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Translating and validating the Ghosting Questionnaire into Arabic: results from classical test theory and item response theory analyses

Short title: the arabic version of the Ghosting Questionnaire

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Abstract

Background Ghosting refers to the sudden cessation of communication in interpersonal relationships. Ghosting has gained attention as a phenomenon commonly encountered in the context of digital communication. Earlier studies on ghosting mostly focused on Western societies while, in Arab societies, research into this practice has yet to be initiated. The current study aimed to address this gap by translating and validating the commonly used Ghosting Questionnaire (GHOST) into Arabic.

Methods The translation process involved forward and back translation, expert review, and pilot testing to ensure linguistic and cultural equivalence. A convenience sample of 607 participants from Bahrain, Egypt, Jordan, Oman, and Tunisia completed the Arabic version of the GHOST. Statistical analyses, including reliability testing and confirmatory factor analysis, were conducted to assess the psychometric properties of the instrument.

Results The Arabic version of the GHOST demonstrated high reliability. The Cronbach's alpha (α=0.87) and McDonald's omega (ω=0.87) coefficients indicated strong internal consistency. Test-retest reliability coefficients confirmed the stability of the responses over time (ICC 0.89, $p < 0.001$). CFA supported a single-factor structure in alignment with the conceptual framework of the original English version.

Conclusions The successful translation and validation of the GHOST into Arabic provide researchers with a reliable tool for investigating ghosting behavior within Arab societies. Future research endeavors can build upon these findings to explore the psychological implications of ghosting. Researchers can now also develop culturally sensitive understanding of online dating and related practices in Arab communities.

Keywords Assessment, Ghosting, Psychometrics, Scale, Arabic

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Introduction

Ghosting, the act of abruptly ending all communication in an established relationship, is viewed as an avoidance tactic employed by someone who avoids face-to-face confrontation [1, 2]. It seems easier and less stressful to exit relationships without explaining and defending one's decision [3]. The term, ghosting "unfriending" or "unmatching" on social media and ignoring the ghostee's calls, emails, and texts [1, 4]. Ghosting can occur gradually but usually occurs suddenly. It is usually abrupt but may stretch out over time [3, 5]. Kay and Courtice [6] define ghosting as the sudden end of a romantic connection without explanation. While this is the usual case, ghosting also occurs in friendships and professional interactions [2, 7].

Ghosting can manifest in various forms. Each type of ghosting reflects distinct relationship dynamics and social contexts. One common type is romantic ghosting where one partner in a romantic relationship abruptly cuts off all communication, leaving the other partner confused and distressed [3, 5]. Friendship ghosting occurs when one person in a platonic relationship withdraws from contact without explanation. This often leads to a breakdown in long-term social bonds [2, 7]. In professional ghosting, colleagues or potential employers suddenly cease communication. This is another variant of ghosting that affects trust and career opportunities. The behaviors and motivations behind ghosting can also differ significantly across societies. In Western individualistic cultures, ghosting may be viewed as a convenient way to end uncomfortable relationships or avoid conflict. It can be driven by a desire for personal autonomy and minimal emotional burden [2]. In contrast, in collectivist societies, ghosting may carry more significant social consequences due to the emphasis on interconnectedness, familial obligations, and community expectations. Understanding these cultural variations is essential for developing culturally sensitive interventions and expanding the theoretical frameworks surrounding ghosting.

The concept of ghosting emerged when traditions, particularly communication, changed and this has impacted mental health because of the implications of rejection in the context of dating. The emergence of media [8], notably social media platforms [5, 9], has changed everything [10]. Technology allows quick global communication across time, geography, and language. Long-distance relationships can now be established by messaging and video conferencing. Mobile apps are now the main way people meet to establish meaningful relationships [11, 12]. The rise of "online vigilance", i.e., monitoring online events such as dating app activity, has almost done away with face-to-face interactions in the early days of a relationship [13]. The emergence of COVID-19 aggravated this trend [14]. The advent of remote dating appears to have given some individuals a sense that ghosting is interpersonally okay and need not induce guilt. Due to mobile technology and social media, ghosting has become a sanctioned way to exit relationships and without misgivings [15].

It is now possible, via online monitoring techniques, to detect ghosting events [7] and the phenomenon has acquired psychological significance. The topic can be studied with respect to cause within the domains of social attachment, personality traits, and mental health. Attachment theory implies that not forming early ties with parents might lead to attachment avoidance in adulthood [16]. People falling into the category of the "dark triad," narcissism, Machiavellianism, and psychopathy, have been considered as the ones most likely to avoid unpleasant conversations and, thus, show an inclination to ghost [1, 15, 17]. Such persons are eager above all to avoid suffering but show little concern about the suffering of others [18]. The suffering that results from being ghosted can have serious log-term psychological effects [5, 18], impairing future relationships [7]. Understanding causes and effects is a young field of study – much remains to be known.

To further this field of study, reliable and validated tools must be developed to identify psychometric factors. Jahrami and colleagues [4] developed the first-ever Ghosting Questionnaire (GHOST) to address this need. GHOST is based on the Shannon–Weaver communication model [19], which lists six key ghosting components consisting of sender, encoder, channel, noise, decoder, and receiver. The encoder converts the sender's message for transmission; noise is any unwanted interference that could distort or conceal the message. Noise can impair encoded message transmission through the transmission channel. The receiver interprets the message after decoding. Interference is common. A sender who anticipates a mobile phone response but does not receive it may attribute it to communication breakdowns rather than to the recipient's decision to ignore, delete, or postpone a response. Multiple unanswered messages suggest ghosting. GHOST is the first self-reported measure for assessing the experience of being ghosted.

GHOST consists of eight items that evaluate neglect, tardiness, ambiguity, barriers, absence, inconsistency, vulnerability, and withdrawal within the paradigm of ghosting. Participants rate each item on a 6-point scale ranging from 1 (never) to 5 (always) to indicate the frequency with which they have experienced the list of ghosting behaviors. GHOST has demonstrated adequate reliability and validity and was developed using rigorous qualitative methods [4].

Arab societies traditionally obey cultural and religious standards in social interactions; dating is traditionally taboo [20]. But internet dating and online marital services can bypass bans and taboos, and are, thus, becoming very

popular [21]. Online connectivity in Saudi Arabia is valued beyond romantic relationships because it facilitates open communication in regions where open communication is constrained [22]. Social media use in the Middle East is also increasing [23] and facilitates online relationships with people across the world [24]. Since the existing research on ghosting mostly originates from the Western world [2], a valid and reliable tool for measuring ghosting in Arabic would encourage researchers to study ghosting from an Arab perspective. Systematic measurement of ghost behaviors would help researchers understand online relationship dynamics and, ideally, design strategies to improve them. The current study, therefore, was designed to translate GHOST into Arabic to help Arab researchers and communities understand ghosting in their respective cultures. The theoretical implications of this study would be significant. It will offer a validated instrument that would facilitate the examination of ghosting behaviors in Arab societies that are currently under-researched for evaluating ghosting behavior. More information would be gathered by researchers on how ghosting operates within distinct cultural, religious, and social norms. The Arabic GHOST would equip mental health professionals, educators, and researchers with a reliable tool to assess the psychosocial effects of ghosting. It would be used to develop interventions targeting the negative emotional and relational consequences of ghosting. Research on ghosting in Arab countries would facilitate Arab societies in fostering healthier communication strategies in both personal and professional relationships.

Methods
The process of translating GHOST into Arabic
There were five crucial stages involved in both the translation and the back-translation of GHOST. First, the task of making GHOST more accessible to Arabic speakers while precisely capturing the meaning of each item was delegated to two very skilled translators who were proficient in both English and Arabic. After translation into Arabic, they reached a consensus on the accuracy and clarity of the Arabic version. This version was then translated back into English by two new translators not involved in the first stage, who were fluent in both English and Arabic. The next step involved a multilingual specialist examining the two back-translations looking for errors. The translators and research authors checked for inconsistencies to ensure that the Arabic version matched the original English. The intraclass correlation coefficient [25] and Cohen's kappa coefficient [26] are well-known statistical methods for measuring rater consensus. These criteria were used to assess translation reliability and accuracy. For each questionnaire item, a kappa coefficient, or intraclass correlation coefficient, was calculated to determine the translators' agreement. Both

Cohen's kappa and the intraclass correlation coefficients were greater than 0.99, indicating translation compatibility. The final step was pilot testing to ensure that the Arabic version was easy to understand. Twenty-five Arabic speakers from the research team completed the questionnaire. The pilot test of GHOST went smoothly.

The term ghosting was defined as the abrupt termination of interaction without explanation [4]. As in the original version [4], a five-point Likert scale was used in the translated version, which consists of eight items and includes the following categories: never (1), rarely (2), sometimes (3), often (4), and always (5).

Participants
The study included a total of 607 participants from Bahrain, Egypt, Jordan, Oman, and Tunisia. They included 142 males (23%) and 465 females (77%). In terms of marital status, 527 participants (87%) were unmarried, and 80 participants (13%) were married. The educational qualifications of 549 participants (90%) were undergraduates, and 58 participants (10%) were graduates. The mean age of the participants was 23 years (SD=5.67). The participants were engaged through the convenient sampling technique.

Sample size and power calculation
Factor analysis indicated that about 500 participants were needed to validate the Arabic version of the questionnaire. It was recommended to have five to ten participants per question/item [27]. Therefore, we aimed for a minimum of 500 participants (100 from each country). Ultimately, 607 participants completed the survey: 104 from Bahrain, 109 from Egypt, 164 from Jordan, 103 from Saudi Arabia, and 127 from Tunisia.

Data collection
The participants were recruited through a convenience sampling technique, primarily via advertisements. In order to gather a diverse pool of participants, various platforms and mediums were utilized to reach out to potential individuals. These included online platforms such as social media websites, online forums, and community groups, etc. There needed to be between five and ten participants for each questionnaire item, according to the typical norms for social surveys [28]. The current study involved 607 participants against 8 items of GHOST.

Ethics
The Declaration of Helsinki from 1964 and all subsequent amendments to the Declaration of Helsinki were followed throughout the study. Ethical approval was provided by Faculty of Arts, Menoufia University, Egypt

(MH-12082023). Each participant willingly provided consent to participate.

Statistical analyses

Descriptive statistics, such as the mean and the standard deviation, were applied to provide a description and summary of the findings. Cronbach's alpha and McDonald's omega were utilized to assess the degree of internal consistency. We regarded a reliability level greater than 0.75 as acceptable to determine the degree to which the scores remained consistent over time, an intraclass correlation analysis was carried out. To examine the factor structure of the Arabic version, we utilized confirmatory factor analysis (CFA). It was concluded, based on the one-factor model, that all the items assessed the same construct following the original form written in English. To conduct CFA, the maximum likelihood estimation approach was utilized, and structural equation modeling (SEM) was considered. Several fit indices, including the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR), were utilized to evaluate the degree to which the models presented a satisfactory level of fit [29]. The statistical procedures were carried out with the help of the R Statistical Foundation (version 4.3.2). A p-value that was either less than or equal to 0.05 was utilized in all the analyses.

Results

Reliability of a scale is of extreme importance because it ensures consistency in the measurement of a construct over time and across various conditions. In the case of the Arabic version of the GHOST scale, the reliability was thoroughly assessed using multiple statistical methods. First, internal consistency reliability, which indicates how well the items on the scale measure the same construct, was evaluated using Cronbach's alpha. The scale demonstrated high internal consistency, with a Cronbach's alpha of (Table 1; $\alpha=0.87$). This value suggests that the

Table 1 Reliability of the arabic version of the Ghosting Questionnaire (n = 607)

Coefficient	Cronbach's α	McDonald's ω	ICC
Point estimate	0.87	0.87	0.89
If item deleted			
Item #1	0.86	0.86	NA
Item #2	0.85	0.85	NA
Item #3	0.85	0.85	NA
Item #4	0.84	0.85	NA
Item #5	0.85	0.85	NA
Item #6	0.84	0.84	NA
Item #7	0.85	0.85	NA
Item #8	0.84	0.85	NA

Notes: The intraclass correlation coefficient (ICC) was computed based on test-retest results for a subsample of 127 participants only

items are closely related to one another, providing a reliable measure of the construct. Additionally, McDonald's omega, another robust measure of internal consistency, yielded a similarly strong result, with a value of (Table 1; $\omega=0.87$). McDonald's omega is often considered a more precise estimate of reliability as it takes into account the hierarchical structure of the data and factor loadings, further confirming the scale's reliability. To evaluate the scale's stability over time, test-retest reliability was assessed using the intraclass correlation coefficient (ICC). This method tests how consistent the results of the scale are when administered to the same individuals on two separate occasions. In this study, 127 participants completed the questionnaire twice, with a two-week interval between the administrations. The ICC value (Table 1; ICC=0.89; $p<0.001$) indicates excellent test-retest reliability, demonstrating that the scale provides stable and consistent results over time.

Confirmatory Factor Analysis (CFA) was performed to evaluate the factor structure of the Arabic version of the GHOST scale. The results indicated that the assumed single-factor model provided an excellent fit to the data, as demonstrated by various incremental fit indices. Specifically, the Comparative Fit Index (CFI) was 0.97, the Tucker-Lewis Index (TLI) was 0.96, and the Normed Fit Index (NFI) was 0.96 (Table 2), all of which exceed the commonly accepted threshold of 0.95, suggesting a strong compatibility between the model and the data. Additionally, absolute fit indices further supported the model's adequacy. The Root Mean Square Error of Approximation (RMSEA) was 0.06, and the Standardized Root Mean Square Residual (SRMR) was 0.03 (Table 2), both of which fall below the recommended cutoffs of 0.08 and 0.05, respectively, indicating a satisfactory fit. These values suggest that the model's residuals are small and that it accurately captures the variance in the observed data. The significant chi-square value ($\chi^2 = 67$, $p<0.001$) may be attributed to the large sample size, which can often inflate the chi-square statistic, making it significant even in well-fitting models (Table 2). Moreover, the factor loadings for the individual items of the scale ranged from 0.56 to 0.81 (Fig. 1), all of which were statistically significant. These loadings are indicative of a strong relationship between each item and the underlying latent factor i.e. the psychological construct of ghosting. The average variance extracted (AVE) was 0.572, which meets the recommended threshold for convergent validity, confirming that the items converge well to represent the same construct. The absence of cross-loading validates that the GHOST scale exclusively measures its intended construct without overlapping with unrelated psychological constructs. The combination of high incremental fit indices, appropriate absolute fit measures, and strong

Table 2 Confirmatory factor analysis of the arabic version of the Ghosting Questionnaire (n = 607)

Fit indices	Value
Comparative Fit Index (CFI)	0.97
Tucker–Lewis Index (TLI)	0.96
Bentler-Bonett Nonnormed Fit Index (NNFI)	0.96
Bentler-Bonett Normed Fit Index (NFI)	0.96
Parsimony Normed Fit Index (PNFI)	0.69
Bollen's Relative Fit Index (RFI)	0.95
Bollen's Incremental Fit Index (IFI)	0.97
Relative Noncentrality Index (RNI)	0.97
Root mean square error of approximation (RMSEA)	0.06
RMSEA 90% CI lower bound	0.05
RMSEA 90% CI upper bound	0.08
RMSEA p-value	0.1
Standardized root mean square residual (SRMR)	0.03
Hoelter's critical N ($\alpha = 0.05$)	284.16
Hoelter's critical N ($\alpha = 0.01$)	339.66
Goodness-of-fit index (GFI)	0.99
McDonald fit index (MFI)	0.96
Expected cross validation index (ECVI)	0.19
Log-likelihood	-6581.68
Number of free parameters	24
Akaike (AIC)	13211.37
Bayesian (BIC)	13317.17
Sample-size adjusted Bayesian (SSABIC)	13240.98
X^2	67, $p > 0.001$

Notes: Based on a one-factor solution. Maximum likelihood estimation is a technique used to estimate parameter values for a model

factor loadings underscores the robustness of the scale's psychometric properties.

The difficulty parameter estimates indicate that all items had reasonably high difficulty, with values ranging from −0.95 to -1.89. Item #2 was the most difficult, while item #8 was the easiest. The standard errors for the difficulty estimates were uniformly low, ranging from 0.05 to 0.05, indicating precise estimation. The tau parameter estimates provide information about how each item discriminates between respondents with different levels of the latent trait. Items #1 through #7 had similar tau estimates across the 5 categories, with slightly higher values for the extreme categories, suggesting that these items distinguish well between very low and very high scorers. Item #8 had marginally lower tau estimates, indicating that it may not discriminate as strongly, particularly for the extreme scoring categories. The IRT results demonstrate that the Arabic Ghosting Questionnaire items have adequate difficulty and discrimination parameters to effectively measure individual differences in the latent ghosting trait (Table 3; Fig. 2).

Discussion

In recent years, "ghosting," the unexpected cessation of interpersonal connection [4], has gained increased attention [1–3, 5–7]. Ghosting is the abrupt discontinuation of communication without explanation. It can take the form of ignoring calls, emails, and texts, causing people to become confused and hurt [30]. This might occur quickly or gradually [1, 17, 30]. It is an extreme form of avoidance [18]. Ghosting can occur in both intimate and professional relationships [5, 7, 8, 31, 32]. In the age of the internet, information technology and social media platforms have made ghosting more prevalent and widespread [9, 15, 18]. This excessive avoidance tendency affects personal and professional relationships, causing confusion and unresolved feelings. The current study translated and validated the Ghosting Questionnaire (GHOST) into Arabic to address the absence of Arab ghosting research.

Translating the GHOST into Arabic followed strict guidelines. Forward and reverse translation, expert review, and pilot testing were used. Strong Cronbach's alpha and McDonald's omega reliability coefficients indicate the Arabic version's internal consistency. A significant test-retest reliability coefficient boosts the instrument's trustworthiness. This shows that the reactions are constant over time. The confirmatory factor analysis showed that the Arabic GHOST had a robust one-factor structure, supporting the conceptual framework of the initial English version.

By successfully translating GHOST into Arabic, ghosting behavior in Arab cultures and socioeconomic circumstances can be studied. Ghosting can illuminate communication patterns, especially in the context of changing social norms and technological advances. Arab societies have unique interpersonal conventions and values. The cultural and religious norms of Arab civilizations affect social interactions, particularly romantic and platonic relationships. Online communication platforms and social media create opportunities and challenges for interpersonal connections [21–24]. Ghosting, a behavioral phenomenon, may represent societal perspectives on communication, conflict resolution, and social etiquette. Ghosting can cause rejection, perplexity, and lower self-esteem in the ghostee.

Ghosting and Arab mental health, interpersonal trust, and relationship satisfaction may be studied in the future. With the translation and validation of the GHOST into Arabic, researchers can now employ a reliable instrument to study interpersonal communication dynamics and cultural variables that affect relationship maintenance and breakdown. Ghosting may have cultural implications; therefore, if researchers understand ghosting in many cultures, they can develop culturally tailored therapies and ways to improve communication.
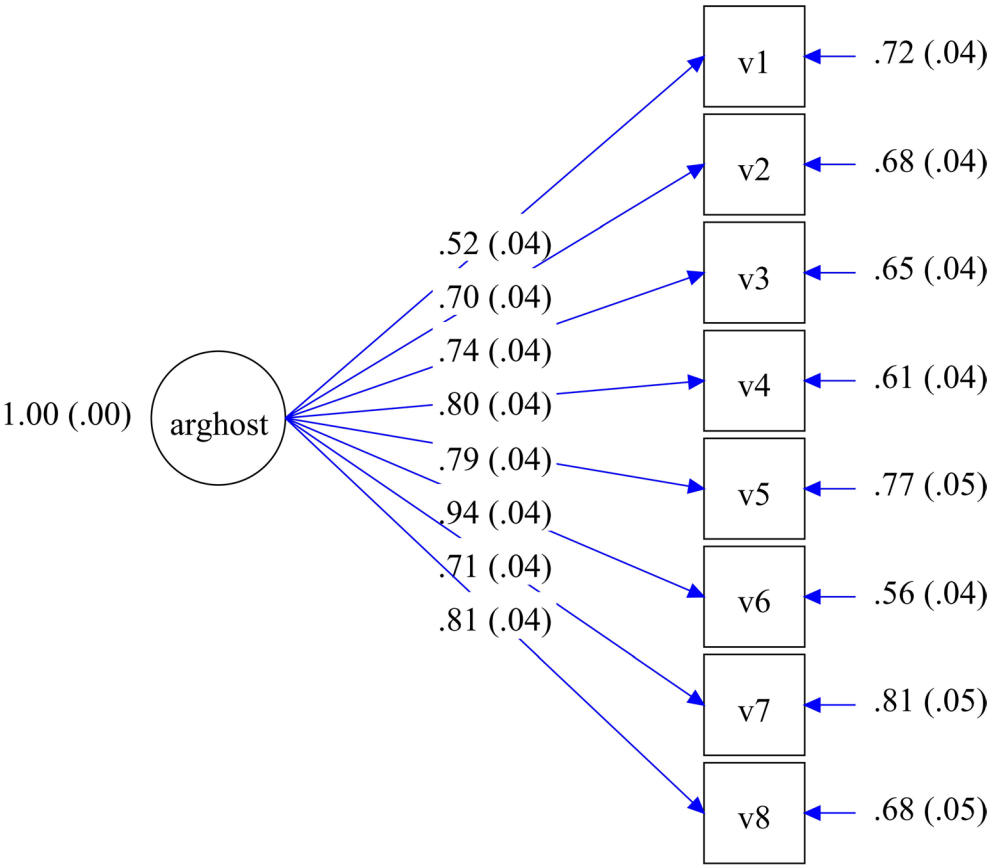
Fig. 1 Factor loading of the Arabic version of the Ghosting Questionnaire (n = 607). Notes for Fig. 1: Path diagram illustrating the relationships between the latent variable "arghost" = Arabic Ghosting Questionnaire and observed variables v1 to v8. The diagram includes standardized factor loadings with standard errors in parentheses. Maximum likelihood estimation is a technique used to estimate parameter values for a model

Table 3 Item response theory analysis of the arabic version of the Ghosting Questionnaire (n = 607)

Items	Difficulty	Difficulty (S.E.)	tau parameters				
			1	2	3	4	5
Item #1	-1.3	0.05	-32.13	6.2	6.63	9.2	10.11
Item #2	-1.89	0.05	-30.22	5.68	6.68	8.26	9.6
Item #3	-1.16	0.05	-31.4	6.14	7.43	8.24	9.6
Item #4	-1.37	0.05	-30.94	6.09	7.13	8.3	9.42
Item #5	-1.24	0.05	-31.49	6.54	7.42	8.4	9.13
Item #6	-1.76	0.05	-30.7	6.15	7.19	8.27	9.08
Item #7	-1.47	0.05	-30.57	6	7.17	8.09	9.31
Item #8	-0.95	0.05	-32.35	6.93	7.64	8.43	9.35

Notes: Based on the Rasch model. *Delta-tau parameterization of the partial credit model. Difficulty: Negative values indicate items are generally easy for participants. Standard Error (S.E.): Consistent at 0.05, indicating precise estimates. Tau Parameters: Represent thresholds for response category transitions

Strengths and weaknesses

GHOST was verified and translated into Arabic with great effort. This project will simplify Arab ghosting research in many sociocultural contexts. Additionally, it will increase the cross-cultural use of GHOST. Future investigations should investigate GHOST's convergent and discriminant validity and link ghosting to the psychosocial characteristics of Arab people.

Implications and future directions

The current study provides several key implications for both theory and practice. The findings would be highly helpful in the domain of relationship dynamics and psychosocial health in Arab societies. The successful adaptation and validation of the Ghosting Questionnaire (GHOST) into Arabic contributes to the growing body of cross-cultural research on ghosting. Most importantly, this highlights the relevance of this construct beyond
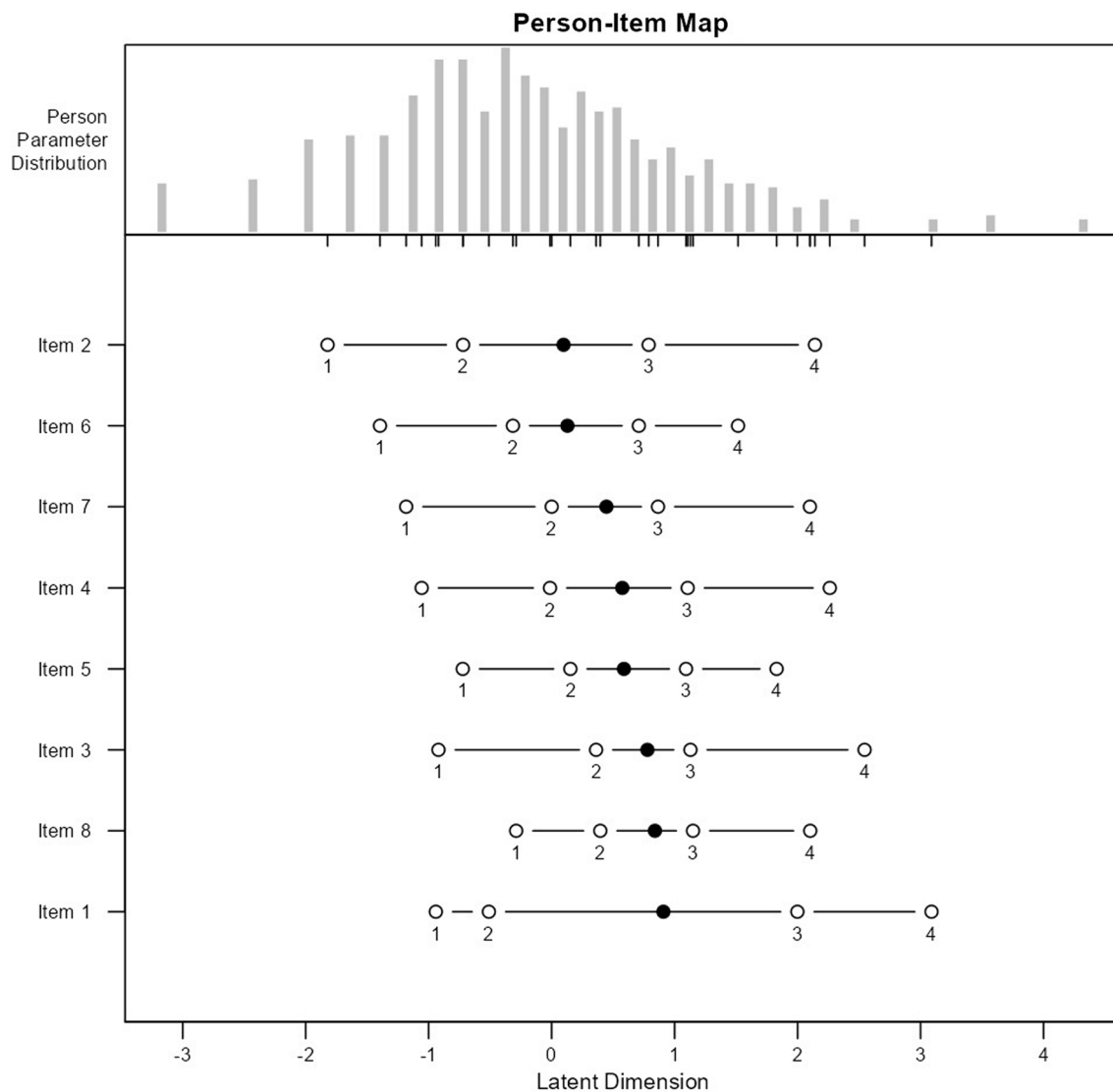
Fig. 2 Person-item map of the Arabic version of the Ghosting Questionnaire (n = 607). Notes for Fig. 2: The Person-Item Map illustrates the distribution of person parameters (top) and item thresholds (bottom) within a latent dimension. The histogram at the top represents the distribution of person abilities, while the item threshold locations are marked along the latent dimension for each item. Each item is shown with its response categories, indicating the points where transitions between categories occur

Western contexts. The newly translated scale would allow researchers to study ghosting behaviors in collectivistic Arab cultures where religion and traditional values are of extreme importance. The Arabic GHOST would also serve as a valuable tool for mental health professionals and relationship counselors in Arab countries. It will enable them to assess and address the psychological effects of ghosting with greater precision. They would be in a better position to tailor specific interventions to promote healthy communication and emotional wellbeing.

Future research should continue to explore ghost behaviors across diverse cultural and socio-economic contexts, comparing its prevalence and impact in various regions. Longitudinal studies could provide deeper insights into the long-term effects of ghosting on mental health and relationship stability, particularly in collectivist cultures. Future studies could also examine how factors such as gender, age, and technological advances influence ghosting behaviors in Arab societies. Expanding research on the psychological coping mechanisms employed by individuals who experience ghosting in such contexts would also offer valuable insights for developing more targeted therapeutic interventions.

Conclusions

This study was undertaken because of a lack of a psychological tool to analyze Arabic ghost behavior. The only instrument used to measure ghosting, the GHOST, was

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translated and validated in Arab populations. We used forward and backward translation and psychometric tests such as confirmatory factor analysis, internal consistency, test-retest reliability, and goodness of fit. The confirmatory factor analysis revealed a one-factor structure that matched the first English GHOST. The Arabic GHOST, therefore, is reliable and valid for assessing Arabic speakers' ghosting experiences. This change simplifies research and clinical evaluations in Arab countries, which aids ghosting research in large populations. Future research should examine cultural differences in Arabic-speaking ghosting behavior as compared to countries where online dating sites have existed for longer periods. The questionnaire also needs to be validated in clinical settings.

Abbreviations

AIC	Akaike Information Criterion
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
ECVI	Expected Cross Validation Index
GHOST	Ghosting Questionnaire
GFI	Goodness-of-Fit Index
ICC	Intraclass Correlation Coefficient
IFI	Incremental Fit Index
NFI	Normed Fit Index
NNFI	Nonnormed Fit Index
PNFI	Parsimony Normed Fit Index
RFI	Relative Fit Index
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SRMR	Standardized Root Mean Square Residual
SSABIC	Sample-size Adjusted Bayesian Information Criterion
TLI	Tucker-Lewis Index

Author contributions
KT, HG, ZS, AHP, HJ involved in conception and performed experiment. WH, AAMSS, AA, KT, HG, ZS, MH, HJ collected data. AHP and HJ performed all analyses. WH, AAMSS, AA, KT, HG, ZS, MH, SRPP, MVS, AHP, HJ wrote the main manuscript text. WH, AAMSS, AA, KT, HG, ZS, MH, SRPP, MVS, AHP, HJ reviewed the first draft and provided critical revisions. All authors reviewed and approved the manuscript.

Data availability
The data that support the findings of this study are available from the corresponding author based upon request.

Declarations

Ethics approval and consent to participate
The research received approval from the Institutional Review Board at the Faculty of Arts, Menoufia University, Egypt (MH-12082023). All methods were conducted in accordance with relevant guidelines and regulations. The study procedures adhered to the ethical guidelines outlined in the Helsinki Declaration of 1964 and its later amendments (1975, 1983, 1989, and 1996). Informed consent was obtained from all subjects.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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