

The development of perception scale of gender role in disaster management and the examination with related factors

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Abstract

Purpose – This study aims to develop a perception scale of gender role in disaster management and examine related factors.

Design/methodology/approach – A total of 1,167 individuals were reached in the main trial. Exploratory and confirmatory factor analyses were applied to test the validity of the final scale form, respectively.

Findings – The scale was developed as unidimensional with two positive items and 17 negative items. The mean scores of the participants were in the positive perception group. The 19-item model is a reliable and valid instrument for measuring the perception of gender role specific to disaster management.

Practical implications – Determining the perceptions of the people will guide the policies related to gender equity and equality and activities to be carried out in the disaster management field. This tool can be used to raise awareness related to gender perceptions in the disaster preparedness activities.

Originality/value – The “Perception Scale of Gender Role in Disaster Management” which is a reliable and robust tool to determine the perception of gender role specific to the disaster management was developed in this study. This tool can contribute to address the needs and capacities and provide influential strategy development through gender analysis.

Keywords Disaster management, Gender, Perception, Scale

Paper type Research paper



Abbreviations

AVE = Average variance extracted;
BTS = Bartlett's test of sphericity;
CFA = Confirmatory factor analysis;
DWLS = Diagonally weighted least square;
EFA = Exploratory factor analysis;
KMO = Kaiser-Meyer-Olkin; and
ULS = Unweighted least squares.

Introduction

Disaster management aims to minimize or eliminate possible danger casualties, ensure timely and sufficient assistance to disaster victims and achieve rapid and efficient recovery (Warfield, 2021). The gender perspective is an essential variable to improve the resilience of society in modern disaster management. Furthermore, disaster risk reduction requires to integrate gender-based influences and decisions (Khan *et al.*, 2020).

In the last 20-year period, 7,348 disaster incidents were recorded worldwide (UNDRR&CRED, 2021). Direct economic losses and damage from disasters were estimated at US\$232bn in 2019 (UNDRR, 2020). About four billion people worldwide were affected by disasters between 2000 and 2019, and over 1.2 million people lost their lives (UNDRR&CRED, 2021). However, disasters do not affect people equally. Although men are affected by disasters (Rushton *et al.*, 2021), the most vulnerable groups include women who are pregnant, lactating or live without their spouse; there are also individuals living in households headed only by women (Mahar *et al.*, 2013). Factors such as age, marital status, social class, race/ethnicity, religion and refugee status interact to make the process even more complicated (Ahmad, 2018). After the 2015 Earthquake in Nepal, it was reported that access to humanitarian assistance was much harder for women and people of lower castes than for men and people of higher castes (IASC, 2018).

The risk of disasters is quite high in the geography where Turkey is located. Turkey has officially reported that 32,962 people in Erzincan Earthquake (1939), 18,373 people in Marmara Earthquake (1999) and 644 people in Van Earthquake (2011) died and several people were injured (AFAD, 2014). However, there was no report on how many women were dead or injured and how many of them were girls or boys. It was reported in Van Earthquake (2011), Turkey, women encountered situations that restricted their freedom of life and movement in the tent cities of Van. They hesitated to use the toilets and bathing places or were even prevented. Furthermore, after the Van earthquake, among the people who committed suicide in the area, the rate of women who were subjected to violence was quite high (Okay and Ilkcaracan, 2018).

COVID-19 has several consequences for women on the economic margins in the world. In particular, women and girls who usually earn less, save less and sustain unsafe jobs or live close to poverty experience exacerbated economic impacts. Women's health was typically affected adversely by the reallocation of resources and priorities, including programs related to sexual and reproductive health. Gender-based violence is increasing exponentially in this period. For example, domestic violence incidents have increased in France by 30% since the lockdown on March 17, 2020 (UN, 2020). Furthermore, there is a situation in which domestic violence/intimate partner violence in relation to public health measures such as "safer-at-home" during the COVID-19 pandemic in Turkey (Unal and Gülseren, 2020). There are also some studies examining gender differences in the COVID-19 pandemic risk perception (Rodriguez-Besteiro *et al.*, 2021; Rana *et al.*, 2021; Bronfman *et al.*, 2021). A study from Pakistan showed that women's risk perception and fear were significantly higher than men in COVID-19 pandemic, and coping mechanisms were also notably different (Rana *et al.*, 2021). Moreover, there are some studies on gendered perceptions in multihazard environment (Papagiannaki *et al.*, 2019; Khan *et al.*, 2020; Sullivan-Willey *et al.*, 2017; Lindell and Hwang, 2008). It is important to measure the gender perceptions of individuals living in the society to realize successful gender equality and equity programs. These programs can be achieved by determining and activating the perceptions of people. Although the current literature has established the role of gender in disaster risk reduction (Kanchana *et al.*, 2009; Sohrabzadeh, 2016), the limited studies have been conducted to examine reliable and valid

instruments aimed at measuring gender perception through scale in disaster management (Sohrabizadeh *et al.*, 2020).

This study aims to develop a perception scale of gender role in disaster management and examine associated factors. The scale can be used as a tool to determine a gender analysis about the disaster management of the society as part of a need assessment and evaluate outcomes.

Conceptual framework

Gender is the result of a social construction patterned with power relations along with historical and cultural processes; it is dynamic and variable (Connelly and Barriteau, 2000). Gender mainstreaming has been adopted as a policy at the UN World Conference on Women in Beijing in 1995. The strategy of gender mainstreaming emphasizes that gender equality is a responsibility for everyone involved in an organization (Wittbom, 2015). However, feminist research studies showed that management systems were constructed to support a technocratic male norm (Haynes, 2008; Parker, 2008), which implies problems in implementing gender mainstreaming on gender-equal terms (Wittbom, 2015). Moreover, male-dominated cultures are associated with competitiveness and emotional detachment, which can further serve to undermine women (Broadbridge and Simpson, 2011).

Broadbridge and Simpson (2011) highlighted a number of opportunities and challenges that continue to plague gender in management research studies. One challenge was determined in the study is that current conceptualizations of gender issues have been “solved,” with a tendency toward “gender denial” in understanding of work-based disadvantages (Broadbridge and Simpson, 2011). This paper is based on research which takes an interpretive approach to social constructions with feministic theorizing (Bacchi, 1999) with the aim of revealing what the differences are on the axis of gender identities in disasters.

The first research studies on the intersectionality of disasters and gender were conducted in the 1990s, and these two subjects are still being debated in numerous contexts (Parker, 2008; Fothergill, 1998; Myers, 1994). It is critical to address predisaster preparedness, mitigation efforts, disaster vulnerability and postdisaster recovery efforts from a gender viewpoint (UNISDR, 2009). In the context of disaster risk reduction, gender mainstreaming refers to fostering awareness about gender equity and equality to help reduce the impact of disaster and to incorporate gender analysis in disaster management, risk reduction and sustainable development to decrease vulnerability (Sohrabizadeh *et al.*, 2014). With respect to the risk management, while women are risk averse, men take risks (Maxfield *et al.*, 2010). This risk-taking by gender also applies to disaster conditions (Pincha, 2008). Men lost their lives more often than women due to the gendered division of labor, which accorded men risky places, tools and tasks (Enarson and Meyreles, 2004). A mitch hit Nicaragua and El Salvador showed that more men than women died. The greater risks involved in rescue efforts undertaken by men, combined with their tendency to underestimate situational risks, appear to have contributed to this gap in deaths by sex (Buvinic, 1999).

The majority of the main studies included in the theoretical framework within the scope of this study evaluate natural disasters and experiences of these disasters (Enarson and Meyreles, 2004; Pincha, 2008; Isik *et al.*, 2015). For example, Pincha’s study mostly deals with the post-2004 Indian Ocean tsunami (Pincha, 2008). Four times more women than men died in this devastating tsunami (Pincha, 2008). Furthermore, Enarson also states that natural disasters dominate in studies conducted in this field (Enarson and Meyreles, 2004).

The three important steps are used in this paper as criteria to reveal how the differing dimensions of gender in disasters are determined (Figure 1).

Needs in disasters based on gender do not have a consistent structure; these needs are divided into two categories: practical gender needs and strategic gender needs (Pincha, 2008). Maxine Molyneux and Caroline Moser pioneered the approach to women's practical and strategic requirements in the 1980s. While decision-making power, leadership positions and activities aimed at women's empowerment are addressed through strategic approach, practical approach focuses on providing basic living conditions such as water, childcare and health services, as well as creating livelihood opportunities (Pincha, 2008). Despite the fact that practical needs to improve women's lives, they have little impact on gender inequality. Changes in power and control relations, on the other hand, are a part of strategic demands (Ciampi *et al.*, 2011). Programs based on skills-training alone are not enough (Pincha, 2008).

There are important activities in disaster management. These activities should be carried out with a gender-based task-sharing perspective (Pincha, 2008). Traditional gender-based division of household responsibilities typically assigns this task to women (Pincha, 2008). Women in male-dominated communities with traditions-based rules are frequently unable to walk outside the home without permission from the head of the household, and they are unable to shift from their own private spaces to social life. As a result, mothers are socially obligated to stay at home with their children, even during disasters, putting them at risk. These circumstances are comparable to those seen in Turkey and other parts of the world (Isik *et al.*, 2015). Women's participation in rescue teams, men's participation in childcare teams, programs in which women are encouraged to use bicycles and gain swimming skills are very critical in terms of promoting gender equality in disaster management. For example, a bicycle would make a girl more mobile and help her education by allowing her to go longer distances to better schools. It would boost her self-esteem and give her more authority. These programs help to create acceptable environments for equal opportunity (Pincha, 2008).

"Think manager-think male" research of Schein showed that most people tend to associate the characteristics of a leader with the characteristics of a male (Schein, 2007). On the other hand, the feminization of management refers to a shift in management style "from control to commitment" (Lawler, 1988). This management style can provide an increase in the promotion of females into management (Rhee and Sigler, 2015). The presence of women in top management teams can improve an organization's success (Burke and Collins, 2001). Rudman and Kilianski (2000) carried out a study to examine attitudes toward female authority to determine the reason for negative perceptions of female leaders. The study showed that prejudice against female authority may be due more to associations linking men to power and influence than to role or trait expectancies (Rudman and Kilianski, 2000).

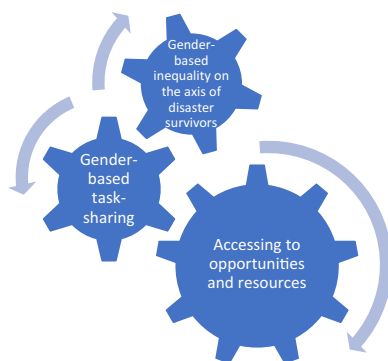


Figure 1. Three steps based on gender in disaster management (created by authors)

According to Pincha, the concept of gender essentially pertains to power relations between men and women (Pincha, 2008). Improving women's participation in leadership roles is important to enhance the rights, freedoms and opportunities of all women globally (Schein, 2007). It is important to access resources and opportunities in the pre-disaster and post-disaster processes (Pincha, 2008). Women cannot participate sufficiently in plans and scenarios because of their gender (Isik *et al.*, 2015). The exclusion of women from decision-making processes, especially in developing countries, has caused higher female victimization in disasters (Enarson and Meyreles, 2004). Although women's participation has not yet reached the levels expected by nongovernmental organizations (NGOs) in Turkey, there has been a significant growth in the number of women participating, especially in disaster-prevention NGOs following the 1999 Marmara earthquakes. It is the result of a realization of women's importance during earthquakes (Isik *et al.*, 2015).

Human behaviors and actions are driven by their perceptions (Lindell and Hwang, 2008). Risk perception has become an important component of disaster risk reduction (Rana *et al.*, 2020). It predicts whether vulnerable groups will take precautionary measures against external dangers. The rationalist and constructivist paradigms are the most common approaches to understanding risk perception (Birkholz *et al.*, 2014). Risk perception is viewed as an individual's mental construct to evaluate the advantages and costs of any decision under the rationalist approach. On the other hand, constructivism approach includes social construction/amplification theory of risk and cultural theory (Rana *et al.*, 2020). Although these approaches have some disadvantages, they help conceptual understanding of risk perception (Wachinger *et al.*, 2010). In Turkey, a review of literature revealed that there is a paucity of published papers that examines the risk perception of gender role on disaster management and its related factors. Measuring gender perception is difficult in quantitative and large-scale survey research. This measurement is important to determine to what degree an individual conforms to societally proscribed roles (Kasabian, 2015).

Public risk perception is very important consideration when developing policies and management strategies for dealing with disasters (Burns, 2007). While risk assessment will undoubtedly be used to guide the management of extreme events, the development of policy is a political enterprise that includes decisions such as recognizing the differences between public perceptions of danger and technical risk estimations (Slovic and Weber, 2002). Furthermore, determining of people's perception risk provides important clues about how people are likely to respond to different types of hazards and effective risk communication (Taylor Gooby and Zinn, 2006). In disaster management, risk perception studies enable managers to predict public response, gain a better knowledge of risk attitudes, avoid conflicts during emergency circumstances and build risk communication (Jóhannesdóttir and Gísladóttir, 2010). Knowing how people perceive the risks they face can affect the efficiency of risk management activities (Prabhakar *et al.*, 2009). A study showed that people's protective response is strongly related to their perceptions of risk before taking action and that emergency warnings play a key role in these perceptions (Mileti and Peek, 2000). In this study, gender perception toward disasters refers to individuals' judgments against gender-based impacts in disasters.

Women and men differ in their perceptions of risk. Women and men are exposed to different risks, perceive risks differently and handle risks in different ways (Gustafsd, 1998). While women are more oriented toward home and family, mainly perceiving risks as threats to their family and other people with whom they had close relations and to their home (e.g. fire), men's concerns are to a higher degree related to their working life, e.g. risks of unemployment and economic problems (Gustafsd, 1998). Approaches for explaining

gender differences in risk perceptions and attitudes focus on biological factors, socialization and social experience, knowledge and sociopolitical factors (Slovic, 1999). Gender differences in risk-taking are found to persist among different cultures as well (Zinkhan and Karande, 2002). Uncovering the gender differences in the relationships between risk perception and human behavior is important for designing more effective and efficient risk management policies (Zhang *et al.*, 2014).

Methods

Study group

The study was conducted in Turkey. A convenience sampling method was used to recruit participants. This scale can be applied to all individuals who are older than 18 and literate. During the development of the scale, 164 individuals were reached for pretrial. In the main trial, 1,167 individuals were reached. Both applications were made online. Table 1 provides descriptive statistics of the main study group.

A larger proportion of respondents were females (53.8%) and 81.7% of participants were between 18–40 years of age (28.58 ± 10.72). Approximately 33% of respondents were

Characteristics	<i>n</i>	(%)
<i>Gender</i>		
Female	628	53.8
Male	539	46.2
<i>Age</i>		
18–25 years	657	56.3
26–40 years	297	25.4
>40 years	213	18.3
	Mean \pm SD = 28.58 \pm 10.72	
<i>Marital status</i>		
Married	785	67.3
Single	381	32.6
<i>Level of education</i>		
<Bachelor's degree	592	50.7
Bachelor's degree	531	45.5
>Bachelor's degree	43	3.8
<i>Level of income</i>		
Low	148	12.7
Medium	704	60.3
High	314	26.9
<i>Disaster experience</i>		
Yes	708	76.7
No	458	75.1
<i>Disaster training status</i>		
Yes	593	77.8
No	574	74.3
<i>Gender education status</i>		
Yes	238	78.4
No	929	75.5

Table 1.
Descriptive characteristics of the study group (N = 1,167)

currently married and 53.4% of participants had a degree higher than a bachelor's. Most levels of income were medium with a percentage level of 60.3%. Participants with disaster experience, disaster training and gender education were 76.7%, 77.8% and 78.4%, respectively (Table 1).

Procedure

Administration: The scale was administered between January and February 2020. The inclusion criterion for this study was to be a volunteer to participate in the study. The study was carried out online due to the COVID-19. A convenience sampling method was used to recruit participants. The interviewers comprised university graduates. All interviewers were trained and informed about the methods of gathering data in the fields, ethical considerations and communication. A guideline was prepared for questionnaire codes and coding response items. Both in the initial trial and main trial, participants were asked to choose one of the five categories for each item in the scale: "Strongly disagree," "Disagree," "Neutral," "Agree" and "Strongly agree." There are two weeks between the main trial and the pretrial.

Initial Item Pool Generation/Criteria for selection of items: First, to develop the "Perception Scale of Gender Role in Disaster Management," an extensive literature review was conducted to assess many scales on gender role attitude and perception and studies about gender roles in disaster management. Gendered norms were questioned according to the three steps in the conceptual framework of this study to mainstream gender. For example, "it is not appropriate for women to participate in search and rescue activities" item was created to determine the perceptions gender-based task sharing. "girls may drop out of school due to increased domestic responsibilities after a disaster" item was created to determine the perceptions gender-based inequality on the axis of disaster survivors. Items were prioritized according to these steps. Then, relevant and possible 37 items were identified assessing the perception of gender role in disaster management in line with this important literature. To assess the degree to which the items were regarding and representative of perception of gender role in disaster management [i.e. content validity (Haynes *et al.*, 1995)], our scale instructions and generated item pool were sent to three experts from disaster management. These experts were involved in the field of public health. Expert panel reviewers rated the relevance of each assessment question item on a two-point scale ranging from 1 (Not Relevant) to 2 (Relevant). In addition to rating each item, the expert panel reviewers were asked to provide any recommendations for additional items and to suggest clarifications for current items (Rossiter, 2011). The experts confirmed that the majority of items included content as intended. According to informal written feedback from them, three items were deleted and some items were revised.

Ethics

Ethical approval was also taken from the Ethical Committee of Çanakkale Onsekiz Mart University (E-84026528-050.01.04-2100009130). All participants were informed about the purpose of the study with a written consent form before starting the survey. Those who agreed to participate in the survey started by accepting this written consent form. Furthermore, they were also instructed that withdrawal from the study was optional at any time.

Data analysis

The results of this study were analyzed in two stages. The first stage consists of scale development analysis. In the second stage, the association of valid and reliable scale with independent variables were examined.

For scale development. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are a common method used for scale development, including reliability tests and validity tests. EFA should be followed by CFA using a different sample (or samples) to evaluate the EFA-informed a priori theory about the measure's factor-structure and psychometric properties (Cabrera-Nguyen, 2010). After the initial trial, EFA and CFA were applied to test the validity of the final scale form, respectively. For the main trial, the data set were divided into half, one of them set to find the factor structure by conducting EFA, the other data set to confirm it by conducting CFA.

To determine whether the items were reasonable, the following criteria were used in the factor analysis process:

- The Kaiser–Meyer–Olkin test (KMO) must be over 0.70, and the Barlett's Test of Sphericity (BTS) test results must be sound and meaningful for good factor analysis (Cokluk *et al.*, 2010).
- The first measures we consider relate to each separate item, including the item-to-total correlation (the correlation of the item to the summated scale score) and the interitem correlation (the correlation among items). Rules of thumb suggest that the item-to-total correlations exceed 0.40 and that the interitem correlations exceed 0.30 (Hair *et al.*, 2019).
- Factor loadings reflect the importance of the item to the extracted common factor, and the value cannot be less than 0.3. When a variable is found to have more than one significant loading, it is termed a cross-loading. In this case, the impact of one loading compared to another, the differences in variance rather than just the difference in loadings should be than 0.10 (Hair *et al.*, 2019).
- The Cronbach's α coefficient value is an index used to assess the internal consistency of the entire scale in reliability analysis. The generally agreed-upon lower limit for Cronbach's α is 0.70, although it may decrease to 0.60 in exploratory research (Hair *et al.*, 2019).

For determining the number of factors, Velicer's MAP test and parallel analysis is carried out. EFA has been conducted with unweighted least squares estimation method and promin rotation at Factor 10 program (Ferrando and Lorenzo-Seva, 2017). CFA was conducted with the retained 19 items for a three-factor model with diagonally weighted least square (DWLS) estimation method at LISREL. LISREL is a proprietary statistical software program used in multivariate analyses including structural equation modeling for manifest and latent variables (Joreskog *et al.*, 2016). DWLS has been recommended for estimating CFA model parameters with categorical variables (Muthén, 2010). Convergent and divergent validity were also checked. Convergent validity was evaluated according to composite reliability (CR) > 0.70 and average variance extracted (AVE) > 0.50 (Fornell and Larcker, 1981). Divergent validity criteria:

- if the correlation coefficient of two dimensions is less than the individual Cronbach α reliability coefficient (Gaski and Nevin, 1985); and
- if the correlation coefficient of two dimensions is smaller than the square root of AVE, then these two dimensions have divergent validity.

The scale development process was summarized in Figure 2.

Analysis of the scale with independent variables. Positive items were coded as 1: Strongly disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly agree, while negative items were coded as the opposite. Total score from the scale ranges from 19 to 95 (fully negative perception:

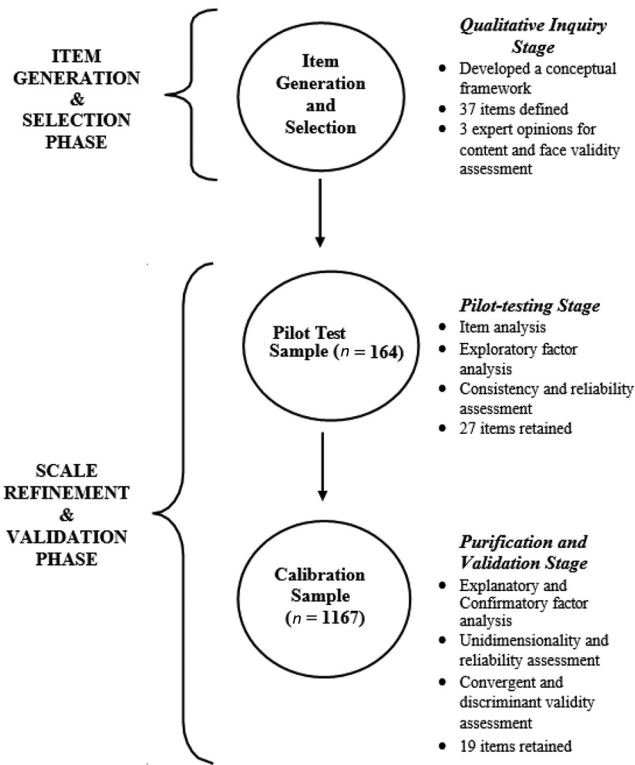


Figure 2.
Scale development process (created by authors)

19–34; negative perception: 35–49; neutral: 50–64; positive perception: 65–79; fully positive perception: 80–95) (Table 2). Whether the “Perception of Gender Role Scale in Disaster Management” scores changed according to gender, marital status, disaster experience [1], disaster training status [2] and gender education status [3] was examined by an independent sample *t*-test. The normality of the total score of the scale was evaluated by examining the kurtosis and skewness coefficients, and it was observed that these coefficients remained between ± 1.5 . If the kurtosis and skewness coefficients are within the limit of ± 1.5 , it is accepted that the distribution of the data set is normally distributed (Pituch and Stevens, 2016). The homogeneity of variance was checked by the Levene test. The effect of the independent variable on the dependent variable was assessed with the eta-squared (η^2) statistic for the results of the difference between the group averages found significant at the

Type of perception	Score range
Fully negative perception	19–34
Negative perception	35–49
Neutral	50–64
Positive perception	65–79
Fully positive perception	80–95

Table 2.
Type of perception according to score range on the scale

0.05 alpha level. η^2 reflects the amount of total variance in the dependent variable that is predictable from knowledge of the levels of the independent variable. Cohen (1988) has presented some guidelines for small ($\eta^2 = 0.01$), medium ($\eta^2 = 0.09$) and large ($\eta^2 = 0.25$) effects. These guidelines apply to experiments and social/clinical areas of psychology; larger values could be expected for nonexperimental research, sociology and the more physiological aspects of psychology (Tabachnick and Fidell, 2013).

Results

The results of the scale development

A total of 34 items were applied to 164 individuals for the initial trial to ascertain the rating of item category and clarity of the items. It was observed in the total item correlations that seven items were below 0.40; the rest was varied from 0.45 to 0.62. After removing these items, 27 items were retained for final form evaluation. Then the data set ($n = 1,167$) from the main trial were divided into half and EFA was firstly conducted to one half. In this study, the coefficient of KMO was calculated as 0.97. BTS was also calculated as 1,755.7 ($df = 406$, $p < 0.001$). Therefore, the hypothesis “correlation matrix is equal unit matrix” was rejected. This rejection showed that the correlation between the variables was different from 1 and the factor analysis was appropriate for the variables. Velicer’s MAP test and parallel analysis advised three dimensions. Table 3 summarizes factor loadings with prominent estimation and item to total correlation.

According to EFA results, factor loadings of five items (m_1 , m_2 , m_3 , m_{13} and m_{16}) had below 0.30, and three items had high loadings (m_4 , m_{21} and m_{23}), which the difference was below 0.10 at different dimensions (Table 3). After removing those eight items, a CFA was conducted for the three-factor model.

According to CFA results, it is seen that the goodness of fit indices of the three-factor model are generally above the acceptable limits, and the factor loadings are ≥ 0.53 ; it may be accepted that the model fitted the data (Table 4). Then convergent and divergent validity were tested (Table 5).

CR was varied from 0.83 to 0.93, and AVE was ranged from 0.49 to 0.59 for the three-factor model (Table 5). Thus, that is adequate for convergent validity. However, the Cronbach α reliabilities (0.69–0.85) and the square root of the AVE (0.70–0.77) were lower than the correlation coefficient of two dimensions (0.80–0.83), it was considered to lack of discriminant validity. Then another CFA was conducted for the single factor model because the dimensions/factors were not separated enough.

In Table 4, it is seen that the goodness of fit indices of the single factor model were generally above the acceptable limits, and the factor loadings were ≥ 0.54 ; it may be accepted that the model fitted the data. At the same time, since the fit indices of the three-factor model were not much superior to the single-factor model, it was concluded that the single-factor model was more fitted to this data. Cronbach reliability was also calculated as 0.90 for the single-factor model. The path diagram of the single factor model is shown in Figure 3. As a result, the “Perception of Gender role in Disaster Management Scale” was developed as unidimensional with two positive items and 17 negative items (Appendix).

Results of independent sample t-tests

Table 6 provides the results of the *t*-test for gender, marital status, disaster experience, disaster training status and gender education status on the “Perception Scale of Gender Role in Disaster Management” mean scores.

The mean scores of the participants in all groups were above 70 points; therefore, they were in the positive perception group. The *t*-test revealed that gender made significant

GM
37,7

846

Table 3.
Factor loadings and
item to total
correlations from
EFA

Item	F1	F2	F3	Item to total correlation
m1	–	–	–	0.00
m2	–	–	–	0.05
m3	–	–	–	0.19
m4		0.59	0.66	0.41
m5			0.82	0.55
m6			0.89	0.59
m7			0.74	0.58
m8			0.77	0.54
m9			0.75	0.48
m10		0.60		0.47
m11	0.81			0.59
m12	0.83			0.56
m13	–	–	–	0.25
m14	0.59			0.40
m15			0.62	0.44
m16	–	–	–	–0.20
m17			0.66	0.57
m18		0.85		0.57
m19	0.68			0.51
m20	0.55			0.43
m21		0.32	0.32	0.42
m22		0.77		0.54
m23	0.34	0.32		–0.17
m24		0.77		0.56
m25		0.82		0.55
m26			0.80	0.58
m27			0.84	0.58

Note: Factor loadings <0.30

Table 4.
Fit statistics and
range of factor
loadings the models

Goodness of fit indices	Criterion*	Three-factor model	Single-factor model
X^2/sd	<5 Moderate <3 Good	1,192.6/149 = 8.00	1,342.3/152 = 8.83
CFI	>0.90	0.95	0.95
NNFI	>0.90	0.95	0.94
GFI	>0.90	0.96	0.96
AGFI	>0.90	0.94	0.94
RMSEA	<0.08	0.11	0.11
Factor loadings	>0.30	0.53–0.86	0.54–0.79

Notes: *Çokluk, Şekercioglu and Büyüköztürk²²

differences in mean scores of the scale ($t = 7.38$; $p < 0.05$). Females' mean score (78.24) was higher than males' (73.54), and gender explained a small proportion of the total variance in the scale scores ($\eta^2 = 0.04$). Married participants' perceptions (77.98) were significantly higher than single ones (72.14), and this independent variable explained a small proportion of the total variance in the scale scores ($\eta^2 = 0.06$). The participants who had disaster experience (76.71) were significantly different from those who had no disaster experience

(75.10), and this independent variable explained a small proportion of the total variance in the scale scores ($\eta^2 = 0.01$). Individuals with disaster training (77.79) significantly assigned a heavier weight to the scale score than individuals without disaster training (74.29), and this independent variable explained a small proportion of the total variance in the scale scores ($\eta^2 = 0.03$). Individuals with gender education (78.39) were significantly different from individuals without gender education (75.47), and this independent variable explained a small proportion of the total variance in the scale scores ($\eta^2 = 0.01$) (Table 6).

Discussion

Valid and reliable tools are needed to achieve motivation and awareness in disaster management. The “Perception Scale of Gender Role in Disaster Management,” which is a reliable and robust tool to determine the perception of gender role-specific to the disaster management process, was developed in this study. This valid and reliable tool facilitates gender-mainstreaming in all policies and practices of disaster risk reduction and promotes gender equity in disaster management.

A pretrial was made to identify unrelated or lowest related items to the total initial item pool after recommendations from the experts. Then, the remaining 27 items were applied in the main trial. EFA and CFA were conducted with data set from the main trial, respectively. EFA results supported a three-dimensional structure. Three dimensions as the “accessing to opportunities and resources” dimension, the “gender-based task-sharing” dimension and the “gender-based inequality on the axis of disaster survivors” dimension were attempted to create as a tool. However, the dimensions were not separated satisfactorily according to the convergent and divergent analyses from CFA results. The data fitted the single factor model adequately according to results from CFA. After all, a reliable and valid perception scale of gender role in disaster management was developed as unidimensional with 19 items. The results are encouraging in terms of scale generalizability. The 19-items scale proposed in this study was found to have a high degree of reliability and validity. We are convinced of the fact that this scale can be generalized to disaster management field. However, it would be useful to further assess the generalizability of this scale developed in this study to other nations’ disaster field and the adoption of the scale in other nations since relationship gender and disaster management mean different themes and perspectives in different cultures. Some scale items may not be culturally appropriate. Any research that uses culturally validated measures gains greater credibility (Menon and Praharaj, 2019). It may be necessary to “translate” the tool using a defined protocol (e.g. the World Health Organization forward-translation and back-translation method) (WHO, 2016). The scale is required to be examined for the psychometric properties of the translated or adapted scales before they can be used in other nations’ research studies, specifically during cross-cultural studies (Menon and Praharaj, 2019).

Table 5. Cronbach α , CR, AVE, square root of AVE (in italics) and correlations between factors of the three-factor model (off-diagonal)

Factor	No of items	Alpha	CR	AVE	F1	F2	F3
F1	5	0.69	0.83	0.49	<i>0.70</i>		
F2	5	0.76	0.87	0.58	0.85	<i>0.76</i>	
F3	9	0.85	0.93	0.59	0.79	0.83	<i>0.77</i>

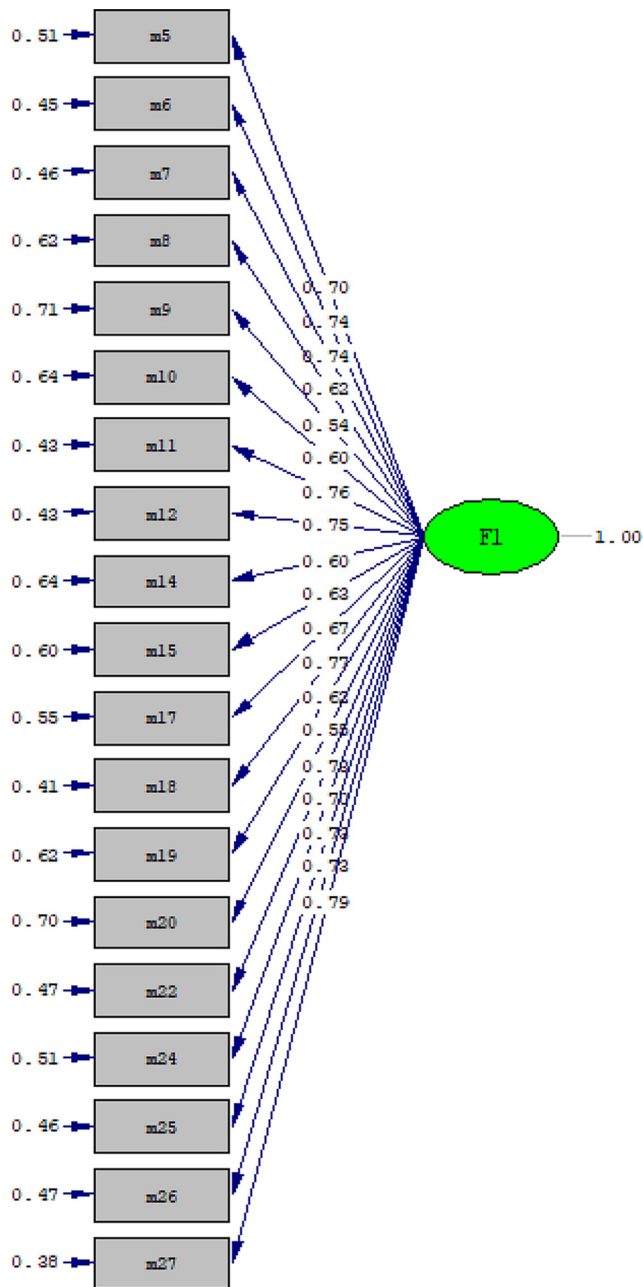


Figure 3.
Path diagram of
single factor model
for perception scale of
gender role on
disaster management

Variable	Level	<i>N</i>	Mean	SD	<i>t</i>	df	<i>p</i>	η^2
Gender	Female	628	78.24	11.06	7.38	1165.00	<0.00*	0.04
	Male	539	73.54	10.60				
Marital Status	Married	785	77.98	10.36	8.70	1164.00	<0.00*	0.06
	Single	381	72.14	11.54				
Disaster experience	Yes	708	76.71	10.98	2.43	1164.00	0.02*	0.01
	No	458	75.10	11.23				
Disaster training status	Yes	593	77.79	10.04	5.45	1122.14	<0.00*	0.03
	No	574	74.29	11.84				
Gender education status	Yes	238	78.39	10.17	3.64	1165.00	<0.00*	0.01
	No	929	75.47	11.25				

Note: *0.05

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Table 6.
Results of independent sample *t*-tests

There are gaps in knowledge about gendered analytical tools to gender analysis in disaster management (Sohrabizadeh *et al.*, 2014). There are some gender analysis checklists in disaster management; however, there is a lack of reliable and valid tool development about these checklists (Sohrabizadeh *et al.*, 2014). However, the gender questions included in the study are specific to the one-to-one disaster management process. This study makes significant contributions to the assessment of gender-specific problems and perceptions related to disasters. One of the items of the scale, “The fact that women take part in administrative units in case of disaster affects their work negatively” helps to determine whether the leadership perceptions of individuals for women are positive or negative. Women are traditionally considered not only as caretakers and nurturers, and so as caring and giving in the positive sense but also as soft and weak in the negative sense (Rhee and Sigler, 2015). On the other hand, male leaders are frequently depicted with male archetypes such as decisive, strong and magnificent (Binns and Kerfoot, 2011). Unfortunately, this perception is valid for disaster management situations (Pincha, 2008). This scale is a scale that can be responded by adults. Besides, one of the important gender-related topics in disasters is the issue of temporary shelter (Pincha, 2008). However, it was more appropriate to ask items regarding temporary shelter to people working in the disaster field. A wider scale that can be applied to people working in the disaster field can be developed by adding items related to temporary accommodation. This study will provide important clues for scales that can be applied to special groups such as people working in the disaster area.

While the interaction between a hazard and the characteristics that make individuals and places vulnerable and exposed is commonly recognized as disaster risk (UNDRR, 2022), risk perception indicates risk acceptability and, to a degree, forecasts community reactions, which contributes in the development of appropriate public education programs and risk communication approaches (Diakakis *et al.*, 2018). Risk perception is also a key factor in determining social vulnerability and community resilience (Birkholz *et al.*, 2014). This study revealed variables such as gender, marital status, disaster experience, disaster training status and gender education status associated with the perception scale. Likewise, a study determining gender differences in the COVID-19 pandemic risk perception, psychology and behaviors of Spanish university students showed that females presented a higher perception of danger to the COVID-19 virus than males (Rodriguez-Besteiro *et al.*, 2021). Furthermore, a study examining hydrogeological and climatological risks perception in a multi-hazard environment showed that males presented lower risk perception and higher coping appraisals. A lack of authority and control may be responsible for this heightened

perception of risk. A larger study would help to provide more differentiation among the independent variables in the future. It is worth noting that the gender perception of the participants was quite high in this study. However, when the mean scores of the participants are examined, it is not possible to say that the participants of the study had a gendered perspective. Therefore, these significant but small differences between all groups were thought to be due to sample size.

Participants in all groups were in a positive perception group determined within the scope of the study. It is interesting that although Turkey is one of the male-dominant societies (Isik *et al.*, 2015), this study showed that participants had not to negative gender perspective on disasters (all group averages of the participants were above 70 points). No study evaluating gender perceptions regarding disasters in Turkey was found. Therefore, much larger studies are needed to evaluate related factors with the scale.

Turkey experiences a high rate of disasters (Inal and Erbaydar, 2016). Marmara earthquakes have started motivating the gender-based scientific evaluations of earthquakes in Turkey (Isik *et al.*, 2015). Society is one of the most important stakeholders in disaster management (Van Niekerk *et al.*, 2018). Determining the perceptions of the people on this issue will guide the policies related to gender equity and equality and activities to be carried out in the disaster management field. This tool can be used to raise awareness related to gender perceptions in the disaster preparedness activities process.

This study has several limitations. Participants were limited to people living in Turkey. The scale should need to be adapted for other countries. The study was carried out online due to the COVID-19 pandemic. Furthermore, convenient sampling was carried out as such, and the results should be carefully interpreted for associated variables. The term of the disaster was used in a generalized form in the scale; evaluations according to a specific disaster type (earthquake, flood, etc.) were not presented. However, this scale is a valid and reliable tool evaluating the perception of gender role-specific to disaster management.

Conclusions

In conclusion, the 19 items model is a reliable and valid instrument for measuring perception of gender role-specific to disaster management. Gender, marital status, disaster experience, disaster training status and gender education status were found associated with the scale. It is important to create gender-based disaster management in all countries. This tool can contribute significantly to addressing needs and capacities and provide effective strategy development through gender analysis. This study promotes the scale to develop coping strategies and to reduce the vulnerability in disasters through gender perspective.

Notes

1. It defines past experience with a disaster. The 88.0% of respondents had earthquake experience, 6.0% of them has flood experience and 2.2% of them has fire experience.
2. It refers to the situation of getting information about any type of disaster.
3. It refers to the situation of getting information about gender.

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Perception of Gender Role on Disaster Management Scale (in Turkish)

Please, choose one of the five categories for each expression.

1: Strongly disagree 2:Disagree 3:Neutral 4:Agree 5:Strongly agree

Expression	1	2	3	4	5
1. Afet sırasında, çocuk/çocukların sorumluluğu esas olarak anneye aittir.					
2. Afet sonrasında da çocuk/çocukların sorumluluğu esas olarak anneye aittir.					
3. Afet sonrasında aile üyelerinin bakımından yalnızca kadınlar sorumludur.					
4. Afet sonrasında erkekler kadınlara göre daha güçlü kalmalıdır.					
5. Afet anında erkekler kadınlara göre duygularına daha fazla hakim olmalı, kendilerini koyvermemelidirler .					
6. Deprem sırasında kadınlar da erkekler gibi üzerlerindeki kıyafetle (sadece iç çamaşırı bile olsa) dışarı çıkabilmelidir . *					
7. Afet durumunda kadınların yönetim birimlerinde görev alması çalışmaları olumsuz etkiler .					
8. Kadınların arama kurtarma faaliyetlerine katılması uygun değildir .					
9. Afet öncesi ve sonrası kadınlar afet yönetimi, planlaması ve organizasyonlarında aktif yer almalıdırlar. *					
10. Afetlerde işlerini, mal varlıklarını ve aile üyelerini kaybeden erkekler şiddete başvurabilir.					
11. Afetlerde anneleri zarar gören kız çocukları aile içinde daha fazla sorumluluk üstlenmelidir.					
12. Afet sonrası artan ev içi sorumluluklarından dolayı kız çocukları okuldan ayrılabilirler.					
13. Afet sonrası sunulan çocuk bakım hizmetinde, yalnızca kadınlar görevlendirilmelidir.					
14. Afet sonrası erkeklerin gece nöbeti, enkaz kaldırma ve kurtarma faaliyetlerinde görev yapmaları daha uygundur .					
15. Erkek çocukları, afetlerden sonra ailenin bütçesine katkı sağlamak için okuldan ayrılabilirler.					
16. Afetlerden sonra devletin sağladığı ekonomik desteklerde erkeklerle öncelik verilmelidir.					
17. Afet sonrası psikolojik yardım/destek yalnızca kadınlara verilmelidir.					
18. Deprem sigortası yaptırımının sorumluluğu yalnızca erkeklere aittir.					
19. Deprem çantasını hazırlamanın sorumluluğu yalnızca kadınlara aittir.					

*Positive items, All others are negative items.

(Continued)

Perception of Gender Role on Disaster Management Scale (in English)

Expression	1	2	3	4	5
1. During the disaster , the responsibility of the child/children mainly belongs to the mother.					
2. After the disaster , the responsibility of the child/children mainly belongs to the mother.					
3. After the disaster , only women are responsible for the care of their family members.					
4. After the disaster , men should remain stronger than women.					
5. In times of disaster , men should control their emotions more than women and should not let themselves go.					
6. During an earthquake , women should be able to go out with their clothes (even if only underwear) just like men.*					
7. In case of disaster, women's taking part in administrative units negatively affects the work.					
8. It is not appropriate for women to participate in search and rescue activities.					
9. Women should take an active part in disaster management, planning and organization before and after the disaster. *					
10. Men who lose their jobs, property and family members in disasters may use violence.					
11. Girls whose mothers have been harmed in disasters should take on more responsibilities than boys within the family.					
12. Girls may drop out of school due to increased domestic responsibilities after a disaster					
13. Only women should be assigned to post-disaster child care services.					
14. It is more appropriate for men to work in night watch, debris removal and rescue activities after the disaster.					
15. Boys can leave school after disasters to contribute to the family's budget.					
16. Men should be given priority in economic support provided by the state after disasters.					
17. Post-disaster psychological assistance/support should only be given to women.					
18. Responsibility for taking out earthquake insurance belongs only to men.					
19. Responsibility for preparing the earthquake kit belongs only to women.					

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