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Validation and reliability assessment of the Persian Adaptation of the Interprofessional Team Collaboration Scale II (P-AITCS-II) for Iranian healthcare providers

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Abstract

The primary objective of this study was to perform a psychometric evaluation of the Persian adaptation of the Assessment of Interprofessional Team Collaboration Scale (P-AITCS-II). This methodological study aimed to assess the validity and reliability of the AITCS-II for practitioners within the Iranian healthcare context. Data were collected from a sample of 230 Iranian healthcare providers between May and June 2024. Confirmatory factor analysis demonstrated good model fit indices ($\chi^2 = 540.20$, $df = 224$, $\chi^2/df = 2.41$, $CFI = 0.917$, $IFI = 0.918$, $TLI = 0.907$, $PNFI = 0.768$, $PCFI = 0.812$, and $RMSEA = 0.079$ [CI90% 0.070–0.087]). These results confirm the validity of the P-AITCS-II model. Additionally, the internal consistency and composite reliability of the three factors were higher than 0.7. Convergent validity was considered acceptable for the P-AITCS-II, as the Average Variance Extracted (AVE) was greater than 0.5. The Persian adaptation of the Assessment of Interprofessional Team Collaboration Scale II (P-AITC-II), consisting of 23 items within three factors—partnership, cooperation, and coordination—demonstrated good validity and reliability. However, further research is needed to confirm its robustness and usefulness for improving interprofessional team collaboration.

Keywords Health care providers, Interprofessional, Collaboration, Intersectoral, Caregivers

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Introduction

Interprofessional teamwork and collaboration are essential aspects to improved client outcomes and increased access to care for effective healthcare delivery. Healthcare workers in collaborative teams report higher job satisfaction and greater effectiveness compared to those working independently [1]. The term "interprofessional-ity," introduced by D'Amour and Oandasan, describes the cohesive practice among professionals from various disciplines, who work together in partnerships with clients' and family members to develop and deliver a shared plan for reaching recipients' goals for their health this concept



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differs from "multidisciplinarity," where professionals from different fields work independently on the same client's care with limited collaboration [2].

Physicians and nurses constitute the primary professional groups involved in healthcare delivery. However, other healthcare providers, such as technical professionals, play crucial roles in patient care paths [3]. The World Health Organization (2010) highlighted that development of specializations in individual healthcare fields has made it increasingly challenging to provide integrated services. To overcome this issue, professionals in different specialized fields must collaborate to deliver healthcare services that enhance the care for to meet individual clients' health and service [4].

Background

Orchard (2012) identified the primary constructs underpinning interprofessional team collaboration (ITC) as partnership, cooperation, and coordination. Partnership involves all team members working together as equals to achieve common objectives, with the client being the main partner [5]. Cooperation entails listening to and valuing all team members' perspectives while respecting inputs of the client and the rest of the team. Coordination refers to the ability to collaborate effectively by engaging in shared decision-making among healthcare professionals, clients, and their families [6, 7].

There are several tools to measure team structures in various healthcare settings [8–10]. However, most instruments assessing interprofessional collaboration have undergone limited psychometric evaluation, failing to address the inclusion of patients, clients, or employees as integral members of the team [5, 7, 11].

The Assessment of Interprofessional Team Collaboration Scale (AITCS) is a Canadian-developed measurement tool designed to assess collaboration within teams across diverse practice settings, emphasizing the integration of patient involvement in team practice [5]. The AITCS has been validated for its internal consistency, reliability, and construct validity. In its original form, it consists of 37 items and three subscales, representing key elements of interprofessional care: (1) Partnership/shared decision-making (19 items), (2) Cooperation (11 items), and (3) Coordination (7 items). In 2018, a shortened version of the AITCS, referred to as AITCS-II, was developed, and its validity and reliability were subsequently confirmed. The AITCS-II retains the three subscales present in the original version, while reducing the total number of items in the entire scale to 23 [12]. This tool has various potential applications in research, such as continuing education, performance assessment, and evaluating team practice. The AITCS has been translated into multiple languages, including German, Spanish, Portuguese,

Rwandan French [12], Japanese [13], and Italian [3]. However, there is currently no validated tool to evaluate interprofessional team collaboration in Persian. The aim of this study was to examine the reliability and validity of the scale within the Iranian healthcare setting.

Materials and methods

Design

This methodological study aimed to assess the psychometric properties of the Persian version of the Assessment of Interprofessional Team Collaboration Scale II (AITCS-II) among a sample of 230 Iranian healthcare providers between May and June 2024. An online survey was created using the Persian online questionnaire platform (www.porsline.ir). The questionnaire with details about the study's objectives was disseminated through various social media platforms, including Telegram, WhatsApp, and internal social network platforms such as Bale and Eitaa. Since most healthcare professionals actively participate in specific virtual groups and channels on various platforms, we distributed the questionnaire link through the administrators of these groups or channels. Participants were eligible for inclusion in the study if they were willing to participate, were currently employed in healthcare services, and had a minimum of one year of work experience. The sample was selected using a convenience sampling method.

Measurements

The online questionnaire was comprised of two sections: (1) demographic and job information, including age, gender, educational level, years of work experience, and job position; and (2) the Persian version of the Assessment of Interprofessional Team Collaboration Scale II (AITC-II). The AITC-II consists of 30 main items, categorized into three dimensions: Partnership (8 items), Cooperation (8 items), and Coordination (7 items). All responses are recorded on a 5-point Likert scale, ranging from "always" (5) to "never" (1) [12].

Translation

With the original author's consent, the Assessment of Interprofessional Team Collaboration Scale II (AITC-II) was translated into Persian using the forward-backward translation method recommended by the World Health Organization. Two independent translators translated the AITC-II from English to Persian. Subsequently, the two Persian versions were synthesized into a single document and given to a Persian-English translator for back-translation into English. The resulting English version was then reviewed and confirmed for originality and accuracy by the original author after two rounds of review. This rigorous translation process ensured that the

Persian version of the AITC-II maintained the integrity and accuracy of the original instrument.

Validity assessment

The face, content, and construct validity of the Persian version of the Assessment of Interprofessional Team Collaboration Scale II (AITC-II) were assessed through a multi-step process. For face validity, 11 physicians, nurses, midwives, and pre-hospital technicians evaluated the difficulty and ambiguity of the scale items. Necessary adjustments were made based on the participants' feedback. Next, content validity was established by having 11 faculty members from nursing, medical emergencies, midwifery, laboratory professions, and pre-hospital fields assess item necessity and relevance using content validity ratio (CVR) and modified kappa coefficient (K). In accordance with Lawshe's recommendation, the minimum CVR value was set at 0.59 for eleven experts [14]. Finally, the modified kappa coefficient (K) was obtained for each item, with a minimum value of 0.60 or higher, to confirm content validity [15].

To validate the original factor structure, Confirmatory Factor Analysis (CFA) was performed on a dataset consisting of $n=230$ participants. Common model fit indices were employed, including the Chi-square test (χ^2), the minimum discrepancy function by degree of freedom (CMIN/DF) <3 , comparative fit index (CFI) >0.90 , incremental fit index (IFI) >0.90 , parsimonious comparative fit index (PCFI) >0.5 , parsimonious normed fit index (PNFI) >0.5 , Tucker-Lewis index (TLI) >0.9 , and root mean square error of approximation (RMSEA) <0.08 [15]. These indices provided a comprehensive evaluation of the model's fit and supported the original factor structure of the Assessment of Interprofessional Team Collaboration Scale II (AITCS-II).

Convergent validity and discriminant validity

To assess convergent validity, we employed the methodology suggested by Fornell and Larcker [16]. This approach involves calculating the Average Variance Extracted (AVE) and Composite Reliability (CR) for each construct. Convergent validity is confirmed when a construct's AVE >0.50 , indicating that the construct accounts for more than half of the variance in its associated

indicators on average. Furthermore, CR greater than is necessary to establish convergent validity [16, 17]. For discriminant validity evaluation, we utilized the Heterotrait-Monotrait (HTMT) ratio of correlations, following Henseler, Ringle, and Sarstedt's recommendations. The HTMT ratio assesses the average of the heterotrait-heteromethod correlations relative to the average of the monotrait-heteromethod correlations. A value below the 0.85 signifies the establishment of discriminant validity between two reflective constructs [18, 19].

Reliability

Cronbach's alpha (α) was assessed for internal consistency, and composite reliability (CR) and maximum reliability (Max H reliability) were evaluated for reliability of scale. The values >0.7 were considered acceptable for all these indices [20].

Results

The questionnaire was viewed by 356 individuals, although only 230 completed it, yielding a response rate of 64.6%. Demographic analysis of the 230 participants revealed a mean age of 37.8 years (SD=8.8), with the majority (77.4%) being female. Participants had a mean of 13.01 ± 8.39 years of work experience. The sample composition consisted primarily of nurses (66.5%), followed by allied medical sciences (10.43%), physicians (9.56%), and midwives (5.2%). The remaining healthcare professions collectively accounted for 8.3% of the participants including pre-hospital paramedics, occupational therapists, and dietitian technicians.

The content validity ratio (CVR) evaluation indicated that all items scored ≥ 0.63 . Additionally, the numerical values of the content validity index (CVI) for all items were greater than 0.80. The calculated S-CVI/Ave was 0.95, based on the mean scores of I-CVI. Every item exhibited a satisfactory level of agreement, as evidenced by their Kappa values.

The confirmatory factor analysis demonstrated good model fit indices, confirming the validity of the P-AITC-II model. The results showed $\chi^2=540.20$, $df=224$, $\chi^2/df=2.41$, CFI=0.917, IFI=0.918, TLI=0.907, PNFI=0.768, PCFI=0.812, and RMSEA=0.079 [CI90% 0.070–0.087] (see Table 1 and Fig. 1).

Table 1 Fit indices of the confirmatory factor analysis of the AITC-II ($n=230$)

Indices	χ^2	df	P value	CMIN/DFI	RMSEA [CI 90%]	PNF	PCFI	TLI	IFI	CFI
CFA	540.2	224	<.001	2.41	0.079 [0.07–0.087]	0.768	0.812	0.907	0.918	0.917

df Degree of freedom, PCFI Parsimonious Comparative Fit Index, PNFI Parsimonious Normed Fit Index, CMIN/DF Minimum Discrepancy Function divided by Degrees of Freedom, RMSEA Root Mean Square Error of Approximation, TLI/Tucker-Lewis Index, CFI Comparative Fit Index, IFI Incremental Fit Index

Fitness indexes: PNFI, PCFI (>0.5); TLI, IFI, CFI (>0.9), RMSEA (<0.08), CMIN/DF (<3 good, <5 acceptable)

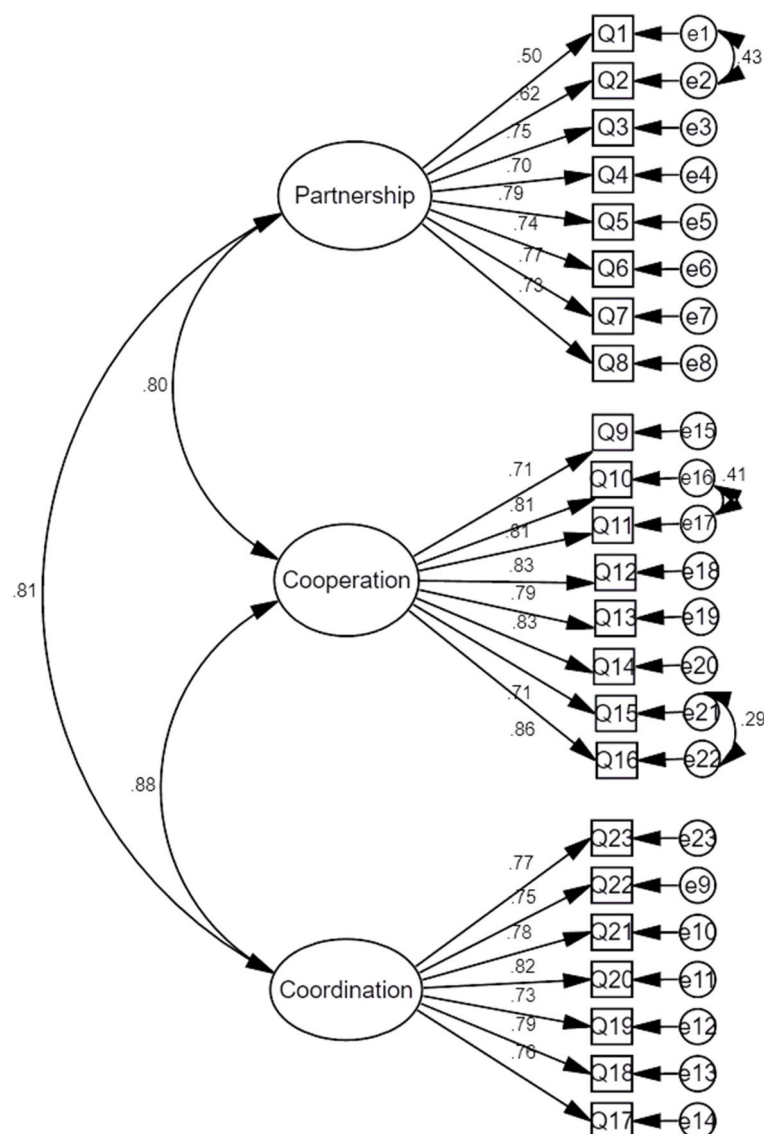


Fig. 1 The CFA structure the AITC-II construct ($N=230$)

Convergent validity was deemed acceptable for all three factors, as evidenced by the average variance extracted (AVE) values exceeding 0.50 (Table 2). To further assess discriminant validity, the Heterotrait-Monotrait ratio (HTMT) was computed. The results, presented in Table 3, provide additional confirmation of the AITC-II's discriminant validity.

Discussion

Cultivating a caring culture among interprofessional team members can significantly enhance collaboration and ultimately improve client care outcomes. This can be achieved by fostering caring relationships, providing constructive feedback, and adopting a strengths-based

approach to practice [21]. Ineffective collaboration among healthcare professionals has caused negative impacts on patient outcomes through medication errors and increased hospital-acquired infection rates. As such,

Table 2 The reliability indices and the convergent validity extracted of the dimensions of AITC-II

Factors	Reliability Indices			Convergent Validity AVE
	Alpha	CR	MaxR(H)	
Partnership	0.88	0.890	0.897	0.505
Coordination	0.90	0.912	0.913	0.597
Cooperation	0.93	0.934	0.939	0.641

Alpha, Cronbach's alpha; CR Composite Reliability, MaxR (H) maximum reliability, AVE Average Variance Extracted

Table 3 Heterotrait-Monotrait Ratio (HTMT)

Construct	Cooperation	Coordination	Partnership
Cooperation	*		
Coordination	0.86	*	
Partnership	0.79	0.80	*

fostering effective interprofessional teams collaborative practice is critical for ensuring safer and more client-centered care [22]. Although healthcare professionals generally hold positive attitudes towards interprofessional collaboration, various institutional barriers impede their participation in collaborative activities [23]. Communication, trust, respect, and mutual understanding are key concepts for both interprofessional and interorganizational collaboration. Challenges to establishing interprofessional collaborative practice include formalization and role clarification and creating a culture for team identity [24]. Despite positive attitudes towards interprofessional collaboration, several barriers hinder its effective implementation. These barriers include role ambiguity, divergent goals among team members, and disparities in authority and income [25]. Nevertheless, research has demonstrated that interprofessional education programs can significantly enhance students' skills, knowledge, and attitudes towards collaborative practice, ultimately promoting a more collaborative and effective healthcare environment once they enter professional practice [26].

The present study aimed to evaluate the psychometric properties of the Persian version of the Assessment of Interprofessional Team Collaboration Scale (P-AITCS-II) among Iranian healthcare providers. The findings revealed that the P-AITCS-II exhibits strong psychometric properties, including satisfactory content validity, construct validity, and reliability, indicating its suitability for assessing interprofessional team collaboration in this context.

Cronbach's alpha values for each item and each factor showed good internal consistency. An acceptable Cronbach's alpha is usually between 0.70 and 0.90 and a value of 0.98 or more indicates that there may be redundancy in the instrument [7]. In the first version of AITCS, Cronbach's alpha for partnership, cooperation, and coordination were 0.936, 0.927, and 0.898 respectively which suggest that there were potential redundancies within the instrument. In the shortened version of AITC to 23 items resulted in reduction in the alpha values of the concepts (partnership=0.898, cooperation=0.924, and coordination=0.898). The authors stated that this rating may indicate a possible redundancy still within the cooperation

subscale [12]. In the current study, convergent validity was confirmed by Average Variance Extracted (AVE) values exceeding 0.50 for all factors, indicating that the items within each factor sufficiently converge to represent the underlying construct. The discriminant validity analysis using the Heterotrait-Monotrait ratio (HTMT) revealed an acceptable value (HTMT=0.86). Following the guidelines set by Franke and Sarstedt (2019), an HTMT value lower than the threshold of 0.9 is indicative of discriminant validity being established (22).

Previous research has investigated the psychometric properties of the Assessment of Interprofessional Team Collaboration Scale (AITCS) across various cultural contexts. For example, both the Swedish and Italian versions of the AITC demonstrated acceptable validity and reliability for the three-factor structure of the questionnaire [3, 7]. Notably, none of these studies utilized Confirmatory Factor Analysis (CFA) in their evaluation of the scale's psychometric properties.

Limitations and strengths

This study utilized social media networks to distribute the questionnaire link, resulting in the participation of healthcare providers from various facilities across different provinces and cities. This diverse sampling approach can be considered a strength of the study. However, the relatively low number of participants and the disproportionate representation of nurses compared to other healthcare professionals are limitations. The minimal participation of other healthcare professionals may limit the generalizability of the findings and highlights the need for future research to engage a more balanced and representative sample of interprofessional healthcare providers.

Conclusion

The Persian adaptation of the Assessment of Interprofessional Team Collaboration Scale II (P-AITC-II), consisting of 23 items within three factors—partnership, cooperation, and coordination—has demonstrated good validity and reliability. However, as a self-reported questionnaire, it inherently possesses the limitations and potential biases associated with self-report measures. To further enhance the validity and reliability of such instruments, it is advisable to conduct qualitative studies that explore the concept of interprofessional team collaboration across diverse contexts, cultures, and professional groups. This approach can help capture a more comprehensive understanding of the complexities and nuances involved in interprofessional collaboration and contribute to the development of more robust assessment tools.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-024-12192-5>.

Supplementary Material 1.

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Informed consent

Participants were informed that their involvement in the study was completely voluntary. Consent to participate was implied upon the completion and submission of the questionnaire.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Authors' contributions

R.N. was involved in the conception and organization of the study. R.N. S.M. and M.G.J. were involved in data collection. S.E.S. participated in statistical analysis. R.N. prepared the first draft of the manuscript. All authors contributed to the critical review and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the principles of the Declaration of Helsinki, and it received ethical approval from the Alborz University of Medical Sciences' ethical committee, with the assigned ethics code [IR.ABZUMS.REC.1403.033]. On the first page of the online questionnaire, participants were provided with information about the study's aim, assurances of voluntary participation, as well as guarantees of confidentiality and anonymity of the provided information. Participants' voluntary completion of the questionnaire served as their willingness to contribute to the research and their informed consent to take part in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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