

Modeling Psychological Distress of Mothers of Children with Autism Based on Family Cohesion and Adaptation with the Mediation of Perceived Social Support

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ABSTRACT

Objective: The present study aimed to model the psychological distress of mothers with children diagnosed with Autism Spectrum Disorder (ASD) based on family cohesion and adaptation, with the mediation of perceived social support.

Methods and Materials: This research, in terms of its goal, is applied, and in terms of data collection, is quantitative and correlational, employing structural equation modeling. The statistical population consisted of all mothers with children diagnosed with ASD in Tehran in 2020, from which 354 participants were selected using a convenience sampling method. To collect data, the following questionnaires were used: Kessler Psychological Distress Scale (Kessler et al., 2002), Family Adaptability and Cohesion Scale (Olson & Gorall, 2003), and the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988).

Results: The results of structural equation modeling indicated that the indirect pathways from family cohesion ($\beta = -0.13$, $p < 0.01$) and family adaptability ($\beta = -0.12$, $p < 0.01$) to the psychological distress of mothers of children with ASD, through perceived social support, were negative and significant.

Conclusion: Perceived social support mediates the relationship between family cohesion and family adaptability with the psychological distress of mothers of children with ASD.

Keywords: Psychological distress, Family cohesion and adaptation, Perceived social support.

1. Introduction

Autism Spectrum Disorder (ASD) is one of the six disorders classified under neurodevelopmental disorders, as defined in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2022). The primary characteristics of ASD include persistent deficits in social communication and interaction, as well as restricted, repetitive, and stereotyped patterns of behavior, interests, and activities. These symptoms must be present from early childhood and must impair or limit daily functioning (American Psychiatric Association, 2022). ASD is a neurodevelopmental disorder characterized by significant impairments in social interaction and rigid, repetitive behaviors, which negatively impact individuals' growth and functioning. Individuals with ASD may experience these symptoms with or without language and intellectual impairments (Will et al., 2018). In some countries (e.g., the U.S.), the prevalence of ASD in at-risk groups is estimated at 1.5% (Politte et al., 2015). ASD is a pervasive developmental disability that affects the individual's nervous and biological systems throughout life. This disorder impacts a child's ability to communicate and socialize with others, in addition to involving repetitive behaviors, interests, and activities. ASD leads to impairments in social and occupational functioning. It is defined as a single disorder encompassing autism, Asperger's syndrome, childhood disintegrative disorder, and other unspecified developmental disorders. To receive an ASD diagnosis, a child must consistently show deficits in two areas: social communication and interaction, and restricted interests or repetitive behaviors (Bagni & Zukin, 2019; Ghanimi et al., 2018).

Caring for children with ASD brings emotional consequences for parents, particularly mothers, disrupting the balance within the family system. Parents of children with developmental delays are exposed to elevated levels of psychological distress, especially mothers who continually bear the heavy burden of having a disabled child and experience greater tension in caring for the child. As a result of this ongoing tension, these mothers often experience depression, anxiety, health issues, social withdrawal, and low self-esteem (Johnston et al., 2013; Shokri et al., 2016). Thus, mothers of children with ASD show higher levels of stress compared to mothers of children with other disabilities (Hsiao, 2016), and generally display higher levels of psychological distress than the general population. In fact, the child's disruptive and abnormal behaviors are considered

a major source of stress for the parents, especially the mother. Studies have shown that mothers of children with ASD experience more stress and concern than those caring for children with other chronic conditions (Essex et al., 2012). Various individual, family, and social factors can exacerbate the psychological stress and distress these mothers experience, which can, in turn, have negative effects on the children.

Psychological distress refers to a set of perceived depressive and anxiety symptoms and maladaptive psychological functioning in response to life stressors (Akhavan Abiri et al., 2019). Family adaptability refers to the family's ability to change, and its stability can have positive outcomes for both children and the family. Family cohesion reflects the emotional bonds between family members and includes elements such as emotional connection, family interaction, parent-child relationships, altruism, interests, and leisure time activities (Navabinejad et al., 2024).

In line with this, Abbasi and Hamidifar's (2019) study demonstrated that high family cohesion leads family members to experience life situations as challenging rather than threatening, and they become more prepared to overcome difficulties (Abbasi & Hamidifar, 2019). Lindgren (2013) defines cohesion as the emotional closeness between family members. When cohesion is high, family members seek each other's success, happiness, and well-being, and when one member faces a problem, they are willing to work together to solve it. Another dimension of cohesion, according to Lindgren, is the time spent together as a family. Families that are strong in this regard regularly schedule group activities, which, while seemingly simple, can be challenging to implement as family members often dedicate extra time to each other when they are busy or tired (Haroon Rashidi & Kazemian Moghadam, 2017).

Having a child with autism leads to significant stress, time, and energy expenditure for families, which can severely impact their participation in activities and daily life (Mirzaei et al., 2018). Research has also demonstrated that social support mediates and moderates the effect of stress on the satisfaction and mental health of parents of children with ASD (Lu et al., 2018). When parents perceive more social support, family adjustment improves, and parental stress decreases (Lin et al., 2011). Social support received from others improves an individual's mental and physical health (Pluut et al., 2019), and the most significant predictors of perceived social support are the social support resources provided by family, friends, or significant others (Meral &

Cavkaytar, 2012). Among these, family support has a greater impact on resilience against problems than support from friends and acquaintances. Parents of exceptional children, due to the intense stress they experience, need more social support than the general population (Smith et al., 2011). The social support these parents receive fosters feelings of importance, respect, value, care, and love (Watson et al., 2019), acting as a buffer against the stressful conditions of having a disabled child, which enhances parents' psychological strength and resilience. Furthermore, perceived social support from family is associated with lower levels of psychological distress among family members (Rivera, 2007).

The prevalence of ASD has rapidly increased in recent years, now affecting 1 in 59 births. These children often exhibit challenging behaviors, including aggression, environmental noncompliance, and self-injury (Sharifi Daramadi et al., 2019). These behaviors cause concern for parents, especially mothers, as the primary caregivers. Consequently, caring for children with ASD has emotional consequences for parents, particularly mothers, and disrupts family balance. Mothers of children with ASD suffer from psychological distress. Given that mothers play a central role in maintaining the psychosocial balance of the family, tension and stress in mothers affect other family members, and their psychological distress can destabilize family cohesion and disrupt family structure. Therefore, paying attention to the mental health of mothers and identifying factors associated with their psychological distress is crucial for preventing and improving their psychological well-being (Sharifi Daramadi et al., 2019).

Ghanimi, Danesh, Dadkhah, and Taghi Lou (2018) conducted a study on the mediating role of coping strategies and perceived social support in the relationship between perceived stress and quality of life in parents of children with ASD. Their findings indicated that perceived stress is both directly and negatively related to quality of life, and indirectly related to coping strategies, perceived social support, and problem-focused, avoidance, and emotion-focused strategies (Ghanimi et al., 2018). Laghmani and Khodabakhshi Koolai (2018) conducted a qualitative study to identify the psychological stressors of mothers with children with ASD. Their results showed that the stress experienced by participating mothers could be categorized into three main themes: negative emotions, life with exhausting pressures, and a lack of supportive resources compared to other sources of stress (Laghmani & Khodabakhshi Koulaei, 2018).

Kostiukow et al. (2019) conducted a study on family functioning in families with children with autism. They compared 70 parents of children with autism with 70 parents of typically developing children using the family adaptability and cohesion scale. The results showed that the average family adaptability and cohesion were lower in parents of children with autism compared to typical peers (Kostiukow et al., 2019). Kang, Choi, and Ju (2016) investigated the experiences of mothers of children with ASD over a 3-month period. They asked seven mothers with children under the age of 7 to write daily events. The main categories of their experiences included difficulty accepting the limitations of the disorder, discouragement and deprivation, changes in the family system, gratitude for small changes, hope and anticipation for the future, and the burden and suffering of the mother (Kang et al., 2016). Qahtan (2015) conducted a study in Baghdad on the psychological distress of parents of children with ASD. The results showed that these parents experienced moderate levels of psychological distress, with factors such as financial problems and family structure affecting the intensity of distress (Qahtan, 2015). Overall, raising and caring for a child with ASD is a persistent and anxiety-provoking challenge for parents and primary caregivers, particularly mothers. The psychological stress these mothers experience negatively affects the mother-child relationship and the entire family. Therefore, considering the psychological distress experienced by mothers of children with ASD and the fact that despite the numerous challenges faced by these families, research on this subject is limited, the current study aims to address the question: Can family cohesion and adaptability, mediated by perceived social support, predict psychological distress in mothers of children with ASD?

2. Methods

2.1. Study Design and Participants

This study is applied in nature and uses a quantitative approach for data collection. The research design is descriptive and correlational, employing path analysis. The statistical population of the study included all mothers of children diagnosed with Autism Spectrum Disorder (ASD) in Tehran in 2020. To determine the required sample size, Huite and Kramer's recommendation of selecting 20-40 participants per component was followed, resulting in an estimated sample size of 354 participants. These participants were selected using convenience sampling. Inclusion criteria

were: having a child diagnosed with ASD, having at least a high school diploma, being between 25 and 50 years of age, not having any clear mental or physical disorder, not being divorced, and providing informed consent. Exclusion criteria included incomplete questionnaire responses.

First, a list of autism centers was compiled, and contact information was obtained. Researchers contacted these centers by phone to explain the study's goals and requested in-person meetings with school officials for further collaboration. Ultimately, Tehran Autism Center and a rehabilitation clinic for children with special disorders agreed to cooperate. The questionnaires were converted into electronic formats, and the researcher visited the centers in person to hold a briefing session, during which the study's objectives and the confidentiality of information were explained. Due to pandemic restrictions, the staff was asked to distribute the questionnaires to mothers of children with ASD.

2.2. Measures

2.2.1. Psychological Distress

This scale was developed by Kessler and colleagues (2002) to identify psychological disorders in the general population and is available in both 10-item and 6-item versions. The questions in both versions are scored on a Likert scale, ranging from "Never" to "Always," with total scores ranging from 0 to 40. The 10-item version does not target any specific psychological disorder but provides an overall indication of anxiety and depressive symptoms experienced in recent weeks. Each item is scored from 0 (Never) to 4 (Always), and the total score is calculated by summing all the item scores, with higher scores indicating greater psychological distress. In Yaghoubi's (2015) study on the psychometric properties of the 10-item version, the reliability and validity were found to be 0.84. The Cronbach's alpha coefficient for this scale in Yaghoubi's (2015) study was estimated to be above 0.7 (Akhavan Abiri et al., 2019).

2.2.2. Family Adaptability and Cohesion

Family Adaptability and Cohesion Evaluation Scales (FACES) is designed to assess family functioning and is one of the most commonly used tools for measuring family structure. The third revision of the scale was designed to measure two main dimensions: family cohesion and adaptability (Ali Akbari Dehkordi, Mehmandoost, & Kakoo

Joybari, 2013). It is a self-report questionnaire, and the fourth version consists of 42 items (21 items measuring family cohesion and 21 measuring family adaptability). Olson and Gorall (2003) designed the scale with six subscales and two primary subscales, measuring cohesion and family flexibility comprehensively. These subscales evaluate both balanced and unbalanced family functioning. Balanced subscales include cohesion and flexibility, while unbalanced subscales are disengaged, enmeshed, rigid, and chaotic. In a study conducted by Mazaheri and colleagues (2013), Cronbach's alpha coefficients for the total score and subscales (balanced cohesion, balanced flexibility, disengaged, enmeshed, rigid, and chaotic) ranged from 0.58 to 0.74 for fathers and 0.56 to 0.72 for mothers. Convergent and divergent validity was confirmed through the correlation of the scale with short-form parenting stress, depression, anxiety, stress scales, and life events (Haroon Rashidi & Kazemian Moghadam, 2017).

2.2.3. Perceived Social Support

Multidimensional Scale of Perceived Social Support (MSPSS), developed by Zimet and colleagues (1988), was used to measure perceived social support. It consists of 12 items and assesses three dimensions: perceived support from family (4 items), perceived support from significant others (4 items), and perceived support from friends (4 items). All items are rated on a five-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree). The total score ranges from 12 to 60. Edwards and colleagues (2004) reported internal consistency reliability for this scale, with Cronbach's alpha coefficients ranging from 0.86 to 0.90 for subscales and 0.86 for the overall scale in a sample of 788 high school students. Salimi and colleagues (2009) reported Cronbach's alpha coefficients of 0.89 for perceived family support, 0.86 for perceived friend support, and 0.82 for perceived significant others support (Ghanimi et al., 2018).

2.3. Data Analysis

Data were analyzed using both descriptive and inferential statistics. The descriptive statistics included tables, charts, means, and standard deviations. For inferential statistics, Pearson's correlation coefficient, path analysis, and structural equation modeling (SEM) were used, while ensuring the assumptions for parametric tests were met. The data were analyzed using SPSS and AMOS software.

3. Findings and Results

The demographic characteristics of the participants are as follows: In terms of age, 21.5% were under 30 years old, 45.2% were between 30 and 40 years, 26.5% were between 41 and 50 years, and 6.8% were over 50 years. Regarding education, 23.4% had less than a high school diploma, 28.5% had a high school diploma, 6.8% had an associate degree, 35.3% had a bachelor’s degree, 5.6% held a master’s degree, and 0.3% had a doctorate. In terms of employment, 25.4% were government employees, 39.3% were self-

employed, and 35.3% were homemakers. Regarding the birth order of the child with ASD, 59% were the first-born, 27.7% were the second-born, 11% were the third-born, and 2.3% were the fourth-born. Finally, in terms of socioeconomic status, 18.6% reported a good status, 55.9% were average, and 25.4% were in a poor economic situation.

Table 1 presents the descriptive findings for the research variables (family cohesion, family adaptability, perceived social support, and psychological distress) among the sample group.

Table 1

Descriptive Statistics of Research Variables

Variable	Mean	Standard Deviation	Minimum Score	Maximum Score
Family Cohesion (Total Score)	64.08	15.08	21	98
Components of Family Cohesion				
Balanced Cohesion	20.68	4.48	7	35
Disengaged Cohesion	21.56	4.35	7	34
Enmeshed Cohesion	21.84	3.89	7	34
Family Adaptability (Total Score)	62.01	13.16	21	100
Components of Family Adaptability				
Balanced Adaptability	18.44	5.18	7	33
Rigid Adaptability	20.61	4.14	7	34
Chaotic Adaptability	22.96	4.43	7	33
Perceived Social Support (Total Score)	41.03	11.12	14	60
Components of Perceived Social Support				
Family Support	14.69	3.89	5	20
Support from Significant Others	12.19	4.04	4	20
Support from Friends	14.15	3.79	5	20
Psychological Distress	24.30	6.43	5	40

As seen in Table 1, the mean (and standard deviation) for family cohesion among the mothers in the sample was 64.08 (15.08). The highest mean among the family cohesion components was for enmeshed cohesion, with a mean (and standard deviation) of 21.84 (3.89), while the lowest was for balanced cohesion, with a mean (and standard deviation) of 20.68 (4.48). Additionally, the mean (and standard deviation) for family adaptability was 62.01 (13.16). The highest mean among the family adaptability components was for chaotic adaptability, with a mean (and standard

deviation) of 22.96 (4.43), while the lowest was for balanced adaptability, with a mean (and standard deviation) of 18.44 (5.18). Moreover, the mean (and standard deviation) for perceived social support was 41.03 (11.12). The highest mean in the components of perceived social support was for family support, with a mean (and standard deviation) of 14.69 (3.89), and the lowest was for support from significant others, with a mean (and standard deviation) of 12.19 (4.04). Finally, the mean (and standard deviation) for psychological distress among the mothers was 24.30 (6.43).

Table 2

Correlation Coefficients between Research Variables

Variable	Perceived Social Support	Psychological Distress
	r (p)	r (p)
Family Cohesion (Total Score)	.45 (.001)	-.29 (.001)
Balanced Cohesion	.46 (.001)	-.25 (.001)
Disengaged Cohesion	.31 (.001)	-.23 (.001)
Enmeshed Cohesion	.41 (.001)	-.30 (.001)
Family Adaptability (Total)	.40 (.001)	-.32 (.001)

Balanced Adaptability	.42 (.001)	-.28 (.001)
Rigid Adaptability	.34 (.001)	-.17 (.008)
Chaotic Adaptability	.36 (.001)	-.31 (.001)
Perceived Social Support	1	-.46 (.001)
Family Support	.69 (.001)	-.49 (.001)
Support from Significant Others	.58 (.001)	-.32 (.001)
Support from Friends	.66 (.001)	-.31 (.001)
Psychological Distress	-.46 (.001)	1

As shown in Table 2, there is a significant positive correlation between family cohesion ($r = .45, p < .001$) and its components (balanced cohesion, disengaged cohesion, and enmeshed cohesion) and family adaptability ($r = .40, p < .001$) and its components (balanced adaptability, rigid adaptability, chaotic adaptability) with perceived social support among mothers of children with ASD ($p < .001$). Additionally, there is a significant negative correlation between family cohesion ($r = -.29, p < .001$) and its

components and family adaptability ($r = -.32, p < .001$) and its components with psychological distress among mothers of children with ASD ($p < .001$). Finally, a significant negative correlation exists between perceived social support ($r = -.46, p < .001$) and its components (family support, support from significant others, and support from friends) and psychological distress among mothers of children with ASD ($p < .001$).

Table 3

Direct Path Coefficients in the Final Model

Path	Unstandardized Coefficient (B)	Standardized Coefficient (β)	Standard Error	Lower Bound	Upper Bound	p
Family Cohesion → Psychological Distress	-.35	-.17	.09	-.288	-.128	.001
Family Adaptability → Psychological Distress	-.29	-.15	.12	-.240	-.091	.001
Social Support → Psychological Distress	-.71	-.37	.03	-.619	-.298	.001
Family Cohesion → Social Support	.68	.35	.04	.281	.617	.001
Family Adaptability → Social Support	.59	.32	.05	.317	.682	.001

As seen in Table 3, the direct path coefficients for family cohesion ($\beta = -.17, p < .001$), family adaptability ($\beta = -.15, p < .001$), and perceived social support ($\beta = -.37, p < .001$) to psychological distress among mothers of children with ASD were negative and significant. The direct path coefficient for perceived social support, as a mediating variable, to

psychological distress was also negative and significant ($\beta = -.37, p < .001$). The direct path coefficients for family cohesion ($\beta = .35, p < .001$) and family adaptability ($\beta = .32, p < .001$) to perceived social support were positive and significant.

Table 4

Indirect Path Estimates Using Bootstrap

Path	Unstandardized Indirect Coefficient (B)	Standardized Indirect Coefficient (β)	Standard Error	Lower Bound	Upper Bound	p
Family Cohesion → Psychological Distress via Social Support	-.27	-.13	.07	-.197	-.062	.001
Family Adaptability → Psychological Distress via Social Support	-.24	-.12	.08	-.172	-.077	.001

As shown in Table 4, the indirect path coefficients for family cohesion ($\beta = -.13, p < .001$) and family adaptability ($\beta = -.12, p < .001$) to psychological distress through perceived social support were negative and significant. This

means that perceived social support mediates the relationship between family cohesion, family adaptability, and psychological distress among mothers of children with ASD. The results suggest that perceived social support not

only maintains the effect of family cohesion and adaptability on reducing psychological distress but also strengthens the negative relationship between these factors and psychological distress through its mediating role. Therefore, based on the results, the main hypothesis—that family cohesion and adaptability, mediated by perceived social support, predict psychological distress among mothers of children with ASD—was confirmed.

4. Discussion and Conclusion

The results indicated that the direct path coefficients for family cohesion, family adaptability, and perceived social support to the psychological distress of mothers with children diagnosed with Autism Spectrum Disorder (ASD) were negative and significant. The direct path coefficient for perceived social support as a mediating variable to the psychological distress of these mothers was also negative and significant. Regarding the significance of the direct path coefficients from the exogenous variables to perceived social support as a mediating variable, the results showed that the direct path coefficients for family cohesion and family adaptability to perceived social support among mothers of children with ASD were positive and significant. Perceived social support not only maintained the impact of family cohesion and adaptability on reducing the psychological distress of these mothers but also strengthened the negative relationship between family cohesion and adaptability and psychological distress through its mediating role.

These findings align with previous research (Abbasi & Hamidifar, 2019; Ghanimi et al., 2018; Kostiurow et al., 2019; Lin et al., 2011; Lu et al., 2018; Meral & Cavkaytar, 2012; Pluut et al., 2019; Watson et al., 2019), which highlighted the role of the family environment, positive family interactions, and balanced family functioning—particularly in terms of cohesion and adaptability—in improving mental health and reducing behavioral problems and some psychological disorders among family members. In explaining this hypothesis, it can be said that balanced families in the dimension of cohesion create strong emotional bonds and warm, intimate relationships among their members. This generates a sense of belonging, acceptance, and mutual responsibility within the family system. In such families, members are sensitive to each other's expectations, values, and interests and spend time and energy supporting one another. Individuals in cohesive families, thanks to the psychological security they

experience, provide a foundation for constructive emotional support, helping each other face life's stressful conditions. Cohesive families are recognized by their supportive atmosphere, mutual understanding, and a desire to meet the needs and concerns of their members (Mirzaei et al., 2018). Therefore, the cohesive nature of the family leads to the formation of protective and supportive systems within the family. In such natural family environments, free from conflict and disconnection, family and societal values and norms are effectively transmitted. Similarly, the study by Abbasi and Hamidifar (2019) showed that high family cohesion allows family members to view life challenges as opportunities rather than threats, fostering greater preparedness to overcome difficulties (Abbasi & Hamidifar, 2019). Lindgren (2013) defined cohesion as the emotional closeness among family members. When cohesion is high, family members care about each other's success, happiness, and well-being. They are also ready to work together to solve problems when one member encounters difficulties. Another dimension of cohesion, according to Lindgren, is the time spent together as a family. Families that excel in this area regularly plan group activities, which, while seemingly simple, can be challenging to implement, as family members often devote their extra time to each other, even when they are busy or tired (Haroon Rashidi & Kazemian Moghadam, 2017).

On the other hand, balanced families in terms of adaptability, due to the presence of democratic leadership, involve all members in decision-making processes. In such families, where negotiation and discussion are open to all members, individuals feel valued and experience higher self-esteem, leading to more adaptive behaviors.

Regarding the mediating role of perceived social support between family cohesion and adaptability and psychological distress, research has shown that social support acts both as a mediator and moderator of the impact of parental stress on the satisfaction and mental health of parents of children with ASD (Lu et al., 2018). When parents of children with ASD perceive more social support, family adaptability increases, and parental stress decreases. Social support from others leads to improvements in both mental and physical health (Pluut et al., 2019). The most significant predictors of perceived social support are the social support resources provided by family, friends, and significant others. Among these, family support has the greatest impact on resilience against problems. Parents of exceptional children, due to the significant stress they experience from caring for their children, need more support from others than the general

population (Smith et al., 2011). The social support that these parents receive instills feelings of importance, respect, value, care, and love (Watson et al., 2019), acting as a buffer for coping with the stressful conditions of having a disabled child. This, in turn, enhances their psychological strength and resilience. Additionally, perceived social support from the family is associated with lower levels of psychological distress among family members.

5. Suggestions and Limitations

This study has several limitations that should be considered. First, the sample was limited to mothers of children with Autism Spectrum Disorder (ASD) in Tehran, which may limit the generalizability of the findings to other regions or populations. Additionally, the use of self-report questionnaires could introduce response bias, as participants might not have accurately reported their psychological distress or perceived social support. The cross-sectional design also limits the ability to establish causality between family cohesion, family adaptability, social support, and psychological distress. Finally, cultural factors that could influence family dynamics and psychological well-being were not fully explored.

Future research could address these limitations by including a more diverse sample, both geographically and demographically, to enhance generalizability. Longitudinal studies could provide a better understanding of the causal relationships between family cohesion, adaptability, social support, and psychological distress over time. Additionally, future research should consider exploring the role of fathers and other family members in contributing to the overall family dynamics and their impact on psychological well-being. Further studies could also examine the influence of cultural and socioeconomic factors on family cohesion and support systems in families of children with ASD.

Given the findings, interventions aimed at enhancing family cohesion and adaptability, as well as increasing perceived social support, should be integrated into programs supporting mothers of children with ASD. Psychologists and family therapists could develop family-centered therapies and support groups to foster stronger emotional bonds and collaborative decision-making within families. Moreover, community-based support services that provide emotional, social, and practical assistance could be expanded to help reduce the psychological distress experienced by these mothers. Educational programs that teach coping strategies

and stress management techniques should also be provided to caregivers to improve their mental health and resilience.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

Not applicable.

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