Research Article

Stuttering Knowledge among Primary School Teachers in Zahedan, Iran: A Cross-Sectional Survey

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Article info:
Received: 11 Jul 2026
Accepted: 14 Oct 2026

Citation: Sakhai F, Arab Nakhaei M, Asadollahpour F. Stuttering Knowledge Among Primary School Teachers in Zahedan, Iran: A Cross-Sectional Survey. Journal of Modern Rehabilitation. 2027;21(2):?-?

Running Title: Stuttering Awareness in Iranian Primary Schools: A Survey of Teachers' Knowledge

Abstract

Background: Primary school teachers play an important role in supporting children who stutter (CWS), and adequate knowledge of stuttering can help them respond appropriately in educational settings. Previous research has identified gaps and misconceptions among teachers, especially regarding causes of stuttering, but evidence from Iran remains limited. This study examined stuttering knowledge among primary school teachers in Zahedan, Iran, and its associations with demographic characteristics and attitudes.

Materials and Methods: In this cross-sectional survey, 136 primary school teachers from 26 urban schools in Zahedan completed the 26-item Alabama Stuttering Knowledge (ASK) Test and the Public Opinion Survey of Human Attributes–Stuttering (POSHA-S). ASK scores (0–26) were summarized descriptively. Associations of demographic characteristics with ASK total score were examined using multiple linear regression, and associations between ASK score and POSHA-S subscales were assessed using Spearman correlations.

Results: Mean ASK score was 14.28 (SD = 2.72; 54.9% correct), with item accuracy ranging from 12.5% to 91.2%. No significant associations emerged between knowledge and demographic or attitudinal variables.
Conclusions: Teachers answered just over half of the ASK items correctly, with notably low accuracy on etiology items. The null knowledge–attitude finding warrants replication in larger samples. Results underscore the need for culturally responsive teacher training addressing both knowledge and underlying beliefs.
Keywords: Stuttering; School Teachers; Knowledge, Attitudes; Iran

Introduction

Stuttering is a neurodevelopmental speech disorder characterized by involuntary disruptions in speech, including repetitions, prolongations, or blocks [1]. It typically emerges in early childhood, and many children recover naturally, although stuttering persists into the school years for about 20% of affected children [2-4]. For children who stutter (CWS), primary school environments can present challenges extending beyond speech fluency itself. Children may show reduced willingness to participate verbally and encounter difficulties in peer interactions [5-10], and teachers report encountering bullying involving CWS in school settings [11]. Some teachers, however, use strategies that are not consistent with recommended approaches to supporting students who stutter, such as advising CWS to "speak slowly" or instruction them to simply ignore bullying [11-13].

Teachers play a critical role in shaping the educational and social experiences of CWS, and their knowledge and attitudes toward stuttering significantly influence classroom support [14]. Yet global studies reveal persistent gaps in teachers' understanding, with misconceptions about stuttering's causes and management [15-19]. For example, Australian pre-service teachers have been reported to attribute stuttering to psychological factors [16], whereas teachers in New Zealand have shown relatively positive attitudes alongside limited knowledge of effective support strategies [18]. Similar knowledge gaps, stereotypes, or perceived lack of preparedness have been reported among teachers in Egypt, Kuwait, Belgium, and Poland [17, 19-21]. In Greece, a study using the Alabama Stuttering Knowledge (ASK) Test and the Teacher Attitudes Toward Stuttering (TATS) Inventory reported an association between teachers' knowledge and attitudes toward stuttering [14]. These findings, drawn from a range of countries and assessed with different knowledge and attitude measures, suggest that the relationship between knowledge and attitudes may vary across populations and educational contexts; however, differences in instrumentation across these studies limit direct comparison.

Studies that assessed knowledge with the same instrument as the present study, the ASK Test, therefore provide a more directly comparable benchmark, particularly among the geographically and culturally proximate Middle Eastern samples reviewed below. In Iraq, most of a large sample of primary school teachers in Baghdad demonstrated poor stuttering knowledge, and no significant relationship was found between teachers' demographic characteristics and their knowledge [22]. In neighboring Jordan, resource-room teachers similarly showed a low overall level of stuttering knowledge, although in that sample knowledge differed significantly by academic qualification and years of experience, favoring holders of graduate degrees and more experienced teachers [23]. Most recently, a study of Saudi Arabian secondary school teachers using a modified Arabic ASK Test reported a mean score lower than those observed in earlier ASK-based studies, alongside persistent misconceptions about the causes of stuttering and no significant association with teaching experience [24]. Taken together, these regional findings point to generally limited, and at

times inconsistent, stuttering knowledge among Middle Eastern educators, underscoring the need for further country-specific investigation such as the present study.

The recurring finding of etiological misconceptions across these studies can be partly contextualized within explanatory-model frameworks from medical anthropology, which describe lay understandings of a health condition as encompassing questions concerning what the condition is, what caused it, how it will develop, and what should be done about it [25]. Causal explanations are particularly sensitive to culturally transmitted, religious, and supernatural beliefs, whereas symptom recognition and treatment knowledge may be shaped more strongly by personal experience, observation, and formal health education [26-29]. Consistent with this framework, misconceptions about the causes and characteristics of stuttering have been reported among teachers and other members of the public, including attributions to emotional trauma or parenting [8, 14, 21], alongside broader negative attitudes such as pity or discomfort when interacting with people who stutter [17]. Such cultural attributions, where present, could plausibly contribute to the pattern of etiological knowledge gaps observed in the ASK-based studies above; however, knowledge, cultural beliefs, and attitudes are distinct constructs that were not jointly assessed in most of this literature and should not be assumed to share the same underlying causes.

Demographic characteristics may also correlate with teachers' stuttering knowledge, though evidence is mixed. In Jordanian resource-room teachers, ASK scores differed significantly by academic qualification and years of experience [23], while age, educational level, and teaching experience were plausible but non-significant correlates among early-childhood educators [14]. In a large Iraqi sample of primary school teachers, no significant association was found between knowledge and demographic characteristics, including age, gender, marital status, and education level [22]. Parenthood was also considered, given that ASK-based research has demonstrated differences in stuttering knowledge between parents of CWS and parents of children who do not stutter (CWNS) [30] , suggesting that personal family experience may be relevant. Gender, marital status, and parental status were therefore included as theoretically and descriptively relevant background variables, while recognizing that existing evidence does not establish them as consistent predictors of knowledge. Examining these variables may help identify whether particular teacher groups would benefit from targeted education about stuttering.

In Iran, however, empirical evidence regarding primary school teachers' knowledge of stuttering remains limited, and it is not known whether the patterns of etiological misconception observed elsewhere in the region are also present in this population. Given the role of teachers in the school experiences of CWS, establishing the extent and pattern of teachers' knowledge may help identify areas that could be addressed through teacher education. This study examined stuttering knowledge among primary school teachers in Zahedan, Iran, using the ASK Test, and explored its association with attitudes toward stuttering measured by the POSHA-S. The study aimed to characterize overall and item-level knowledge of stuttering and to examine whether ASK scores were associated with teacher characteristics and attitudes toward stuttering. The findings may help identify topics that warrant greater attention in future teacher education and research.

Materials and Methods

Study Design and Ethical Considerations

This descriptive-analytical cross-sectional study was conducted from March to May 2025 in Zahedan, Iran, to evaluate stuttering knowledge and attitudes among primary school teachers. Ethical approval was granted by the Zahedan University of Medical Sciences Ethics Committee

(Ethics code: [IR.ZAUMS.REC.1403.385]), and all participants provided written informed consent prior to participation.

Participants and Sampling

The study included 136 primary school teachers from grades 1–6, recruited from 26 urban elementary schools in Zahedan, out of 282 eligible schools (Schools for children with special needs were excluded). Schools were selected via stratified random sampling, stratified by gender (boys'/girls') and management type (public/private), using an online random number generator (Calculator.net). The final sample comprised 17 public schools (8 girls' and 9 boys') and 9 private schools (4 girls' and 5 boys'). Within each selected school, all teachers meeting eligibility criteria, grades 1–6 with at least three years of teaching experience, were invited to participate using educator lists provided by the Zahedan Department of Education. Teachers were approached during scheduled break periods; those who provided written informed consent were included, while teachers who declined or withdrew were excluded. Because all eligible teachers within a selected school were invited, sampling at the teacher level constituted a census within schools rather than a further random draw. Although the sampling design involved teachers nested within 26 schools, school-level identifiers were not retained in the final dataset in order to preserve participant anonymity, as required by the ethics protocol (IR.ZAUMS.REC.1403.385). Sample size calculation used WINPEPI version 3.18, based on a prior study's mean ASK knowledge score of 15.13 (SD = 2.4) [14], with α=0.05, β=0.05, precision d=0.6, 15% non-response rate, and design effect=2, yielding a minimum of 136 participants.

Measures

Stuttering Knowledge (ASK Test)

Stuttering knowledge was assessed using the ASK Test, a 26-item true/false questionnaire evaluating understanding of stuttering's etiology, characteristics, and management. Total scores range from 0 to 26, with higher scores indicating greater knowledge [30]. The Persian version used in this study was developed and validated by Golmohammadi et al. (unpublished data, cited with permission) through a structured cross-cultural adaptation process based on established questionnaire adaptation guidelines [31, 32]. The process included independent forward translation, back-translation, expert committee review, and qualitative assessment of content and face validity by an 11-member expert panel and Persian-speaking teachers. During content and face validity assessment, items were evaluated for scientific appropriateness, clarity, simplicity, readability, cultural appropriateness, and comprehensibility. Items containing ambiguous, outdated, grammatically problematic, or scientifically unsupported wording were revised to improve clarity and ensure consistency with contemporary evidence on stuttering while preserving the intended construct and the scoring direction of reverse-scored items. In a separate psychometric evaluation of 85 middle school teachers, the Persian ASK demonstrated satisfactory internal consistency (Cronbach's α = 0.87) and high test–retest reliability (r = 0.905) over a 10-12-day interval.

Attitudes Toward Stuttering

Attitudes were measured using the Public Opinion Survey of Human Attributes–Stuttering (POSHA-S), which provides an Overall Stuttering Score and subscales (Beliefs About People Who Stutter and Self-Reactions to People Who Stutter) ranging from -100 to +100 [33]. The Persian version of the POSHA-S is a valid and reliable tool for assessing public attitudes toward stuttering

in Iran [34], with established face validity and high test-retest reliability (Pearson correlation $p < 0.000$, agreement 80.43%–90.27%).

Demographic Questionnaire

In this study, the POSHA-S was used solely to examine correlations with ASK scores. A demographic questionnaire collected data on gender, age (≤33, 34–41, or >41 years), education level (bachelor's, master's, or doctorate), marital status, and parental status.

Procedure

Following institutional approval and coordination with the Zahedan Department of Education, school principals were contacted to arrange data collection visits. Research assistants visited each selected school and met with eligible teachers during designated break periods. After obtaining written informed consent, participants were provided with comprehensive instructions regarding survey completion. Participants completed paper-based or optional online surveys, including the ASK, POSHA-S, and demographic questionnaire, within 15-30 minutes during recess to minimize disruption. A one-week period was provided for questionnaire completion, with responses returned in sealed envelopes to ensure confidentiality. Research assistants remained available during the completion period to address any questions or concerns. Completed surveys were collected by research assistants and transported to the research center for data entry and analysis.

Statistical Analysis

Data were analyzed using Stata version 14 (StataCorp LLC, College Station, TX, USA). The ASK total score was calculated by summing correct responses across the 26 dichotomous items (range 0–26), with higher scores indicating greater stuttering knowledge, and was treated as a continuous variable throughout. Its distribution departed significantly from normality (Shapiro–Wilk test, Q-Q plot inspection), so non-parametric procedures were used for correlational analyses. Continuous variables (ASK total score, POSHA-S Overall Stuttering Score and subscales) are reported as means and standard deviations; categorical demographic variables are reported as frequencies and percentages. Overall knowledge was additionally summarized using the observed range, 95% CI for the mean, and percentage of the maximum attainable score. Of 3,536 possible item responses, 66 (1.9%) were unanswered. No participant had two or more unanswered items; therefore, no participants were excluded from total-score analyses. Participants with a single unanswered item were retained, with the unanswered item coded as incorrect according to the prespecified ASK scoring convention [30]. Item-level proportions correct were calculated using participants who responded to each item as the denominator, with corresponding 95% CIs.

A multiple linear regression model was tested, entering all five sociodemographic variables simultaneously (age, gender, educational level, marital status, and parental status) as explanatory variables, with ASK total score as the criterion variable. Education, marital status, and parental status were entered as indicator (dummy) variables, referenced to undergraduate degree, unmarried, and non-parent, respectively. An ANOVA of the regression model was conducted to test whether the set of predictors significantly improved estimation of ASK score relative to an intercept-only model. For each explanatory variable, the unstandardized (B) and standardized (β) regression coefficients, standard errors, and t-scores were calculated to evaluate its individual contribution to the model. Model fit was assessed using the coefficient of determination (R^2) and adjusted R^2. Tolerance and the variance inflation factor (VIF) were calculated for each predictor to assess the assumption of non-multicollinearity. Despite non-normality of the ASK total score,

ordinary least squares regression was used because regression assumptions concern the residuals rather than the marginal distribution of the outcome. Residual diagnostics were assessed, and sensitivity analyses used heteroscedasticity-consistent (HC3) robust standard errors and exclusion of influential observations. Associations between ASK total score and POSHA-S scores (Overall, Beliefs, and Self-Reactions) were examined using Spearman's rank correlation coefficient, consistent with the non-normal distribution of ASK scores. All tests were two-sided, with significance set at $p < 0.05$.

Results

Of 145 teachers invited, 140 were assessed for eligibility, and 136 completed and returned questionnaires for analysis (Fig. 1).

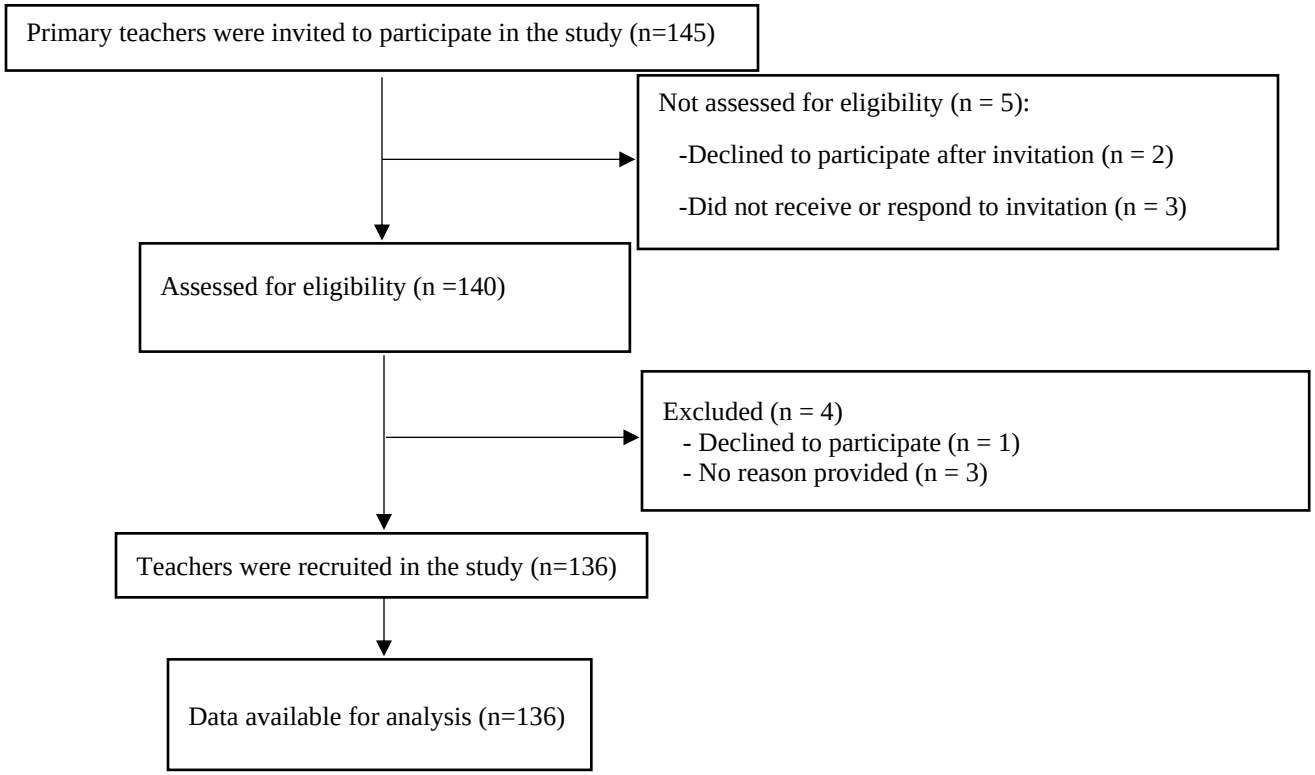


Fig. 1 Schematic flowchart of participant recruitment showing initial invitations (145 teachers), exclusions (9 teachers), and final inclusion of 136 primary school teachers

Participant Characteristics

A total of 136 primary school teachers from 26 urban elementary schools in Zahedan, Iran, completed the survey. Participants ranged in age from 24 to 55 years (M = 37.5, SD = 7.5). The

sample was fairly balanced by gender (55.1% female, n = 75). Most participants had a post-graduate degree (52.2%, n = 71), while 47.8% (n = 65) held an undergraduate degree. The majority of participants were married (86.0%) and were parents (74.3%). Full demographic characteristics are presented in Table 1.

Table 1. Demographic Characteristics of Participating Teachers (N = 136)

Demographic	N (%)
Gender	
Female	75 (55.1%)
Male	61 (44.9%)
Education level	
Undergraduate	65 (47.8%)
Post-graduate	71 (52.2%)
Marital status	
Married	117 (86.0%)
Unmarried	19 (14.0%)
Parental status	
Parent	101 (74.3%)
Non-parent	35 (25.7%)

Overall and Item-Level Stuttering Knowledge

Total ASK scores ranged from 0 to 20 out of a possible 26 points (M = 14.28, SD = 2.72, median = 14.0, 95% CI, 13.82–14.74), corresponding to a mean of approximately 54.9% of items answered correctly. The distribution of total scores departed significantly from normality (Shapiro–Wilk W = 0.932, $p < .001$; skewness = –1.03), which informed the choice of non-parametric procedures as the primary approach for subsequent group comparisons.

Item-level performance varied substantially across the 26 items, with the proportion of correct responses ranging from 12.5% for item 3 to 91.2% for item 15 (Table 2). The lowest proportions of correct responses were observed for items addressing whether stuttering can be attributed to a specific event in a child's life (12.5%), whether stuttering runs in families (22.1%), whether people who stutter talk less than non-stutterers (21.3%), sex distribution (22.8%), and whether stuttering typically has a sudden onset (29.4%). These findings indicate substantial misconceptions in several key areas of stuttering knowledge, particularly its etiology, familial occurrence, speech-related characteristics, demographic distribution, and onset.

Table 2. Correct and Incorrect Responses to Alabama Stuttering Knowledge (ASK) Test Items.

Item	Statement	Correct Response n (%)	95% CI
1	Girls stutter more often than boys. *	31 (22.8)	[15.8, 29.8]
2	The severity and frequency of stuttering may vary across different situations, days, and communication contexts.	113 (83.1)	[77.0, 89.2]

Item	Statement	Correct Response n (%)	95% CI
3	Stuttering is usually caused by a specific event in a child's life. *	17 (12.5)	[7.1, 17.9]
4	Stuttering usually begins suddenly. *	40 (29.4)	[21.7, 37.1]
5	On average, a person who stutters stutters on one third of the words they say. *	69 (50.7)	[42.3, 59.1]
6	Most moments of stuttering last less than two seconds.	75 (55.1)	[46.8, 63.4]
7	More than 5% of preschool children may experience a period of stuttering.	65 (47.8)	[39.4, 56.2]
8	In people who stutter, the likelihood of stuttering is approximately the same across all speech sounds. *	112 (82.4)	[76.2, 88.6]
9	A person who stutters usually stutters on specific words.	55 (40.4)	[32.1, 48.7]
10	Stuttering does not mean that a person has lower intelligence.	112 (82.4)	[76.2, 88.6]
11	Some people who stutter can anticipate the likelihood of stuttering before saying a word or entering a speaking situation.	79 (58.1)	[49.8, 66.4]
12	For many people, repeatedly reading the same text aloud can temporarily reduce the amount of stuttering.	85 (62.5)	[54.3, 70.7]
13	Stuttering is caused only by a physical problem. *	74 (54.4)	[46.1, 62.7]
14	Developmental stuttering usually begins in early childhood but may continue into adolescence and adulthood.	100 (73.5)	[66.1, 80.9]
15	Most specialists believe that stuttering has different types.	124 (91.2)	[86.5, 95.9]
16	People who stutter usually talk less than other people. *	29 (21.3)	[14.5, 28.1]
17	Approximately 1% of the population stutters.	78 (57.4)	[49.1, 65.7]
18	Stuttering occurs more often on the second part of multisyllabic words. *	50 (36.8)	[28.7, 44.9]
19	Singing or speaking with a rhythm can temporarily reduce stuttering in many people.	99 (72.8)	[65.3, 80.3]
20	The louder a person who stutters speaks, the more they stutter. *	70 (51.5)	[43.1, 59.9]
21	Most people who stutter begin stuttering before the age of three. *	80 (58.8)	[50.5, 67.1]
22	Many children who stutter recover without treatment.	67 (49.3)	[40.9, 57.7]
23	Stuttering is more common in some families, and genetic factors contribute to the risk of developing it.	30 (22.1)	[15.2, 29.0]
24	Stuttering is more common in families with higher socioeconomic status. *	111 (81.6)	[75.3, 87.9]
25	Stuttering may improve at any age.	116 (85.3)	[79.5, 91.1]
26	People who stutter share common personality traits. *	61 (44.9)	[36.6, 53.2]

Note. The item wording is from the unpublished Persian translation and cultural adaptation developed by Golmohammadi et al, reproduced with written permission. The original instrument was the Alabama Stuttering Knowledge Test. Item wording was revised for linguistic clarity, cultural appropriateness, and consistency with contemporary evidence. An asterisk (*) indicates a reverse-scored item.

Association Between Stuttering Knowledge and Attitudes

Participants had a mean Overall Stuttering Score of 14.02 (SD = 18.06), with mean scores of 18.95 (SD = 22.78) for Beliefs About People Who Stutter and 9.08 (SD = 24.93) for Self- Reactions to People Who Stutter. Total ASK score was not significantly correlated with the POSHA-S Overall Stuttering Score (Spearman ρ = .115, p = .181), the Beliefs About People Who Stutter subscale (ρ = .113, p = .191), or the Self-Reactions to People Who Stutter subscale (ρ = .062, p = .475). These findings indicate that stuttering knowledge, as measured by the ASK Test, was not associated with attitudes toward stuttering in this sample of Iranian primary school teachers.

Demographic Correlates of ASK Total Score

A multiple linear regression was conducted to examine whether age, gender, marital status, parental status, and educational category were associated with total ASK score (Table 3). All five predictors were entered simultaneously. Collinearity diagnostics indicated no evidence of problematic multicollinearity (VIFs = 1.02–2.51). Although marital and parental status showed conceptual and empirical overlap in this sample, both were retained as simultaneous predictors because their VIFs (1.89 and 2.51, respectively) remained below conventional thresholds for problematic collinearity (VIF < 5). The overall regression model did not significantly improve prediction of ASK total score over an intercept-only model (Table 3), accounting for 3.7% of the variance (R2=0.037; adjusted R2<0.001). The standard error of the estimate was 2.721. None of the individual predictors made a statistically significant unique contribution to total ASK scores. Specifically, ASK score was not significantly associated with age (B = 0.043 per year, 95% CI [−0.034, 0.120], p = .268), gender (B = 0.145, 95% CI [−0.796, 1.087], p = .760), educational level (B = 0.615, 95% CI [−0.316, 1.547], p = .194), marital status (B = −0.734, 95% CI [−2.564, 1.095], p = .429), or parental status (B = −0.680, 95% CI [−2.352, 0.992], p = .422). Residual diagnostics identified one influential observation, corresponding to a participant with an ASK total score of 0. Although the residuals showed some deviation from normality (Shapiro–Wilk W = 0.951, p < .001), there was no evidence of heteroscedasticity (Breusch–Pagan LM = 2.38, p = .794). Sensitivity analyses using HC3 robust standard errors and exclusion of the influential observation yielded consistent results (all p > .19; F (5, 129) = 0.64, p = .671, R^2 = 0.024), with residuals no longer departing from normality (Shapiro–Wilk p = .806).

Table 3. Multiple linear regression predicting ASK total score (N = 136)

Predictor	B	SE	β	T	*P*	Tolerance	*VIF*	F
Age	0.043	0.039	0.119	1.112	0.268	0.644	1.552	0.991
Gender	0.145	0.476	0.027	0.306	0.760	0.972	1.029	
Marital status	-0.734	0.925	-0.094	-0.794	0.429	0.530	1.888	
Parental status	-0.680	0.845	-0.110	-0.805	0.422	0.399	2.507	
Educational level	0.615	0.471	0.113	1.307	0.194	0.985	1.015	

Model fit: R^2 = 0.037, adjusted R^2 = −0.000, F (5, 130) = 0.991, p = 0.426. CI = confidence interval; VIF = variance inflation factor. Robust (HC3) standard errors and a sensitivity analysis

excluding one influential case (ASK = 0) did not alter the significance of any coefficient (see Statistical Analysis).

Discussion

This study examined stuttering knowledge among primary school teachers in Zahedan, Iran, and its association with demographic characteristics and attitudes toward stuttering. Mean performance on the 26-item ASK Test corresponded to just over half of items answered correctly (54.9%), with item-level accuracy ranging from 12.5% to 91.2%. ASK total score was not associated with any of the demographic or professional variables examined, nor with POSHA-S attitude scores. Together, these findings suggest that this sample held partial and unevenly distributed stuttering knowledge, most consistently limited in the domain of etiology, without a clear demographic pattern explaining that variability.

The lowest-accuracy items concentrated in etiology and related descriptive content: only 12.5% of teachers correctly rejected a specific traumatic event as the cause of stuttering (Item 3), 21.3% correctly rejected the claim that people who stutter talk less than non-stutterers (Item 16), and 22.1% correctly rejected a familial explanation (Item 23). This pattern is consistent with the explanatory-models framework introduced above, in which lay causal understandings about a health condition are more susceptible to culturally transmitted attributions than understandings about its observable characteristics or management [15-19]. Iran-specific empirical literature on lay explanatory models of stuttering was not identified; the interpretation above therefore draws on cross-cultural health-beliefs research from other regions and conditions, and its applicability to the Iranian context specifically remains untested. The present data cannot test this framework directly, since cultural understandings were not independently measured; the concentration of errors in causal rather than descriptive items is only consistent with, not confirmatory of, this account. The traumatic-event and familial misconceptions carry distinct risks for classroom practice. A belief that stuttering originates in a specific traumatic event may lead a teacher to probe a child or family for a supposed precipitating trauma, an approach that is factually unsupported and potentially stigmatizing. Failure to recognize a familial contribution may lead a teacher to assume a child will simply "outgrow" the difficulty and to delay referral for speech-language evaluation. We did not assess teachers' actual referral practices, so the link between these knowledge gaps and concrete teacher actions remains inferential; if confirmed by future work linking knowledge to observed practice, training addressing these specific misconceptions may be a more efficient use of limited instructional time than broad curricular additions on stuttering causation generally.

These findings sit within a broader pattern of ASK-based studies in the Middle East and beyond. Direct comparison is limited by differences in sample type, instrument version, and country context. The comparisons below are therefore offered as context rather than as matched benchmarks. Greek early-childhood educators achieved higher ASK scores overall and showed a positive knowledge–attitude association [14]. Australian pre-service teachers showed a knowledge profile comparably mixed to the Iranian sample. Most incorrectly linked stuttering to psychological factors [16]. A New Zealand study found that teacher knowledge improved substantially after targeted education. This finding suggests that low baseline knowledge in this domain is remediable rather than fixed [18]. Closer to the present setting, primary school teachers in Baghdad [22] and resource-room teachers in Jordan [23] have also shown limited ASK-based knowledge. A more recent Saudi Arabian sample of secondary teachers scored somewhat lower than the present sample on the same instrument. Etiology was again identified as a weak area [24].

Taken together, these studies suggest that limited, etiology-concentrated stuttering knowledge recurs across several Middle Eastern teacher samples assessed with the ASK. Whether this reflects shared regional factors, such as limited speech-language pathology content in teacher curricula, cannot be determined from the present data. An alternative explanation is that the pattern is coincidental across studies with different designs.

No significant association was detected between ASK scores and any POSHA-S subscale. This finding is consistent with a broader pattern in the stuttering literature suggesting that the ASK and POSHA-S may capture related but distinct constructs. The ASK assesses factual knowledge of stuttering, including its etiology, characteristics, epidemiology, and management, whereas POSHA-S beliefs and self-reactions appear to be more closely related to interpersonal contact and exposure to training than to factual knowledge. Among primary school teachers, knowing at least one person who stutters has been associated with more positive POSHA-S beliefs [35], while positive attitudes among Spanish teachers have been associated with training and direct teaching experience rather than factual knowledge alone [36]. A similar pattern of relatively positive attitudes alongside substantial factual misconceptions has been reported among Australian [37], New Zealand [18], and Saudi Arabian teachers [24]. In contrast, a positive association between knowledge and attitudes has been reported using the Teacher Attitudes Toward Stuttering (TATS) scale [14]. This instrument was developed specifically to assess classroom decision making rather than general attitudes toward stuttering. The difference suggests that associations between knowledge and attitudes may depend partly on how closely the attitude measure reflects applied, knowledge-related content. Limited statistical power may also have contributed to the absence of a significant association. However, this possibility should be considered alongside other plausible explanations, including differences in the constructs assessed by the two instruments and the potential roles of interpersonal contact and training exposure. The present cross-sectional design could not directly examine these explanations because prior contact with children who stutter and stuttering-specific training were not assessed.

None of the demographic or professional characteristics examined was associated with ASK total score. This pattern is broadly consistent with an Iraqi sample of primary school teachers, in which no significant association was found between knowledge and demographic characteristics [22]. The finding may reflect more than limited statistical power. The demographic variables examined here may not be established proxies for exposure to stuttering-specific content. For example, higher educational attainment may reflect broader professional development opportunities. However, to our knowledge, standard primary teacher education programs in Iran do not routinely include training related to communication disorders. Higher academic qualifications may therefore not necessarily translate into greater knowledge of stuttering. Teachers across demographic subgroups may be similarly uninformed because none has been differentially exposed to relevant training. This explanation remains plausible but was not tested in the present study because prior stuttering-specific training and exposure were not directly assessed. Future studies should measure these variables to distinguish a true absence of demographic differences from an absence of the training exposure that might be expected to produce them.

Implications for Teacher Education

Two considerations follow for the Iranian context. These recommendations rest on the assumption that improving teachers' factual knowledge will translate into changed classroom practice and referral behavior. The present study did not measure practice or referral outcomes and therefore could not test this assumption directly. The training targets identified below should accordingly be

viewed as evidence-informed priorities for content rather than as evidence that such training will alter teacher behavior toward children who stutter.

First, the concentration of knowledge gaps in etiology-related items, rather than uniformly low knowledge, suggests that training addressing specific causal misconceptions may be more efficient than general stuttering-awareness content. Second, because no knowledge-attitude association was found, information provision alone should not be assumed to improve attitudes. Interventions targeting both constructs may therefore require distinct components. Integrating basic speech-language pathology content into primary teacher education curricula is a plausible starting point. However, this cross-sectional design cannot determine whether such integration would improve teachers' knowledge or attitudes. Establishing such effects would require intervention studies using pre-post or controlled designs. Interactive, low-cost formats such as case-vignette workshops or brief video modules may provide a more immediately scalable starting point than technology-intensive approaches such as virtual-reality simulations. Feasibility and outcome data for such approaches are not yet available in comparable low-resource settings.

Limitations and Future Directions

Several limitations should be acknowledged when interpreting these findings. First, the sample was drawn exclusively from urban schools in Zahedan, a city whose linguistic and sociocultural profile differs from the Persian-majority urban centers more commonly represented in prior Iranian research. Rural schools were not represented. Findings should therefore be interpreted as a regional benchmark rather than a national estimate. Multi-site studies spanning linguistically and culturally diverse Iranian regions, using consistent sampling and the same validated instruments, are an important research priority. Second, teachers were nested within 26 schools, but school identifiers were not retained in the analytic dataset to protect participant anonymity in accordance with the ethics approval. Potential school-level clustering could therefore not be modeled. Standard errors for teacher-level predictors may consequently be somewhat anti-conservative if meaningful between-school variability exists. Future studies with ethics approval to retain anonymized school codes should formally test for such clustering. Third, potential self-selection and social-desirability bias may have influenced participation and self-report on both instruments. These biases could not be evaluated with the present design. Future studies could mitigate them through anonymous, unsupervised online administration or indirect attitude measures. Fourth, the demographic questionnaire did not assess teachers' prior classroom experience with children who stutter. The present study therefore cannot determine how knowledge and attitudes relate to practical experience. Future research should pair knowledge and attitude instruments with measures of practical experience and should test culturally adapted interventions using pre-post or controlled designs. Finally, the Persian ASK's reliability estimates derive from an unpublished psychometric evaluation conducted in a sample of middle-school teachers rather than the primary-school population sampled here. Because the full validation manuscript is not yet publicly available, independent evaluation of item functioning, differential item functioning across teacher subgroups, and construct validity specifically among primary-school teachers was not possible. The reported reliability coefficients should therefore be interpreted as supportive rather than conclusive evidence of the instrument's measurement properties in the population studied here.

Conclusions

Iranian primary school teachers in this sample answered just over half of the ASK items correctly, with particularly low accuracy on etiology related items, most notably the item linking stuttering

to a specific traumatic event. No significant association was found between knowledge and attitudes, although the sample size limits confidence in this null result. Knowledge gaps and the absence of demographic correlates were broadly consistent with patterns reported in other Middle Eastern teacher samples, although direct cross study comparisons are limited by differences in study design. These findings highlight the need for teacher training that specifically addresses etiological misconceptions within a broader, culturally responsive approach to supporting Iranian children who stutter. This recommendation, like the training priorities identified above, assumes that improved teacher knowledge will lead to changes in classroom practice. However, this relationship cannot be directly tested in a cross-sectional design. Larger, multisite studies are needed before these findings can be generalized beyond Zahedan.

Author's Contribution:
Farhad Sakhai: Conceptualization, Methodology, Investigation, Writing – review & editing
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Funding
This work was supported by the Zahedan University of Medical Sciences [grant number 11596]**.**

Declaration of Interest statement
We have no known conflict of interest to disclose.

Declaration of generative AI in scientific writing
During the preparation of this work, the authors used OpenAI's ChatGPT (GPT-5.6 Luna) to improve the readability and language of the manuscript. After using this tool, the authors thoroughly reviewed and edited all AI-assisted content as needed and take full responsibility for the accuracy, integrity, and final content of the published work.

References
1. Yairi, E. and N. Ambrose, *Epidemiology of stuttering: 21st century advances.* Journal of Fluency Disorders, 2013. **38**(2): p. 66-87.
2. Singer, C., et al., *Clinical characteristics associated with stuttering persistence: a meta-analysis.* Journal of Speech, Language, and Hearing Research, 2020. **63**(9): p. 2995-3018.
3. Einarsdóttir, J., K. Crowe, and B. Hermannsdóttir, *A prospective 14-year follow-up study of the persistence and recovery of stuttering.* Journal of Fluency Disorders, 2024. **80**: p. 106058.
4. Månsson, H., *Childhood stuttering: incidence and development.* Journal of Fluency Disorders, 2000. **25**(1): p. 47-57.
5. Johnson, G., et al., *Psychosocial features of stuttering for school-age children: A systematic review.* International Journal of Language & Communication Disorders, 2023. **58**(5): p. 1829-1845.
6. Eggers, K., S. Millard, and E. Kelman, *Temperament, anxiety, and depression in school-age children who stutter.* Journal of Communication Disorders, 2022. **97**: p. 106218.

7. Gerlach-Houck, H., K. Kubart, and E. Cage, *Concealing stuttering at school: "when you can't fix it…the only alternative is to hide it".* Language, speech, and hearing services in schools, 2022. **54**(1): p. 96-113.
8. Daniels, D., R. Gabel, and S. Hughes, *Recounting the k-12 school experiences of adults who stutter: a qualitative analysis.* Journal of Fluency Disorders, 2012. **37**(2): p. 71-82.
9. Rocha, M., J.R. Rato, and J.S. Yaruss, *The impact of stuttering on Portuguese school-age children as measured by the OASES-S.* Speech, Language and Hearing, 2021. **24**(1): p. 38-47.
10. Sari, H. and H. Gökdag, *An analysis of difficulties of children with stuttering enrolled in Turkish primary inclusive classes who encounter in academic and social activities: from their perspectives.* Journal of Education and Practice, 2017. **8**(2): p. 31-43.
11. Plexico, L.W., A.M. Plumb, and J. Beacham, *Teacher knowledge and perceptions of stuttering and bullying in school-age children.* Perspectives on Fluency and Fluency Disorders, 2013. **23**(2): p. 39-53.
12. Almudhi, A., *Investigating the beliefs and attitudes of teachers towards students who stutter.* South African Journal of Education, 2022. **42**(3): p. 1-15.
13. LaBlance, G.R., K.F. Steckol, and V.L. Smith, *Stuttering the role of the classroom teacher.* Teaching Exceptional Children, 1994. **26**(2): p. 10-12.
14. Grigoropoulos, I., *Early childhood educators' knowledge and attitudes toward young children who stutter.* Psychiatriki, 2020. **31**(4): p. 352-356.
15. Yeakle, M.K. and E.B. Cooper, *Teacher perceptions of stuttering.* Journal of Fluency Disorders, 1986. **11**(4): p. 345-359.
16. Matheson, T., S. Arnott, and M. Donaghy, *Australian pre-service primary teachers' knowledge, attitudes, and skills regarding stuttering.* International Journal of Speech-Language Pathology, 2022. **25**(5): p. 710-721.
17. Abdalla, F.A. and K.O. St. Louis, *Arab school teachers' knowledge, beliefs and reactions regarding stuttering.* Journal of Fluency Disorders, 2012. **37**(1): p. 54-69.
18. Hearne, A., et al., *Exploring teachers' attitudes: knowledge and classroom strategies for children who stutter in New Zealand.* Speech, Language and Hearing, 2020. **24**(1): p. 28-37.
19. Michalczyk, A. and A. Ślusarczyk, *Teacher perspectives on supporting students with stuttering in schools and preschools.* Horyzonty Wychowania, 2024. **23**(68): p. 137-147.
20. Adriaensens, S. and E. Struyf, *Secondary school teachers' beliefs, attitudes, and reactions to stuttering.* Language, speech, and hearing services in schools, 2016. **47**(2): p. 135-147.
21. Elrefaie, D., et al., *Survey on Cairene primary school teachers' knowledge and attitude about stuttering.* The Egyptian Journal of Otolaryngology, 2022. **38**(1).
22. Al-Qaisi, R.Q.M., E.G. Ali, and A.K. Khudhair, *Assessment of primary school teachers' knowledge about stuttering of school-age children at first al-karkh education directorate in Baghdad city.* Indian Journal of Forensic Medicine & Toxicology, 2020. **14**(3): p. 1418-1422.
23. Khodair, R., et al., *An exploratory study of Jordanian resource-room teachers' knowledge about stuttering.* Journal of Positive School Psychology, 2022. **6**(6): p. 1190-1203.
24. Alharbi, E., et al., *Investigating Saudi secondary school teachers' knowledge of stuttering and experiences with adolescents who stutter.* Journal of Fluency Disorders, 2026. **87**: p. 106193.

25. Kleinman, A., *Patients and healers in the context of culture: an exploration of the borderland between anthropology, medicine, and psychiatry*. Vol. 3. 1980, Berkeley: University of California Press.
26. Arabiat, D., et al., *Beliefs about illness and treatment decision modelling during ill-health in Arabic families.* Journal of Multidisciplinary Healthcare, 2021. **8**(14): p. 1755-1768.
27. Ayinde, O., et al., *Explanatory models, illness, and treatment experiences of patients with psychosis using the services of traditional and faith healers in three African countries: similarities and discontinuities.* Transcultural Psychiatry, 2021. **60**(3): p. 521-536.
28. Dieste, S., et al., *An explanatory framework for understanding mental health needs of Afghan refugees resettled in the global north.* International Journal of Psychology, 2025. **60**(6): p. e70117.
29. Gudyanga, D., et al., *Illness explanatory models of depression among young people in low-resource settings: a qualitative study in Ghana and Zimbabwe.* PLOS One, 2026. **21**(1): p. e0340267.
30. Crowe, T.A. and E.B. Cooper, *Parental attitudes toward and knowledge of stuttering.* Journal of Communication Disorders, 1977. **10**(4): p. 343-357.
31. Ramada-Rodilla, J.M., C. Serra-Pujadas, and G. Delclós-Clanchet, *Cross-cultural adaptation and health questionnaires validation: revision and methodological recommendations.* Salud Publica de Mexico, 2013. **55**(1): p. 57-66.
32. Epstein, J., R. Santo, and F. Guillemin, *A review of guidelines for cross-cultural adaptation of questionnaires could not bring out a consensus.* Journal of clinical epidemiology, 2015. **68**(4): p. 435-441.
33. St. Louis, K.O., *Research and development on a public attitude instrument for stuttering.* Journal of Communication Disorders, 2012. **45**(2): p. 129-146.
34. Abdi, S., S. Jalaei, and A. Pourmohammad, *Development and evaluation of psychometric properties of the Persian version of "Public Opinion Survey of Human Attributes-Stuttering".* Journal of Modern Rehabilitation, 2016. **9**(7): p. 86-92.
35. Abrahams, K., et al., *Primary school teachers' opinions and attitudes towards stuttering in two South African urban education districts.* South African Journal of Communication Disorders, 2016. **63**(1): p. 1-10.
36. Modrego-Alarcón, M., et al., *Analyzing the attitudes of teachers in Spain toward stuttering.* International Journal of Language & Communication Disorders, 2026. **61**(3): p. e70223.
37. Lefort, M., et al., *Stuttering in the classroom: an exploration of Australian teachers' attitudes.* International Journal of Speech-Language Pathology, 2026. **31**: p. 1-15.