Urdu Adaptation and Validation of Cognitive Appraisal Scale for Firefighters

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Abstract
Firefighting is a highly stressful occupation, requiring firefighters to face high-risk situations while protecting lives and property. Understanding their cognitive appraisal of occupational stress is crucial for assessing its impact. This study translated, adapted, and validated the 15-item Cognitive Appraisal Scale (CAS) into Urdu for Pakistani firefighters. Using a standardized forward-backward translation method, Phase I ensured linguistic accuracy. A pilot study with 52 firefighters from nine districts confirmed equivalence (r = .81). Cross-language validation, assessed with a two-day interval between administrations, showed satisfactory results. Phase II evaluated the scale's psychometric properties using EFA and CFA with a sample of 400 firefighters (200 for each). EFA identified a five-factor structure with all 15 items loading above .60. CFA confirmed a good model fit (χ^2 = 136.30, df = 80, p< .00, CFI = .98, GFI = .92, RMSEA = .05, α = .83). In conclusion, the Urdu CAS is a valid, reliable tool for evaluating firefighters' stress appraisal.
Keywords: CAS, Firefighters, Cognitive Appraisal, Adaptation

INTRODUCTION

Stress perception serves as a protective cognitive mechanism, helping individuals manage physical and mental strain while maintaining overall well-being. While moderate stress can be beneficial, excessive stress negatively impacts physical and psychological health. Occupational stress is a global concern that impacts both physical and mental health (Makara, Wajda & Lizinczyk, 2020). Defined by the WHO Network of Collaborating Centers in Occupational Health, it arises when workplace demands exceed an individual's capacity to cope (Quick & Henderson, 2016). In professional settings, occupational stress significantly affects work efficiency (Wang et al., 2014) and has gained increasing attention due to its high costs and impact on both individuals and organizations (Crompton & Lyonette, 2007).

Duxbury and Higgins (2001) classified occupational stressors into organizational (context-related) and operational (content-related) stressors. Organizational stressors, such as management structures and policies, can significantly impact firefighters' cognitive and physiological well-being (Ricciardelli, 2018). The para-militaristic structure of firefighting further adds to stress due to rigid hierarchies (Shane, 2010). In contrast, operational stressors stem from the nature of firefighting itself, involving frequent exposure to potentially traumatic events, including physical attacks, witnessing death, and high-risk activities, all of which can severely affect mental health and overall well-being (Finney et al., 2013). Due to the unique nature of firefighting duties, the current research focuses on firefighters' cognitive appraisal of operation-related occupational stress. Firefighters encounter distinct stressors on the fireground during fire and rescue operations, making it essential to understand how they perceive and evaluate these situations.

Firefighting is an extremely demanding and high-risk profession, exposing firefighters to unique stressors on the fireground (Britton et al., 2013). They operate in life-threatening situations, unpredictable environments, and under intense time pressure during fire and rescue operations (Marcelino & Figueiras, 2007). Frequent exposure to traumatic events, such as fatalities and severe injuries, contributes to occupational (operation-related) stress (Skogstad et al., 2013). Additionally, firefighters face physically and psychologically demanding tasks, including recovering bodies and rescuing victims from fire-involved buildings during fireground operations (Klimley, Van, & Stripling, 2018).

The concept of cognitive appraisal is rooted in Lazarus's (1984) "Transactional Model of Stress and Coping (TMSC)," which highlights the pivotal role of cognitive appraisal in determining whether an individual perceives a stressor as manageable or overwhelming, depending on their available coping resources. This model has been extensively applied across various fields, including human resources, education, healthcare, sports performance, and notably, firefighting (Knol & Brantley, 2021). In the firefighting profession, cognitive appraisal is particularly crucial in shaping how firefighters interpret and respond to operational stressors. Steffen et al., (2012) utilized this model to examine how individual differences in cognitive appraisal impact firefighters' perception of stress and their coping strategies in high-risk environments on the fireground. Understanding this appraisal process is essential for evaluating how firefighters assess threats, challenges, and their coping capacity when facing the extreme demands of fire and rescue operations.

Within Lazarus's TMSC (2000), cognitive evaluation is key in shaping responses to traumatic and physically demanding situations. Influenced by cognitive, motivational, and relational factors, this process determines how individuals assess and react to stress. When external

demands exceed coping abilities, stress arises, emphasizing the need to understand how individuals evaluate and manage such challenges (Lazarus et al., 2001).

The TMSC differentiates between primary and secondary appraisals, with primary appraisal resulting in one of three outcomes: importance, threat, or challenge (Lazarus & Folkman, 1984). Importance appraisal occurs when a stimulus is irrelevant to personal goals and values, making it insignificant in the stress-response process. Threat appraisal arises when a stressor is relevant but perceived as beyond one's coping resources, whereas challenge appraisal occurs when the individual believes they can effectively manage the stressor. These align with distress and eustress—distress occurs when stressors exceed coping capacity, while eustress enhances motivation and performance (Horan et al., 2020). Research links threat appraisals to negative emotions and impaired performance, whereas challenge appraisals are associated with positive emotions, better health, and improved performance (Nicholls, Polman, & Levy, 2012).

After primary appraisal, secondary cognitive appraisal involves assessing available resources and coping options to manage the stressor. Stress becomes more intense when an individual perceives a situation as harmful, threatening, or challenging but feels inadequately equipped to handle it. Coping strategies are then selected based on perceived coping potential. Problem-focused coping, such as active coping and planning, is preferred when the situation can be changed, whereas emotion-focused coping, including distraction and acceptance, is used when the situation is beyond one's control (Carver, Scheier, & Weintraub, 1989; Preudhomme et al., 2022).

Understanding cognitive appraisal mechanisms is essential for evaluating occupational stress, particularly operation-related stress in high-risk professions like firefighting. In such environments, cognitive assessments influence stress perception, coping strategies, and ultimately impact psychological resilience and performance. Firefighters often make critical decisions with limited information and within extremely short timeframes at the fireground, placing even experienced personnel at risk. During stressful situations, individuals initially engage in cognitive appraisal to assess the significance of the stressor, its potential impact on their well-being, and their ability to cope with and control the situation (Lazarus, 2000).

Cognitive appraisal plays a crucial role in determining stress responses. Firefighting is one of the most stressful civilian occupations worldwide, as firefighters regularly encounter traumatic and high-risk scenarios on the fireground. Understanding how they perceive these events—as either challenges or threats—depends on their appraisal of their job, which involves saving lives and protecting property during fire incidents. Currently, no standardized scale has been specifically adapted for firefighters to assess their cognitive appraisal of physically and

psychologically demanding situations in their profession. Therefore, there is a pressing need to translate and adapt the Cognitive Appraisal Scale (CAS) into Urdu for use in firefighter populations. The Lazarus Transactional Model of Stress and Coping, which underpins cognitive appraisal, is particularly relevant as it emphasizes the role of cognition in understanding and explaining stress. Since the CAS is based on this theoretical model, it is the most suitable tool for measuring firefighters' cognitive appraisal of their operation related occupational stress.

The primary objectives of this study are:

1. To translate and adapt the Cognitive Appraisal Scale (CAS) into Urdu for firefighters, ensuring cultural and contextual relevance.
2. To establish the validity and reliability of the Urdu version of CAS, confirming its effectiveness in assessing cognitive appraisal of stress in firefighting contexts.

METHOD

The Cognitive Appraisal Scale (CAS) was translated and contextually adapted into Urdu for firefighters. The psychometric properties of the original English version of CAS are as follows:

Cognitive Appraisal Scale (CAS)

The CAS by Gomes and Teixeira (2013) includes 15 items measuring two main sub-dimensions: primary cognitive appraisal and secondary cognitive appraisal. Primary cognitive appraisal is assessed through three dimensions: (a) work importance (e.g., "*My job means nothing at all to me / means a lot to me*"), (b) threat perception (e.g., "*My job is not at all disturbing to me / is very disturbing to me*"), and (c) challenge perception (e.g., "*My job is not at all exciting to me / is very exciting to me*"). Secondary cognitive appraisal is evaluated with two dimensions: (d) coping potential (e.g., "*To what extent do you think you are prepared to deal and solve the demands of your job?*") and (e) control perception (e.g., "*To what extent do you feel that what happens in your job depends on you?*"). Each item is rated on a 7-point Likert scale (0= *Not at all important*, 3= *More or less*, 6= *Very important*), with higher scores indicating greater appraisal in each dimension. The Cronbach's alpha (α) values for primary appraisal dimensions are .91, .73, and .86, and for secondary appraisal dimensions are .79 and .68 respectively (Gomes & Teixeira, 2013).

The research was conducted in two distinct phases. Phase 1 focused on translation, contextual adaptation to the firefighting setting, and validation within the firefighting population. Phase 2 aimed to establish the psychometric properties of the adapted and translated version specifically for firefighters.

PHASE 1: TRANSLATION AND ADAPTION OF COGNITIVE APPRAISAL SCALE (CAS)

The primary objective of the current research was to adapt, translate, and validate the Urdu version of the Cognitive Appraisal Scale (CAS) by Gomes and Teixeira (2013) for the firefighting population while maintaining cultural and conceptual equivalence. The focus was to ensure that the translated questionnaire was not only linguistically accurate but also functionally equivalent to its English counterpart within the firefighting context. Rather than prioritizing linguistic precision alone, emphasis was placed on achieving cross-cultural and conceptual consistency. To accomplish this, a well-established forward and backward translation method was employed (Brislin, 1976; Nisar et al., 2020). The translation and cross-language validation of the CAS followed six comprehensive steps.

Step 1: Forward Translation

The Cognitive Appraisal Scale (CAS) was translated into Urdu with the assistance of seven experts, selected through purposive sampling. This panel included two Ph.D. scholars in Psychology and four M.Phil. lecturers specializing in English, Urdu, Education, and Sociology. Their role was to ensure that the translation accurately conveyed the original meaning while maintaining conceptual clarity and cultural relevance. Additionally, they were instructed to identify any items that might be culturally inappropriate in the Pakistani context and suggest suitable alternatives.

Step 2: Expert Panel

A meeting with six seasoned experts, including academics, a fire department research officer, firefighter trainers, and professional firefighters, ensured a precise and contextually relevant Urdu translation of the CAS. The researcher also contributed, and consensus was reached on the most accurate translations for the firefighting context. During the translation and adaptation process, modifications such as bracketing adjustments were made to align the scale with the cultural and professional context of firefighting, as recommended by bilingual experts. Since the original English version was developed for different professions and cultural settings, special attention was given to distinguishing key verbs that appeared as synonyms in Urdu. Given that the CAS uses three items to measure each dimension, the Urdu translation of certain verbs initially appeared identical. To ensure differentiation while preserving meaning, extensive discussions were held. Professionals and bilingual translators collaborated to determine the most accurate wording, balancing linguistic precision with contextual relevance. For example, terms such as "*My Job*," "*Exciting*," "*Stimulating*," "*Prepare*," "*Able*," and "*Work Environment*" were translated after thorough consultation. The process involved first examining dictionary definitions and then selecting Urdu words that best captured the intended meaning. Additionally, translations of cognitive appraisal concepts related to job

scenarios, as outlined in the scale instructions, were refined to ensure clarity and applicability for firefighters.

Step 3: Back-translation

The Urdu-translated CAS was reassessed by four independent bilingual translators using the same procedure as the forward translation. The expert panel included an Associate Professor of English/Applied Linguistics, a Psychology Lecturer, a Research Coordinator in HSE, a Research and Safety Officer in Emergency Services, and an English Lecturer. Each expert had over 10 years of experience in teaching and research.

Step 4: Expert panel

The back-translated Urdu version was compared with the original English CAS by the same expert panel involved in the forward translation. The finalized translated items were then arranged in the same order as the original questionnaire to ensure consistency.

Content Validity Ratio (CVR)

Lawshe (1975) developed a method to measure content validity by assessing expert agreement on the essentiality of each item. Experts rate items as "*essential*," "*useful but not essential*," or "*not necessary*." The Content Validity Ratio (CVR) is then calculated using Cohen's (2009) formula, with positive CVR values ranging from .00 to .99.

Table 1

Content Validity Ratio of Urdu Version Items of Cognitive Appraisal Scale (CAS)

Item No.	CVR (Value)
1,2,6,8,9	.80
3,5,7,13,14	.60
4,10,15	.40
11,12	.20

Table 1 displays the Content Validity Ratio (CVR) values for 15 items in the Urdu-translated version of the CAS. The CVR represents the panelists' evaluation of each item as *"essential," "useful but not essential,"* or *"not necessary."* Based on assessments from 10 expert panelists, all items in the translated questionnaire demonstrated a positive CVR. Specifically, five items had a CVR of .80, five items had .60, three items had .40, and two items had .20. As all items in the translated CAS scale exhibit positive CVR values, they fall within the acceptable *"essential"* range of .00 to .99 (Lally & Testa, 2015).

Step 5: Try Out

After completing the content validity process, the Urdu-translated 15-item CAS was finalized for the tryout phase. This step aimed to assess the correlation between the English and Urdu versions. Using purposive sampling, 52 firefighters aged 20 to 60 years (six from each division) were

selected. Research supports that a sample of fewer than 60 participants is adequate for translation tryouts (Akram & Munawar, 2016). To ensure consistency, the English version was administered first, followed by the Urdu version after two days using the same procedure and instructions.

Procedure

For the tryout phase, the firefighters' training center was approached during a refresher training course for experienced firefighters. Verbal permission was obtained from the Registrar of the training academy, and the study's purpose, time requirements, and administration procedures were communicated to the Registrar's office and training instructors. After securing verbal consent from participants, essential instructions were provided. An online questionnaire link was shared, and test administration took place in a group setting. Firefighters rated each item based on personal experience. The English version of the CAS was administered first, with relevant queries noted. After two days, the Urdu version was administered using the same procedure with the same sample. On average, firefighters completed both questionnaires in 8–10 minutes and reported no difficulty in rating the Urdu version.

Table 2

Demographical-Characteristics of Firefighters for Tryout Step (N=52)

Variable	*f*	*%*
Age		
Below 25 years	9	17.30
Above 25 years	43	82.70
Experience		
Below 3 years	17	32.70
Above 3 years	35	67.30
Education		
Intermediate	29	55.80
Graduation or above	23	44.20
District		
Bahawalpur	6	11.50
Gujranwala	6	11.50
Rawalpindi	6	11.50
Dera Ghazi Khan	6	11.50
Lahore	6	11.50
Sahiwal	5	9.60
Faisalabad	6	11.50
Multan	6	11.50
Sargodha	6	9.60

Note: *%* = Percentage, f = Frequency

Table 2 summarizes the demographic distribution of firefighter participants, including age, experience, education, and districts. Most firefighters were above 25 years old (82.70%) and had over three years of experience (67.30%). A majority held an intermediate-level education (55.80%), while 44.20% had a graduate degree or higher. Firefighters from the nine divisions of Punjab were evenly represented in the sample.

Cross Validation

Cross-validation, or rotation estimation, is a statistical method used to evaluate learning procedures by splitting data into training and validation sets (Shujja et al., 2017). To cross-validate both Urdu and English versions of the CAS, inter-item and total correlation analyses were conducted to assess consistency and reliability. The results are presented in Table 4.

Table 3

Correlation and Linguistic Equivalence between English and Urdu version of CAS

Test Administered	*N*	*M*	*SD*	1	2
1. English Version	52	10.36	2.36	-	.81***
2. Urdu Version	52	10.82	2.70		-

Note. **p < .01, ***p < .001, CAS = Cognitive Appraisal Scale

The initial analysis evaluated language similarity and correlation between the Urdu and English versions of CAS as presented in Table 3. The results show a significant correlation (r= .81), indicating strong consistency between both versions.

Table 4

Linguistic Equivalence (item by item) of Urdu and English Version of Cognitive Appraisal Scale (CAS)

Item No.	*R*	*A*
1	.57**	.01
2	.54**	.01
3	.71**	.01
4	.85**	.01
5	.51**	.01
6	.73**	.01
7	.65**	.01
8	.44**	.01
9	.52**	.01
10	.84**	.01
11	.58**	.01
12	.50**	.01
13	.59**	.01
14	.47**	.01
15	.62**	.01

Note. r = Inter Item Correlation, α = Cronbach Alpha

Table 4 displays the item-to-item correlation between the Urdu and English versions of the CAS, also indicating a significant correlation across items.

Table 5

Cronbach Alpha of English and Urdu Versions of CAS (N= 52)

Variables	*k*	*M(SD)*	*Range*		*α*
			Actual	*Potential*	
English Version of CAS	15	10.36(2.36)	1.33-15	0-15	.85
Urdu Version of CAS	15	10.81(2.69)	1.17-15	0-15	.91

Note: k = No. of items, *α* = Cronbach Alpha, *M* = Mean, *SD* = Standard Deviation

Table 5 presents that English and Urdu versions of CAS demonstrated excellent internal consistency, with Cronbach's alpha values of .85 (English) and .91 (Urdu), confirming their reliability in assessing cognitive appraisal among firefighters.

PHASE II: PSYCHOMETRIC PROPERTIES OF COGNITIVE APPRAISAL SCALE (CAS)

Step 6: Field Study (Sample)

A sample of 200 male firefighters, aged 20 to 60 years, was recruited through purposive sampling from major cities in Punjab for Exploratory Factor Analysis (EFA). These firefighters, with at least an intermediate-level education, were selected specifically for their operational duties rather than administrative roles, ensuring they faced similar fireground challenges and threats. Similarly, another 200 male firefighters with the same characteristics were recruited for Confirmatory Factor Analysis (CFA). According to the 10-to-1 item ratio guideline (Hatcher & O'Rourke, 2013), a minimum of 150 participants were required for EFA and another 150 for CFA. However, to enhance precision, 200 participants were chosen for each analysis. In total, 417 firefighters were initially targeted for data collection, but after reviewing the completed forms, 17 were excluded from the final analysis.

Procedure

In the field study, the same procedure from the tryout phase was followed, using only the Urdu-translated the CAS. Verbal permission was obtained from district fire department in-charges, and an online link was shared with firefighters, including instructions, informed consent details, and an option to withdraw if they chose not to participate. Firefighters could either complete the form or submit it blank if they declined. The questionnaire took 8-10 minutes to complete, and after obtaining consent, participants were given guidelines to rate each item. No difficulties or concerns were reported.

Results

Table 6

Demographical-Characteristics of Firefighters for EFA (N=200)

Variable	*f*	%
Designation		
Firefighters	173	86.5
Lead Firefighters	27	13.5
Age		
Below 30 years	24	12.00
Above 30 years	176	88.00
Experience		
Below 10 years	63	31.50
Above 10 years	137	68.50
Education		
Intermediate	76	38.00
Graduation or above	124	62.00
District		
Bahawalpur	22	11.00
Gujranwala	23	11.50
Rawalpindi	22	11.00
Dera Ghazi Khan	22	11.00
Lahore	22	11.00
Sahiwal	22	11.00
Faisalabad	22	11.00
Multan	22	11.00
Sargodha	23	11.50

Note: *%* = Percentage, f = Frequency

Table 6 presents the demographic distribution of 200 male firefighters in EFA, covering designation, age, experience, education, and district. Most participants were firefighters (68.50%), with 88% over 30 years old and 68.50% having over 10 years of experience. Additionally, 62% held a graduate-level education or higher, and representation across the nine divisions of Punjab was relatively balanced.

Exploratory Factor Analysis (EFA)

The 15-item Cognitive Appraisal Scale (CAS) underwent Principal Component Analysis (PCA) with Varimax rotation using SPSS version 21 to determine its underlying structure. The data met the criteria for factor analysis, as multiple correlation coefficients in the matrix were ≥ .40, indicating strong inter-item relationships. The "*Kaiser-Meyer-Olkin (KMO)*

measure of sampling adequacy" was .81, exceeding the recommended threshold of .60 (Kaiser, 1974), confirming excellent factorability. Additionally, "*Bartlett's Test of Sphericity"* (Bartlett, 1954) was statistically significant, further supporting the suitability of factor analysis. PCA extracted five factors using a fixed-factor approach, accounting for 34.99%, 13.78%, 12.35%, 7.64%, and 5.67% of the variance, respectively, with a total variance explanation of 74.42%. The scree plot indicated a distinct break after the fifth factor, suggesting a well-defined structure. A minimum factor loading criterion of .60 was applied, and all communalities exceeded .60, confirming the clarity and adequacy of the retained components.

Table 7

KMO and Bartlett's Test of Sphericity Results for CAS

KMO	Bartlett's Test of Sphericity		
	Chi Square	*Df*	Sig.
CAS	1485.03	105	.00

Note. KMO = Kaiser-Meyer-Olkin; df = Degree of Freedom

Table 7 shows the KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity for the CAS. The KMO value of .81 indicates good sample suitability for factor analysis. Bartlett's test of sphericity was significant ($\chi^2 = 1485.03$, $p < .001$), confirming sufficient inter-correlations among the variables.

Figure 1

Scree Plot for Cognitive Appraisal Scale (CAS)

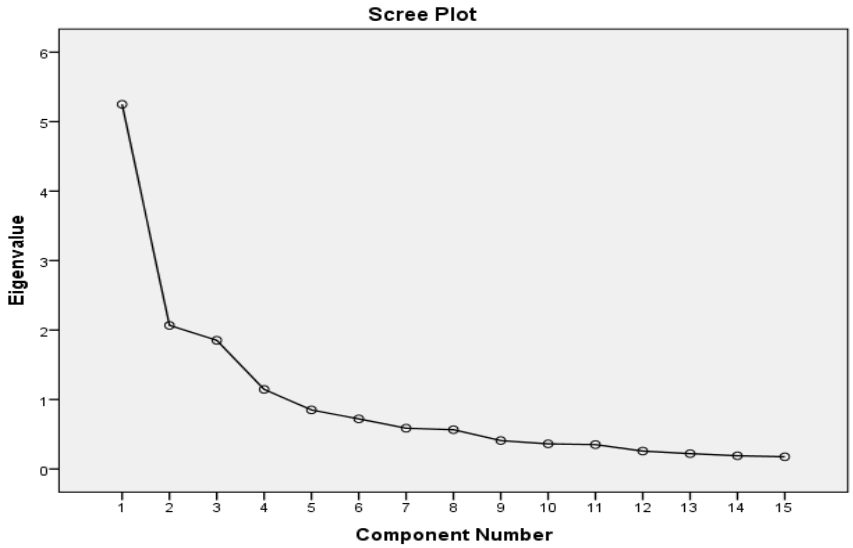


Figure 1 displays the scree plot indicating the factor solution. A five-factor structure emerged, showing a clear pattern without ambiguous items or cross-loadings. Items with factor loadings greater than .60 were retained for each factor of the CAS.

Table 8

Result from EFA for Cognitive Appraisal Scale (CAS)

Item	Factor Loading				
	1	2	3	4	5
Factor 1: Importance Perception					
PSCAS1				.75	
PSCAS2				.72	
PSCAS3				.82	
Factor 2: Threat Perception					
PSCAS4					.77
PSCAS5					.80
PSCAS6					.78
Factor 3: Challenge Perception					
PSCAS7		.80			
PSCAS8		.83			
PSCAS9		.72			
Factor 4: Coping Potential					
PSCAS10			.67		
PSCAS11			.82		
PSCAS12			.85		
Factor 5: Control Perception					
PSCAS13	.85				
PSCAS14	.90				
PSCAS15	.91				

Note. $N = 200$. The extraction method was principal component analysis with varimax (Kaiser Normalization) rotation.

Table 8 displays the results of the Exploratory Factor Analysis (EFA) on the CAS, revealing a five-factor structure that explains 74.42% of the total variance. The table outlines item-factor relationships, ensuring that only items with communalities and factor loadings of .60 or higher were retained. Consequently, all items appropriately aligned with their respective factors, and no items required removal.

Confirmatory Factor Analysis (CFA)

CFA was conducted on a separate sample of 200 male firefighters to validate the measurement model and factor structure of the Urdu CAS. Research supports that 200 participants are sufficient for CFA in translation studies (Swami et al., 2017; Tsounis & Sarafis, 2018). Using AMOS 21, the EFA-identified factors were tested, and multiple fit indices (CFI, GFI, RMSEA, and TLI) were assessed to evaluate the model's fit.

Table 9

Demographical-Characteristics of Firefighters for CFA (N= 200)

Variable	*f*	*%*
Designation		
Firefighters	174	87.00
Lead Firefighters	26	13.00
Age		
Below 30 years	31	15.50
Above 30 years	169	84.50
Experience		
Below 10 years	71	35.50
Above 10 years	129	64.50
Education		
Intermediate	76	39.50
Graduation or Above	124	60.50
District		
Bahawalpur	22	10.00
Gujranwala	23	12.00
Rawalpindi	22	12.00
Dera Ghazi Khan	22	10.00
Lahore	22	11.00
Sahiwal	22	12.50
Faisalabad	22	11.00
Multan	22	10.50
Sargodha	23	11.00

Note: *%* = Percentage, f = Frequency

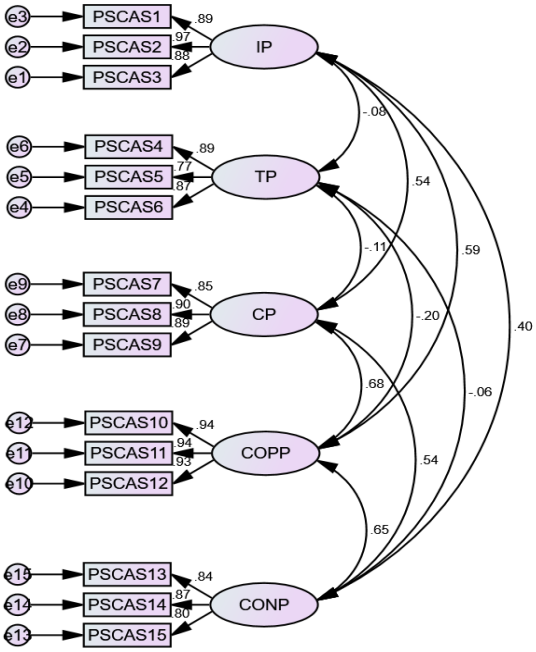
Table 9 presents the frequency and percentage distribution of demographic characteristics for firefighters included in the CFA. The variables analyzed include designation, age, experience, education, and district. The data show that most participants were firefighters (87%), with 84.50% over the age of 30 and 64.50% having more than 10 years of experience. Additionally, 60.50% of participants held a graduation-level education or higher. The sample also reflects a relatively balanced representation of firefighters from the nine districts.

Table 10

Results of Confirmatory Factor Analysis for Five Factors of CAS

Index	χ^2	*df*	*p*	CFI	RMSEA	GFI	TLI
Model	136.30	80	.00	.98	.05	.92	.97

Note. χ^2 = chi-square; df = degree of freedom; *p* = significance level; CFI = comparative fit index; RMSEA = root-mean-square error of approximation;



GFI = goodness of fit index; TLI = Tucker-Lewis index.

The model demonstrated a satisfactory to excellent fit across multiple indices. Although the chi-square was significant (χ^2= 136.30, df= 80, p < .001), this statistic is sensitive to sample size. The "comparative fit index" (CFI= .98) and "Tucker-Lewis index" (TLI= .97) indicated a strong fit. The "root mean square error of approximation" (RMSEA= .05) suggested a good population fit, while the "goodness of fit index" (GFI= .92) and "standardized root mean residual" (SRMR= .07) further supported the model's robustness. These findings demonstrate the strong psychometric properties of the 15-item CAS in assessing firefighters' cognitive appraisal of their job nature.

Figure 2

Results of CFA for Cognitive Appraisal Scale (CAS)

Note. IP = Importance Perception; TP = Threat Perception; CP = Challenge Perception; COPP = Coping Potential; CONP = Control perception; All items are numbered as presented in the text, with all modeled correlations and path coefficients found to be significant (p < .05), indicating strong relationships between the variables within the model.

Table 11

Cronbach Alpha of CAS and its Subscales (N=200)

Variables	*K*	*M(SD)*	*Range*		*α*
			Actual	*Potential*	
TPSM	15	11.58(2.08)	2.5-15	0-15	.83
Importance Perception	3	2.78(.56)	0-3	0-3	.94
Threat Perception	3	1.17(.99)	0-3	0-3	.88
Challenge Perception	3	2.54(.65)	.33-3	0-3	.91
Coping Potential	3	2.66(.59)	0-3	0-3	.95
Control Perception	3	2.43(.63)	.33-3	0-3	.88

Note. k = No of items, α = Cronbach Alpha, M = Mean, SD = Standard Deviation

Table 11 indicates excellent internal consistency for CAS, with Cronbach's alpha values of .94 (Importance Perception), .88 (Threat Perception), .91 (Challenge Perception), .95 (Coping Potential), .88 (Control Perception), and an overall .93. These results confirm the scale's reliability in measuring cognitive appraisal in the firefighting profession.

Table 12

Summary of Confirmatory Factor Analysis and Reliability of CAS (N = 200)

Construct/Item	**Factor Loading (T Value)**	**Cronbach' s Alpha**	**AVE**	**Composite Reliability**	**Bootstrap 95% CI**
Importance Perception		.94	.88	.96	
PSCAS1	.89 (18.23)				.93-1.22
PSCAS2	.97 (21.30)				1.00-1.18
PSCAS3	.88				1.00-1.00
Threat Perception		.88	.83	.94	
PSCAS4	.89 (14.29)				1.02-1.33
PSCAS5	.77 (12.54)				.70-.92
PSCAS6	.87				1.00-1.00
Challenge Perception		.91	.71	.88	
PSCAS7	.85 (15.99)				.94-1.22
PSCAS8	.90 (17.46)				.90-.1.14
PSCAS9	.89				1.00-1.00
Coping Potential		.95	.77	.91	
PSCAS10	.94(24.50)				.90-1.11
PSCAS11	.94(24.65)				.92-1.12
PSCAS12	.93				1.00-1.00
Control Perception		.88	.70	.88	
PSCAS13	.84(12.66)				.86-1.26
PSCAS14	.87(13.08)				.89-1.16
PSCAS15	.80				1.00-1.00

Note. TP = transition process; AP = action processes; IP = interpersonal processes; AVE = Average Variance Extracted; CI = confidence interval; bootstrap = 1000; range: lower 2.5% to upper 2.5%.

Discussion

Firefighting is widely recognized as one of the most stressful professions among civilian occupations worldwide. Firefighters' cognitive appraisal of their work—primarily focused on saving lives and property during fire incidents—is essential. Understanding how they perceive their job, whether as a threat or a challenge, and how they assess their coping potential and sense of control in high-stress situations is crucial.

Cognitive appraisal is a key psychological concept that explains why the same situation can be perceived as highly stressful by one individual, as a challenge by another, or as having no impact at all. In firefighting, where each emergency differs in nature and complexity, firefighters may appraise the same situation differently—some experiencing significant stress while others remain unaffected. This variation underscores the need for a specialized tool to assess how firefighters evaluate emergency situations. However, most existing cognitive appraisal scales are designed for general populations rather than emergency responders, particularly firefighters. In Pakistan, no validated measure currently captures cognitive appraisal specific to the high-risk, operation-related stressors firefighters face at the fireground. This study aims to translate and validate the 15-item Cognitive Appraisal Scale (CAS) for Pakistani firefighters, offering a brief, reliable, and valid tool to assess cognitive appraisal in firefighting contexts. Due to its concise nature, the CAS may also be applicable to other emergency responder groups, such as paramedics, divers, rescue technicians, and disaster response teams. While self-reported measures often face challenges related to response rates due to workload and organizational constraints, the CAS has demonstrated strong reliability and validity in other high-pressure professions, such as athletics and health professionals, supporting its suitability for emergency response settings.

Developed in 2013, the CAS was validated across diverse samples, enhancing its applicability. Multiple versions, including general, sports, and specific versions, were created to suit various contexts. Translating the scale into other languages is crucial for ensuring its reliability and validity across different populations in future research.

In this study, the CAS was translated into Urdu to align with the operational context of firefighting, making it accessible to Urdu-speaking firefighters. The Forward-Backward Translation technique (Brislin, 1976) ensured linguistic and conceptual accuracy. The scale comprises two main factors with five sub-dimensions: primary appraisal (importance perception, threat perception, and challenge perception) and secondary appraisal (coping

potential and control perception). Reliability analysis confirmed consistency with the original version, and findings indicated that the translated items effectively captured firefighters' cognitive appraisal of their job. To validate its structure, both EFA and CFA were conducted on Pakistani firefighters, revealing a five-factor structure with strong factor loadings (> .60) and excellent model fit. These results align with Gomes and Teixeira (2013), further supporting the five-factor model's appropriateness.

Strengths and Limitations

The adaptation and validation of the CAS extend its applicability beyond firefighters to various emergency response professions, including paramedics, disaster response forces, urban search and rescue teams, and divers. Since the primary responsibility of all emergency responders is to protect lives and property during crises, a validated cognitive appraisal measure can enhance research and intervention strategies across these professions.

A key strength of this study is its focus on the firefighting population; however, future research incorporating other emergency responders may further establish the utility of the Urdu-translated CAS across diverse emergency professions. The scale's brevity makes it particularly suitable for professionals with time constraints due to the demanding nature of their work in major cities. Additionally, translating the CAS into Urdu contributes significantly to social sciences by facilitating the assessment of cognitive appraisal related to occupational stress among Urdu-speaking populations.

Future studies should aim to enhance the scale's factor structure and psychometric robustness by including a more diverse sample from all districts of Punjab, other provincial fire departments, and various emergency response organizations across Pakistan. Expanding the sample size with equal representation nationwide and in other Urdu-speaking regions would improve the scale's generalizability and construct validity, ensuring its effectiveness across different emergency response contexts.

Conclusion

The CAS proves to be a reliable and valid measure for assessing cognitive appraisal among firefighters during firefighting operations. Its five-factor structure—encompassing importance perception, threat perception, challenge perception, coping potential, and control perception—remains consistent with the original model, reaffirming its applicability. The successful translation and adaptation into Urdu enhance its relevance for Pakistani firefighters and other Urdu-speaking emergency responders. Given its brevity and strong psychometric properties, the CAS serves as a valuable tool for future research and practical assessments of cognitive appraisal in high-risk professions.

Acknowledgments Section:

We are grateful to our participants for their time and effort. We are thankful to the Emergency Services Department, Rescue 1122 for their cooperation in this study.

Statements and Declaration

Declaration of Conflicting Interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Consideration: The study was conducted according to the guidelines of the Directorate of Advanced Study & Research Board, approved by the Institutional Review Board of University of Gujrat.

Consent to Participate: Verbal informed consent was obtained from all participants prior to their involvement in the study. Participants were provided with detailed information about the research objectives, procedures, potential risks, and benefits. They were assured of their right to withdraw at any time without any consequences and that their data would remain confidential and be used solely for research purposes.

Consent for Publication: Informed consent was obtained from all participants prior to their inclusion in the study. This consent included their agreement to participate in the research and approval for the publication of the findings, ensuring ethical compliance and respect for their rights and confidentiality.

Funding: This research, including its authorship and publication, was conducted without any financial support or external funding.

Data availability: Datasets related to this article can be requested from corresponding author.

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