

Original Research

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community resilience; disaster-affected people; moderating effect; perception of government relief services; quality of life

Abbreviations:




PTSD, post-traumatic stress disorder; NDMI (Korea), National Disaster Management Research Institute; WHO-QOL, World Health Organization Quality of Life assessment instrument; CCRAM10, Conjoint Community Resiliency Assessment Measure 10; SD, standard deviation; WCDRR, World Conference on Disaster Risk Reduction

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Relationship Between Community Resilience and Quality of Life of Disaster-Affected People: Reinforcement Effects of the Perception of Government Relief Services in South Korea

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Abstract

Objective: The occurrence of various forms of disasters has increased worldwide. In South Korea, community resilience is particularly emphasized, especially in response to large-scale disasters in regional and group units. This study investigated the association between community resilience and the quality of life of disaster-affected people, and identified the moderating effects of perception of government relief services.

Methods: Data from the third long-term survey on the change of life of disaster-affected people conducted in 2018 by the National Disaster Management Research Institute were used. The study selected 1046 participants ages ≥ 19 years from among the disaster-affected people. Statistical analyses were performed using Model 1 of the PROCESS Macro 4.0 in the SPSS program.

Results: Community resilience positively affected disaster-affected people's quality of life. The perception of government relief services significantly strengthened the association between community resilience and quality of life.

Conclusions: The study highlights the importance of enhancing community resilience to improve disaster-affected people's quality of life and emphasizes the role of perception of government relief services in reinforcing this relationship. Several practical and political measures that focus on improving community resilience and perception of government relief services are suggested to enhance disaster-affected people's quality of life.

The occurrence of various forms of disasters has rapidly increased worldwide in recent years. In South Korea, there have been continuous large-scale disasters resulting in loss of life and property, including the Ferry Disaster (April 16, 2014), earthquakes in Gyeongju-si (September 12, 2016) and Pohang-si (November 15, 2017), large forest fires in Uljin-si and Samcheok-si (March 4, 2022), and Itaewon Halloween disaster (October 29, 2022). In the past decade, the property damage caused by natural disasters in South Korea averaged 350 billion KRW per year, with a recovery cost of 820 billion KRW. For social disasters^a, occurrences have increased approximately 8.3-fold compared to 10 years ago.¹

A disaster situation causes psychological and emotional damage, as well as damage to the life, body, and property of individuals and communities during and after the disaster. At an individual level, disaster-affected people may experience emotions such as sorrow, loss, rage, and guilt following the disaster.² They may also face difficulties in social relationships, sleep disorders, anxiety, depression, or alcoholism.^{3–5} The continued presence of painful emotions can lead to post-traumatic stress disorder (PTSD) in disaster-affected people. These psychological symptoms negatively affect disaster-affected people's quality of life.^{6,7} For example, earthquake-affected people in Turkey had markedly lower quality of life compared to those without an earthquake experience.⁸ Furthermore, more than half of the hurricane-affected people had low scores on quality of life indicators even 2 years after the disaster.⁹ Disaster-affected people struggle to return to normal daily life due to poor health, PTSD, depression, and other factors, which ultimately decrease their quality of life. Therefore, it is important to not only treat symptoms after a disaster but also consider the overall well-being of disaster-affected people in daily lives, which is reflected in their quality of life.^{10–12} Quality of life is an important measure of disaster-affected people's genuine recovery.

^a*Social accidents:* Incidents that cause damage beyond the scale prescribed by Presidential Decree. These incidents can be caused by a fire; collapse; explosion; traffic accidents; chemical, biological, and radioactive accidents; environmental pollution incidents; and so on. (Framework Act on the Management of Disasters and Safety. <https://www.law.go.kr/LSW/eng/EngLsSc.do?menuId=2§ion=lawNm&query=disaster&x=0&y=0#libgcolor1>)

At a community level, the aftermath of a disaster can lead to “corrosive community” or “community disintegration,” which occurs when there is conflict in clarifying responsibilities or a split caused by social confusion and rage.^{13,14} These factors can delay the recovery of daily life or hinder affected people’s recovery.¹⁵ Considering the increasing trend of disaster occurrence in specific regions (villages) or groups in South Korea, the concept of “community resilience” becomes crucial in post-disaster management and recovery.¹⁶

Resilience refers to the ability to recover from stress and resist risk factors during a crisis.^{17,18} This concept is applied to individuals’ ability to internally manage a disaster and restore their healthy state¹⁹ for disaster management.^{6,20,21} Expanding on this scope, community resilience is highlighted as vital in post-disaster recovery. A study showed that a resilient community had a lower vulnerability to disasters compared to a non-resilient community.²² The second World Conference on Disaster Risk Reduction (WCDRR) emphasized the importance of building community resilience to enhance recovery capacity in a disaster situation. The Sendai Framework, recommended at the third WCDRR, prioritized reinforcing community-based support of resilience as the core of disaster risk reduction. In South Korea, the importance of community resilience in disaster studies is increasing, driving further research. Studies in South Korea have confirmed that the recovery capacity of a community is a critical factor in the restoration of daily life, and community resilience can also reduce the impact of PTSD and increase disaster-affected people’s social adaptation.^{23–25} Moreover, research seeks to apply community resilience in practice, for example, through policies²⁶ promoting community restoration and the implementation and outcomes of community recovery programs in disaster-affected areas.²⁷ The results of these studies further support the positive effects of increased community recovery capacity on disaster-affected people’s quality of life.

In sum, disaster-affected people experience harmful consequences both at the individual and community levels, affecting their quality of life. The extent of these effects varies, depending on follow-up measures such as recovery from damage and relief services. It is the government’s responsibility to provide relief services after a disaster. These services are closely linked to the cohesion and solidarity of the affected community and region.¹⁷ In the absence of appropriate relief services, trust among individuals, communities, and the government may decrease, and conflicts may arise. Therefore, government relief services play a crucial role in the recovery of individuals, reinforcement of solidarity within society, and overall social stability. The government provides a wide range of disaster relief services at both the individual and community levels, ranging from physical, psychological, and emotional health programs to economic support for the return to daily life. Emergency relief resources such as water, food, and temporary housing are also provided.

However, there have been problems observed in South Korea with regard to disaster relief and recovery in the case of the earthquake in Pohang-si.²⁸ Temporary or unsystematic services, as well as low satisfaction and conflicts due to the selection and support of the relief cases, have been reported.²⁹ It is important not only to focus on the provision of relief services, but also to examine the perception and satisfaction of those receiving the services, as well as the fairness of these services. Evaluating relief services from the perspective of service recipients can maximize survivors’ resilience.³⁰ Additionally, public satisfaction increases when there are improvements in the quality and fairness of resource

distribution, as well as continuous communication regarding government-provided services after a disaster.³¹

The negative perception of disaster management can cause public anxiety and decrease quality of life.³² Studies report that citizens’ subjective happiness is influenced by their perception of the outcome of public services.³³ This suggests that the recovery of quality of life varies, depending on disaster-affected people’s perception of government services in worst-case scenarios. Therefore, it is important to determine the perception of government relief services along with community resilience to improve disaster-affected people’s quality of life. To this end, it is essential to examine how service users’ satisfaction with and subjective perception of government relief services affect the quality of life and recovery of disaster-affected people.^{34–36}

Previous discussions on disaster-affected people’s recovery have been limited to narrow dimensions such as PTSD and depression.^{6,37} Furthermore, most studies have focused on resilience on an individual level.³⁷ However, it is important to consider the interaction between individuals and their environment.^{38–40} Therefore, a more diverse range of perspectives should be applied when examining the variables, taking into account the multidimensional system of mutual interactions between individuals, events, and environmental factors.⁴¹

Instead of focusing solely on resilience and psycho-emotional aspects at an individual level, it is important to adopt broader perspectives when examining disaster-affected people’s quality of life. This study aimed to investigate the association between disaster-affected people’s community resilience and quality of life and identify the moderating effects of the perception of government relief services on this association. Subsequently, based on the findings, the study conducted multidimensional discussions focused on the practical and political implications to enhance the quality of life of disaster-affected people in the process of recovery.

Based on the above, the hypotheses for this study are as follows:

- Hypothesis 1: Community resilience enhances the quality of life of disaster affected people.
- Hypothesis 2: Community resilience and the quality of life of disaster-affected people are reinforced as the perception of government relief services becomes more positive.

Methods

Data Procedure and Participants

This study utilized the raw data from the National Disaster Management Research Institute of South Korea (NDMI) on the change of life of disaster-affected people (2018) to develop safety services for disaster-affected people. The NDMI has been conducting studies on disaster-affected people annually since 2015. For this investigation, the most recent data from the 2018 study were used. The panel in that study consisted of systematically sampled disaster-affected people, taking into consideration specific time and region where disasters occurred. The public data were obtained from the institution after submitting the study plan.⁴²

The participants in this study were adults ages ≥ 19 years, who had experienced a disaster in 2017 and responded to the 2018 survey of disaster-affected people. This decision was based on the fact that community resilience and government relief services, the main variables in this study, were first examined in the 2018 survey, and disaster-affected people’s quality of life could vary over time due to various factors.⁴³ The study period was October to

December 2018. The participants completed the questionnaire using a tablet PC in a computer-aided personal interview. A total of 1046 participants who responded to all items of the main variables, including age and gender, were analyzed. According to the conventional method, the minimum ratio between the number of independent variables and sample size should be 1:10 to ensure statistical validity when determining an appropriate sample size.⁴⁴ In this study, 9 variables were analyzed, which required a minimum sample size of $n = 90$. The actual sample size in this study was $n = 1046$, satisfying the criteria.

Ethical Standards

This study was approved by the relevant institutional review board, and the study procedures were undertaken in accordance with the Declaration of Helsinki [JBNU 2022-11-004].

Instruments

Dependent variable

The Korean version⁴⁵ of the World Health Organization Quality of Life (WHO-QOL) assessment tool was used in this study to measure quality of life. Modifications were made to the tool to align with the study's purposes. The WHO-QOL tool allows for a comprehensive evaluation of physical health, psychological health, independence, social relationships, the environment, and spirituality. The tool comprises 7 questions, some being: How satisfied are you with your health?/How satisfied are you with your overall interpersonal relationship?/How often do you experience negative emotions like gloominess, hopelessness, anxiety, and depression? Participants were asked to rate each question on a 5-point Likert scale, ranging from "Strongly disagree = 1" to "Strongly agree = 5." The total scores ranged from 7 to 35, with higher scores indicating higher levels of quality of life. The reliability of the WHO-QOL tool in this study was Cronbach's $\alpha = 0.776$.

Independent variable

To assess community resilience, the Korean version by the NDMI⁴⁶ of the Conjoint Community Resiliency Assessment Measure 10 (CCRAM10) by Cohen et al.⁴⁷ was used. The 10 questions of the CCRAM10, which comprise items related to leadership, group efficiency, risk management, place attachment, and social trust, include the following: The municipal authority (regional council) of my town functions well./There is mutual assistance and concern for others in my town./The relations between various groups in my town are good./I can depend on people in my town to come to my assistance during a crisis. Each question was rated on a 5-point Likert scale, ranging from "Strongly disagree = 1" to "Strongly agree = 5." The range of total scores was 10 to 50, with higher scores indicating higher levels of community resilience. The reliability of the CCRAM10 in this study was Cronbach's $\alpha = 0.936$.

Moderating variable: Perception of government relief services

The study used 14 subitems from the NDMI to measure the perception of government relief services; these subitems are related to the adequacy, satisfaction, and appropriateness of the allocation of government relief services.⁴⁶ Of the 14 questions included in this study, some examples were as follows: Do you think the post-disaster support for psychological counseling on the national level was adequate?/Do you feel generally satisfied with the current relief services?/Do you think the allocation of financial aid and assistance to disaster-affected people was fair? Each question was rated on a 5-point Likert scale, ranging from "Strongly disagree = 1" to

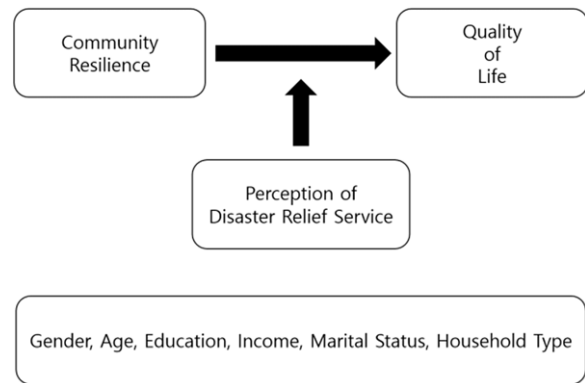


Figure 1. The research model.

"Strongly agree = 5." Two of the questions were reverse coded for rating purposes. Higher scores indicate higher levels of perception of government relief services. The reliability of the NDMI index in this study was Cronbach's $\alpha = 0.889$.

Control variables

The control variables in this study were those reported to impact disaster-affected people's quality of life. As studies have shown that demographic characteristics affect disaster-affected people's quality of life,^{6,20} age, gender, education, income, marital status, and household type were used as control variables in this study. Their subcategories included male (1) and female (0) for gender; 19–39 (1), 40–59 (2), and ≥ 60 (3) for age (in years); pre-elementary school (1), elementary school (2), middle school (3), high school (4), and college or university, or above (5) for education; < 200 (1), 200–399 (2), 400–599 (3), 600–799 (4), and ≥ 800 (5) for monthly income (in million KRW); has a spouse (1) and no spouse (0: unmarried, separated, divorced, or bereaved) for marital status; and single-person (1) and multi-person (0) for household type.

Statistical Analysis

The PROCESS Macro v.4.0 of SPSS v.25 was used for the statistical analysis. First, a frequency analysis like the number of cases and percentage was performed to analyze participants' demographic characteristics. Second, descriptive statistics were obtained, and a correlation analysis was performed to identify the characteristics of the main variables and to check for multicollinearity across variables. Third, Model 1 of the PROCESS Macro, as suggested by Hayes,⁴⁸ was employed to determine the moderating effects of the perception of government relief services on the association between community resilience and quality of life of disaster-affected people. The dependent and moderating variables as the interaction terms were applied to the analysis after mean centering. Finally, a graph was drawn to present the moderating effects of the perception of government relief services. Figure 1 presents the study model.

Results

General Characteristics of Participants

Table 1 outlines participants' general characteristics. In total, 57.9% of the participants were female and 42.1% were male. Regarding age, 49.9% were ≥ 60 years, 34.9% were within 40–59 years, and 15.2% were within 19–39 years. Furthermore, 36.7%

Table 1. Participants' general characteristics

Category	Subcategory	Frequency (N)	Percentage (%)
Gender	Male	440	42.1
	Female	606	57.9
Age (years)	19–39	159	15.2
	40–59	365	34.9
	≥ 60	522	49.9
Education	Pre-elementary school	103	9.8
	Elementary school	162	15.5
	Middle school	168	16.1
	High school	384	36.7
	College/university or above	229	21.9
Income (million KRW)	< 200	365	34.9
	200–399	468	44.7
	400–599	161	15.4
	600–799	36	3.4
	≥ 800	16	1.5
Marital status	Have a spouse	718	68.6
	No spouse (unmarried, separation, divorced, or bereaved)	328	31.4
Household type	Single-person	122	11.7
	Multi-person	924	88.3
Total		1046	100.0

were high school graduates, and more than half of participants earned < 4 million KRW. Finally, 68.8% had a spouse, and 88.3% lived in multi-person households.

Descriptive Statistics of Main Variables and Correlations

Table 2 presents the descriptive statistics of the main variables and correlations. First, the mean scores (standard deviation) of community resilience, perception of government relief services, and quality of life were 3.05 (0.67), 2.74 (0.60), and 2.99 (0.57), respectively. Second, no problem was found in normality, as skewness and kurtosis did not exceed the absolute values at 3 (0.341) and 8 (0.251), respectively.⁴⁹ Finally, the correlation coefficients across the main variables were less than 0.8, which indicated the lack of multicollinearity. Furthermore, the variance inflation factor ranged between 1.075 and 1.925, and the Durbin–Watson value was 1.406, close to 2, which confirmed the suitability for regression analysis.

Reinforcement Effects of the Perception of Government Relief Services on the Association Between Community Resilience and Quality of Life

Table 3 presents the results of examining the reinforcement effects of the perception of government relief services on the association between community resilience and quality of life. The explanatory power of the model in this study was 26.7% ($F = 41.948, P < 0.000$), whereas the variation of explanatory power ($\Delta R^2 = 0.0356$) with the addition of the interaction terms, including community resilience and perception of government relief services, was also significant ($F = 50.356, P < 0.000$). Community resilience as the independent variable showed positive effects on disaster-affected people's quality of life ($B = 0.190, P < 0.001$). Hence, an increase in disaster-affected people's community resilience indicated an increase in quality of life.

Table 2. Descriptive statistics of main variables and correlations (N = 1046)

Variable	Age	Education	Income	Community resilience	Awareness of government relief services	Quality of life
Age	1					
Education	-0.591***	1				
Income	-0.328***	0.379***	1			
Community resilience	0.087***	-0.155***	0.136***	1		
Awareness of government relief services	0.039	-0.104***	0.125***	0.589***	1	
Quality of life	-0.240***	0.310***	0.333***	0.255***	0.222***	1
Mean				3.05	2.74	2.99
SD				0.67	0.60	0.57
Skewness				-0.091	0.341	0.076
Kurtosis				0.097	0.251	0.170

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$; SD, standard deviation.

Table 3. Factors influencing the quality of life of disaster victims (N = 1046)

Category		B	SE	t
Constant term		2.520	0.107	23.470***
Independent variable	Community resilience (A)	0.190	0.028	6.715***
Moderating variable	Perception of government relief services (B)	0.065	0.032	2.071*
Interaction term	A × B	0.208	0.030	7.096***
Control variable	Gender (ref. female)	0.045	0.032	1.397
	Age	-0.071	0.029	-2.484*
	Income	0.104	0.020	5.306***
	Education	0.096	0.016	5.924***
	Household type (ref. single-person household)	-0.002	0.057	-0.040
	Marital status (ref. no spouse)	0.054	0.041	1.310
Model fit	R ² = 0.267,	F = 41.948***	ΔR ² = 0.0356,	F = 50.356***

B, coefficients; SE, standard error; * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Likewise, perception of government relief services showed positive effects on quality of life of disaster-affected people ($B = 0.065$, $P < 0.05$). This could be interpreted as the positive perception of government relief services, leading to enhanced quality of life. Finally, the effect of the interactions between community resilience and perception of government relief services on quality of life of disaster-affected people was significant ($B = 0.208$, $P < 0.001$), verifying the moderating effects of the perception of government relief services on the association between community resilience and quality of life. Thus, disaster-affected people's positive perception of government relief services reinforced the effects of community resilience on their quality of life. Regarding the control variables, age ($B = -0.071$, $P < 0.05$), income ($B = 0.104$, $P < 0.001$), and education ($B = 0.096$, $P < 0.001$) showed significant effects on disaster-affected people's quality of life. The younger disaster-affected people with a higher monthly income and higher education level displayed a higher level of quality of life.

Figure 2 shows the moderating effects of the perception of government relief services on the effect of community resilience on quality of life. The graph in Figure 2 indicates the effect of community resilience on quality of life for 3 cases: the moderating effects of the perception of government relief services being 1 standard deviation (SD) lower than the mean (the lower group), equal to the mean (mean centering score = 0, the middle group), and 1 SD higher than the mean (the upper group). When the level of perception of government relief services was categorized into upper, middle, and lower ranges, all groups exhibited an improvement in quality of life as community resilience increased, albeit with varying degrees of increase. The slope of the middle group was steeper than that of the lower group, and the slope of the upper group was steeper than that of the middle group. This suggests that there was a quicker increase in the impact of community resilience on the quality of life for disaster-affected people when there was an improved perception of government relief services. The change was negligible, as there was a slight and gradual improvement in the favorable perception of government relief services, which was already at a low level.

Discussion

This study verified the association between community resilience and quality of life of disaster-affected people in South Korea and the relevant moderating effects of the perception of government relief

services. The main findings and discussion are provided in the following.

First, community resilience was significantly correlated with the quality of life of disaster-affected people. This aligns with studies reporting the direct or indirect effect of community resilience of disaster-affected people on recovery.^{50–52} According to Kim and Oh,²³ community resilience had significantly greater effects on the alleviation of PTSD than individual resilience. This confirmed that, in addition to resilience on the individual level, that on the community level is critical to enhancing quality of life—promoting complete recovery from the negative effects of a disaster experience, ranging from physical damage to psychological and emotional consequences such as fear and anxiety.

Second, the perception of government relief services moderated the association between community resilience and quality of life of disaster-affected people. A more positive perception of government relief services reinforced the positive correlation between disaster-affected people's community resilience and quality of life. This indicates the importance of disaster-affected people's perception of the central or regional government's responsibilities and duties toward disaster relief services and provision thereof. Increased positive perception of the outcome of public services provided by the regional government increased local residents' subjective happiness^{53–55} and satisfaction with life varied according to the region threatened by situations such as a war as well as coping resources and resilience.⁵⁶

To improve the quality of life for disaster-affected people, a communication platform is needed to strengthen the social network and enhance community resilience. However, community resilience does not increase through short-term effects alone. Thus, a collaborative system involving both public and private sectors should be established to support local organizational projects and resources. For example, organizing community events, festivals, and local club activities can encourage community residents to enhance cohesion, perception, and trust.

Furthermore, specialized support is necessary for disaster damage and community organization after a disaster, to reduce conflicts among community members and neighboring communities, as well as improve communication. An example of such support is the Community Support Center in Kobe-city, Japan. The center actively provides support, intervention, and collaboration as part of post-disaster community reconstruction projects. This includes forming communities to promote interactions among residents and activities to address social structural issues.⁵⁷ Similarly, in South Korea, the liaison

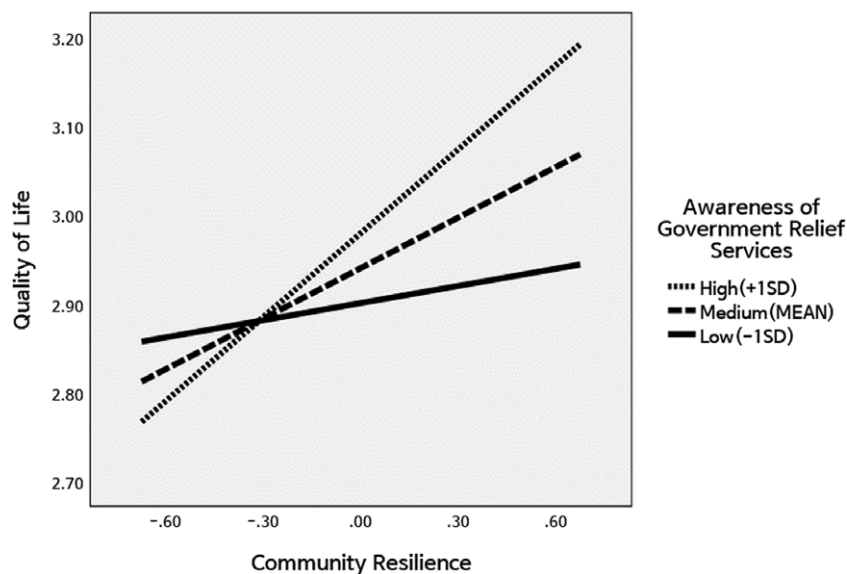


Figure 2. Moderating effects of the perception of government relief services on the association between community resilience and quality of life of disaster-affected people.

system to oversee various activities and projects for community resilience for local residents of a disaster area should be reinforced, especially considering the recent increase in disasters in regional units and scales. Community welfare centers, which have the potential to solve problems in the community,⁵⁸ and regional organizational projects for community advancement could be more actively utilized in disaster relief efforts. Additionally, the establishment of welfare networks could also play a significant role in addressing disaster damage.

Official relief services should consider the multidimensional perspectives of disaster-affected people as service users. In South Korea, the Ministry of Public Safety and Security was established after the Ferry Disaster (April 16, 2014) to manage national disasters. This highlights the short-term nature of government-level political interests and institutions in relation to disasters.⁵⁹ Hence, disaster damage services primarily focus on addressing the psychological and emotional difficulties of the affected people on an individual level, with a service provider-centered approach.^{34,35,54,60,61} In order to develop and implement relevant policies, it is important to adequately consider the opinions and needs of disaster-affected people, as well as thoroughly analyze the regional characteristics of the disaster area, the characteristics of the disaster itself, and the affected communities. To achieve this, it is necessary to establish mutual trust between all relevant stakeholders in disaster management through effective and timely communication. Additionally, continuous monitoring is needed to proactively respond to disaster-affected people's needs for relief services in a user-oriented way.

This study also found that quality of life improved as education and income levels increased, supporting previous studies.^{62–64} This suggests that individuals' socioeconomic status, including education and income, is a significant predictor of quality of life. Therefore, future interventions should recognize that individuals with lower socioeconomic status are more vulnerable and prioritize their recovery from a disaster experience.

Policy Implications

This study is significant because it extended the research on disaster-affected people's recovery beyond psychological and

emotional aspects like resilience on an individual level and PTSD. Instead, it investigated the quality of life of disaster-affected people, thereby providing empirical evidence for the importance of community resilience among those who have faced a disaster together. Additionally, the study explored the concept of disaster relief services and examined the moderating effects they had on the recovery of disaster-affected people. Specifically, it looked at the perceptions of disaster-affected people regarding government relief services in order to derive more efficient and realistic practical and political implications.

Limitations

This study has several limitations. First, as it was cross-sectional, it could not examine time-dependent changes in the quality of life of disaster-affected people based on community resilience and perception of government relief services over a period of time. In addition, the scope of disaster exposure could not be perfectly controlled for, as the data included individuals exposed to a disaster at different time points. Nevertheless, a cross-sectional analysis of secondary data was conducted. Second, the study's analyses could not consider all potentially influencing factors of community resilience and quality of life, such as the individual level and pattern of damage and the duration of residence of a given region. Third, in this study, analysis was not conducted by disaster types, and there was a high proportion of the older adult age group in the sample. More comprehensive discussions can be conducted in future follow-up studies if the disasters and age groups are classified and the differences are examined.

Conclusions

The occurrence of various forms of disasters has increased worldwide, particularly in South Korea. These disasters deteriorate people's lives, affect their physical and psychological health, and lead to property damage for affected people. They also pose challenges to post-disaster life. For disaster-affected people's recovery, the concepts of resilience and government responsibilities and duties—relief services—have been emphasized. This

study examined the protective effect of community resilience on disaster-affected people's quality of life and identified the moderating effects of their perception of government relief services. The results emphasized the need to develop collaborative support systems, both public and private, to enhance the recovery and quality of life for individuals and communities. Additionally, a multidimensional approach to disaster relief services should be considered, taking into account the perspectives of the affected people.

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Author contribution. H-JP and YS designed the research and performed the analysis. SBL wrote the manuscript. All authors have read and approved the final manuscript.

Competing interests. The authors declare they have no conflicts of interest.

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