economical status everyday life, the future after the pandemic) on a scale from 1 (dramatically negative) to 7 (extremely positive). It is possible to obtain 11 to 77 points, and the cut-off scores bring 44 points. The lower score of COVID-19 SLCHQ corresponds to the perception of changes in life in a more negative way. The higher score means a more positive perception of life changes during the COVID-19 pandemic. The internal consistency of COVID-19 SLCHQ was satisfactory ($\alpha=0.90$).

Procedure

The participants of the study were enrolled online. Methods were used in several language versions (Polish, Ukrainian and English). Data were collected by applying the snowball method. Participants were familiarized with the scientific aim of the research (through e-mail or social media). A survey was distributed by the use of the Google Forms platform. Respondents were instructed that sending the filled survey is tantamount to expressing informed electronic consent to partake in the research. The questionnaires were launched on

September the 1st, 2021 and remained open until December 12th 2021. Each person participated in the study voluntarily. All information was treated confidentially. The local University Research Ethic Commission approved the research protocol (number: 8/2021).

Statistical analysis

SPSS statistical software (version 26.00 for Windows) and Hayes PROCESS (v 3.3 macro in SPSS) was used to analyse the collected data (Hayes, 2022). To identify the impact of event, personality characteristics and the sense of life changes during the COVID-19 connections, the Spearman's correlation (ρ) was applied. In further analysis, simple moderated regression analysis using Hayes PROCESS, and analysis of the effects of X (X_{In} —Intrusion, X_{Av} —Avoidance, X_{Hyp} —Hyperarousal) on Y (the COVID-19 SLCHQ scores) at $-1 SD$, $0 SD$ and $+1 SD$ of the moderator W (personality traits from the TIPI: W_{Est} —Emotional stability, W_{Ex} —Extraversion, W_{Con} —Conscientiousness, W_{Oex} —Openness to experience and W_{Ag} —Agreeableness) were applied (Fig. 1).

The significance of the effects was assessed with bias-corrected bootstrap confidence intervals based on 5000 bootstrapping samples (Hayes, 2022). To investigate the moderating role of personality characteristics in Model 1, on the basis of the Johnson-Neyman procedure, three subgroups were distinguished dependently on the scores in personality traits: low level ($1SD$ below mean), mid-level ($-1SD$ to $+1SD$), high level ($1SD$ above mean). Johnson-Neyman plots were used to visualize the relationships between the impact of the pandemic and the perception of the life changes over the COVID-19 time across low, moderate and high respective personality traits conditions.

Results

Table 1 contains the statistical data of the measures and the correlation analysis. The mean IES-R score is lower than the score indicating the presence of clinically significant PTSD severity, however, the standard deviation indicates a large variation in the severity of hyperarousal, intrusion and avoidance. The score of COVID-19 SLCHQ ($M=40.75$, $SD=10.01$) indicates a sense of life change in the negative direction. However, among the respondents there were those who claimed that changes in their lives caused by the pandemic were very positive or extremely negative (range: 14–77 points). Results highlighted statistically significant and negative associations of the perception of life changes during the COVID-19 with each subscale of IES-R (Intrusion, Avoidance, Hyperarousal), as well as positive significant relationships with all measured personality characteristics.

Fig. 1 The hypothesis model of simple moderated regression (Model 1)

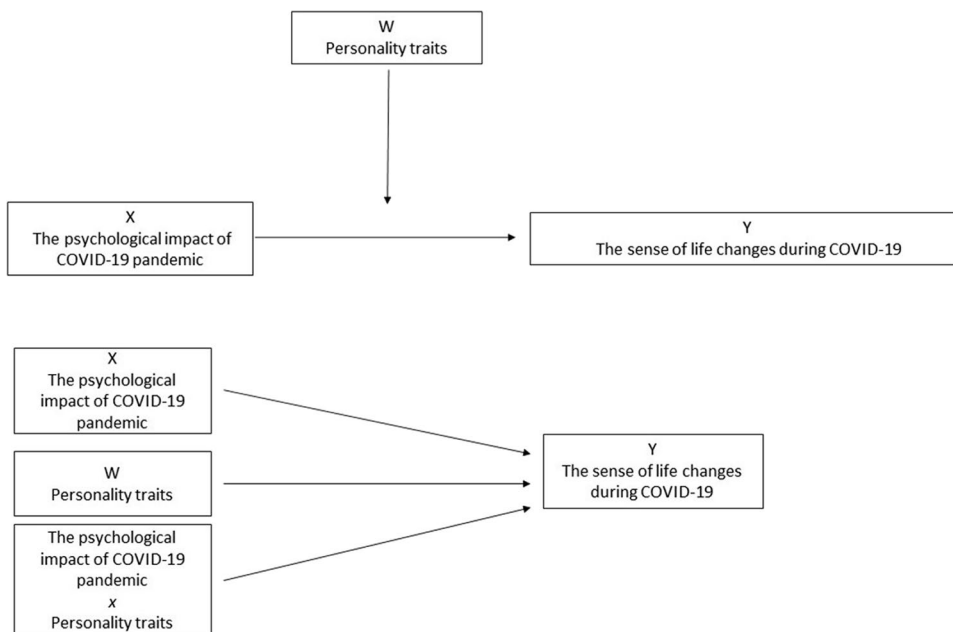


Table 1 IES-R, TIPI and SLCHQ (N=492; total sample): M (SD) and the Spearman’s rank-order correlation (ρ)

variables	M (SD)	SLCHQ ρ Spearman
In	1.03 (0.68)	- 0.116**
Hyp	1.24 (0.68)	- 0.201***
Av	1.11 (0.69)	- 0.105*
IES-R (total)	24.81 (12.87)	- 0.156***
Ex	10.25 (2.910)	0.147***
Ag	10.47 (2.433)	0.165***
Con	10.46 (2.846)	0.256***
Est	8.63 (3.161)	0.245***
Oex	10.16 (2.788)	0.107*
SLCHQ	40.75 (10.01)	

*The correlation is significant (2-tailed) at the 0.05 level

** The correlation is significant (2-tailed) at the 0.01 level

*** The correlation is significant (2-tailed) at the 0.001 level

In Intrusion, Hyp Hyperarousal, Av Avoidance, IES-R The Impact of Event Scale-Revised (total), Ex Extraversion, Ag Agreeableness, Con Conscientiousness, Est Emotional stability, Oex Openness to experience, SLCHQ Sense of Life Changes Questionnaire

The next step of the analysis was to assess the moderating effect of personality characteristics on the relationships between the psychological impact of the pandemic and the sense of life changes during COVID-19 time. Table 2 includes the data of the regression model with moderation (model 1 in Hayes).

Intrusion, Hyperarousal and Avoidance had a negative influence on the sense of life changes over the COVID-19 time, but some personality traits like Emotional stability, Openness and Extraversion redounded to the more

positive perception of life changes over the time of the pandemic. There were identified the moderation effects of three personality traits: Agreeableness, Emotional stability and Conscientiousness. The interaction between Emotional stability and Avoidance significantly predicted the sense of life changes, pointing on the substantial moderation effect of Emotional stability on the connection between Avoidance and the COVID-19 SLCHQ score (Table 2).

Based on the multi-group analyses with Emotional stability (Est) as the moderator, Avoidance was only significantly and negatively correlated with the sense of life changes, when Emotional stability was low ($M-1SD = 5.4649$; $b = -2.1132$, $p = 0.0134$; 95%CI [-3.7856, -0.4409]). Correlation between these variables was not significant at the mid-level of W_{Est} ($M = 8.6293$; $b = -0.7796$, $p = 0.2291$; 95%CI [-2.0516, 0.4923]), and at the high level of W_{Est} ($M + 1SD = 11.7937$; $b = 0.5540$, $p = 0.5511$; 95%CI [-1.2709, 2.3790]).

Figure 2 demonstrates the interaction effect wherein the relations between Avoidance and the score of COVID-19 SLCHQ was stronger for low than for high Emotional stability. Except for Emotional stability, two other personality traits have moderation effects on the relationships between variables. The relations between Intrusion and the perception of life changes during the COVID-19 was moderated by both Agreeableness (Ag) and Conscientiousness (Con). On exploring the moderation effect of Agreeableness, the interaction of Agreeableness and Intrusion substantially predicted COVID-19 SLCHQ score (Table 2). At the low and mid-level of W_{Ag} , the increase of Intrusion was significantly

Table 2 Regression model with moderation (model 1 in Hayes)

Variables	B	SE	T	p	LLCI	ULCI
Constant	37.8716	3.103	12.21	.000	31.775	43.967
Hyperarousal	-2.7713	2.4322	-1.139	.255	-7.5502	2.0075
Extraversion	.608	.287	2.118	.0346*	.00441	1.1720
$X_{Hyp} \times W_{Ex}$	-.0242	.229	-1.105	.9160	-.4741	.4258
$R^2 = .076$, $MSE = 93.4651$, $F_{(3,486)} = 13.363$, $p = .0001$						
Variables .2	B	SE	T	p	LLCI	ULCI
Constant	38.4613	3.2837	11.712	.000	32.009	44.913
Avoidance	-3.4809	2.3536	-1.479	.1398	-8.105	1.143
Extraversion	.3917	.3154	1.242	.2148	-.229	1.0114
$X_{Av} \times W_{Ex}$	.2017	.2270	.888	.3747	-.244	.647
$R^2 = .04$, $MSE = 96.5709$, $F_{(3,486)} = 7.680$, $p = .0001$						
Variables .3	B	SE	T	p	LLCI	ULCI
Constant	39.4152	2.902	13.609	.000	33.793	45.197
Intrusion	-5.219	2.4670	-2.115	.034*	-10.06	-.3702
Extraversion	.2954	.273	1.0818	.279	-.241	.8318
$X_{In} \times W_{Ex}$	.3405	.2331	1.4604	.1448	-.117	.7985
$R^2 = .051$, $MSE = 95.779$, $F_{(3,486)} = 8.793$, $p = .0001$						
Variables .4	B	SE	T	p	LLCI	ULCI
Constant	36.806	3.8124	9.654	.000	29.315	44.296
Hyperarousal	-3.026	2.916	-1.037	.299	-8.757	2.703
Agreeableness	.6757	.3487	1.949	.06	-.005	1.3648
$X_{Hyp} \times W_{Ag}$	.0177	.275	.0642	.948	-.532	.558
$R^2 = .07$, $MSE = 93.396$, $F_{(3,486)} = 13.402$, $p = .001$						
Variables .5	B	SE	T	p	LLCI	ULCI
Constant	34.910	4.221	8.269	.000	26.616	43.205
Avoidance	-1.828	2.889	-.631	.528	-7.524	3.868
Agreeableness	.693	.386	1.792	.073	-.067	1.453
$X_{Av} \times W_{Ag}$	.066	.271	0.243	.808	-.467	.500
$R^2 = .04$, $MSE = 96.537$, $F_{(3,486)} = 7.648$, $p = .0001$						
Variables .6	B	SE	T	p	LLCI	ULCI
Constant	43.188	3.756	11.469	.000	35.807	50.568
Intrusion	-9.584	2.896	-3.309	.0001***	-15.278	-3.893
Agreeableness	-.076	.343	0.223	.823	-.748	.596
$X_{In} \times W_{Ag}$	.778	.269	2.886	.004**	.248	1.308
$R^2 = .06$, $MSE = 94.434$, $F_{(3,488)} = 11.138$, $p = .001$; $X_{In} \times W_{Ag} : R^2_{chg} = .016$; $F = 8.333$ $p = .004$ **						
Variables .7	B	SE	T	p	LLCI	ULCI
Constant	40.5767	3.2503	12.483	.000	34.190	46.961
Intrusion	-8.953	2.6389	-3.393	.0007***	-14.138	-3.768
Conscientiousness	.1771	.2982	.594	.5529	-.401	.763
$X_{In} \times W_{Con}$	.7070	.2452	2.88	.004**	.225	1.1887
$R^2 = .09$, $MSE = 91.04$, $F_{(3,488)} = 17.614$, $p = .001$; $X_{In} \times W_{Con} : R^2_{chg} = .015$; $F = 8.316$ $p = .004$ **						
Variables .8	B	SE	T	p	LLCI	ULCI
Constant	38.9552	3.2901	11.837	.000	32.489	45.421
Hyperarousal	-6.833	2.6171	-2.6109	.009**	-11.975	-1.609
Conscientiousness	.486	.3005	1.6186	.106	-.104	1.076
$X_{Hyp} \times W_{Con}$	.3753	.2439	1.538	.124	-.104	.854
$R^2 = .12$, $MSE = 89.4306$, $F_{(3,478)} = 12.19$, $p = .001$						
Variables .9	B	SE	T	p	LLCI	ULCI
Constant	37.5353	3.5337	10.622	.000	30.529	44.478
Avoidance	-5.304	2.5075	-2.115	.035*	-11.975	-1.609
Conscientiousness	.477	.3278	1.456	.146	-.166	1.121

Table 2 (continued)

$X_{Hyp} \times W_{Con}$	.369	.2329	1.587	.113	-.08	.822
$R^2 = .08, MSE = 92.429, F_{(3,478)} = 15.203, p = .001$						
Variables .10	B	SE	T	p	LLCI	ULCI
Constant	37.5367	2.5872	15.281	.000	34.453	44.620
Avoidance	-4.416	1.7365	-2.543	.0113*	-7.828	-1.004
Emotional stability	.268	.2742	.978	.328	-.270	.807
$X_{Av} \times W_{Est}$	.421	.1934	2.1794	.029*	.0415	.8014
$R^2 = .08, MSE = 93.149, F_{(3,488)} = 13.830, p = .001; X_{Av} \times W_{Est}: R^2_{chg} = .009; F = 4.749, p = .029^*$						
Variables .11	B	SE	T	p	LLCI	ULCI
Constant	37.8269	2.3041	16.417	.000	33.299	42.354
Intrusion	-3.603	1.7871	-2.0313	.043*	-7.141	-1.118
Emotional stability	.4938	.2454	2.0122	.044*	.0116	.9761
$X_{In} \times W_{Est}$	.279	.1998	1.397	.1630	-.113	.6817
$R^2 = .07, MSE = 93.149, F_{(3,488)} = 13.618, p = .001$						
Variables .12	B	SE	T	p	LLCI	ULCI
Constant	41.0654	2.5062	16.385	.000	36.141	45.989
Hyperarousal	-5.463	1.7876	-3.056	.002**	-8.975	-1.950
Emotional stability	.276	.2599	1.0622	.288	-.234	.786
$X_{Hyp} \times W_{Est}$	.374	.2024	1.845	.065	-.02	.77
$R^2 = 0.09, MSE = 91.271, F_{(3,487)} = 17.493, p = 0.001$						
Variables .13	B	SE	T	p	LLCI	ULCI
Constant	36.9528	3.3019	11.191	.000	30.465	43.440
Hyperarousal	-.9317	2.4804	-.375	.707	-5.805	3.94
Openness to experience	.6944	.3060	2.269	.024*	.09	1.295
$X_{Hyp} \times W_{Op}$	-.199	.2362	-.845	.398	-.663	.264
$R^2 = .06, MSE = 94.3910, F_{(3,487)} = 11.5503, p = .001$						
Variables .14	B	SE	T	p	LLCI	ULCI
Constant	35.9306	3.1238	11.502	.000	29.792	43.068
Intrusion	-.444	2.4701	-.179	.857	-5.297	4.409
Openness to experience	.6304	.2929	2.152	.0319*	.0549	1.206
$X_{In} \times W_{Op}$	-.109	.2389	-.457	.647	-.373	.360
$R^2 = .36, MSE = 97.3253, F_{(3,488)} = 5.975, p = .00005$						
Variables .15	B	SE	T	p	LLCI	ULCI
Constant	42.1913	3.3711	12.517	.000	35.573	48.821
Avoidance	-5.599	2.3412	-2.3917	.017*	-10.199	-.999
Openness to experience	.0108	.3183	.039	.9530	-6.6147	.6362
$X_{Av} \times W_{Op}$	.4321	.2257	1.9146	.06	-.0113	.8756
$R^2 = .04, MSE = 97.113, F_{(3,487)} = 66.397, p = .0002$						

X_{In} Intrusion, X_{Av} Avoidance, X_{Hyp} Hyperarousal, Y COVID-19 SLCHQ scores, W_{Est} Emotional stability, W_{Ex} Extraversion, W_{Con} Conscientiousness, W_{Op} Openness to experience, W_{Ag} Agreeableness

Using regression model with moderation including gender and vaccine status as covariates, it was concluded that these variables have no contribution to the dependent variable

associated with the decrease in COVID-19 SLCHQ scores ($M - 1SD = 8.0385$; $b = -3.3278$, $p = 0.0003$, $95\%CI [-5.138, -1.517]$; $M = 10.4715$; $b = -1.4342$, $p = 0.0272$; $95\%CI [-2.706, -0.162]$ respectively). However, at the high level of Agreeableness the relationship between Intrusion and COVID-19 SLCHQ score was positive but non-significant ($M + 1SD = 12.9046$; $b = 0.4595$, $p = 0.6182$; $95\%CI [-1.3511, 2.270]$). Substantial contributions to the perception of life changes

during COVID-19 were made also by both Intrusion and Conscientiousness (Table 2). The further exploration of moderating effect of W_{Con} suggested that the correlation between Intrusion and COVID-19 SLCHQ scores was significant and negative at the low ($M - 1SD = 7.614$; $b = -3.569$, $p = 0.0002$, $95\%CI [-5.4152, -1.7240]$) and mid-levels ($M = 10.4614$, $b = -1.557$, $p = 0.0140$, $95\%CI [-2.798, -0.3159]$) of Conscientiousness, but non-significant and positive at the high

Fig. 2 Johnson-Neyman plot showing the interaction effect of Avoidance and Emotional stability on the sense of life changes during COVID-19

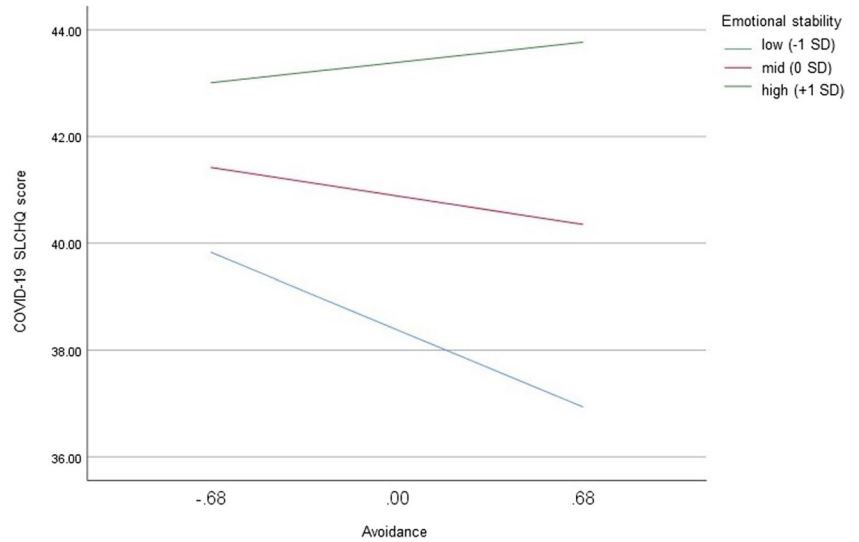
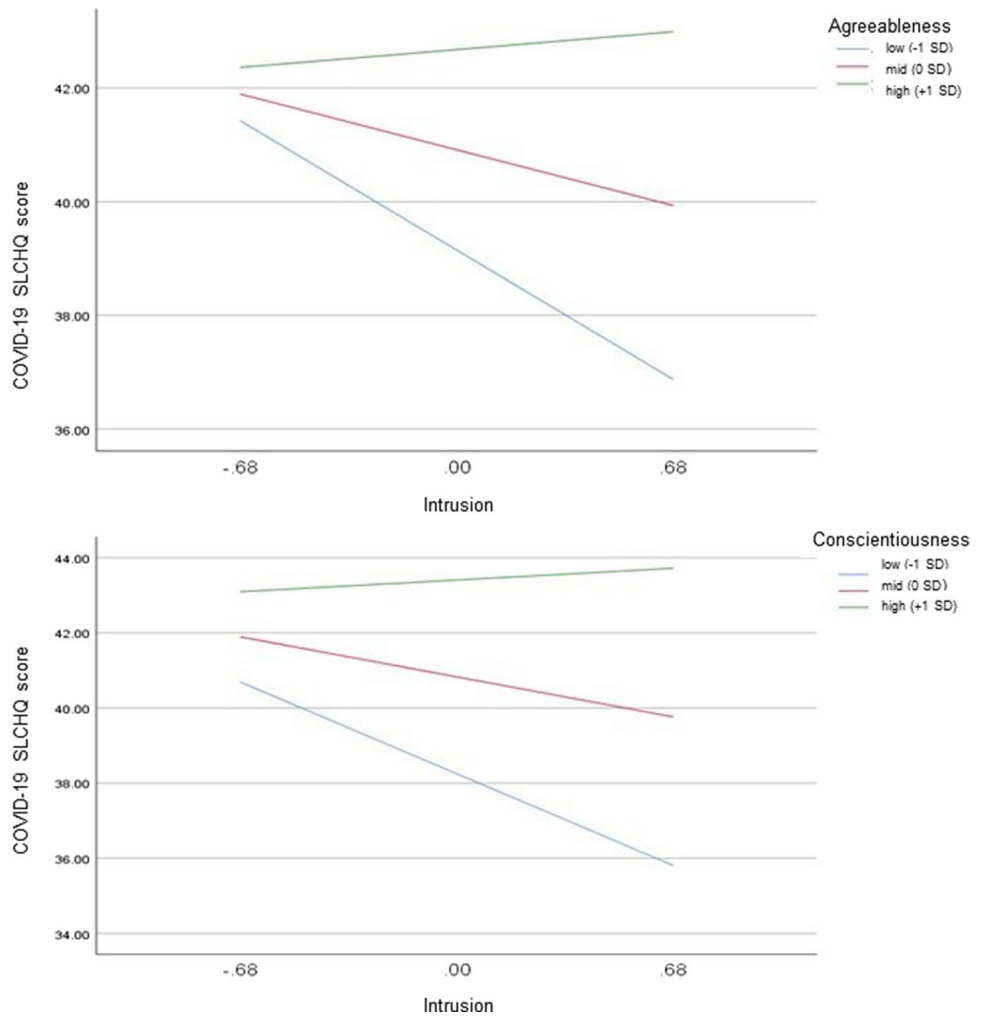


Fig. 3 Johnson-Neyman plot showing the interaction effect of Intrusion and Agreeableness or Conscientiousness on the sense of life changes during COVID-19



level of W_{Con} ($M + 1SD = 13.307$, $b = 0.455$, $p = 0.6294$; 95%CI [-1.397, 2.3089]). The interaction effect of Agreeableness x Intrusion and Conscientiousness x

Intrusion on the perception of life changes over the COVID-19 time was demonstrated by Johnson-Neyman plots (Fig. 3).

Discussion

The onset of the COVID-19 time, perceived as a negative life experience, raised questions concerning possible determinants explaining behaviours exhibited in response to this type of situation (Modersitzki et al., 2021; Krajewski et al., 2021; Zacher & Rudolph, 2021). Hence, the first aim explored in this study was to assess the relationships between the psychological impact of such event as the pandemic and the perception of life changes in different domains connected with COVID-19 time. It was a new, stressful, confusing situation for most people and its psychological impact was determined by identifying patterns of behaviours and thoughts corresponding to post-traumatic symptoms, i.e., avoidance, intrusions and hyperarousal. The previous studies provide evidence that post-traumatic symptomatology is observed as an effect of the pandemic (Arredondo & Caparrós, 2021; Forte et al., 2020; Mourelatos, 2021; Schmiedeberg & Thönnissen, 2021; Shevlin et al., 2020; Wathelet et al., 2021). In our study, it was generally mild. However, the respondents' scores in avoidance, intrusions and hyperarousal are consistent with those identified by some researchers (Cénat et al., 2022), or lower than those reported in other studies (Arredondo & Caparrós, 2021) conducted during the pandemic. The feeling of adverse changes in life may depend on the severity of the psychological impact of the pandemic. The respondents participating in our research tended to perceive changes in various domains of life in ways which more frequently were expressed by negative opinions, however there were differences in that, as well. The findings showed that higher levels of intrusions, hyperarousal or avoidance correspond to a greater intensity of negative opinions about life changes.

The second aim was to identify the links between personality characteristics and the sense of life changes during the COVID-19 time. According to earlier research, individuals exhibiting specific personality traits react to health emergencies disparately (Forte et al., 2020; Modersitzki et al., 2021; Schmiedeberg & Thönnissen, 2021). It should be emphasized that higher degree of most personality traits defined in the framework of the Big Five Model were conducive to more positive perceptions of the changes in life during the pandemic, which means that these traits are an important factor associated with a sense of life changes accompanying the experience of a difficult situation (Agbaria & Mokh, 2022; Aschwanden et al., 2021). Hence, some personality traits may constitute a buffer in the evaluation of adverse changes during the years 2020–2021, whereas the influence of the COVID-19 time manifested as intrusions, hyperarousal and avoidance may contribute to such negative perceptions.

To explain the role of the psychological impact of the pandemic and the level of personality characteristics in the ways people perceive their life in the COVID-19 conditions, we formulated the third objective and assumed that the traits underlying Five Factor Model, understood as dispositions for interpretation of live events, moderate the relationships between the psychological impact of the COVID-19 time changes, perceived as going in a positive or negative direction. The findings show that a moderating effect was identified in the case of Agreeableness, Conscientiousness and Emotional stability. Each particular trait has a specific contribution in explaining individual differences in behavioural patterns treated as avoidance or intrusion and experience of life changes. The level of Emotional stability moderated the effect of avoidance, exhibited in respondents' behaviours, on the sense of life changes, which is congruent with previous research conducted on a German sample (Zacher & Rudolph, 2021). A higher level of anxiety, a predisposition for excessive worry and irrational fear, persisting negative affect, as well as inclination to respond with fear and tension corresponds to a more pronounced tendency to negatively assess changes occurring as a result of the pandemic. A moderating effect was also observed in the case of low Emotional stability. More specifically, respondents with higher level of neuroticism, exhibiting a greater tendency for avoidance, are more likely to negatively assess the situation of the pandemic. Earlier studies showed that these individuals present stronger and longer-lasting emotional responses and experience greater intensity of stressful events in their life (Agbaria & Mokh, 2022; Gori et al., 2021). This may result from the poorer ability of these individuals to control a situation and cope with stress (Hervas & Vazquez, 2011). Indeed, during the pandemic people were required to control many areas of life, to comply with the rules imposing restrictions on functioning in daily life, and to work out strategies to cope with the new situation. However, the study revealed that in the case of those presenting moderate and high Emotional stability, a tendency towards avoidance did not significantly impact the perception of life changes. The plausible explanation for these results may be connected with the protective role of high emotional stability in facing traumatic events. This trait may decrease the likelihood that symptoms of a disorder will develop, and it may promote a more positive assessment of the situation, based on a realistic estimate, even when the situation is uncertain and confusing (Mourelatos, 2021; Oniszczenko, 2021). A high level of Emotional stability positively impacts one's sense of life change, whether or not they present a tendency for avoidance, which in fact may be a natural response to a traumatic situation. In contrast, an increased level of neuroticism seems to be a key predictor for the perception of the coronavirus as a serious threat as well as for negative emotional reactions, and consequently for

the potential appearance of post-traumatic symptomatology (Forte et al., 2020; Mourelatos, 2021).

Considering the psychological influence of the COVID-19 time, it appears that the presence of intrusions also negatively and significantly impacts the way respondents assess the changes emerging in life (Gori et al., 2020, 2021). This relationship is moderated by Agreeableness and Conscientiousness, particularly in the case of low and moderate levels of these personality traits. In these conditions, a higher level of intrusions is connected with more negative feelings about changes in life during this period of time. The study confirmed that competitive attitude, aloofness in contacts with others as well as a limited tendency to define life goals, impulsiveness and poor motivation for achievement may be important factors leading to a stronger influence of the COVID-19 time, manifested by intrusions which largely lead to a negative perception and emotions related to the life changes. According to some researchers, low intensity of Conscientiousness and Agreeableness along with a low degree of Emotional stability are some of the characteristics of a maladaptive personality profile, which is linked to higher COVID-19 fear and perceived stress, thus these traits may increase some characteristics of the psychological impact of the depicted traumatic event (Forte et al., 2020; Modersitzki et al., 2021). In our research, under conditions of high degree of Conscientiousness and Agreeableness, the level of intrusions no longer significantly determines a sense of changes during the pandemic, and intrusions occurring, in this case, can be reformulated to enable perception of positive aspects of the stressful events taken rather than focusing on negative aspects of the situations experienced. Therefore, like in the instance of avoidance accompanying a high level of Emotional stability, intrusions experienced by those with a high degree of Conscientiousness and Agreeableness may play an adaptive role. Such characteristics of conscientious and agreeable individuals as greater acceptance of changes, compliance with the COVID-19 related guidelines, rules, or restrictions, as well as focus on following the recommendations, and a tendency to acknowledge their protective role, may facilitate adaptation to the difficult situation (Al-Omiri et al., 2021; Fink et al., 2021). This approach may help these individuals to minimize infection risk or to obtain more social encouragement in difficult circumstances (Forte et al., 2020). Conscientiousness and Agreeableness seem to be associated with constructive strategies of resolving problems in a difficult situation, among others positive reinterpretation or seeking support which may be helpful in attempts undertaken during the pandemic and aimed at behavioural adaptation to

new living circumstances and at enhancing resources in handling with the pandemic (Agbaria & Mokh, 2022; Gori et al., 2021; Mourelatos, 2021). Notably, certain behaviours intensified during the pandemic, such as a focus on one's health, and on relations with the loved ones, can be seen as a positive change, linked with greater attention to the areas of life which were previously underestimated or neglected (Szepietowska et al., 2022). Personality characteristics might mould responses to crisis events by impacting the way of thinking, as well as the emotional reactions and strategies used to regulate some non-adaptive behaviours (Anglim & Horwood, 2021; Aschwanden et al., 2021; Gori et al., 2021; Zacher & Rudolph, 2021).

Strengths and limitations

The current study has several merits. Using the scale to assess the perception of life changes during the COVID-19 time showed that this assessment was not extremely negative. Similar results were revealed by Vargas et al. (2021) in analyses of negative words related to the pandemic used in posts on Twitter (in the years 2020–2021) in the English-speaking population. Data obtained from longitudinal studies covering several waves of the pandemic also showed positive changes in mental conditions in terms of well-being (Murphy & Elliot, 2022). These changes reflect the trajectory natural for traumatic events: from negative reactions to stress to post-traumatic growth. A crisis can generate new resources and create conditions for development (Kuntz, 2021). The outcomes of our research prove that in a situation of trauma, people adopt an attitude of expectation, taking into account the past, present or future. Personality traits are considered as important factors moderating the assessment of life changes. The results of our analyses are congruent with others and indicate that certain personality traits (and their intensity) may moderate the relationship between PTSD traits and the evaluation of life changes during a pandemic. This may mean that the level of certain personality traits is conducive to resilience and/or post-traumatic growth, while others may be the cause of the increase in various psychopathological symptoms (Kocjan et al., 2021). Knowledge regarding the personality traits that moderate the psychological impact of crisis situations on the perception of life changes during the pandemic is important to design targeted interventions, treatments and prevention activities to support those who are more sensitive to stress and need help during the crisis. Because of the international context of this research, the results may be used as a

hallmark of relevant longer-term actions which have been undertaken by such organizations as WHO to promote well-being, control and manage public health now and in the future (2019). Furthermore, another research may be designed to investigate the interactive effects of personality and various individual factors to explain reactions to potential crisis situations.

The results have some limitations. The first one pertains to online assessment, however due to the pandemic it was the only possible way to gather data from individuals from different countries. The sample was not large, though consisted of adults in a rather narrow age range. Our analyses did not take into account individual factors (age, sex or education) that could moderate the described relationships. Moreover, the cultural factor was not taken into account, however, the authors wanted to capture the main regularities in the relations between the psychological influence of the pandemic, personality and perception of life changes.

Conclusion

Our results provide evidence that some personality traits can modify behaviours emerging during the COVID-19 time, and are connected with the perception of life changes. Irrespective of the level of intrusions experienced, individuals with a high degree of conscientiousness and agreeableness perceive life changes during the pandemic in a more positive way, like those with at least moderate level of emotional stability exhibiting symptoms of avoidance. Many effects occurring as a result of the pandemic, involving damage to many areas of life, loss of loved ones, or home lockdown, explain the symptoms of traumatic stress. The circumstances related to COVID-19 have varied impacts on people's behaviour and perception of their life, depending on their personality traits, especially Emotional stability, Conscientiousness and Agreeableness. Individuals with high levels of these traits may find an opportunity to develop adaptive strategies and to perceive the traumatic situation not only in negative ways.

Author contributions All authors were substantially involved in the conception of the study and participated in its design. E.M.Sz, E.Z. and S.F. collected the data. E.M.Sz., S.F. and E.Z. conducted statistical analysis. E.Z., S.F. and E.M.Sz. drafted the first version of the manuscript. All authors contributed to the review, editing of the manuscript and approved the final manuscript.

Data availability The data set is available from the corresponding author on reasonable request.

Declarations

Conflict of interest The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Ethical approval All procedures performed involving human participants were in accordance with the ethical standards of The local Research Ethic Commission of the Maria Curie-Skłodowska University (the research protocol number: 8/2021), and with 1994 Helsinki declaration and its later amendments or comparable ethical standards.

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