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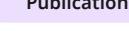
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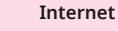
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PTSD Symptoms and Quality of Life in COVID-19 Survivors: The Mediating Effect of Resilience

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Abstract. Quality of life (QoL) is a concept which aims to capture the well-being, whether of a population or individual, regarding both positive and negative elements within the entirety of their existence at a specific point in time. Many studies have found that PTSD symptoms can worsen the quality of life of COVID-19 survivors, and a high level of resilience can indicate a good quality of life for COVID-19, because a high level of resilience makes people able to rise from their worst condition. This study aimed to explain the mediating effect of resilience on the relationship between PTSD symptoms and the COVID-19 survivors' quality of life. This study used a quantitative method, and 133 participants (mean age: 26.738; 75.2% female) were selected using a convenience sampling technique. Data analysis in this study used the IBM SPSS Statistics 26.0 program. PROCESS Macro 4.1 add-on by Hayes. Research results showed that in path a, PTSD symptoms significantly predicted resilience ($\beta = -0.049$; $p = 0.001$; LLCI = -0.072; ULCI = -0.020). In path b, resilience also significantly predicts quality of life ($\beta = 2.156$; $p = 0.000$; LLCI = 1.443; ULCI = 2.868). The direct effect of PTSD symptoms on quality of life shown in path c' is also significant ($\beta = -0.387$; $p = 0.000$; LLCI = -0.511; ULCI = -0.263) which gives higher results than the total effect ($\beta = -0.493$; $p = 0.000$; LLCI = -0.626; ULCI = -0.359). The results of the study show that PTSD symptoms had an antagonistic relationship, and resilience had a positive relationship with COVID-19 survivors' quality of life. In addition, resilience was also found to significantly mediate the relationship between PTSD symptoms and COVID-19 survivors' quality of life. COVID-19 survivors are advised to increase their resilience level to reduce the negative impact of PTSD symptoms on their quality of life.

Keywords: COVID-19 survivors; PTSD symptoms; quality of life; resilience

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Introduction

Since COVID-19 was declared a pandemic on March 12, 2020, COVID-19 survivors have reported symptoms such as fatigue, shortness of breath, chest pain, prolonged cough with phlegm, hair loss, back pain, neurocognitive problems such as decreased memory, concentration, and difficulty in carrying out daily activities, as well as mental health problems such as depression and anxiety (Bugos, 2022; Ghosh, 2022; O' Mahony et al., 2022; Raveendran et al., 2021; Shah et al., 2021). These symptoms indicate a decrease in the quality of life of COVID-19 survivors.

Quality of life is an individual's perception of their life position in the context of the culture and value system in which they live and about their goals, hopes, standards, and anxieties (World Health Organization, 2012). Quality of life has several domains and will be used by researchers in this research, including the physical, psychological, level of independence, social relationships, environmental, and spiritual domains (Cesnales & Thyer, 2014). Knowing and measuring a person's quality of life is essential because it can help assess patient needs, monitor disease progression, evaluate treatment, improve the quality of health services, and inform resource allocation and health policies for governments (Fitzsimmons & Johnson, 2014).

Many factors influence the quality of life of COVID-19 survivors, one of which is mental health. Several studies have found that COVID-19 survivors have several psychological problems, especially PTSD symptoms found in COVID-19 survivors. Several factors cause PTSD symptoms to appear in COVID-19 survivors, including discrimination against COVID-19 patients and survivors, fear of the spread of COVID-19, anxiety about sudden termination of employment, and the death of a family member due to COVID-19 (Hong et al., 2021; Olagoke et al., 2020; Speth et al., 2020).

Based on DSM 5-TR, PTSD (Post Traumatic Stress Disorder) is a repetitive stress disorder that appears after experiencing exposure to a traumatic event. Furthermore, DSM 5-TR also explains that PTSD symptoms include the emergence of intrusive symptoms related to trauma (such as recurring thoughts about traumatic memories and prolonged distress); then there is also the behavior of avoiding exposure to stimuli related to traumatic events; the emergence of cognitive changes and negative moods related to the traumatic events experienced; and finally described by excessive reactions to stimuli related to traumatic events. These symptoms need to last at least one month after experiencing the traumatic event. The global prevalence of PTSD caused by COVID-19 is 17.52% (Yunitri et al., 2022). In Indonesia, a survey found that 84% of Indonesian people experienced psychological trauma after experiencing COVID-19 for two years, of which 46% experienced severe PTSD and 33% experienced mild PTSD (Association of Indonesian Mental Health Specialist Doctors, 2022).

PTSD symptoms experienced by COVID-19 survivors can affect their quality of life. Blake et al., (2021), with research on 294 COVID-19 patients in Rotterdam, the Netherlands, found that PTSD symptoms can worsen the quality of life of COVID-19 survivors, and the severity of PTSD symptoms can predict the level of their quality of life. The worse the PTSD symptoms experienced by COVID-19 survivors, the worse their quality of life will be. This statement is supported by research conducted on 574 COVID-19 patients in China by Huang et al., (2022). They found that PTSD symptoms due to COVID-19 infection could cause or worsen pre-existing psychological problems, thereby worsening their quality of life. COVID-19 survivors can be predicted to experience PTSD symptoms if they have low resilience (Kalaitzaki et al., 2022). This statement is supported by several studies that have been conducted previously. A longitudinal study conducted on 992 college students in China by Chi et al., (2021) found that there was a negative relationship between PTSD symptoms and resilience. Individuals with a high level of resilience adapt more easily when facing difficulties to recover quickly from negative events. In addition, a high level of resilience can generate positive emotions, thereby reducing the psychological impact caused by traumatic events. *Resilience* is the resilience to adapt to life's difficulties and recover from stress (Smith et al., 2008).

The above opinion is, of course, reinforced by other research conducted on 102 COVID-19 patients in India by Miglani et al., (2022) found that high levels of resilience were negatively correlated with anxiety and stress related to COVID-19. COVID-19 patients with a high level of resilience tend to use active and positive coping methods, thereby reducing stress and anxiety due to COVID-19. This then reduces the possibility of PTSD symptoms appearing in COVID-19 patients. By becoming resilient individuals, COVID-19 survivors can respond positively to stressful conditions to maintain their physical and psychological well-being. Aldhahi et al., (2021) also found that a high level of resilience can indicate a good quality of life for COVID-19 survivors. Differences in resilience can explain differences in the quality of life for COVID-19 survivors. Resilience has been proven to have a dual role, namely as a protective factor against PTSD symptoms and also as a predictor of quality of life for COVID-19 survivors. This causes resilience to be a mediator of the relationship between PTSD symptoms and the quality of life of COVID-19 survivors. Other research also shows the role of resilience as a mediator in other traumatic events (Wijaya et al., 2021; Widyorini et al., 2022) and does not rule out the possibility of mediating psychological variables in COVID-19 survivors. The role of resilience as a mediator has been studied previously in 150 colon cancer patients with stomas in South Korea (Shin et al., 2017). Colon cancer patients with a stoma are at greater risk of experiencing PTSD symptoms and, therefore, tend to have a lower quality of life compared to other cancer patients. However, high levels of resilience can significantly reduce the impact of PTSD symptoms.

Another study conducted on 102 COVID-19 patients in India by Miglani et al., (2022) found that high levels of resilience were negatively correlated with anxiety and stress related to COVID-19. COVID-19 patients with a high level of resilience tend to use active and positive coping methods, thereby reducing stress and anxiety due to COVID-19. This then reduces the possibility of PTSD symptoms appearing in COVID-19 patients. By becoming resilient individuals, COVID-19 survivors can respond positively to stressful conditions to maintain their physical and psychological well-being. Aldhahi et al., (2021) also found that a high level of resilience can indicate a good quality of life for COVID-19 survivors. Differences in resilience can explain differences in the quality of life for COVID-19 survivors. Another study conducted by Javellana et al., (2022) on 61 women with ovarian cancer in Chicago, United States, also obtained similar results. A high level of resilience is a significant predictor of the high level of quality of life for ovarian cancer patients during the COVID-19 pandemic. Resilience encourages ovarian cancer patients to apply adaptive coping mechanisms to withstand difficulties during the pandemic.

Resilience has been proven to have a dual role, namely as a protective factor against PTSD symptoms and also as a predictor of quality of life for COVID-19 survivors. This causes resilience to be a mediator of the relationship between PTSD symptoms and the quality of life of COVID-19 survivors. The role of resilience as a mediator has been studied previously in 150 colon cancer patients with stomas in South Korea (Shin et al., 2017). Colon cancer patients with a stoma are at greater risk of experiencing PTSD symptoms and, therefore, tend to have a lower quality of life compared to other cancer patients. However, a high level of resilience can significantly reduce the impact of PTSD symptoms on their quality of life. People living with Colon cancer with a stoma who have PTSD symptoms but have a high level of resilience have been shown to have a better quality of life compared to those who have a low level of resilience.

This study aims to determine the correlation between PTSD symptoms, body resilience, and the quality of life of COVID-19 survivors. In this research, resilience is believed to have a mediating role, so it is hoped that it can influence PTSD symptoms on the quality of life of COVID-19 survivors. The hypothesis proposed in this study is that resilience mediates the influence of PTSD symptoms on the quality of life of COVID-19 survivors.

Methods

Research design

This research is a correlational study aiming to determine the relationship between (a) PTSD symptoms and quality of life, (b) PTSD symptoms and resilience, (c) resilience and quality

of life, and (d) the mediating influence of resilience in the relationship between PTSD symptoms and quality of life.

Participant

This research has received approval from the Research Ethics Commission of the Faculty of Psychology, Soegijapranata Catholic University no.032/B.7.5/FP.KEP/2022. Convenience sampling was used in this study, and questionnaires were distributed using Google Forms to recruit participants. Individuals participating in this study were between 18 and 40 years of age, had been confirmed positive for COVID-19 at least once, and lived in Indonesia. 133 COVID-19 survivors (33 men and 100 women) participated in this study. The majority of participants were aged between 24-29 years ($n = 51, 38.3\%$), single ($n = 98, 73.7\%$), had mild COVID-19 symptoms ($n = 83, 62.4\%$), and had not been vaccinated when they contracted COVID-19. 19 ($n = 60, 45.1\%$).

Measurement

The RAND Short Form-36 (SF-36) scale was used to measure the quality of life of COVID-19 survivors (Hays et al., 1993). The scale has 36 items separated into eight domains: physical function, physical role limitations, body pain, general health perception, energy/vitality, social function, emotional role limitations, and mental health (Burholt & Nash, 2011). An example of a question on this scale is, "During the past four weeks, to what extent have your physical health or emotional problems interfered with your activities with family, friends, neighbors, or groups?" With response categories with a five-point Likert scale. The results of statistical analysis by researchers based on COVID-19 survivors in Indonesia show that all items in this scale are valid ($r > 0.30$) and reliable ($\alpha = 0.901$).

The Impact of Event Scale-Revised (IES-R), a reliable and widely used tool, was employed to measure PTSD symptoms in COVID-19 survivors (Weiss, 2007). The scale, with its 22 items and 5-point Likert scale, is separated into 3 subscales; intrusion, avoidance and hyperarousal based on PTSD symptoms in DSM-IV (Davico et al., 2020). All items on this scale have been rigorously tested and proven to be valid ($r > 0.30$) and reliable ($\alpha = 0.960$) based on data from COVID-19 survivor participants in Indonesia, instilling confidence in its use for our research.

The Brief Resilience Scale is used to measure the resilience of COVID-19 survivors (Smith et al., 2008). This six-item, 5-point Likert scale measures a person's ability to bounce back after bad events in life. After a psychometric test by researchers based on participants who were COVID-19 survivors, there were four valid items on this meaning scale. It had good item discrimination power, with ($r \text{ count} > 0.30$) and reliability ($\alpha = 0.671$).

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Data analysis

The data collected in this study was analyzed using the IBM SPSS Statistics 26.0 program. The PROCESS Macro 4.1 add-on by Hayes (2013) was used for hypothetical testing. The mediation analysis used in this research is path analysis based on least squares regression (Hayes & Rockwood, 2017). This research was analyzed with a 95% confidence interval (CI) and bootstraps of 5000.

Results

First, the assumption test shows that the data obtained does not have a normal distribution where the p-value for the three variables is below 0.05. However, the linearity test shows that the three variables have a linear relationship, so correlational and regression analyses are still carried out in this research by considering the generalization of the results at the final stage. Table 1 shows the demographic profile of the participants involved in this research. Based on the distribution of data on the severity of COVID-19, it can be seen that survivors with mild symptoms dominated the participants. In addition, of the 133 participants, 60 had not been vaccinated against COVID-19 at the time of data collection.

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Table 1.**Correlation between Demographic Variables and Main Research Variables**

Variable	Categories	Frequency	Percentase
Gender	Female	100	75.2
	Male	33	24.8
Marital Status	Not married	98	73.7
	Married	33	26.3
COVID-19 symptoms	Mild Symptoms	83	62.4
	Moderate Symptoms	48	36.1
	Severe Symptoms	2	1.5
Vaccine Status	No Vaccine	60	45.1
	Vaccine 1	15	11.3
	Vaccine 2	35	26.3
	Vaccine 3	23	17.3

Furthermore, as additional data regarding the demographic conditions of the participants, we carried out the Mann-Whitney test to determine the differences in the results of the main variables regarding marital status and obtained the results that there were differences between marital status on the resilience variable ($Z = 2.352$; $p = 0.019$), PTSD symptoms ($Z = 2.106$; $p = 0.035$) and quality of life ($Z = 4.190$; $p = 0.000$). The Kruskal-Wallis test was also carried out to determine differences in the severity of COVID-19 symptoms and age groups for all main variables. The results found that there were differences between the severity of COVID-19

symptoms in the PTSD symptom variable ($H = 8.353$; $p = 0.015$) and between age groups in the quality of life variable ($H = 13.770$; $p = 0.003$).

Table 2 shows the results of Spearman's rho correlation test between the main variables. PTSD symptoms were negatively correlated with resilience ($r = -0.324$, $p = 0.000$) and quality of life ($r = -0.518$, $p = 0.000$). In addition, there is a positive correlation between resilience and quality of life ($r = 0.521$, $p = 0.000$). These findings suggest that quality of life is positively associated with resilience and negatively associated with PTSD symptoms.

Table 2.

Means, Standard Deviations and Correlations with the main research variables

Variable	Mean	S.D	1	2	3
1. Resilience (RS)	12.59	2.69			
2. PTSD Symptoms (PTSS)	13.54	15.54	-0.324**		
3. Quality of life	106.70	14.24	0.521**	-0.518**	

** significance at the 0.01 level (2-tailed).

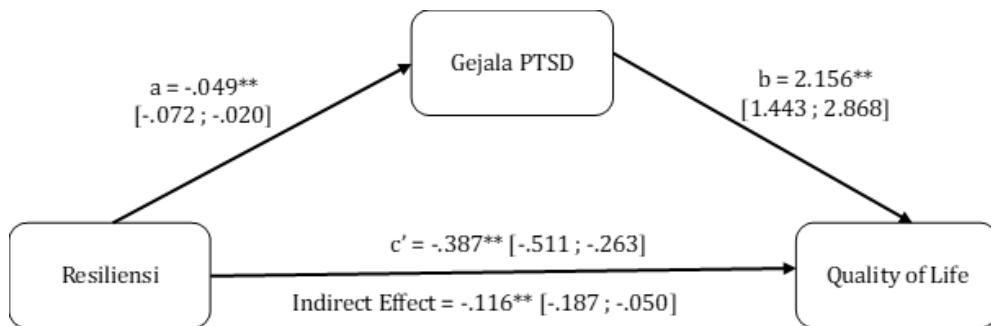
Table 3 shows the results of the mediation test (model 4) to test whether resilience is a mediator of the relationship between PTSD symptoms and quality of life. Research results showed that in the path a, PTSD symptoms significantly predicted resilience ($\beta = -0.049$; $p = 0.001$; LLCI = -0.072; ULCI = -0.020). In path b, resilience also significantly predicts quality of life ($\beta = 2.156$; $p = 0.000$; LLLCI = 1.443; ULCI = 2.868). The direct effect of PTSD symptoms on quality of life shown in path c' is also significant ($\beta = -0.387$; $p = 0.000$; LLLCI = -0.511; ULCI = -0.263) which gives higher results than the total effect ($\beta = -0.493$; $p = 0.000$; LLLCI = -0.626; ULCI = -0.359). The research results also show a significant indirect effect of resilience on the relationship between PTSD symptoms and quality of life ($\beta = -0.116$; LLLCI = -0.187; ULCI = -0.050). This concludes that resilience partially mediates the relationship between PTSD symptoms and quality of life.

Table 3.

Calculation Results with Path Analysis

	β	SE	t	p	R2	F(df)	LLCI	ULCI
a	-0.049	0.015	-3.377	0.001	0.080	$F(1) = 11.407$	-0.072	-0.020
b	2.156	0.360	5.989	0.000	0.443	$F(2) = 51.691$	1.443	2.868
c'	-0.387	0.063	-6.186	0.000			-0.511	-0.263
Total Effect	-0.493	0.067	-7.302	0.000			-0.626	-0.359
Indirect Effect	-0.116	0.036					-0.187	-0.050

Note: a = PTSS RS; b = RS QoL; c' = PTSS QoL



Figur 1. Model of Path Analysis

Discussion

3 This study analyzes the correlation between three main variables and the mediating role of resilience in the relationship between PTSD symptoms and the quality of life of COVID-19 survivors. From the data taken, several exciting results can be concluded. Married individuals were found to have better resilience and quality of life compared to single individuals. Previous studies support this finding. About resilience research conducted by Aydogan et al., (2022) found that having a marital relationship can increase resilience during the COVID-19 pandemic. The partner can help maintain behavior, help each other deal with daily hassles, and show empathy during the pandemic to increase their resilience. Our findings regarding differences in marital status and quality of life are also in line with previous research, which suggests that marriage functions as a 'buffering mechanism' against mental health problems and reduces the likelihood of feeling lonely and isolated. This causes married individuals to have better quality of life scores than single individuals (Gutiérrez-Vega et al., 2018; Han et al., 2014).

Different results were shown for PTSD symptoms, where married individuals had fewer symptoms than single individuals. Previous research regarding these findings presents different results from each other. Although a US study found that married individuals had less PTSD than single or widowed individuals (Breslau et al., 1998), a study in Jordan found that married individuals were more affected by traumatic events than single individuals (Al-Shagran et al., 2015) and a study in Peru found no significant differences between single and married individuals (Martínez Pajuelo et al., 2022). The differences in results in some of these studies are also related to the cultural context of marriage because, in some cultures, married people have fewer mental health problems, including PTSD symptoms, which the social support may cause, they receive from those closest to them. It has been previously reported that "marriage alone does not provide universal benefits" (Holt-Lunstad et al., 2008). Specifically in research in Indonesia, the local and

cultural context of life in each marriage must be taken into account in interpreting the relationship between marital status and mental health problems (Afifi et al., 2006).

In this study, the age group was positively correlated with resilience, supported by previous research conducted in Turkey (Bozdağ & Ergün, 2021). Age is one of the most essential factors in predicting resilience during a pandemic. Older people have the advantage of having more experience in developing their coping skills in dealing with bad events in life, thus successfully maintaining their level of resilience during a pandemic (Bozdağ & Ergün, 2021; Martínez Pajuelo et al., 2022). Additionally, seniors are known to have a higher quality of life. This differs from previous research, which states that the younger generation has a better quality of life (Purba et al., 2018; Yuniati & Kamso, 2021). Our findings can be better explained because most older adults already have families, solid social relationships with others, and stable incomes, and thus, their quality of life is assessed based on these factors (Netuveli & Blane, 2008).

Differences in the severity of COVID-19 symptoms influence PTSD symptoms that occur in COVID-19 survivors, where those who have severe COVID-19 symptoms have more PTSD symptoms than other survivors who have mild or moderate symptoms. These findings are in line with previous reports stating that survivors of severe COVID-19 are more susceptible to PTSD symptoms (Mao et al., 2022; Sekowski et al., 2021). Severe COVID-19 survivors, whether hospitalized or not, may experience life-threatening symptoms and fear of death, resulting in traumatic events and possibly PTSD symptoms (Sekowski et al., 2021).

PTSD symptoms have shown a significant negative correlation with quality of life. This finding aligns with previous research (Balayan, 2014; Huang et al., 2022; Park & Bae, 2022). PTSD symptoms can cause a person's function to decrease in various environments, reducing their quality of life (Park & Bae, 2022). More specifically, individuals with PTSD symptoms may experience various functional disorders, such as difficulty sleeping and concentrating, not being able to work well due to re-experiencing symptoms, decreased ability to play, learn, and creativity, difficulty in relationships, and reduced self-esteem and physical health. Problems and this disruption will cause a decrease in aspects of the quality of life (Holowka & Marx, 2012).

A similar negative correlation was also found between PTSD symptoms and resilience. These results are supported by research conducted by Mikutta et al., (2022), which states that people who inhibit at least one PTSD subsyndrome are significantly less resilient. This negative correlation is bidirectional; resilience is known to protect individuals against mental illness, so lower levels of resilience may increase the risk of developing PTSD symptoms (Dhungana et al., 2022; Lee et al., 2013). Next, applying various resilience factors, such as active coping styles, physical exercise, positive outlook, moral compass, social support, and cognitive flexibility, helps protect against psychological distress caused by traumatic situations (Haglund et al., 2007).

The positive correlation between resilience and quality of life in the study aligns with previous studies' results (Macía et al., 2020; Mejia-Lancheros et al., 2021; Temprado Albalat et al., 2020). Resilience is an essential protective factor in life and health in general, and by building or maintaining a level of resilience, individuals can maintain mental and physical well-being and thus have a better quality of life (Aldhahi et al., 2021; Mejia-Lancheros et al., 2021). Additionally, the ability to self-manage and apply positive appraisal as coping mechanisms were found to be two of the strongest resilience factors that can directly influence quality of life, and improving these factors may be a promising way to improve quality of life (Brinkhof et al., 2021).

The findings of this study support the idea stated in the literature review that PTSD symptoms and resilience predict specific levels of quality of life. Nevertheless, resilience played a partial mediating role in this study. Partial mediation refers to conditions in which PTSD symptoms and resilience can predict quality of life. However, the negative impact of PTSD symptoms on quality of life will be reduced if COVID-19 survivors have a high level of resilience. Supporting these findings, Shin et al., (2017) stated that changes in physical and psychosocial functioning can cause the development of PTSD symptoms that have a negative impact on their quality of life, but having a high level of resilience can withstand the negative impact of PTSD symptoms on their quality of life. In addition, several studies explain that resilient people can adapt quickly and tend to use positive coping methods when facing difficulties, such as PTSD symptoms, and this will maintain the level of quality of life (Aldhahi et al., 2021; Chi et al., 2021; Migliani et al., 2022).

There are several limitations in this research. First, the data obtained in this study does not follow a normal distribution, so the results cannot be generalized to an average population. Second, the current sample is relatively small compared to the Indonesian population. This is related to the high level of negative stigma related to COVID-19 in Indonesia at the time of data collection, which caused only a few people to volunteer to participate in this research. Future research is recommended to replicate this research with a larger sample size. Lastly, future researchers might professionally assess participants' mental health conditions to obtain a more valid diagnosis of PTSD. Despite some limitations, this study adds a new framework for exposure to disease-specific traumatic events and quality of life.

Conclusion

The results of this study indicate that resilience plays a partial mediating role in the relationship between PTSD symptoms and quality of life. Apart from that, we can also conclude that in this study, there were additional findings from processing participant demographic data,

which has several limitations. First, the data obtained in this study does not follow a normal distribution, so the results cannot be generalized to a normal population. Second, the current sample is relatively small compared to the Indonesian population. This is related to the high level of negative stigma related to COVID-19 in Indonesia at the time of data collection, which caused only a few volunteers to participate in this research. Future research is recommended to replicate this research with a larger sample size. Lastly, future researchers might professionally assess participants' mental health conditions to obtain a more valid diagnosis of PTSD. Despite some limitations, this study adds a new framework for exposure to disease-specific traumatic events and quality of life.

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