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Understanding the Process and Nature of Grief and Loss in the Family Members of COVID-19 Victims: Developing and Elaborating the Model for Psychological Adjustment with Grief from a Mixed Methods Approach

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A B S T R A C T

Objective: This study aimed to examine the process and nature of grief and loss among family members of COVID-19 victims and to develop a model for psychological adjustment to grief in Tehran.

Methods and Materials: This study utilized an exploratory sequential mixed methods design. The study population comprised survivors of COVID-19 victims in Tehran who had lost loved ones during the COVID-19 pandemic in 2021. In the qualitative phase, 20 survivors were selected through purposive sampling and participated in semi-structured interviews. The interview data were analyzed using conventional qualitative content analysis, leading to the development of a psychological adjustment to grief model based on the findings. In the quasi-experimental phase, 32 survivors from Mostafa Khomeini Hospital were selected via simple random sampling and randomly assigned to intervention and control groups, each with 16 participants. Data were collected using the Grief Experience Questionnaire (GEQ; Barrett & Scott). The intervention group participated in 14 sessions, each lasting 1.5 hours, employing the psychological adjustment to grief model. Data were analyzed using multivariate analysis of covariance (ANCOVA) with SPSS software (version 26).

Findings: The qualitative phase revealed three selective codes: "contextual factors affecting grief," "the nature and process of grief," and "coping with and managing grief." Quantitative phase results demonstrated a significant difference between pre-test and post-test scores in the intervention group. ANCOVA results indicated the developed psychological adjustment model significantly affected the bereaved survivors of COVID-19 victims ($\eta^2 = 0.962$; $p < 0.0001$; $F = 739.978$).

Conclusion: The psychological adjustment model, developed based on the context and experiences of bereaved survivors of COVID-19 victims in Tehran, improved psychological adjustment to grief. Counselors can employ this intervention to assist survivors in adjusting to grief, thereby enhancing their level of adjustment.

Keywords: *grief, psychological adjustment, COVID-19, victims, mixed methods approach.*

1. Introduction

Throughout history, humans have always been exposed to the risk of infectious diseases with the potential to develop into large pandemics. Many pandemics have significantly impacted humanity, resulting in millions of deaths, the destruction of civilizations, and the devastation of numerous nations (Dyregrov, 2008; Huremović, 2019). In the present era, the COVID-19 pandemic is considered a social, economic, and psychological health crisis with widespread and unfortunate consequences worldwide. These include the closure of schools, universities, and industries, leading to millions of lost jobs and exacerbating inequalities such as increased global poverty and physical and psychological disorders (Khodabakhshi-Koolaee et al., 2023). Additional issues caused by the COVID-19 pandemic include home quarantine, disruption of daily activities, obsessive cleanliness, unnatural grief for deceased loved ones, death within communities, insufficient well-equipped hospitals, challenges faced by hospital staff, fatigue of medical personnel, economic problems in communities, closure of educational institutions and offices, and misinformation in cyberspace and the community (Buckley et al., 2024; Khodabakhshi-Koolaee et al., 2023; Padhan & Prabheesh, 2021).

According to Haung and Zhao (2020), COVID-19 spread across many countries, claiming numerous lives (Huang & Zhao, 2020). During the pandemic, family members of COVID-19 victims were not permitted to hold mourning ceremonies, express their emotions, or communicate with other relatives due to quarantine measures (Chen, 2022). Consequently, these family members were deprived of the opportunity to grieve properly, potentially leading to ruminations during the quarantine period. Furthermore, due to the COVID-19 outbreak, individuals may experience delayed grief, manifesting at least six months later (Kumar, 2021). As social beings, humans form deep attachment bonds, and the loss of these bonds through separation or death induces grief. Grief occurs when a person loses a loved one, resulting in physical, psychological, and behavioral disorders (Mansoori et al., 2023).

Researchers have examined the mental crises of family members of COVID-19 victims, stating that the high risk of infection and mortality associated with COVID-19 has severe adverse effects on life and social activities, thereby compromising psychological security (Mohammadi et al., 2021). The death of a family member typically causes shock and emotional trauma to other family members, necessitating extensive emotional support from relatives and the community to cope with their loss. Family members of COVID-19 victims experience numerous psychological crises during the adjustment phase, facing challenges beyond the psychological shock caused by the death of a loved one, which severely threatens their mental health (Lightbody et al., 2022; Yoosefi Lebni et al., 2022).

Grief can be overwhelming for some individuals, prompting the development of various methods across cultures to help the bereaved adapt and cope safely during this period. Grief refers to how a bereaved person expresses their thoughts and feelings (Shear, 2012). It manifests differently across cultural contexts, with various ceremonies and customs aimed at helping the bereaved adjust to their grief and continue living without the deceased (Mansoori et al., 2023).

There is a distinction between grief and mourning; mourning is the process following grief, involving resolution and psychological recovery. It is often observed through traditions, rituals, and individual personality traits. In recent years, mental health professionals have shown significant interest in grief therapy as an effective method to help the bereaved return to normal life (Shear, 2012). Adjusting to loss without intervention during the COVID-19 pandemic can complicate the grieving process due to the unique and restrictive nature of the circumstances (Arora & Bhatia, 2023). Funeral and burial ceremonies have become painful and different, with physical distancing protocols preventing others from providing support and sympathy (Mansoori et al., 2023; Mohammadi et al., 2021).

The natural process of grief may be prolonged and even become chronic. Nearly three years after the COVID-19 outbreak, numerous studies have explored the grief process of bereaved survivors. Some studies have addressed grief complications, others its consequences, and some have investigated coping mechanisms. During this painful tragedy, many people experienced unprecedented grief, with those who lost loved ones to COVID-19 enduring more psychological distress than those whose loved ones died under different circumstances. Despite the significance of the grief process, no study has investigated the nature and process of grief and loss to develop a model for psychological adjustment and management of grief. Prevention is more cost-effective and requires less energy and time, highlighting the need for a comprehensive understanding of the grief process among family members of COVID-19 victims. This study aims to explore the

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process and nature of grief and loss in family members of COVID-19 victims and develop a model for psychological adjustment to grief in Tehran.

2. Methods and Materials

2.1. Study Design and Participants

This study employed an exploratory sequential mixed methods design. The qualitative data were collected in the first phase using the exploratory sequential method (Fetters et al., 2013). The quantitative data were collected and analyzed in the second phase based on the findings from the first phase. Conventional content analysis was used to identify components required for developing the model for psychological adjustment to grief. Additionally, a quasi-experimental method with a pre-test and post-test design and a control group was used to examine the effectiveness of the proposed model.

The research population consisted of bereaved family members of COVID-19 victims in Tehran. Participants in the qualitative phase were selected through purposive sampling, including 20 family members and first-degree relatives of individuals who died in 2020-2021 due to COVID-19. The sample size for the qualitative phase was determined based on data saturation and adequacy. Data saturation occurs when no new information emerges during analysis, and adequacy ensures the sample reflects the research population's range. In the qualitative phase, responses were analyzed until no new themes emerged. Participants in the quantitative phase were selected through simple random sampling from 170 willing and available bereaved family members. In the second sampling stage, 32 participants were randomly assigned to intervention and control groups (16 members each) from Mostafa Khomeini Hospital. The sample size for the quantitative phase, determined by the experimental design, was adequate for each group.

Eligibility criteria included consent to participate, no psychological disorders (self-reported and clinically assessed), the loss of a first-degree relative due to COVID-19, experiencing grief for 3-6 months, and being aged 20-60 years. Exclusion criteria were non-completion of the intervention program, non-cooperation in the intervention process, and unwillingness to continue participating.

2.2. Procedure

2.2.1. Qualitative Part

Participants in the qualitative phase were individuals who lost loved ones to COVID-19 in Tehran in 2021, selected through purposive sampling. Data saturation was achieved after interviewing 20 bereaved survivors. Data were collected using semi-structured interviews, with questions developed based on the study's objectives. The researcher guided the interviews to maintain focus. Theoretical saturation was reached after 20 interviews, and the process ceased. Interview questions included:

"Do you think that the time of his/her death had not yet come?"

"You cannot accept the fact that he/she is dead? Are you trying to find a good reason for this death?"

Specific follow-up questions were asked based on participants' responses. The interview questions aimed to discard researcher presuppositions, based on a literature review and validated by subject-matter experts to ensure objectivity. Interviews were conducted in a counseling center, lasting 50 to 70 minutes, totaling 1050 minutes. Participants were offered a free counseling session as appreciation. They were assured of confidentiality and anonymity, with data used solely for research purposes and deleted after publication. Written informed consent was obtained for conducting and recording interviews. Audio files were deleted after transcription. Data from the qualitative phase were analyzed using grounded theory content analysis, employing a three-stage coding scheme: open, axial, and selective coding. Factors accounting for grief in survivors were identified and categorized.

2.2.2. Quantitative Part

In the quantitative phase, a model for psychological adjustment to grief was developed using qualitative data and previous studies. Subject-matter experts reviewed and revised the model, which focused on practical exercises and techniques without extensive theoretical concepts. The model involved group instructions implemented over 15 sessions.

2.2.3. Connection and Integration

The third phase utilized a sequential exploratory design in two stages:

Connection: The model for psychological adjustment to grief developed in the qualitative phase was implemented in

the quantitative phase. Participants (n = 32) from the qualitative phase were randomly assigned to control and intervention groups, with the intervention conducted in the quantitative phase.

Integration: Qualitative data were analyzed using a meta-inference strategy to explain the quantitative data. The quantitative phase employed a quasi-experimental approach with a pre-test-post-test control group design. The research population included survivors of COVID-19 victims in 2021. Of 170 grieved survivors, 128 were selected through simple random sampling and randomly placed into intervention and control groups (16 members each). The second phase focused on factors affecting grief and the process of adjustment and management of grief. The developed model involved 14 intervention sessions focusing on psychological adjustment to grief, reviewed and confirmed by subject-matter experts. Intervention group participants attended 14 group training sessions in a counseling center, each lasting 1.5 hours, while the control group received no intervention. The Grief Experience Questionnaire (GEQ) was used to assess the model's effectiveness.

2.3. Measures

2.3.1. Semi-Structured Interview

Qualitative data were collected through semi-structured interviews with a predetermined protocol, allowing for additional questions as needed. The interview questions focused on the nature and process of adjustment to grief for COVID-19 victims.

2.3.2. Grief Experience

Quantitative phase interviews used the Grief Experience Questionnaire (GEQ) developed by Barrett and Scott (1989). The GEQ, a 34-item instrument by Barrett and Scott (1989), evaluates feelings after the death of loved ones from various perspectives (e.g., guilt, search for explanation, somatic reactions, rejection, loss of social support, judgment, shame, and stigmatization) (Barrett & Scott, 1989). Items are scored on a five-point Likert scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = most often, 5 = always). The Cronbach's alpha for the questionnaire in this study was 0.88.

2.4. Statistical analysis

Data were analyzed using descriptive statistics (frequency, mean, percentage, standard deviation, skewness, kurtosis) and inferential statistics (univariate analysis of covariance). Multivariate analysis of covariance (ANCOVA) was performed using SPSS-26 software.

3. Findings and Results

The data were analyzed using qualitative content analysis, and the extracted themes are displayed in Table 1. Based on the extracted categories, themes, and data on the nature of grief, Table 2 was provided.

The participants in this study were 32 bereaved survivors of COVID-19 victims. The descriptive findings of the study are reported in Table 3. Table 4 presents the descriptive statistics for grief after death. According to the findings, the mean grief scores for the participants in the intervention and control groups were 63.19 and 108.19, respectively, before the intervention. After controlling for the pre-test scores of adjustments and exposure to grief, a significant difference was found between the two groups in terms of their grief scores, indicating a significant reduction in grief scores in the intervention group compared to the control group. Furthermore, the eta squared value suggests that 96.2% of the variance in grief scores was due to the intervention. Thus, the grief adjustment intervention was effective in helping the survivors of COVID-19 victims to manage their grief.

Table 1

Axial and Selective Codes Extracted from the Qualitative Phase of the Study

Open Codes	Axial Codes	Selective Codes
Accepting the divine order and surrendering to God	Belief in death and life after death	Contextual factors affecting grief
Accepting death as a definite reality		
Belief in religion and religious teachings		
Belief in the futility of material life		
The unknown and vagueness of death		
Belief in life after death and reunion		

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Other people's failure to understand the grief	Public reaction to grief during the COVID-19 pandemic	
People's fear of developing the disease		
Underestimation of grief		
The sympathy of friends and relatives from afar		
People's curiosity about COVID-19 and death		
Intimate and friendly relationships with the deceased	The special role and position of the deceased	
The role of the deceased's emotional and economic support		
Love and affection of the deceased to the family members and others		
The deceased's presence and dominance in life		
Delay in vaccine importation	Feeling angry with the medical community and staff	The nature and process of grief
Lack of equipment and medicines		
The compulsion to be at work during the COVID-19 pandemic		
Medical staff's failure to diagnose and treat COVID-19 on time		
Inadequate information provided by the Ministry of Health		
A senseless death	The nature of death during the COVID-19 pandemic	
Dying in solitude		
Unexpected and sudden death		
Dying for sacrifice and saving others		
Not being with the deceased during illness	Self-blame for the deceased's illness and death	
The experience of anger and grief in the process of illness and death		
The impossibility of following up on the treatment of the deceased		
Feeling guilty for not saving the deceased		
Blaming oneself for the deceased's illness		
Regretting the failure to take care of the deceased at home		
Searching for the philosophy of life and death	Focusing on death thinking and the meaning of life	Coping with and management of grief
Using audiovisual media		
Reaching a deeper understanding and insight into life and death		
Providing emotional and material assistance to the family of the deceased	Helping oneself and other survivors to start their normal life	
Engaging in educational and occupational programs		
Performing obligations and responsibilities toward children		
Modeling the characteristics and will of the deceased	Changing the patterns of thinking and behaving toward others and life	
Good manners and kindness to others		
Correcting one's behavior		
Enjoying living and being together		
Life becomes meaningless and worthless	Giving up on the material world and life	

The analysis of the data from the semi-structured interviews revealed 44 open codes, 9 axial codes, and 3 selective codes categorized as follows: Contextual factors affecting grief (belief in death and life after death, public reaction to grief during the COVID-19 pandemic, and the special role and position of the deceased), the nature and process of grief (feeling angry with the medical community and staff, the nature of death during the COVID-19 pandemic, and self-blame for the deceased's illness and death), and grief management (focusing on death thinking and the meaning of life, helping oneself and other survivors to start their normal life, and changing the patterns of thinking and behaving toward others and life). The extracted selective codes are interrelated and provide insight into the nature and process of grief in survivors of COVID-19 victims. Table 2 shows the content of the intervention for psychological adjustment with grief and loss in survivors of COVID-19 victims.

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Table 2

Content of the Intervention Program

Sessions	Content
1	Providing a simple definition of grief, normal grief, pathological grief, and the ideal model of psychological adjustment with grief in family members of COVID-19 victims
2	Discussing the goals of the survivors for participating in the sessions and their expectations
3	Exploring their thoughts and feelings about death and fear of it
4	Addressing participants' beliefs about death, accepting death as a reality, the futility of material life, the unknown essence and vagueness of death, and belief in life after death and reunion
5	Describing public reactions to grief
6	Discussing the role of the deceased, including intimate relationships, emotional and economic support, and love and affection for family members and others
7	Exploring the nature and process of grief and its parameters
8	Discussing death and nothingness based on existential and meaning therapy approaches
9	Addressing human reactions to grief, such as self-blame for the deceased's illness and death
10	Focusing on death thinking and the meaning of death for grief adjustment and management
11	Exploring coping strategies with an emphasis on endurance and acceptance of grief and loss
12	Discussing effective coping strategies based on religious instructions about hope, the meaning of life, and meaning therapy
13	Reviewing previous sessions and highlighting key points
14	Appreciating participants and administering the post-test

The developed model focused on practical exercises and techniques, avoiding extensive theoretical concepts. These exercises were conducted over 14 sessions. The content aimed to improve psychological adjustment to grief in family members of COVID-19 victims. Table 3 shows the descriptive statistics for the research variables.

Table 3

Descriptive Statistics for Research Variables

Group	Variables	Frequency	Pre-intervention	Post-intervention
			M (SD)	M (SD)
Control	Feeling guilty	16	24.94 (1.982)	25.38 (1.996)
	Search for explanation	16	23.94 (1.879)	23.56 (1.788)
	Somatic reactions	16	11.69 (1.448)	11.56 (1.504)
	Rejection and loss of social support	16	12.75 (1.125)	13.00 (1.317)
	People's judgment	16	15.13 (1.147)	16.06 (1.731)
	Shame	16	12.19 (1.642)	11.63 (1.500)
	Stigmatization	16	7.54 (1.094)	6.69 (0.946)
	Total	16	108.63 (2.895)	108.19 (5.394)
Intervention	Feeling guilty	16	25.81 (1.905)	13.38 (1.088)
	Search for explanation	16	24.00 (1.673)	15.00 (1.506)
	Somatic reactions	16	10.44 (1.672)	10.44 (1.672)
	Rejection and loss of social support	16	13.19 (1.109)	6.00 (0.730)
	People's judgment	16	14.63 (1.544)	6.63 (1.310)
	Shame	16	12.44 (1.590)	7.44 (0.814)
	Stigmatization	16	7.56 (1.209)	4.69 (1.138)
	Total	16	108.69 (3.516)	63.19 (3.728)

As can be seen in Table 3, a declining trend in the mean scores of the participants in the intervention group after the intervention confirms the effectiveness of the training intervention in reducing grief in family members of COVID-19 victims. Table 4 shows the descriptive statistics for grief after death in the two groups.

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Table 4

Descriptive Statistics for Grief After Death in the Two Groups

Group	Frequency	Mean	SD	F	df1	df2	Sig.
Control	16	108.19	5.395	2.235	1	30	.145
Intervention	16	63.19	3.728				
Total	32	85.69	23.311				

As shown in Table 4, the mean score for grief in the control and intervention groups are 108.19 and 63.19, respectively. Table 5 displays the results of the univariate analysis of covariance (ANCOVA) for the post-intervention scores of psychological adjustments with grief after death.

Table 5

Results of Univariate ANCOVA for the Post-Intervention Scores of Psychological Adjustments with Grief

Source of Changes	Sum of Squares	df	Mean Squares	F	Sig.	Eta Square	Test Power
Constant	16206.336	1	16206.336	739.978	.001	.962	1.000
Error	635.132	29	21.901				

The data in Table 4 and Table 5 show a significant difference between the control and intervention groups in terms of their psychological adjustment to grief for COVID-19 victims ($p = .001$). This finding confirms that the grief for COVID-19 victims was significantly reduced in the intervention group compared to the control group. Furthermore, the eta squared value ($\eta^2 = .962$) indicates that 96.2% of the variance in grief for COVID-19 victims can be attributed to the intervention program, which improved psychological adjustment to grief in COVID-19 survivors.

4. Discussion and Conclusion

The present study examined the challenges related to the nature and process of grief in family members of COVID-19 victims. It also aimed to develop and validate a model for psychological adjustment with grief in these family members. The analysis of the data from participant interviews revealed three axial codes:

Feeling angry with the medical community and staff (delay in vaccine importation, lack of equipment and medicines, compulsion to work during the COVID-19 pandemic, medical staff's failure to diagnose and treat COVID-19 on time, and inadequate information provided by the Ministry of Health)

The nature of death during the COVID-19 pandemic (a senseless death, dying in solitude, unexpected and sudden death, and dying for sacrifice and saving others)

Self-blame for the deceased's illness and death (not being with the deceased during illness, experiencing anger and grief during the illness and death process, the impossibility of following up on the treatment of the deceased, feeling guilty for not saving the deceased, blaming oneself for the deceased's illness, and regretting the failure to take care of the deceased at home).

Many individuals who lost loved ones during the COVID-19 pandemic could not say farewell due to restrictive regulations on funeral ceremonies and stay-at-home and social distancing mandates (Moya-Salazar et al., 2022). Consequently, family members of those who died from COVID-19 have not experienced a regular grief cycle, hindering their adaptation and recovery. The absence of a comprehensive grief response can disrupt mental health, potentially leading to a pandemic of mental health issues, depression, and despair. Additionally, family members and relatives may lose the ability to communicate emotionally and physically with others due to quarantine requirements (Mansoori et al., 2023; Reitsma et al., 2023).

Survivors may experience varying degrees of emotions regarding the deceased person's loss. Feelings of guilt and self-blame can arise from the failure to care for the patient due to social isolation and quarantine restrictions before death. These emotions can complicate the grief resolution process for family members who lost loved ones during pandemics (Khodabakhshi-Koolaee et al., 2023; Wallace et al., 2020; Yoosefi Lebni et al., 2022).

Participants also reported feelings of rejection and abandonment following the death of loved ones. Survivors experienced anxiety due to the uncertainty and lack of control over the situation. The Intolerance of Uncertainty Model (IUM) explains that people often perceive uncertain situations as disturbing and stressful, leading to extreme

worry (Dugas, 2004). Anxiety in such situations can result in cognitive avoidance or rumination, particularly when participants were unable to be with the patient in the hospital, which could have met their basic need for communication during stressful COVID-19 conditions (Menzies et al., 2020).

The condition of patients admitted to hospitals left survivors confused about the outcome, which is consistent with previous studies on death and grief that differentiate between "good" and "bad" deaths. Bad deaths, associated with pain, discomfort, and isolation, are more traumatic for survivors. Deaths from COVID-19, which often occur in hospitals without family presence and happen suddenly, exemplify bad deaths and cause significant psychological distress (Mansoori et al., 2023).

Studies have shown that the quality of death influences grief, with sudden deaths leading to more severe physical and psychological consequences compared to predictable deaths. This underscores the importance of the support role of the government, community, and medical staff, as well as societal attitudes toward grief and the deceased's role in the survivor's life, in the grief process. Negative emotions, lack of motivation, and difficulty meeting emotional and material needs all impact grief. Training interventions focusing on the nature and process of grief can help individuals understand and manage their grief (Chachar et al., 2021; Mansoori et al., 2023; Menzies et al., 2020).

The interviews revealed that contextual factors affecting grief, which lead to adjustment, are complex and involve various elements including contextual, facilitating, and intervening factors, as well as barriers and obstacles. Personality traits are significant determinants of adjustment to loss, with extraversion and neuroticism predicting grief patterns following spousal loss (Bonanno et al., 2002; Sarubin et al., 2015). Adequate social support also plays a crucial role in mitigating anxiety, depression, and psychosomatic symptoms among the bereaved (Boelen et al., 2010).

The analysis identified three codes for grief adjustment and management: (1) focusing on death thinking and the meaning of life, (2) helping oneself and other survivors to start a normal life, and (3) changing thinking and behavior patterns toward others and life. These findings suggest that coping strategies vary among individuals, and personalized training based on contextual factors can enhance grief adjustment for COVID-19 survivors.

Given the complexities of the adjustment process, factors affecting grief, effective adjustment strategies, and individual differences should be considered when developing intervention programs. Such programs can provide survivors with new perspectives on themselves, their communities, and important life decisions (Mansoori et al., 2023; Mohammadi et al., 2021; Tan & Andriessen, 2021).

The findings from the qualitative phase indicate that the nature and process of grief adjustment can be categorized into three main categories (contextual factors affecting grief, the nature and process of grief, and coping with and managing grief) and nine subcategories. Understanding these categories can help prevent negative consequences of maladjusted grief. Training programs focused on grief for survivors of COVID-19 victims can develop effective coping strategies for optimal grief adjustment.

The quantitative phase showed significant differences between intervention and control groups in grief scores, confirming the effectiveness of the grief adjustment intervention. The study results indicated that feelings of guilt, searching for explanations, stigmatization, public judgment, rejection and loss of social support, and shame significantly impact the grief experienced by family members of COVID-19 victims.

5. Limitations & Suggestions

The findings underscore the need for more studies to understand how to better adapt to grief and loss caused by COVID-19. Effective coping strategies learned through training programs are essential for returning to normal life routines. Adaptability is a key human trait that aids in overcoming difficult situations, and the training protocol used in this study could help family members of COVID-19 victims start anew.

One limitation of this study is the lack of comprehensive research on the grief experience of survivors of COVID-19 victims. Additionally, grief reactions were not assessed by gender. Future research should consider these factors and develop empowerment workshops for counselors, social workers, and nurses based on the proposed model. Regular follow-ups with family members of COVID-19 victims through various communication means can help prevent adverse effects from ineffective coping strategies.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. To comply with ethical protocols, participants were assured of data anonymity. A two-day grief management workshop was held for the control group after the intervention program. The study protocol was registered with the Iran National Committee for Ethics in Biomedical Research with the code IR.IAU.SRB.REC.1400.059.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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