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Childhood Psychological Maltreatment and Subjective Vitality: Longitudinal Mediating Effect of Cognitive Flexibility

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Abstract
Childhood psychological maltreatment is an essential concept that can have an impact on an individual's physical and psychological health. The majority of studies on childhood psychological maltreatment used a cross-sectional design. The fact that this concept, which has a long-term effect on an individual's life, has not been investigated in longitudinal research has produced a gap in the literature. Our study aimed to examine the longitudinal relationship between childhood psychological maltreatment, cognitive flexibility, and subjective vitality. The role of cognitive flexibility in the relation between childhood psychological maltreatment and subjective vitality was investigated in a Turkish sample ($N = 270$). In order to explain the relationship, a cross-lagged panel study in two waves was conducted. The results revealed that cognitive flexibility longitudinally mediates the relationship between childhood psychological maltreatment and subjective vitality. This research indicates that childhood psychological maltreatment reduces cognitive flexibility, which in turn influences subjective vitality.

Keywords Childhood Psychological Maltreatment · Cognitive Flexibility · Subjective Vitality · Longitudinal Mediation

Introduction

Childhood experiences are believed to be a factor that influences all aspects of an individual's life. People's prior experiences can have a negative influence on a variety of future behaviors. Physical and psychological maltreatment is one of the leading negative experiences in childhood. Parents' or caregivers' psychological maltreatment can have grave repercussions. Childhood psychological maltreatment consists of emotional

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maltreatment, being denied affection, experiencing emotions of worthlessness, and being socially isolated as a child (Hart et al., 2002). Psychological maltreatment may be defined as the emotional pressure a person is subjected to by their parents or caregivers.

Childhood psychological maltreatment, which is considered a serious problem that exists worldwide, causes individuals to suffer socially, cognitively, and physically (Arslan & Yıldırım, 2021; Dubey et al., 2020). Although childhood psychological maltreatment may seem like a family life problem for the individual, it is actually a mental health problem that influences the individual's wellbeing and future life (Satıcı & Okur, 2022). According to studies in the literature, individuals who are victims of childhood psychological maltreatment may experience serious problems in interpersonal relationships (e.g., Kong & Martire, 2019; Zhang et al., 2020). Besides, they frequently engage in harmful behaviors that will seriously harm their health, such as drinking, smoking, and using drugs (e.g., Hayre et al., 2019; Sun et al., 2020). According to studies, these people are also more likely to suffer from cognitive impairments, including focus issues and different mood disorders (e.g., Brodski & Hutz, 2012; Hart & Glaser, 2011). According to Taillieu et al. (2016), childhood psychological maltreatment can have a major effect on a person during adulthood even if other types of maltreatment (physical, mental, or sexual abuse) that the person can endure in childhood are avoided. Based on all these studies, these problems, as a result of the psychological maltreatment individuals are exposed to during childhood, indirectly influence their life energy in adulthood. The concept expressed as the life energy of individuals is generally related to subjective vitality. In the literature, the state of individuals having their own personal life energy, both physically and mentally, indicates subjective vitality (Deci & Ryan, 2000).

Childhood Psychological Maltreatment and Subjective Vitality

Subjective vitality, which is based on the theory of self-determination, is the state of being aware of the life energy of the individual (Ryan & Frederick, 1997). Individuals with high subjective vitality are thought to be resilient, lively, active, and willing to adapt to changes that may occur throughout their lives (e.g., Bostic et al., 2000; Fini et al., 2010). Ryan and Deci (2008) state that these individuals have high psychological wellbeing and motivation levels. On the other hand, the psychological maltreatment that a person experienced as a childhood is one of the factors that is assumed to impact their subjective vitality level.

No study that included the topics of childhood psychological maltreatment and subjective vitality could be found in the literature review. Nevertheless, when the concepts are examined, it can be said that psychological maltreatment can negatively influence subjective vitality. It is stated that the mental health of individuals who are exposed to psychological maltreatment may be adversely impacted (Arslan & Genç, 2022). Childhood psychological maltreatment-related negative experiences may affect a person's subjective wellbeing. The decrease in subjective wellbeing can cause a person to experience a number of psychological problems (Widyanto & McMurran, 2004). Studies show that the concept of subjective vitality is positively related to wellbeing (Jackson & DiPlacido, 2020; Uysal et al., 2013) and happiness, and negatively related to psychological distress (Rouse et al., 2015; Satıcı,

2020), neuroticism (Deniz & Satıcı, 2017), and addictive behaviors (Niemiec et al., 2010). This perspective points out that psychological maltreatment, which increases dependency and psychological distress, can have a detrimental effect on subjective vitality. Childhood psychological maltreatment sufferers are thought to have more negative thoughts about themselves (Satıcı & Okur, 2022). One may claim that this situation may have the influence of lowering the person's subjective vitality. Based on these studies and opinions, a significant relationship between childhood psychological maltreatment and subjective vitality may be mentioned.

Therewithal, other variables may also play a role in this relationship. When the literature is examined, one of these variables may be cognitive flexibility. The concept of cognitive flexibility is shaped as a result of the events experienced, especially in the preschool years (Buttelmann & Karbach, 2017). Researchers consider that early experiences may have an effect on cognitive flexibility from this perspective (e.g., Lucassen et al., 2015; Wiebe & Karbach, 2017). At the same time, considering that cognitive flexibility has a positive effect on the wellbeing of individuals (Buyruk Genç, 2024; Davies et al., 2024), it is evaluated as being associated with subjective vitality. Based on this, cognitive flexibility may have a mediating role in the relationship between childhood psychological maltreatment and subjective vitality.

Cognitive Flexibility as a Mediator

Upon examining the concepts of cognitive flexibility, it becomes evident that researchers in the literature employ many distinct definitions. For instance, Silver et al. (2004) described cognitive flexibility as the capacity to devise alternate answers for different life situations. On the other hand, Stevens (2009) described cognitive flexibility as the capacity of an individual to change between thoughts. Descriptions like a person's capability to adapt to various situations they have experienced (e.g., Bilgin, 2009) or their capacity to combine many abilities to respond to environmental indications (e.g., Barbey et al., 2013) are made in research. Cognitive flexibility is important as it helps to change dysfunctional coping strategies. Thanks to their cognitive flexibility, individuals may increase their ability to adapt to the environment by creating new alternatives when necessary (Satıcı et al., 2020). Optimism and higher self-confidence are characteristics of those with high cognitive flexibility (Mellor et al., 2003). Individuals with inadequate cognitive flexibility may suffer from mood disorders like anxiety or depression (Hayes et al., 2006). The concept of cognitive flexibility, which strengthens the coping mechanisms of the individual, supports the psychological wellbeing of the person by increasing their adaptation to the environment (Rheid Mohammed, 2023). From this perspective, it is possible to say that cognitive flexibility is a crucial concept that enhances an individual's wellbeing (Koesten et al., 2009).

Cognitive flexibility is addressed in many studies in the literature. For instance, Spann et al. (2012) state that children and adolescents who are victims of psychological maltreatment weaken their cognitive flexibility during adulthood. Similar findings were observed in prior research conducted with people who had experienced maltreatment in the past (e.g., Carvalho et al., 2020; Dileo et al., 2017). From this point of view, people who have experienced childhood psychological maltreatment may have poor levels of

cognitive flexibility, which may have a negative impact on their coping skills. Additionally, research shows that those who experience psychological maltreatment have problems controlling stress because of their poor level of cognitive flexibility (e.g., Kalia et al., 2020). This situation, which has a negative influence on people's coping skills, may also have a negative impact on people's life energies in an indirect way. At this point, it may be assumed that the process may also have a negative impact on subjective vitality. It is possible to conclude at this point that the process may have a negative impact on subjective happiness because cognitive flexibility and subjective vitality have a good link, according to Algharaibeh (2020). From this point of perspective, people with low cognitive flexibility will also be likely to have low subjective vitality. To summarize all this, exposure to psychological maltreatment may seriously influence individuals' cognitive flexibility and, thus, subjective vitality.

This research hypothesizes that childhood psychological maltreatment may decrease cognitive flexibility, which would have an influence on people's subjective vitality. There are studies in the literature examining the variables of cognitive flexibility, subjective vitality, and psychological maltreatment (e.g., Algharaibeh, 2020; Carvalho et al., 2020). However, no studies have been found that reveal the relationship between childhood psychological maltreatment and subjective vitality. Likewise, the relationship between psychological maltreatment, cognitive flexibility, and subjective vitality has not been studied either. This study has significance as it addresses the existing vacuum in the scholarly literature. Longitudinal studies are less prevalent in the literature than cross-sectional investigations. Therefore, in terms of validity and reliability, longitudinal studies are preferable. Moreover, the number of longitudinal studies published in the literature should be increased. Given the enduring impact of childhood psychological maltreatment on an individual's life, it is important to conduct a longitudinal investigation in this subject. The study aims to test the mediator role of cognitive flexibility in the relationship between psychological maltreatment and subjective vitality with a longitudinal design. Furthermore, it is especially notable since it is the initial study to examine the relationship between psychological maltreatment, subjective vitality, and cognitive flexibility longitudinally. In line with the main purpose, answers to the following research questions (RQ) will be sought:

RQ1. Does childhood psychological maltreatment predict cognitive flexibility longitudinally?
RQ2. Does cognitive flexibility predict subjective vitality longitudinally?
RQ3. Is there a longitudinal mediating effect of cognitive flexibility on the relationship between childhood psychological maltreatment and subjective vitality?

Method

Participant and Procedure

Data for this longitudinal study were collected in two waves, three months apart, using the convenience sampling method. Participants are adults aged 18 and over living in Türkiye. In both waves, data was collected via the authors' social media

accounts using Google Forms. In order to collect data reliably and reach the same person in both waves, pseudonym information was requested from the participants. This pseudonym information includes: (1) a nickname; (2) the first three letters of the participant's mother's name; and (3) the last three letters of the participant's father's name. Thanks to this information, the matching of participants in the longitudinal design was made more practical. Besides, participants gave informed consent in both waves. During this process, participants were informed about the research, the purpose of the study was explained, and they were informed that it was a longitudinal study. They were also informed that they could withdraw from the study at any time and that if any data had been collected before, this measurement would be removed from the data set. Lastly, all participants participated in the study voluntarily and were not paid any fees.

This research was carried out with the ethical approval of Artvin Çoruh University's Scientific Research and Ethics Committee [Reference number = E-18457941-050.99-54373]. Data was collected from 282 participants at Time 1, and data was collected from 274 participants at Time 2 three months later. After matching, analyses were made with 270 participants (68.1% females and 31.9% males) aged from 18 to 59 years old ($M = 29.71$, $SD = 8.52$).

Measures

Psychological Maltreatment Questionnaire (PMQ)

The PMQ assesses individuals' perceptions of their parents' psychological maltreatment practices. It is a self-report questionnaire developed by Arslan (2016). There are 27 items on the questionnaire (e.g., "*They would threaten to leave me*") and four sub-dimensions. High scores from the four-Likert scale (*1 = almost never; 4 = almost always*) indicate high perceived psychological maltreatment. The internal consistency coefficient of the adaptation study was calculated as 0.84 (Arslan, 2016). In this study, the Cronbach alpha reliability values of the scale were calculated as 0.913 at Time 1 and 0.916 at Time 2.

Subjective Vitality Scale (SVS)

Ryan and Frederick (1997) developed it as a self-report scale. The scale consists of seven items (e.g., "*I feel alive and fit*"). High scores from the seven-Likert scale (*1 = not true at all; 7 = very true*) indicate high subjective vitality. The internal consistency coefficient of the original form of the scale was calculated as 0.84 (Ryan & Frederick, 1997). It was adapted to the Turkish sample by Akın et al. (2012). The internal consistency coefficient of the adaptation study was calculated as 0.84 (Akın et al., 2012). In this study, the Cronbach alpha reliability values of the scale were found as 0.890 at Time 1 and 0.902 at Time 2.

The Cognitive Flexibility Scale (CFS)

The CFS developed by Dennis and Vander Wal (2010) consists of 20 items (e.g., "*I am good at evaluating events and situations*") and two sub-dimensions. It is a self-report scale with seven-Likert-type scoring (*1 = strongly disagree; 7 = strongly agree*). High scores on the scale indicate high cognitive flexibility. It was adapted to the Turkish sample by Sapmaz and Doğan (2013). The internal consistency coefficient of the adaptation study was calculated as 0.90 (Sapmaz & Doğan, 2013). In this research, the Cronbach alpha reliability values of the scale were calculated as 0.882 at Time 1 and 0.919 at Time 2.

Data Analysis

The present study aimed to examine the mediating role of cognitive flexibility in the longitudinal relationship between childhood psychological maltreatment and subjective vitality. Correlations, descriptive statistics (skewness, kurtosis, means, and standard deviations), and reliability coefficients were examined in the preliminary analyses. Later, we carried out the hypothetical longitudinal mediation model via an autoregressive analysis of a cross-lagged panel model for a half-longitudinal design (Cole & Maxwell, 2003; Preacher, 2015) using AMOS 24. In this technique, the model examines whether the independent variable from Time 1 predicts change in the mediator at Time 2, while the mediator at Time 1 predicts change in the dependent variable at Time 2. The overall model fit was investigated through the Standardized Root Mean Square Residual (SRMR), and comparative fit index (CFI), Incremental Fit Index (IFI), and Goodness of Fit Index (GFI). The values of SRMR<0.08, and CFI, IFI, and GFI > 0.90 indicate acceptable fit (Hu & Bentler, 1999).

Results

Preliminary Analysis

Descriptive statistics, reliability coefficients, and correlations of the study variables are displayed in Table 1. Regarding the associations among the study variables, childhood psychological maltreatment (Time 1 and Time 2) was negatively correlated with subjective vitality and cognitive flexibility, with correlations ranging from −0.145 to −0.401, $ps < 0.05$. Subjective vitality at Time 1 and Time 2 were found to be positively correlated with cognitive flexibility, with correlations ranging from 0.348 to 0.493, $ps < 0.001$.

Longitudinal Mediational Model

We used structural equation modeling to describe a mediation model. In this research, we hypothesize that cognitive flexibility serves as a mediator between

Table 1 Descriptive Statistics and Reliabilities for the Study Variables

Variable	Correlations					Descriptive Statistics and Reliabilities						
	1	2	3	4	5	Mean	SD	Skewness	Kurtosis	α	ω	λ6
1. Childhood PM T1	–					39.77	9.59	1.27	1.29	.913	.927	.929
2. Childhood PM T2	.751**	–				40.36	9.85	1.15	1.26	.916	.931	.932
3. Subjective vitality T1	−.181**	−.170**	–			33.15	8.47	−.49	.06	.890	.898	.900
4. Subjective vitality T2	−.145*	−.287**	.657**	–		32.67	8.61	−.43	−.41	.902	.907	.907
5. Cognitive flexibility T1	−.200**	−.179**	.493**	.362**	–	109.90	14.34	−.34	−.37	.882	.884	.937
6. Cognitive flexibility T2	−.338**	−.401**	.348**	.435**	.654**	110.36	16.14	−.59	.34	.919	.909	.947

* $p<.05$, ** $p<.01$; *PM* Psychological maltreatment

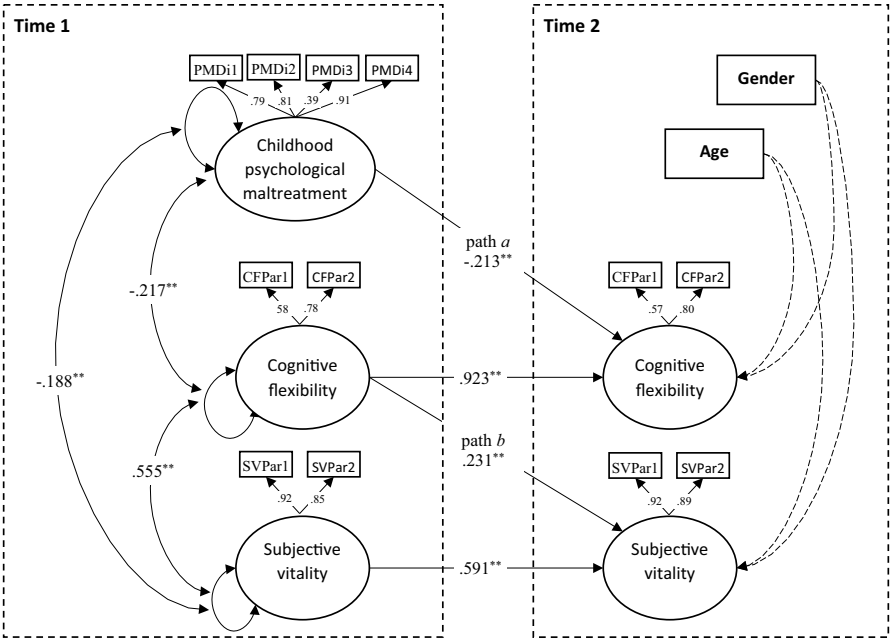

Fig. 1 Cross-lagged Panel Model for a Half-longitudinal Design for Testing the Indirect Association between Childhood Psychological Maltreatment and Subjective Vitality via Cognitive Flexibility. Note. *p<.05, **p<.01

childhood psychological maltreatment and subjective vitality. According to Cole and Maxwell's (2003) recommendations, the hypothesis would be confirmed if the findings demonstrated significant paths a and b. Consistent with our hypotheses, the findings indicated that childhood psychological maltreatment (at Time 1) significantly and negatively predicted change in cognitive flexibility (at Time 2), controlling for age, gender and cognitive flexibility at Time 1 (path a = β = −0.213, p < 0.001). Also, cognitive flexibility (at Time 1) significantly and positively predicted change in subjective vitality (at Time 2), controlling for age, gender, and subjective vitality at Time 1 (path b = β = 0.231, p < 0.001). In addition, fit indices indicated that the model was an acceptable fit; $\chi^2_{(61,\ N=270)} = 223.80$, $p < 0.001$; χ^2/df = 3.67, SRMR = 0.052; CFI = 0.91, IFI = 0.91, and GFI = 0.90. These results suggest that cognitive flexibility is a partial mediator for the association between childhood psychological maltreatment and subjective vitality. Our longitudinal mediation model is in Fig. 1.

Discussion

Childhood experiences continue to have an impact on people throughout their lives. A variable that may be addressed within these experiences is childhood psychological maltreatment. Childhood psychological maltreatment, which is seen as a

worldwide problem, is an important concept in the psychology literature. According to previous research, childhood psychological maltreatment has a negative impact on both the individual's childhood and adulthood (Arslan, 2018). Childhood psychological maltreatment has a detrimental effect on an individual's psychological health (Chen et al., 2021). According to Sheets and Armey (2020), psychological maltreatment in childhood has a negative influence on mental and physical health. The findings of Satıcı and Okur (2022) and Arslan and Genç (2022) also support the claim. Based on this viewpoint, childhood psychological maltreatment has a negative impact on an individual's psychological wellbeing. One of the concepts closely related to psychological wellbeing is subjective vitality. Subjective vitality is the state of being energetic towards the variables in an individual's life. Individuals with high psychological wellbeing are likely to have high subjective vitality (Ryan & Deci, 2008). Childhood psychological maltreatment can have an effect on an individual's psychological wellbeing and cause a decrease in subjective vitality. Revealing the relationship between subjective vitality and psychological maltreatment may provide a clearer understanding of psychological health. It is commonly recognized that cognitive flexibility, a variable that improves an individual's psychological wellbeing and resilience, begins to emerge in childhood (Buttelmann & Karbach, 2017). In this study, it was tested how the experiences of individuals during their childhood would be reflected in their current lives. There is no study in the literature that examines childhood psychological maltreatment, cognitive flexibility, and subjective vitality together. Previous research on psychological maltreatment, this study's dependent variable, was generally cross-sectional in design (e.g., Arslan, 2017b; Arslan & Genç, 2022). It is aimed at filling this gap in the literature with a two-wave longitudinal study. Examining the variables longitudinally reveals the importance of the study. This research demonstrated the longitudinal mediating role of cognitive flexibility in the relationship between psychological maltreatment and subjective vitality. The findings are discussed in more detail below.

The first finding of the study is the answer to the first research question (RQ1). Childhood psychological maltreatment, according to this finding, predicts cognitive flexibility negatively and significantly. This finding reveals the negative effect of childhood psychological maltreatment on cognitive flexibility. Wiebe and Karbach (2017) obtained results that supported this finding. Similarly, Lucassen et al. (2015) observed similar findings on the relationship between childhood experiences and cognitive flexibility. Recently research has found that sufferers of childhood psychological maltreatment have lower cognitive flexibility (Carvalho et al., 2020; Spann et al., 2012). Especially during childhood, cognitive flexibility skills begin to develop. Therefore, childhood psychological maltreatment has a negative influence on this development. In this direction, psychological maltreatment may decrease a person's cognitive flexibility. In light of this information, this finding obtained in this research proves that exposure to psychological maltreatment during childhood will negatively affect the cognitive flexibility level of individuals in adulthood. Childhood psychological maltreatment can also have an impact on other concepts related to cognitive flexibility. One of these concepts is subjective vitality.

Cognitive flexibility is described as the ability to produce solutions to various issues encountered in life. The decrease in the ability to produce solutions also

affects subjective vitality, which is described as the individual's life energy. The study's second finding supports this claim. Cognitive flexibility predicts subjective vitality both positively and significantly. This finding meets the second research question of the study (RQ2). There has been little research that looks at the relationship between cognitive flexibility and subjective vitality. Algharaibeh (2020) concluded in his study that there is a positive relationship between cognitive flexibility and subjective vitality. Malkoç and Kesen Mutlu (2019) stated that cognitive flexibility is an important predictor of psychological wellbeing. Ryan and Frederick (1997) argue that subjective vitality reflects psychological wellbeing. From this point of view, the findings of Malkoç and Kesen Mutlu (2019) support the results of this study. The failure to find research dealing with these variables in the literature suggests that the obtained results will fill a significant gap in the literature. This finding proves that increasing the level of cognitive flexibility in individuals will play a decisive role in subjective vitality. In this regard, it may be important to strengthen the cognitive flexibility of individuals who have had a difficult childhood.

The last finding of the study is the answer to the third research question (RQ3). This finding revealed the longitudinal mediating role of cognitive flexibility in the relationship between childhood psychological maltreatment and subjective vitality. According to the findings, childhood psychological maltreatment has a negative impact on cognitive flexibility. Subjective vitality is also negatively influenced by this negative effect on cognitive flexibility. There was no similar research in the literature. Previous studies have found that concepts such as social acceptance (Arslan, 2018), coping strategies (Arslan, 2017a), forgiveness, and mindfulness (Arslan, 2017b) mediate psychological maltreatment. The absence of a finding that is similar to the study's result indicates the research's originality. There is no research showing that psychological maltreatment influences subjective vitality. However, research on psychological health suggests that psychological maltreatment may have an effect on subjective vitality (e.g., Arslan & Genç, 2022; Widyanto & McMurran, 2004). Childhood psychological maltreatment is known to negatively predict cognitive flexibility (e.g., Carvalho et al., 2020; Spann et al., 2012; Wiebe & Karbach, 2017). Previous research indicates that the findings on cognitive flexibility mediation are consistent with the literature. In summary, the main finding of this study is that childhood psychological maltreatment reduces cognitive flexibility, which in turn influences subjective vitality.

Implications

There are some traces of childhood in every moment of human life. Childhood experiences have long-term effects. For instance, childhood psychological maltreatment can have a critical impact on an individual's entire life. Exposure to psychological maltreatment can have a significant impact on many areas, from the relationships individuals will establish in adulthood to their personal wellbeing. This research has revealed how childhood psychological maltreatment and cognitive flexibility affect subjective vitality longitudinally. Based on this research, it can be said that exposure to psychological maltreatment during childhood may influence individuals' cognitive thinking and make them lose flexibility. At the same time, loss of flexibility can

affect individuals' wellbeing, that is, their subjective vitality level. All of these prove that psychological maltreatment is important for the psychological health of individuals not only at the moment it occurs but also in the future.

The findings obtained through this longitudinal study will help other researchers understand the factors that influence subjective vitality. Not only researchers but also mental health professionals will be able to carry out their practices based on the connection between these variables. Activities that increase a person's cognitive flexibility are likely to decrease the negative effects of psychological maltreatment. At the same time, growing cognitive flexibility will boost a person's subjective vitality. According to this viewpoint, victims of psychological maltreatment should be encouraged to participate in educational programs that enhance cognitive flexibility. The frequency of educational activities designed to improve an individual's cognitive flexibility should be increased. Psychological maltreatment is a family-related problem. Therefore, mental health practitioners may play a role in reducing the impact of psychological maltreatment, not only personally but also by creating family education programs. Frequent psycho-educational sessions for all societal segments will promote mental health in the community as well as in individuals. Thus, personal and social wellbeing may increase.

Limitations and Future Research

There are various limitations to the study's findings. The first limitation of the study may be due to the sample. The study's data were collected from Turkish participants using an accessible sampling strategy. Different sample groups might be selected by future researchers. Especially for future research, it may be recommended to examine the relationship between these variables by conducting cross-cultural studies. Another limitation is that the study's measures are based on self-report. This may result in biased responses. For this reason, data can be collected in experimental or qualitative designs in future studies. Another research limitation is that the data is from a two-wave longitudinal study. Increasing the number of measures in future research may indicate more clearly the long-term effects.

Conclusion

As a result, cognitive flexibility was found to have a longitudinal mediating role in the relationship between childhood psychological maltreatment and subjective vitality. The research was conducted using a two-wave longitudinal model. This is critical for understanding the long-term effect. Direct and indirect relationships were found in this research conducted. Psychological maltreatment has a direct effect on cognitive flexibility and subjective vitality. Cognitive flexibility indirectly influences the relationship between psychological maltreatment and subjective vitality. Based on the findings, activities that increase cognitive flexibility can reduce the negative effects of psychological maltreatment. It can also increase subjective vitality. In order to contribute to the literature, the variables discussed in the study can be retested using different research designs.

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Pre-Registration Statement This study was not pre-registered.

Authors' Contributions H.K.: Writing - Original Draft, Visualization, Writing - Review & Editing; S.A.S: Methodology, Data Curation, Formal analysis, Supervision; D.U.: Investigation, Resources, Supervision; S.O.: Writing - Original Draft, Conceptualization, Writing - Review & Editing.

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Data Availability Data will be available on request.

Declarations

Conflict of Interest No conflict of interest exists for this manuscript for any of the authors.

Ethical Approval The study protocol has been approved by the Artvin Coruh University's Scientific Research and Ethics Committee (Reference number = E-18457941-050.99-54373). The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its following updates.

Consent to Participate Informed consent was obtained from all the individual participants that were included in the study.

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