

Urdu Adaptation and Validation of Team Process Survey Measure for Firefighters

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Abstract

Firefighting relies on effective teamwork, yet firefighters often work in rapidly assembled teams rather than fixed units. Existing teamwork scales fail to capture these unique dynamics. This study aimed to adapt, translate, and validate the 10-item short form of the Team Process Survey Measure (TPSM) (Mathieu et al., 2020) into Urdu for Pakistani firefighters. The research was conducted in two phases. In Phase I, TPSM was translated into Urdu using a standardized forward and backward translation method. A pilot study with 52 firefighters from nine major districts confirmed linguistic equivalence ($r = .81$). Cross-language validation, assessed by administering both versions with a two-day gap, yielded satisfactory results. Phase II examined the scale's psychometric properties through EFA and CFA with a sample of 400 firefighters (200 for each). EFA identified a three-factor structure with 10 items, each with a minimum factor loading of .70. CFA confirmed a good model fit ($\chi^2 = 57.40$, $df = 32$, $p < .000$, $CFI = .98$, $GFI = .94$, $RMSEA = .06$). The scale showed strong internal consistency (Cronbach's $\alpha = .93$). The findings establish the Urdu TPSM as a valid and reliable tool for assessing team dynamics in firefighting, making it useful for future research and practical applications.

Keywords: TPSM, Firefighters, Team Dynamics, Teamwork, Urdu Adaptation

Introduction

Teams have become crucial in organizations facing intricate and high-stakes tasks, such as those with severe consequences for errors, tasks surpassing individual capacity, and ambiguous or stressful environments. They are prevalent in aviation, military, firefighting, finance, engineering, manufacturing, and various other sectors, adapting to different forms like teams of teams and human-robot teams. The growing complexity of workplaces leads organizations to rely more on teams for collective insights

and decision-making. Research in the field of team performance has responded to the increasing demand from organizations for evidence-based guidance. This scientific exploration has yielded substantial insights into the composition, management, structure, measurement, and enhancement of team performance (Salas, Cooke, & Rosen, 2008).

A team is a group of two or more individuals working together toward a shared goal. Teamwork, as defined by Salas, Sims, and Burke (2005), involves the interrelated thoughts, actions, and feelings of each team member, contributing to coordinated performance and achieving task objectives for value-added outcomes. In emergency situations, teams operate in uniquely stressful, high-stakes, and complex environments. Major incidents prompt the formation of various sub-teams at different levels, requiring interdependent operations to accomplish both individual and collective goals.

Power (2018) emphasizes on facilitating team processes during emergency teamwork due to the rapid formation of teams involving unfamiliar individuals. Team processes are essential for achieving collective goals during task-related emergencies. These processes include coordination (using mechanisms to achieve goal-related outcomes), communication (sending and receiving information among team members), and cooperation (motivational drivers for teamwork). Wilson, Ho, and Brookes (2018) found that poor communication, lack of shared mental models, and low trust contributed to teamwork breakdowns, while adaptive processes like closed-loop communication and mutual performance monitoring facilitated performance. Current research emphasizes team processes during episodes of teamwork, rather than long-term team dynamics like cohesion (Marks et al., 2005) due to distinct nature of firefighting profession.

The researcher selected the Team Process Survey Measure (TPSM) for firefighters to examine the team dynamics as it is grounded in the well-established Marks et al. (2001) model of team processes. This framework has been widely recognized and has guided numerous empirical studies. Marks, Mathieu, and Zaccaro (2001) proposed that ten first-order constructs—such as strategy formulation, coordination, and conflict management—map onto three broader second-order constructs: transition, action, and interpersonal processes. These constructs illustrate how team processes evolve over time. Despite the model's prominence, there has been a lack of validated multi-item measures specifically designed to capture these team processes. While various existing scales assess teamwork, they do not align precisely with the Marks et al. framework. Differences in terminology and inconsistencies in item content create potential issues of construct deficiency and contamination. Therefore, TPSM was chosen for this study as it provides a theoretically sound and comprehensive measure of team processes.

Firefighter exhibit distinct personality traits, rely extensively on teamwork dynamics, adhere to unique cultural norms, spend prolonged periods in their work environments, and governed by paramilitary style institutional policies of job performance, conduct, and behavior (Elliot et al., 2007). Firefighter I and Firefighter II are two distinct levels within the firefighting profession. Firefighter I signifies an individual who, according to the criteria outlined in Chapter 4 of NFPA 1001, has demonstrated the necessary knowledge and abilities to serve effectively as a vital member of a firefighting team, operating under direct supervision in hazardous conditions (NFPA 1001). Conversely, Firefighter II denotes a person who, per the specifications in Chapter 5 of NFPA 1001, has shown competence and depth of understanding to function under general supervision (NFPA 1001).

The "Two-in & Two-out" rule, a critical component of the revised OSHA Respiratory Protection Standard (1998), mandates a minimum staffing requirement for firefighting operations. According to this regulation, during interior firefighting operations, at least two firefighters must be stationed outside the structure while a minimum of two others work inside. This protocol ensures that there is a standby crew ready to provide immediate assistance or rescue in case of emergency. The concept of the "Two-in & Two-out" rule originated from the standard NFPA 1500 of National Fire Protection Association Standard (1987), where it was first proposed as an essential operational goal for firefighter safety. Since its inception, fire departments have implemented various strategies to comply with this requirement, including adjusting response procedures, deploying additional apparatus, or hiring more personnel. Despite potential challenges, compliance with this regulation is imperative for all organizations utilizing respirators, as emphasized by Thomas Seymour (IAFC, 1998).

The critical role of teamwork in firefighting underscores the need to assess its effectiveness among firefighters. However, due to the nature of their job, traditional teamwork assessments may not fully capture their team dynamics. Unlike professionals who work in fixed teams, firefighters operate in rapidly formed teams, assembling on-site just before initiating firefighting and rescue operations. A review of the literature reveals a lack of tools specifically designed to measure teamwork in firefighting populations, particularly team processes that drive effective collaboration. Additionally, no existing scale has been adapted for this unique professional setting. Therefore, the present study aims to translate, validate, and adopt the 10-item short form of the Team Process Survey Measure (TPSM) for firefighters, ensuring a reliable and context-specific assessment of their teamwork dynamics.

The primary objectives of this research are:

1. To adapt and translate the Team Process Survey Measure (TPSM) into Urdu for firefighters.
2. To establish the psychometric properties of the TPSM, ensuring its validity and reliability for assessing teamwork dynamics in firefighting contexts.

Method

The Team Process Survey Measure (TPSM) by Mathieu et al. (2020) was translated into Urdu within the firefighting context. The psychometric properties of the TPSM English version are as follows:

Team Process survey Measure (TPSM)

The Team Process Survey, a 10-item measure developed by Mathieu et al. (2020), will be utilized to assess teamwork among firefighters. This survey comprises three sub-domains: “transition process, action process, and interpersonal process.” The transition process (three items) is further divided into three dimensions: “mission analysis, goal specification, and strategy formulation and planning.” The action process (four items) is categorized into four sections: “monitoring progress toward goals, system monitoring, team monitoring and backup, and coordination”. Lastly, the interpersonal process (three items) is divided into three sub-factors: “conflict management, motivating and confidence building, and affect management.” Respondents will rate each item on a 5-point Likert scale: 1= *Not at All*, 2= *Very Little*, 3= *To Some Extent*, 4= *To a Great Extent*, and 5= *To a Very Great Extent*. Sample items include questions such as "To what extent does our team actively work to identify the key challenges that we expect to face?" and "Regularly monitor how well we are meeting our team goals?" The Cronbach's alpha values for the transition process, action process, and interpersonal process were .83, .82, and .85 respectively, indicating high internal consistency.

The study was conducted in two phases: (1) Translation and Adaptation of the Team Process Survey Measure (TPSM) and (2) Assessment of the Psychometric Properties of the TPSM.

PHASE 1: TRANSLATION AND ADAPTATION OF TEAM PROCESS SURVEY MEASURE (TPSM)

Phase I aimed to adapt and translate the TPSM into Urdu for firefighters while ensuring cultural and conceptual equivalence. The goal was to maintain the questionnaire's functional relevance rather than just linguistic accuracy, incorporating firefighting-specific context where necessary. A standardized forward and backward translation method (Nisar et al., 2020) was employed to achieve cross-cultural consistency. The adaptation and validation process followed six systematic steps to ensure the TPSM's effectiveness in assessing teamwork dynamics among firefighters.

Step 1: Forward Translation

The translation of the TPSM was conducted with the assistance of seven experts, including two Ph.D. scholars in Psychology and five M.Phil. Lecturers specializing in Urdu, Project Management, Education, Sociology, and English. Selected through purposive sampling, these experts were proficient in both English and Urdu. They ensured that each item was accurately translated while maintaining conceptual clarity. Additionally, they identified culturally irrelevant items and suggested appropriate modifications to enhance the questionnaire's relevance within the Pakistani firefighting context.

Step 2: Expert Panel

A meeting was held with six experts, each possessing over 10 years of experience. Among them, one was an Assistant Professor at psychology department, one was a research officer at the fire department, two were research coordinator (Ph.D. Scholar) at training academy of firefighters, and two were professional firefighters. Additionally, the researcher (a Ph.D. scholar) participated in the process. Each translated item was carefully analyzed, and the most suitable translation, accurately conveying the intended meaning in the firefighting context, was selected through mutual consensus.

During the translation and adaptation process, necessary modifications, such as adjustments in bracketing, were made to align the scale with the cultural context of firefighting, as recommended by bilingual experts. These changes were essential because the original English version of the scale was developed for different professions and cultural settings. For instance, terms like "Challenges," "Stakeholders," and "Work Environment" were translated after consulting experts from the firefighting department and the psychology department. Additionally, translations of teamwork-related concepts regarding job scenarios, as presented in the scale instructions, were refined. The expert panel also suggested alternative translations for complex words and expressions to enhance clarity and relevance.

Step 3: Back-translation

The Urdu-translated version of the TPSM was reassessed by four independent bilingual translators, following the same procedure as in the forward translation (Step 1). The expert panel consisted of an Associate Professor from the English/Applied Linguistics Department, a Psychology Lecturer, a Research Coordinator at the HSE Department, and a Research and Safety Officer at the Emergency Department. Each expert had an average of over 10 years of teaching and research experience in their respective fields.

Step 4: Expert Panel

The back-translated Urdu version was compared with the original English version of the TPSM. This process was carried out by the same panel of experts who participated in the forward translation (Step 1). Finally, the selected translated items were arranged in the same order as in the original questionnaire to maintain consistency.

Content Validity Ratio (CVR)

The method for measuring content validity was developed by Lawshe (1975) as a technique to assess the level of agreement among raters or expert panelists regarding the essentiality of a particular item. According to Lawshe (1975), each rater or expert evaluates each item by responding to the following question: "*Does the item measure a necessary skill or knowledge?*" with three possible responses: "*essential*", "*useful but not essential*", and "*not necessary*". The Content Validity Ratio (CVR) is calculated based on these responses, with positive CVR values ranging from 0.00 to 0.99. The formula for calculating CVR, as provided by Cohen (1996), is given below.

Table 1*The CVR of Urdu Version Items of Team Process Survey Measure (TPSM)*

Item No.	CVR (Value)
1,2,4,5	.99
6,10	.80
3,9	.60
7,8	.20

Table 1 presents the Content Validity Ratio (CVR) values for 10 items in the Urdu-translated version of the TPSM. The CVR reflects the panelists' assessment of each item as "essential," "useful but not essential," or "not necessary." The 10 expert panelists evaluated each item, and all items in the translated questionnaire demonstrated a positive CVR. Specifically, four items had a CVR of 0.99, two items had 0.80, two items had 0.60, and two items had 0.20. Since all items in the translated TPSM scale exhibit a positive CVR, they fall within the acceptable "essential" range of 0.00 to 0.99 (Lally & Testa, 2015).

Step 5: Try Out

After completing the content validity procedure, the Urdu-translated 10 items of the TPSM was finalized for the tryout phase. The objective of this step was to determine the correlation between the English and Urdu version of TPSM. For this purpose, 54 firefighters from nine divisional districts (six from each division) were selected using a purposive sampling technique. Several studies support the idea that a sample size of fewer than 60 participants is sufficient for the tryout phase of translation studies involving scales (Akram & Munawar, 2016). To ensure consistency, TPSM was first administered in English. After two days, the Urdu version was administered using the same procedure and instructions.

Procedure

For the tryout phase, the firefighters' training center was approached, where a refresher training course for experienced firefighters was in progress. Verbal permission was first obtained from the Registrar of training academy, and the rationale of the research study, along with details regarding time and administration procedures, was communicated to the Registrar office and respective training instructors.

After obtaining verbal consent from the participating firefighters, essential instructions were provided. An online link to the questionnaire was shared with all participants, and test administration was conducted in a group setting. Firefighters were asked to rate each item based on their personal experiences. The English versions of the TPSM was administered first, and any relevant queries were noted. After two days, the Urdu versions of TPSM was administered using the same procedure and instructions with the same sample. On average, firefighters took 6-7 minutes to complete the questionnaire. Participants reported no difficulty in rating the items in the Urdu version of TPSM.

Table 2
Demographical-Characteristics of Firefighters for Tryout (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 presents the frequency and percentage distribution of demographic variables, including age, experience, education, and districts of the firefighter participants. The data indicate that the majority of firefighters in the sample are above 25 years old (82.70%) and have over three years of experience (67.30%). Additionally, the table highlights that a higher proportion of participants have an intermediate-level education (55.80%) compared to those with a graduate degree or higher (44.20%). Furthermore, the representation of firefighters from the nine districts was relatively balanced.

Cross Validation

Cross-validation, also known as rotation estimation, is a statistical method used to evaluate and compare learning procedures by dividing data into two sections—one for training the model and the other for validating it (Shujja et al., 2017). For the cross-validation of both the TPSPM (Urdu and English versions), inter-item and total correlation analyses were conducted to assess the consistency and reliability of the translated scale. The results of these analyses are presented in Table 3.

Table 3

Correlation and Linguistic Equivalence between English and Urdu version of TPSM

Test Administered	<i>N</i>	<i>M</i>	<i>SD</i>	1	2
1. English Version	52	40.21	7.71	-	.84***
2. Urdu Version	52	41.10	6.85		-

Note. ** $p < .01$, *** $p < .001$, TPSM = Team Process Survey Measure

The initial analysis assessed language similarity and correlation between the Urdu and English versions of TPSM. Table 3 shows a significant correlation ($r = 0.84$), indicating strong consistency between both versions.

Table 4

Linguistic Equivalence (item by item) of Urdu and English Version of TPSM

Item No.	<i>R</i>	α
1	.43**	.01
2	.74**	.01
3	.61**	.01
4	.65**	.01
5	.71**	.01
6	.74**	.01
7	.80**	.01
8	.70**	.01
9	.50**	.01
10	.55**	.01

Note. r = inter item correlation, α = Cronbach alpha, TPSM = team process survey measure

Table 4 presents the item-to-item correlation between the Urdu and English versions of the TPSM, showing a significant correlation across items.

PHASE II: PSYCHOMETRIC PROPERTIES OF TEAM PROCESS SURVEY MEASURE (TPSM)

Step 6: Field Study (Sample)

The Urdu-translated version of the TPSM was administered to 415 male firefighters, aged 20 to 60 years, selected through purposive sampling from nine major districts. Fifteen questionnaires were excluded as participants opted not to participate and submitted blank forms, resulting in a final sample of 400 firefighters. Previous studies suggest that a sample size of 400 is sufficient for both exploratory and confirmatory factor analyses (Adawi et al., 2018; Orcan, 2018). Additionally, following the 10-to-1 item ratio guideline (Hatcher & O'Rourke, 2013), at least 100 participants were required for EFA and another 100 for CFA. Accordingly, EFA was conducted on a sample of 200 firefighters, while CFA was performed on a separate sample of 200 firefighters, ensuring the adequacy of the sample size.

Procedure

In the field study, the same procedure from the preceding tryout phase was followed, using only the Urdu-translated version of the TPSM. Verbal permission was obtained from the respective district fire department in-charges. An online link was shared with firefighters, including clear instructions, informed consent details, and a statement allowing participants to withdraw if they chose not to proceed after understanding the research purpose. Firefighters were instructed to either complete the form or submit it blank if they declined participation. The questionnaires took approximately 5-7 minutes to complete. After obtaining informed consent, participants were provided with essential guidelines and asked to rate each item. No difficulties or concerns regarding the items were reported.

Results

Table 5

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

Variable	<i>f</i>	%
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 5 illustrates the frequency and percentage distribution of demographic variables for the firefighters sampled in the EFA and CFA. The

variables include designation, age, experience, education, and district. The data reveal that most participants were firefighters (68.50%), with 88% being over 30 years old and 68.50% having more than 10 years of experience. Additionally, 62% of the participants had attained a graduation-level education or higher. The table also indicates a relatively balanced representation of firefighters across the nine divisions of Punjab.

Exploratory Factor Analysis (EFA)

EFA with Varimax Rotation was conducted to explore the relationships among variables and define the underlying construct. Principal Component Analysis (PCA) was employed, analyzing the total variance of the variables. To ensure an adequate sample size, two methods were applied: the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the evaluation of factor loadings.

Table 6

KMO and Bartlett's Test of Sphericity Results for Team Process Survey Measure (TPSM)

KMO	Bartlett's Test of Sphericity		
	Chi Square	df	Sig.
TPSM	1481.02	45	.00

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

The table 6 presents the results of the KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity for the TPSM. The KMO value of .89 indicates excellent sample suitability for factor analysis. Additionally, Bartlett's test of sphericity was significant ($\chi^2 = 1481.02$, $p < .001$), confirming adequate inter-correlations among the variables.

Figure 1

Scree Plot for the Team Process Survey Measure (TPSM)

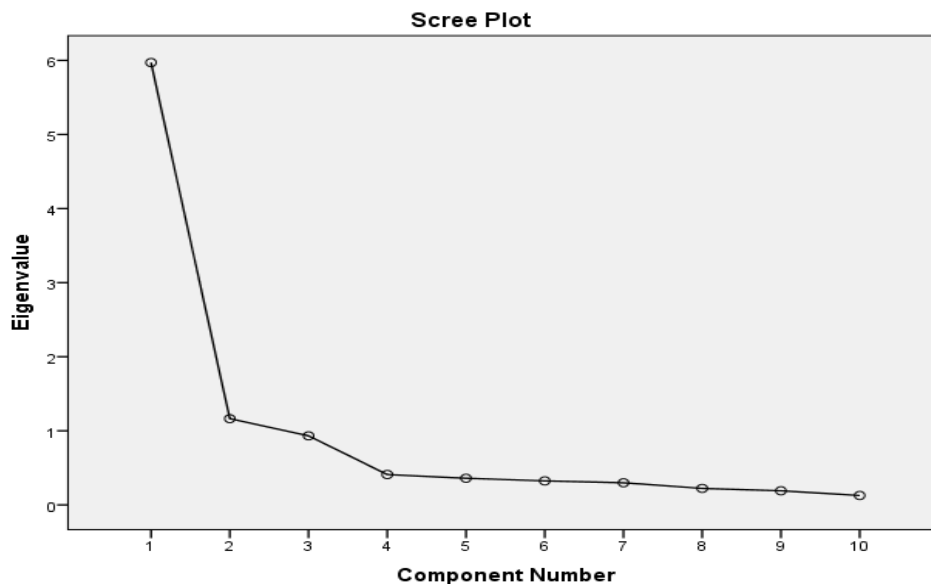


Figure 1 presents the scree plot illustrating the factor solution. A three-factor solution revealed a clear factor structure with no ambiguous items or cross-loadings. Factor loadings greater than 0.70 were set as the criterion for item inclusion in each factor of the questionnaire.

Table 7

Result from EFA for Team Process Survey Measure (TPSM)

Items	Factor Loading		
	1	2	3
Factor 1: Transition Process			
TPSM-1	.85		
TPSM-2	.84		
TPSM-3	.76		
Factor 2: Action Process			
TPSM-4		.78	
TPSM-5		.84	
TPSM-6		.83	
TPSM-7		.82	
Factor 3: Interpersonal Process			
TPSM-8			.84
TPSM-9			.79
TPSM-10			.81

Note. TPSM (Team Process survey Measure); Factors Loading >.70.

Table 7 represents EFA results conducted on the 10-item Urdu version of the TPSM using Varimax rotation. The results indicated a six-factor structure, with factor loadings greater than .70. Cronbach's alpha for the 10-item TPSM was .92 ($p < 0.001$), demonstrating high internal consistency and strong reliability of the measure.

Confirmatory Factor Analysis (CFA)

CFA was conducted on data from 200 firefighters, recruited using purposive sampling, to validate the measurement model and factor structure of the Urdu version of TPSM. Research supports that a sample of 200 is sufficient for CFA in translation studies (Swami et al., 2017; Tsounis & Sarafis, 2018). The factors identified through EFA were tested in the second phase of the study using AMOS 21. Multiple fit indices, including CFI, GFI, RMSEA, and TLI, were evaluated to determine the model's fit.

Table 8*Demographical-Characteristics of Firefighters for CFA (N= 200)*

Variable	<i>f</i>	%
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 8 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 divisions of Punjab.

Table 9*Results of Confirmatory Factor Analysis for Three Factors of TPSM*

Index	χ^2	<i>Df</i>	<i>p</i>	CFI	RMSEA	GFI	TLI
Model	57.40	32	.00	.98	.06	.94	.98

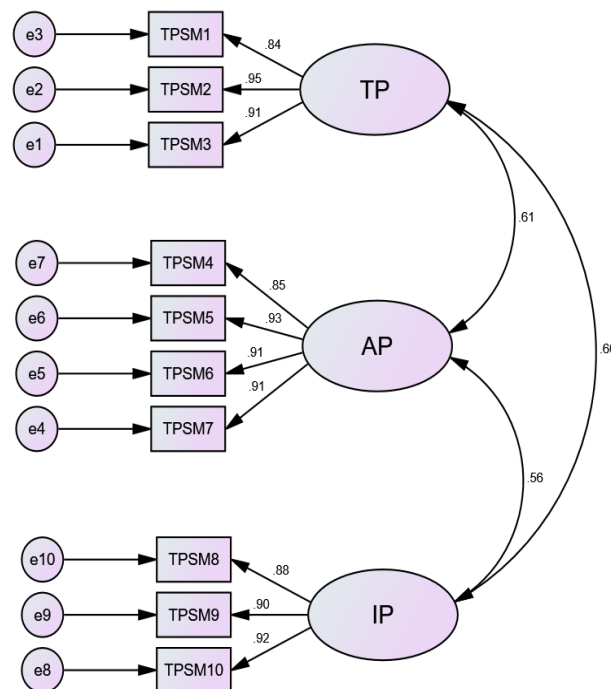
Note. χ^2 = chi-square; *df* = degree of freedom; *p* = significance level; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; GFI = goodness of fit index; TLI = Tucker-Lewis index.

The overall model showed a satisfactory to excellent fit across various indices. Although the chi-square was significant ($\chi^2 = 57.40$, $df = 32$, $p < .001$), this measure is sensitive to sample size. The “comparative fit index” (CFI = .98) and “Tucker-Lewis index” (TLI = .98) indicated a strong fit. The “root mean square error of approximation” (RMSEA = .06) suggested a good population fit, while the “goodness of fit index” (GFI = .94) and “standardized root mean residual” (SRMR = .03) further supported the model’s robustness. These results highlight the strong psychometric properties of the 10-item TPSM in assessing teamwork processes during firefighting operations.

Figure 2

Results of CFA for Team Process Survey Measure (TPSM)

Note. TP = Transition Process; AP = Action Processes; IP = Interpersonal



Processes; All items were numbered as in the text, and all correlations and path coefficients were significant ($p < .05$), confirming strong relationships between the variables.

The results provided strong evidence supporting the validation of the three-factor structure of the Urdu-translated TPSM, confirming it as the most appropriate and best-fitting model. To assess the reliability of the translated scale, Cronbach’s alpha reliability analysis was conducted. Findings presented in Table 2 indicate that TPSM and its subscales demonstrate high reliability, ensuring the scale’s consistency and suitability for measuring team dynamics among firefighters.

Table 10*Cronbach Alpha of TPSM and its Subscales (N=200)*

Variables	<i>k</i>	<i>M(SD)</i>	<i>Range</i>		<i>α</i>
			<i>Actual</i>	<i>Potential</i>	
TPSM	10	44.07(7.67)	10-50	10-50	.96
Transition Process	3	12.97(2.94)	3-5	3-5	.93
Action Processes	4	17.71(3.57)	4-20	4-20	.94
Interpersonal Processes	3	13.39(2.65)	3-15	3-15	.92

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

Table 10 shows excellent internal consistency for TPSM, with Cronbach's alpha values of .93 (transition), .94 (action), .92 (interpersonal), and an overall .96, confirming its reliability in measuring team dynamics among firefighters.

Table 11*Summary of confirmatory factor analysis and reliability of TPSM (N = 200)*

Construct/ Item	Factor Loading (T Value)	Cronbach's Alpha	AVE	Composite Reliability	Bootstrap 95% CI
TP		.93	.81	.95	
TPSM1	.84 (16.88)				.87-1.08
TPSM2	.95 (21.74)				.93-1.14
TPSM3	.91				1.00-1.00
AP		.94	.81	.93	
TPSM4	.85 (17.75)				.89-1.11
TPSM5	.93 (21.71)				.95-1.16
TPSM6	.91 (21.00)				.94-1.15
TPSM7	.91				1.00-1.00
IP		.92	.81	.93	
TPSM8	.88 (18.42)				.83-1.09
TPSM9	.90 (19.21)				.74-.98
TPSM10	.92				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

Teamwork is a crucial concept in psychology, particularly in firefighting, yet most existing teamwork scales are designed for populations other than emergency responders, especially firefighters. In Pakistan, no psychometrically robust measure captures teamwork dynamics specific to emergency responders. Since firefighters do not operate in fixed teams, traditional teamwork measures may not fully capture their team interactions. Instead, team process measures offer a more suitable alternative. This study

aimed to translate and validate the 10-item short form of the Team Process Survey Measure (TPSM) for Pakistani firefighters, providing a brief, reliable, and valid tool to assess team processes (Mathieu et al., 2020). Given its brevity, the TPSM can be effectively applied to other emergency responder populations, including police, paramedics, and disaster response teams. While self-reported measures often face response rate challenges due to workload and departmental constraints, TPSM has demonstrated validity and reliability in studies conducted on healthcare professional teams, supporting its applicability in high-pressure emergency settings.

The TPSM, published in 2020, was developed and validated using a diverse sample, which is a key strength of the study. Researchers recruited participants from various healthcare teams, ensuring broad applicability. Since most scale items were derived from the Marks et al. model, comparative analyses across different professions, particularly emergency responders who do not work in fixed teams, provided strong validation evidence. Translating the scale into other languages is essential for further assessing and enhancing its reliability and validity across diverse populations in future research.

The present study aimed to translate the TPSM into Urdu within the firefighting context, making it accessible to Urdu-speaking firefighters worldwide. The Forward-Backward Translation technique (Brislin, 1976) was employed to ensure linguistic and conceptual accuracy. The scale consists of three subscales: Transition Process, Action Processes, and Interpersonal Processes. Reliability analysis confirmed that the Urdu-translated scale and its subscales were consistent with the original version. The findings indicated that the translated items effectively captured team processes and dynamics among firefighters. To validate the factor structure, both EFA and CFA were conducted on data collected from Pakistani firefighters. Results supported a three-factor structure with factor loadings exceeding .70 and an excellent model fit in CFA, replicating the structure established in previous research. These findings align with those of Mathieu et al., (2020), who also reported that a single-factor model was inadequate, confirming that the three-factor structure is the most appropriate for this scale.

Strengths and Limitations

The adaptation and validation of this scale will facilitate research on team dynamics across various emergency response professions, including paramedics, military personnel, and police. Its short length makes it particularly useful for groups that may not respond well to lengthy assessments, such as other emergency responders. The translation of this scale is a valuable contribution to social sciences, as it enables efficient measurement of teamwork and team dynamics among Urdu-speaking populations. This, in turn, opens new avenues for exploring the impact of

teamwork on both professional and personal aspects of individuals' lives. The current study focused solely on the firefighting population; however, incorporating other emergency responders, such as paramedics and rescue technicians, would provide a broader perspective, as teamwork is essential across all emergency response professions. To enhance the factor structure and psychometric robustness of TPSM for firefighters, future studies should include a more diverse and representative sample from all districts of Punjab, rather than only major districts, as well as from other provincial fire departments in Pakistan. For greater generalizability and construct validity, future research should consider recruiting a larger sample with equal representation from all districts across the country.

Conclusion

In conclusion, the TPSM demonstrates excellent reliability and validity for measuring team dynamics among emergency responders, particularly firefighters. Its three-factor structure aligns with the original model, confirming its suitability for assessing transition, action, and interpersonal processes within rapidly formed teams. The successful translation and adaptation of TPSM into Urdu ensure its applicability in the Pakistani firefighting context and other Urdu-speaking emergency response settings. Given its brevity and strong psychometric properties, TPSM can serve as a valuable tool for future research and practical assessments of teamwork in high-risk professions.

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Statements and Declarations

Conflict of Interest: The authors declare no conflicts of interest concerning the research, authorship, or publication of this article.

Ethical Approval: This study was conducted in accordance with the guidelines of the Directorate of Advanced Study & Research Board and received approval from the Institutional Review Board of the University of Gujrat.

Informed Consent: Prior to participation, verbal informed consent was obtained from all individuals involved. Participants were thoroughly briefed on the study's objectives, procedures, potential risks, and benefits. They were assured of their right to withdraw at any time without repercussions and were guaranteed confidentiality, with data used exclusively for research purposes.

Consent for Publication: All participants provided informed consent, which included agreement to participate in the study and approval for the publication of research findings, ensuring adherence to ethical standards and the protection of their rights and privacy.

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