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The effect of community-based crisis management on the resilience to disasters with the mediating role of social capital

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ABSTRACT

BACKGROUND AND OBJECTIVES: In recent years, the occurrence of natural disasters, including floods, earthquakes, storms, and the like, has increasingly resulted in severe concerns in Iran as such disasters were unfortunate, causing human and financial losses, especially in disaster-prone areas like the south of Kerman province. Thus, it is critical to focus on innovative Community-based Crisis Management approaches. The present research aims to study the effect of community-based crisis management on the resilience to disasters with the role of social capital in the south of Kerman province. Although much research has been conducted in this area in recent years, no study can be found that has simultaneously measured these three variables and from the citizens' perspective, which is the innovation of this paper.

METHODS: Research data were collected using a questionnaire; thus, the research questionnaire was distributed among many citizens in the south of Kerman province. Research findings were analyzed through using LISREL.

FINDINGS: The results showed that the community-based crisis management variable with an impact factor of 0.37 has a positive and significant effect on citizens' resilience. Social capital also plays a mediating role in the relationship between community-based crisis management and resilience, while having a positive and significant effect on citizens' resilience.

CONCLUSION: The research findings help policymakers, managers, and crisis management experts deliver effective programs to reduce vulnerability and enhance citizen resilience of south of Kerman province against natural disasters.

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INTRODUCTION

One of the dangers that have constantly threatened the lives of human societies over the centuries is the occurrence of disasters that may cause irreversible damages to multiple aspects of human life, including social, environmental, and residential areas, in case of lack of awareness and unpreparedness (Pourahmad *et al*., 2019). Crises are of critical human concern, which is more pronounced in developing countries due to disasters intensity (Ziervogel *et al*., 2017). It is expected that disasters and their consequences will affect around 800 million people worldwide in the next twenty years, causing abundant death and economic losses (Soltani *et al*., 2016). Like other developing countries, Iran is currently facing many issues. Iran is ranked among the top 10 countries in terms of unexpected events, with 34 of 40 natural disasters identified globally with around 90-95% climatic origin. Due to climatic and tectonic conditions in Iran, the most critical natural disasters are earthquakes, landslides, avalanches, floods, droughts, hurricanes, lightning, extreme cold and heat, desertification, hail, and freezing (Sarvar and kashani, 2016). With only 1% of the global population, Iran accounted for 6% of natural disaster casualties. It underwent around 14 earthquakes (within the range of 6.2-7.7 R) over the last 50 years (the most recent of which has occurred in Fin, Hormozgan province). Meanwhile, Iran's vulnerability to the earthquake is almost a thousand times larger than an earthquake-prone country like Japan (Moeinian *et al*., 2019). Although such occurrences are unpredictable cannot be predicted long before, careful planning and appropriate policies for participatory approaches and citizen empowerment could diminish disaster damages as much as possible (Ali *et al*., 2019). In many cases, the damages caused by secondary accidents were much larger than the accident itself (Moeinian *et al*., 2019). However, natural disasters are often beyond human control; the damages and injuries caused can be restrained. Hence, Iran is dealing with one of the significant challenges of decreasing natural disaster losses and damages through citizen resilience and empowerment (Fazeli Kebriya *et al*., 2021). From the crisis management perspective, the local community structure and decentralized and participatory decision-making through social groups associated with cooperation and mutual trust may result in logical disaster responses and decreased vulnerability (Neal and Philips, 1995). Despite the importance of the community-based approach and the variables mentioned above, the traditional top-down approach is still considered the dominant crisis management method in Iran (Mohebati Zohan *et al*., 2020). In addition to intensified secondary injuries, it also heightens citizen vulnerability to natural disasters (Ricciardelli *et al*., 2018). Community-based disaster management aims to enhance public knowledge (awareness) and preparedness in disaster-prone areas. The significance of local community participation lies in the fact that people know their place of residence and its opportunities and threats much better than any other outsider (Ali *et al*., 2019). According to Karimi and Taghilou (2020), the community-based approach overcomes the top-down approach shortcomings, which failed to address local needs due to neglect of local resources and potentials. It tends to decrease public vulnerability, reform planning, and crisis management. In addition, Hosseini *et al* (2017) considered inadequate attention to the nature of reduced or increased risk, low community resilience, neglecting social capital, and improper educational programs are of some community-based approach challenges in Iran. The community-based approach essentially relies on citizen empowerment through participation (Mohebati Zohan *et al*., 2020). Participation refers to the presence of people attending at all processes, including policymaking, planning, decision-making, and implementation (Jahangiri *et al*., 2013). Moreover, public participation significantly contributes to decreased vulnerability and enhanced resilience (Cutter *et al*., 2008). On the other hand, recent studies aimed at finding the relationship between resilience and social capital during natural disasters showed interesting results. Malekan *et al* (2020) investigated the relationship between social capital and drought resilience in rural areas of Kangavar. Research data were analyzed using SPSS and AMOS and revealed a significant positive correlation between resilience and intra-group, relational, and organizational social capital. Savari and Abdeshahi (2019) focused on studying the effect of social capital in improved drought resilience of rural households. The results demonstrated a significant positive relationship between rural household resilience and social capital. Moreover, structural equation modeling also revealed that social capital could explain resilience at 0.81. Arvin

et al (2018) also conducted another study and found a significant relationship between social capital and resilience-focused risk management. Accordingly, Delilah Roque *et al.* (2020) also concluded that social capital facilitates efforts to recover and enhance resilience through shared values, expand the social network, and more contributions. Although many studies have been so far conducted on resilience and social capital at natural disasters, no research has yet analyzed the relationship between community-based crisis management and the two variables in Iran. If crisis management authorities in Iran seek appropriate prospective policies focused on local people empowerment, it seems necessary to consider community-based crisis management, citizen resilience, and social capital. The present research originality lies in the fact that the first research studies the relationship among these three critical variables. By sharing the research results with research findings of other similar developing countries, the present research may decrease natural disaster vulnerability in communities. In response to community concerns to destructive natural disasters, the present research studies the relationship among three variables using structural equation modeling through LISREL. In this regard, a research survey was carried out among citizens of the south of Kerman province in 2021. Fig. 1 illustrates the research conceptual model.

According to the research experimental and theoretical foundations, research hypotheses are as follows:

H1: Community-based crisis management positively affects citizens' resilience in the south of Kerman province.

H2: Social capital positively affects the citizens' resilience in the south of Kerman province.

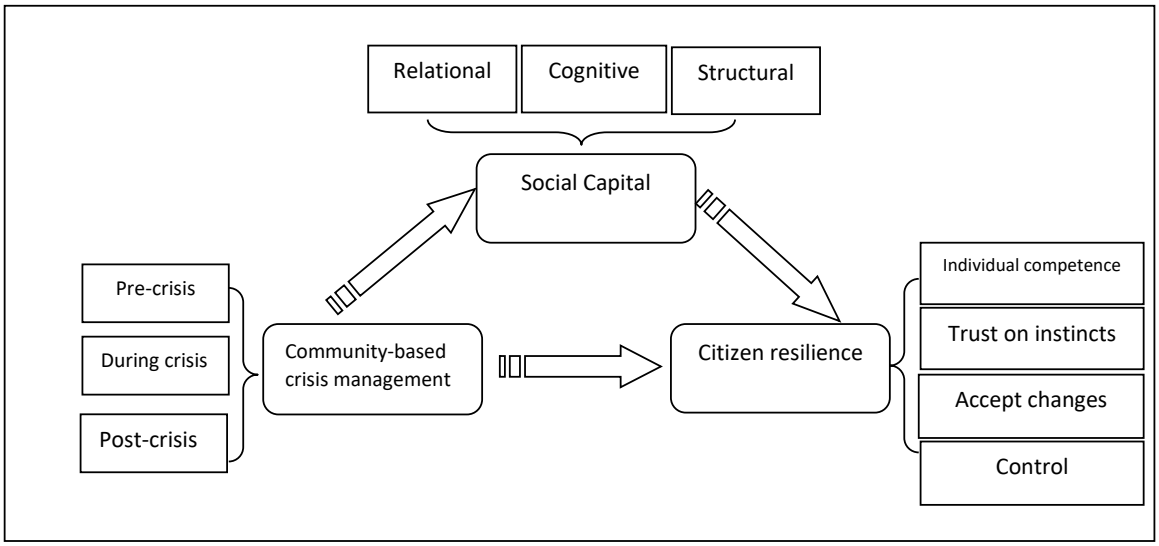
H3: Community-based crisis management positively affects citizens' social capital in the south of Kerman province.

H4: Social capital positively mediates the relationship between community-based crisis management and citizens' resilience in the south of Kerman province.

MATERIALS AND METHODS

Research method In the present study, according to the applied purpose and based on the implementation method, is a descriptive-survey based on structural equation modeling that has been done in the south of Kerman province.. The south of Kerman is extended about 50000 square km consisting of Jiroft, Anbarabad, Kahnooj, Menoojan, Rudbar, Faryab, and Ghale Ganj cities (Fig. 2). The understudied area's diverse climate results from the location topography and geography (Sharifi *et al*., 2019). According to the latest census 2016, the population in the centers of the southern cities of Kerman province was 444141. The area is prone to

Fig. 1: Research conceptual model



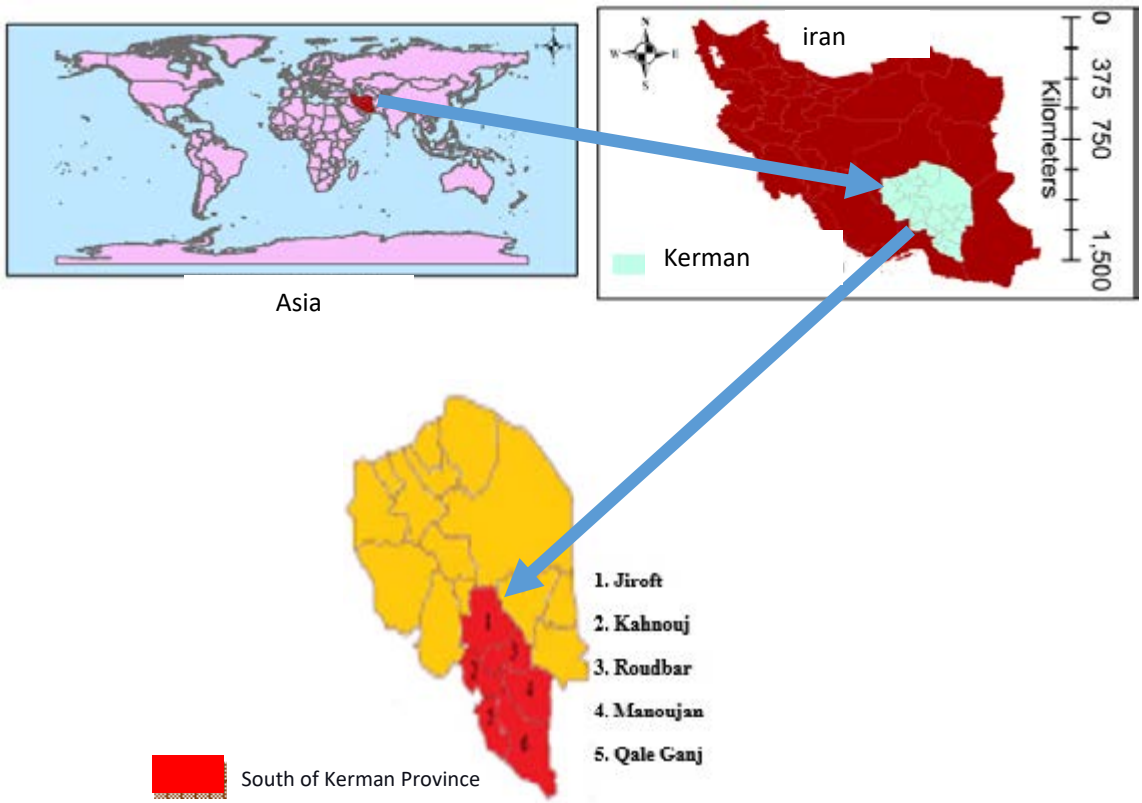


Fig. 2. Location of the study area

earthquakes due to the Sabzawaran fault, a fault zone separated into eastern and western Sabzewaran. The latter extends around 100 km in the west of Kahnooj to the south of Jiroft. The interaction of western Sabzewaran and Jiroft faults has caused a tectonic depression in the north of Kahnooj. As one of the most critical southern cities of Kerman province, Jiroft, with an area of around 9653 km2, accounts for 5.3% of the total area of Kerman province. It is surrounded by Kerman city from the north, Faryab, and Kahnooj in the south. Also, it is located in the east of Bam and the west of Baft, Arzuiyeh, and Rabor. Jiroft is situated in the vast plain of Halil River on the southern outskirts of the Jebal Barez mountain chain and Delfard. It has a warm climate with hot summers when the temperature reaches 50°.Anbarabad is another city located 257 km from Kerman province. It is situated northwest of Jiroft, south of Kahnooj and Rudbar-e Jonubi County, and east of Bam and Rigan County. With an area of nearly 4699 km2, Anbarabad is equal to 6.2% of the province's total area. With an area of 2190 square kilometers, Kahnooj is located southwest of Kerman, accounting for 2.1% of the total area. It is situated north of Jiroft and east of Rudbar-e Jonubi County. The city is surrounded by Faryab city from northwest to the west, Qaleh Ganj in the southeast, Rudan County, Hormozgan Province in the southwest, and Manujan County in the south. Manujan County is also located north of Kahnooj, west and southwest of Rudan County, east of Qaleh Ganj, south of Minab in Hormozgan province. It is situated in a hot, humid, and vast plain 400 km southwest of Kerman, 155 km of south Jiroft, and 130 km of east Bandar-e' Abbās. Another southern city of Kerman is Rudbar-e Jonubi County, located northwest of Rigan County, northeast of Anbarabad, west of Kahnooj, and east of Dalgan County in Sistan and Baluchestan province. It is also surrounded by Qaleh Ganj in the south. Rudbar-e Jonubi County lies 230 km away from the capital of Kerman province with an

Table 1: Questionnaire validity and reliability factors

Variable	Components	Convergent Validity	Fornell and Larcker Convergent Validity	Cronbach's alpha	Compositional reliability
Community-based crisis management	Pre-crisis	0.574	0.757	0.823	0.842
	During crisis	0.637	0.798	0.721	0.838
	Post-crisis	0.548	0.740	0.780	0.824
Resilience	Individual competence	0.501	0.707	0.864	0.853
	Trust on individual instincts	0.571	0.757	0.891	0.901
	Accept changes	0.583	0.763	0.783	0.873
	Control	0.516	0.718	0.904	0.860
Social Capital	Cognitive	0.563	0.750	0.835	0.857
	Relational	0.528	0.726	0.856	0.923
	Structural	0.554	0.744	0.820	0.893

area of 6864 square kilometers. Faryab is surrounded by Jiroft from north to the northeast, Arzuiyeh in the northwest, Hajiabad in the west, Rudan County in the south, and Kahnooj in the east. Finally, the southernmost city of Kerman province is Qaleh Ganj, with 10438 square kilometers. It is located 400 km from the province capital in the north of Kahnooj and Rudbar-e Jonubi County, south of Bandar-e-Jask in Hormozgan Province, and Fanuj in Sistan and Baluchestan province. Qaleh Ganj is also situated east of Hamun-e Jaz Murian (inland basin) and west of Manujan County. Furthermore, the northern Gook faults, southern Gelatohi fault, and Jiroft and Sardouei faults have constantly threatened Ghale Ganj. On the other side, with a mean rainfall of 173 mm, the southern areas are suffering from drought and annual economic losses as an arid and semi-arid region. Precipitation dispersion and thunderstorms have also caused seasonal floods. Studies reveal that flood-prone areas are almost located south of Kerman province at low altitudes containing south Roudbar, Ghale Ganj, and some parts of Anbarabad.

Research samples were 384 selected through simple random sampling method by Cochran formula (0.05). Data were collected through the library and filed study methods, and the conceptual research model was obtained by investigating national and international papers and scientific books. The conceptual research model was validated using the field studying method through three questionnaires. The first researcher-made questionnaire was designed to measure the community-based crisis management variable before (awareness and education, theoretical participation, cultural-social capital, intellectual capital), during (practical participation, public emotional management, communication), and post-crisis (social participation, mass media, collective memories, identity creation) in a 5-point Likert Scale (Very Low, Low, Moderate, High, Very High). Citizens' resilience was measured using the Connor-Davidson Resilience Scale (2003), which is a 25-item Likert scale from zero (totally unacceptable) to five (always acceptable), assessing resilience (individual competence, trust in instincts, accepting positive change, and control). Nahapiet and Ghoshal's (1998) inventory was used to evaluate the social capital variable. It consists of 28 items assessing structural, cognitive, and relational dimensions of social capital variable in a 5-point Likert Scale (Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree). Face and content validity, and construct validity were verified by experts and confirmatory factor analysis, respectively. Cronbach's alpha measured the reliability of research instrumentations, and further, compositional reliability of the latent variables was also obtained. Given that AVE>0.5 examines the correlation between construct and its measurements, results of research questionnaires' validity and reliability (Table 1) display that the AVE value was larger than 0.5 for all variables of community-based crisis management, resilience, and social capital inventories. In addition, Cronbach's alpha and compositional reliability were also obtained larger than 0.7 verifying the research questionnaires'

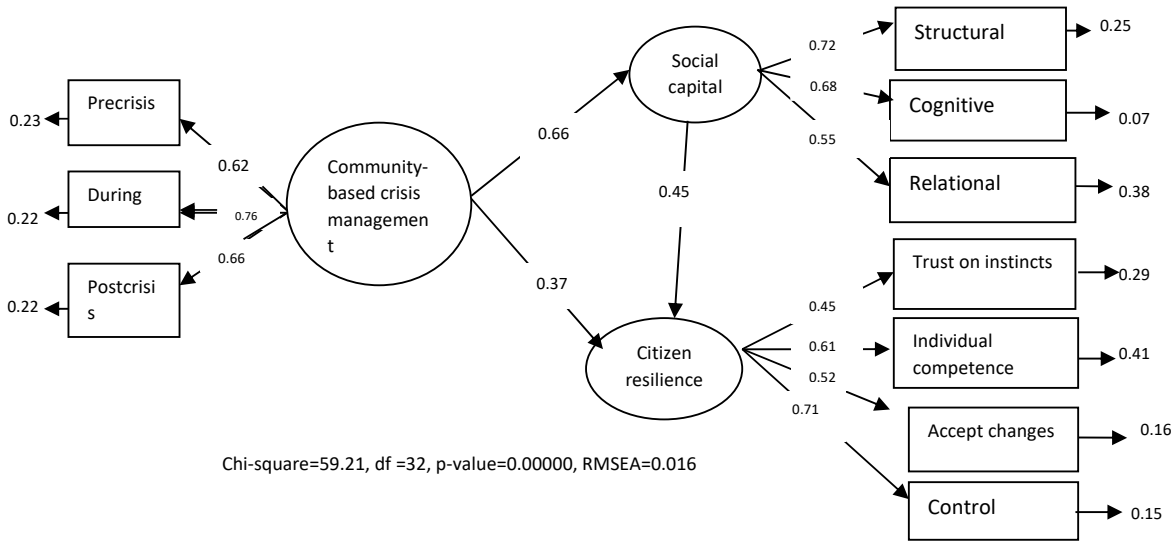


Fig 3: Structural model for standard coefficents

validity. Research data were analyzed using structural equation modeling through LISREL.

RESULTS AND DISCUSSION

Factor Analysis

The structural equation model was run in two steps through LISREL. First, to verify the model reliability, validity, and confirmatory factor analysis, the model was measured. Then, the structural model was studied to investigate the relationships between research variables. Fig. 3 represents confirmatory factor analysis output for standard coefficients. The standard estimate shows factor loading. The more prominent factor loading closer to 1 means the component can explain the latent variable better. The negligible relationship is disregarded for the factor loading of less than 0.3. 0.3-0.6 is an acceptable factor loading range; further, factor loadings larger than 0.6 are desired. As shown in Fig. 3, the factor loading of all items was obtained larger than 0.3. Thus, the items can adequately explain the understudied variable.

Model Fit

The goodness of fit is a technique to calculate how well a theoretical model fits an experimental one. For structural equation modeling and partial least squares, the goodness of fit is obtained by multiple indexes. The research model index of fit is reported in Table 2. Normal Fir Index (NFI), also referred to as *Bentler and Bonett fit index,* was firstly investigated; values larger than 0.8 are acceptable, indicating goodness of fit. As the estimated value was 0.91, it could be stated that the model goodness of fit is accepted. Traditionally, Goodness of feet Index (GFI) was also used for measuring the goodness of fit (acceptable range is within 0.9 and above). Since the obtained value equals 0.94, so the model goodness of fit is verified. Adjusted goodness of fit index (AGFI), equivalent to the mean squares instead of sum squares in the GFI numerator and denominator, was analyzed. According to the accepted range of ≥ 0.90, the estimated 0.92 confirms the fitness of the model. Bentler also provided an accepted Comparative Fit Index (CFI) > 0.90; thus, the obtained 0.95 indicates the goodness of fit. IFI is another comparative fit index within the accepted range of > 0.90; therefore, the measured value of 0.93 presenting in Table 2 shows the goodness of fit. As Chi-square is an inappropriate index for structural equation modeling, the standard Chi-square test was used, which estimates free parameters by simply dividing Chi-square by degree of freedom. A value less than two is desired, and values less than five can be accepted without loss of generality. According to the obtained value of 1.247, it can be stated that the model is accepted for this index. Root Mean Square Error of Approximation

Table 2: Research model index of fit

The measured value	Acceptable range	Index
0.91	Larger than 0.80	**NFI**
0.95	Larger than 0.90	**CFI**
0.93	Larger than 0.90	**IFI**
1.247	1-5	**X^2/df**
0.001	0.008	**RMSEA**
0.94	Larger than 0.90	**GFI**
0.92	Close to 1	**AGFI**

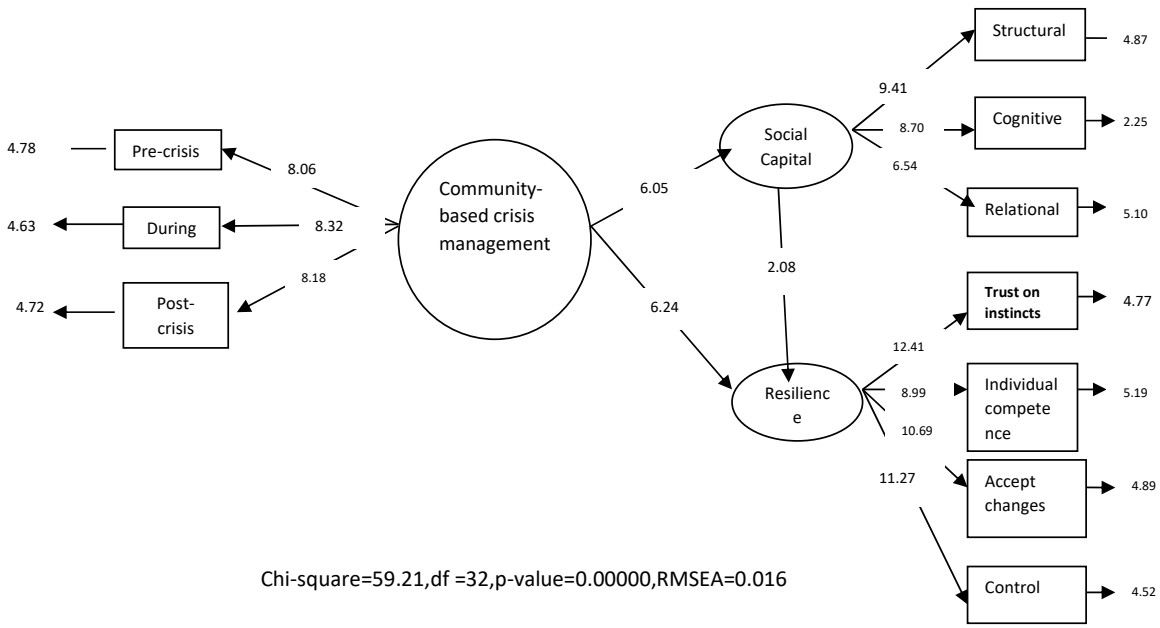


Fig 4: Significant research model

(RMSEA) is also used for checking goodness of fit, where if the value is less than 0.05, the goodness of fit is accepted; while, the model is moderately fit within 0.0 and 0.08. The obtained value of 0.01 demonstrates the acceptable goodness of fit for this index. In general, by assessing all fitness indices, the model goodness of fit is verified.

Research hypotheses test

The casual relationship between research variables was evaluated using t and p. Given the significance level of 0.05, the t value must be larger than 1.96. Smaller values uncover insignificant parameters. Moreover, the p-value of less than 0.01 also reveals significance at 0.99. Fig 4 shows the research model for significance coefficients. Research hypotheses tests and structural modeling results are presented in Table 3.

According to the first research hypothesis and β=0.37, the more pronounced community-based components during the crisis, the higher natural disaster citizen resilience (Prasad Parajuli and Shakya, 2019; Cox and Hamlen, 2015; Qin,2020; Khair *et al*., 2021). Hosseini *et al.* (2017) pointed out that providing citizen empowerment opportunities may potentially enhance public risk compatibility and harmful consequences. Involving them in planning, organizing, policy-making, coordination, and controlling may decrease losses and damages. Meier *et al.* (2021) recently in a similar study examined the empowerment of citizens to improve their resilience to floods and stated that if citizens are

Table 3: Research hypotheses test results

Hypotheses	Independent variable	Dependent variable	Coefficient of determination	Beta	Significance
H1: Community-based crisis management affects citizens' resilience.	**Community-based crisis management** Prior crisis During crisis Post crisis	**Resilience**	0.51	0.37 0.63 0.39 0.51	P<0.001
H2: Social capital affects citizens' resilience.	**Social capital** Structural Cognitive Relational	**Resilience**	0.32	0.49 0.33 0.39 0.47	P<0.001
H3: Community-based crisis management affects social capital.	**Community-based crisis management** Before crisis Within crisis Post crisis	**Social capital**	0.46	0.66 0.57 0.33 0.48	P<0.001
H4: Social capital mediates the relation between community-based crisis management and resilience.	Resilience <social capital < community-based crisis management		0.36	0.32	P<0.001

empowered, their resilience to disasters will increase. Moreover, Norris and Stevens (2007) also view public resilience as a significant community-based issue. They believe that resilience plays a critical role in lessening injuries. The research second hypothesis was confirmed at β=0.49.The hypothesis shows the effect of social capital on citizen resilience (Aldrich, 2010; Poortinga, 2012; Bianca, 2018; Lee, 2020; Ritchie And Gill, 2018(.This is consistent also with the findings of Fazeli Kebriya *et al.* (2021), studying the relationship between social capital and employee resistance to natural disasters like earthquakes. They claimed that it is critically important to address social capital as a particular capital distinguished from other capitals, including trust, cooperation, partnership, and dependence. Social capital leads to cohesion, strong motivation for success, honesty, respect, and mutual trust. More social capital may result in higher consensus, cooperation, meritocracy, resilience, calm, and increased confidence during catastrophes. In addition, Malekan *et al.* (2020) also declared that people react differently to crises; some show higher disaster resilience. They proposed that resources and capital on social networks are distinguishing factors as disaster consequences are related to the community structure. Any shortcomings and weaknesses in the social capital may disrupt the social order. The research third hypothesis was confirmed at β=0.66. This hypothesis demonstrates that community-based crisis management influenced citizen social capital in the south of Kerman province(Musavengane and Simatele, 2016; Koh and Cadigan, 2008). Motahari (2016) indicated a significant relationship between social capital in the local community and crisis management components. The local people tending to participate in risk reduction programs is positively related to the level of participation and social and kinship relations status. Wagner *et al.* (2008) stated that one of the ways to increase participation and cooperation among citizens is to pay attention to the components of social capital such as mutual trust, cooperation, interaction and attention to relationship networks. Juita *et al.* (2019) also believed that social capital is a common feature of crisis-resistant societies and moving towards a community-oriented approach with emphasis on the participation of indigenous citizens of the region leads to greater solidarity and cooperation. The research fourth hypothesis indicates that social capital plays a mediating role in the relationship between community-based crisis management and resilience. The hypothesis was confirmed at β=0.32. Risk reduction goes much beyond

engineering and structural measures, and addressing social dimensions is treated as one of the most critical natural disaster risk management links. The idea of social capital focused on resilience significantly contributes to the decreased posttraumatic stress disorder (Arvin *et al*., 2018; Savari and Abdeshahi, 2019; Delilah Roque *et al*., 2020; Murphy,2007; Jia *et al*, 2020; Morsut *et al*., 2021). A community where its citizens enjoy a greater sense of commitment, mutual trust, respect, and cooperation, would be more resilient and undergo less vulnerability. On the other side, social capital may enhance community-based crisis management components and increase public willingness toward participation, which in turn would lead people to prioritize public to personal interests in coping with catastrophes. As a result, the public vulnerability would decline.

CONCLUSION

In recent years, the attitudes of natural disasters and dealing with this phenomenon have had many ups and downs. So, the purpose of focusing on the reduced vulnerability has turned into increased resilience to disasters and empowerment of local people. According to the new vision, risk reduction programs must improve public participation and create and enhance resilient community features. Therefore, it is critically important to create and promote resilient communities toward sustained development. In this regard,The present research has been conducted to study the effect of community-based crisis management on citizen resilience to natural disasters with the mediating role of social capital. Great natural catastrophes in the southern areas of Kerman province have caused many challenges and difficulties encouraging scholars to conduct this study. Despite recent measures adopted for citizen preparedness facing a crisis, the conventional top-down approach is still the prevailing method in dealing with misfortunes. Thus, reviewing and revising the conventional approach to the new community-based approach seems necessary to focus on citizen empowerment. The present research investigated the three variables of resilience, social capital, and community-based crisis management. Once research data were analyzed, all research hypotheses were confirmed (Table 3). Natural disaster management requires citizen empowerment through a community-based approach and enhanced resilience to natural disasters through improved social capital components, decreasing vulnerability. Almost all earlier studies have focused mainly on the two variables of resilience and social capital in natural disasters. In contrast, the present research provided more effective findings for less vulnerability relying on the community-based approach since it highlights citizen participation, which reduces the vulnerability. This study provides valuable information for crisis managers and experts. The research findings are expected to serve as an academic reference to understand better the effect of the three variables in dealing with natural disasters. It also supports the aid of crisis managers, practitioners, and politicians to deliver effective plans for decreased vulnerability and improved natural disaster citizen resilience in the south of Kerman province.

Suggestions

Based on the research results, the following recommendations are suggested: Since community-based empowerment is crucial, it is required to adopt necessary measures to remove barriers toward participation. Good participation is a voluntary and accountable one; therefore, macro-educational programs must be included in education. Handing out educational manuals and improving experimental learning beyond theoretical education is critically important, leading to increased resilience among citizens. Give the positive effect of social capital on the citizens' resilience and community-based crisis management; it is recommended to expand close face-to-face relations among neighbors to get together at incidents through local group ceremonies. In addition, local communications and the sense of cooperation and philanthropy can be extended and augmented through raising people's awareness and culture utilizing mass media, brochures, and educating kids to improve resilience finally. Ultimately, it should be pointed out that the present research only studied social capital as the mediation variable; however, there must be many other effective variables. So, it is advised that other mediating variables are also examined.

AUTHOR CONTRIBUTIONS

A.Salehi performed the literature review, analyzed and interpreted the data, prepared the manuscript text. NM. Yaghobi helped with the literature review,

compiled the data and model design. A. Keikha helped in the literature review, methodology review and manuscript edition.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest regarding the publication of this work. In addition, the ethical issues including plagiarism, informed consent, misconduct, data fabrication and, or falsification, double publication and, or submission, and redundancy have been completely witnessed by the authors.

ABBREVIATIONS

AVE	Average Variance Extracted
SEM	Structure equation modeling
P-VALUE	Probability value
NFI	Normal Fir Index
CFI	comparative fit index
GFI	Goodness of fit index
RMSEA	Root Mean Square Error of Approximation
AGFI	Adjusted goodness of fit index (AGFI)
IFI	Incremental Fit Index
X2 /df	Normed Chi-square
R^2	Coefficient of determination
B	Path coefficient

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