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A New Scale for Preschool Children's Questioning Tendencies

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ABSTRACT

As well as being important tools for information acquisition, children's questions can also lead to profound learning. Nevertheless, no scale for measuring their questioning tendencies has hitherto been developed. Accordingly, this study pioneers one for use with preschool children. To establish construct validity, data from 544 children were used in exploratory factor analysis, and from an additional 237 children in confirmatory factor analysis. Of the original 25 questions, 10 were eliminated, and the remaining 15 items had a three-factor structure that explained 67.59% of the total variance. The internal consistency coefficient of the final Questioning Tendencies Scale was 0.894, establishing it as a valid and reliable instrument for use with children aged three to six.

1 | Introduction

Children are motivated to actively acquire knowledge and use certain speaking techniques for this purpose (Frazier et al. 2009). Children's questions are both more serious and more fun than most adults imagine (Olsson 2013). Far from being just a way to pass the time or to attract adults' attention, they are signs of children's curiosity, interests, and desire to know (Engel 2011; Harlen 1996; Hedges and Cooper 2016) as well as a reasonably effective method of learning about the world (Kucherenko et al. 2024; Ronfard et al. 2018; Ruggeri and Lombrozo 2015). Bereiter (2002) noted that children's wisest questions rarely concern their current activities, but rather focus on larger issues such as the state of the world, birth, death, good, evil, power, danger, survival, generosity, and adventure (see also Compayre 1902; Simon 2001). Chouinard et al. (2007) showed that, while only a small proportion of young children's questions to their parents included demands for attention, permission, or assistance, 70% of such questions aimed to elicit information. These important tools for information acquisition can also lead to profound learning (Murray 2022).

Preschool children can effectively formulate questions as a means of obtaining the information they need to learn new concepts (e.g., Callanan and Oakes 1992; Chouinard et al. 2007; Kemler Nelson and O'Neil 2005; Kemler Nelson et al. 2004; Kurttekin 2024; Mills et al. 2010; Ronfard et al. 2018; Wong et al. 2024). This information-seeking strategy emerges in early childhood and develops rapidly (e.g., Was and Warneken 2017). Adult responses to children's scientific questions have been found essential for fostering early learning (e.g., Kurkul and Corriveau 2018; Lombrozo et al. 2018; Willard et al. 2019). Children's existing knowledge and misconceptions can also be revealed through their questions (Kucherenko et al. 2024; Rowland 2006). "Question-asking [...] is a central part of what it means to be a child" (Chouinard et al. 2007, 25) and, as well as revealing the questioner's curiosity and interests, can indicate their cognitive, linguistic, and social development, learning motivation, and problem-solving skills.

Children's development is supported by their efforts to understand the unknown (Piaget 1969). More specifically, their questions can be seen as triggers of their cognitive growth (Chouinard

et al. 2007; Frazier et al. 2009; Legare et al. 2013) as well as reflections of it (Havigerova and Juklova 2011; Piaget 1926). Though seemingly simple, the act of asking questions is facilitated by cognitive resources, encompassing metacognition, attention, and executive function (Ronfard et al. 2018). Ronfard et al. (p. 3) proposed a questioning model consisting of four components. The first, *initiation*, consists of "[t]aking action upon realizing that information is incomplete and necessary." The second, *formulation*, comprises "[d]etermining what information is to be asked," speculating about the likely answers, and "[p]hrasing the question so that it is understood." The third, *expression*, is the process of deciding whether the question is worth asking a particular person, and involves determining whether they will provide reliable information, and if so, whether requesting it is contextually acceptable. Finally, *response evaluation and follow-up* is the process of deciding if additional information is needed, based on the initial response's quality.

According to Piaget (1974, 171), "there is no better way to understand children's logic than by examining the questions that arise spontaneously" (see also Vygotsky 1978). Younger children frequently use questions instrumentally to obtain information that fills knowledge gaps or resolves uncertainties (Baldwin and Moses 1996; Frazier et al. 2009; Kucherenko et al. 2024; Piaget 1929). Chouinard et al. (2007) determined that 81% of the 4359 children's questions they collected from parents were asked for the purpose of obtaining information. When faced with an abnormal or unexpected situation, children tend to seek an explanation for it by asking "why" questions (Isaacs 1930). Frazier et al. (2009) found that two to five-year-olds enhance their cognitive development via questions aimed at obtaining knowledge of causation. Moreover, positive correlations between teachers' epistemic positions and their replies to children's questions may mean that such replies convey messages to youngsters regarding the construction of knowledge and reasoning (Haber, Leech, et al. 2021).

Questioning's specific positive effects on young children include stimulating and enriching their creative and sociodramatic competencies, improving their communication and language skills, and developing their empathy (MacNaughton and Williams 1998). The specific information it provides us with, meanwhile, includes children's syntactic, semantic, conceptual, and pragmatic development (James and Seebach 1982). Bloom et al. (1982) reported that children's linguistic capabilities influence their question-asking behaviors and delineated a developmental progression in the mastery of fundamental question words. That is, around age two, children master question words that solicit factual information or labels (e.g., "what," "where," "who"), whereas those associated with more open-ended questions (e.g., "why," "when," "how") come later. Yang et al. (2024) found that children's wh-questions predicted their receptive vocabulary development over the course of 1 year.

Vygotsky (1978) emphasized the influence of the social environment and interpersonal relationships on higher-level cognitive skills: i.e., children can learn and develop by interacting with the tools, symbols, and people in a particular culture. Riihelä (2003) highlighted the importance of questioning to children's to integration of their direct experience with information they have obtained from others; and Sylva et al. (2010) reported that the length of dialogs between preschool children and their teachers is positively associated with the quality of early childhood education. Because children's advanced questioning skills increase over the preschool period (Corriveau and Kurkul 2014; Coughlin et al. 2015; Wellman 2020), constructivist teachers use children's questions to learn about their interests and make teaching/intervention plans accordingly (Birbili and Karagiorgou 2010). Children's questioning should therefore be studied in the context of the scaffolding for it that their parents, teachers, and others provide (Mills et al. 2011).

Preschool teachers talk to children in their classrooms as much as parents talk to their children at home (Test 1988). However, Tizard and Hughes (1984) found that preschool children asked their parents more questions than they asked their teachers. Children ask their parents questions because they see them as a valuable source of information (Aydın et al. 2025; Callanan 2006). Chouinard et al. (2007) reported that children at home with their mothers asked an average of 76 trivia questions per hour. Stephens (2004) argued that adults should consider preschoolers' questions ideal opportunities to honestly share their own experiences, values, and beliefs.

Komatsubara et al. (2018) have argued that posing questions is essential for self-motivated learning. If a child does not ask any questions about a particular topic, it can be assumed that the child is not ready to learn it (Martin and Torres 2013). Similarly, children's questions and answers have been seen as evidence of children's active learning and, therefore, as helpful to educators' efforts to support their comprehension skills (Tizard et al. 1983). The properties of objects that children consider conceptually important can also be revealed through questions (Greif et al. 2006). In short, children's questions directly engage their attention and motivation (Yang et al. 2024).

Children's questions have been studied by researchers from various fields, including education, cognitive psychology, and linguistics (Bova 2011). Although they have long been studied in developmental psychology (Harris 2000; Harris and Koenig 2006; Isaacs 1930; Piaget 1926), children's questions have also been studied extensively from a linguistic perspective (Bloom et al. 1982; Brown 1968; Cairns and Hsu 1978; Tyack and Ingram 1977; Valian and Casey 2003; Wode 1971). Sully (1896), one of the first researchers to take an interest in this topic, examined the "why"-type questions of children aged three to six. Davis (1932) examined children's questions according to their forms and functions, and Smith (1933) explored the effects of age, gender, and being with others on the frequency, form, and functions of preschool children's questions. Later, children's questions were studied in relation to their academic success (Blank and Covington 1965; Ross and Killey 1977) and literacy (Yaden et al. 1989). The answers given by adults to preschool children's questions have also been examined by various researchers (Callanan and Jipson 2001; Callanan and Oakes 1992; Chouinard et al. 2007; Frazier et al. 2009; Sak 2015, 2020; Sak and Şahin-Sak 2020; Tizard et al. 1983). Most recently, Wong et al. (2024) analyzed the question-asking targets of children (adults, peers, self) during an open-play session in a US preschool classroom and evaluated how the cognitive and linguistic attributes of the questions differed according to the intended receiver.

Although opportunities for children to ask questions differ across cultures, social settings, and educational methodologies (Wong et al. 2024), parents and teachers everywhere should be aware of questions' relations to children's cognitive, linguistic, and social development, as well as their interests, curiosity, learning motivation, and problem-solving skills. Nevertheless, no measurement tool for children's tendency to ask questions has hitherto been developed. Certain investigations have endeavored to ascertain the inquiries posed by children using surveys administered to parents (Martin and Torres 2013). Children's conversational records have been analyzed for questions in some studies (Chouinard et al. 2007; Frazier et al. 2009; Kurkul and Corriveau 2018; Smith 1933; Tizard et al. 1983). Children's questions have been analyzed using a problem-solving activity that necessitated their questioning (Legare et al. 2013). Children's questions have been analyzed by allowing children to pose questions on unfamiliar artifacts (Kemler Nelson et al. 2004; Greif et al. 2006). The diaries of parents documenting their children's questions have been analyzed (Callanan and Oakes 1992). Sak's study (Sak 2020) data were collected from educators via an interview form to ascertain the questions posed by students in their classrooms. Birbili and Karagiorgou (2010) investigated children's questions using a questionnaire for parents, interviews with both parents and children, and observations of children's questioning behavior in the classroom. This study aims to build a valid and reliable measurement tool to assess children's questioning tendencies, as no such tool currently exists in the literature.

2 | Methods

2.1 | Participants

Parents of preschool children aged 3 to 6 were reached via preschools for the study. Parents dropping off or picking up their children at the preschools were informed of the study. Parents who volunteered for the study were requested to respond to each question in a manner that accurately represented their child's circumstances. With the consent and assistance of their parents, data were collected about 781 preschoolers aged three to six; it was consisted of two groups: one for exploratory factor analysis (EFA; $n = 544$) and the other for confirmatory factor analysis (CFA; $n = 237$). Data from the EFA group were obtained first and used as the basis for removing unsuitable items from our draft measurement instrument. Then, the data were collected for CFA. Demographic details of both participant groups can be seen in Table 1.

TABLE 1 | Demographic information for both participant groups.

	EFA group ($n = 544$)			CFA group ($n = 237$)		
	Var.	***n***	**%**	**Var.**	***n***	**%**
Gender	Female	322	59.2	Female	112	47.3
	Male	222	40.8	Male	125	52.7
Age	3 years	38	7.0	3 years	33	13.9
	4 years	64	11.8	4 years	60	25.3
	5 years	106	19.5	5 years	70	29.5
	6 years	336	61.8	6 years	74	31.2
Number of siblings	0	156	28.7	0	49	20.7
	1	219	40.3	1	77	32.5
	2	125	23.0	2	79	33.3
	≥ 3	44	8.1	≥ 3	32	13.5
Duration of preschool education	1 year	373	68.6	1 year	156	65.8
	2 years	137	25.2	2 years	61	25.7
	3 years	34	6.3	3 years	20	8.4

Note: CFA, confirmatory factor analysis; EFA, exploratory factor analysis; var., variable.

2.2 | Development of the Data-Collection Tool

A draft instrument consisting of 25 items was prepared based on a review of previously published literature on preschool children's questioning behavior (Callanan and Jipson 2001; Callanan and Oakes 1992; Chouinard et al. 2007; Frazier et al. 2009; Greif et al. 2006; Haber, Puttre, et al. 2021; Haber, Leech, et al. 2021; Harris 2000; Sak 2015, 2020; Sak and Şahin-Sak 2020; Smith 1933; Sully 1896; Tizard et al. 1983; Wong et al. 2024; Yaden et al. 1989). This draft was evaluated by three experts in child development, two in education, and two in measurement and evaluation. Specifically, they were asked to rate each item as appropriate, partially appropriate, or inappropriate, and to provide detailed justifications for these ratings. In line with the experts' opinions, wording changes were made to four items. Several example questions from the draft scale are as follows: My child asks questions about physical mechanisms. My child asks questions about space. My child asks why-questions. My child asks questions about death.

Permission to apply the modified instrument was obtained from Van Yüzüncü Yıl University's Social and Human Sciences Scientific Research Publication Ethics Board. Then, a pilot study was conducted to evaluate its real-world suitability, notably in terms of understandability, with 50 parents of preschool children who were not among the parents from whom the main study data were collected. This resulted in a few further minor modifications being made to the scale, but no items were added or deleted.

2.3 | Data Analysis

First, extreme data values were removed and incorrectly entered data were corrected. Then, EFA was performed to ascertain the scale's construct validity, and its factors were arrived at using principal component analysis (PCA; Pallant 2016) with "direct oblimin" oblique rotation in SPSS 27. PCA develops a small set of components that empirically summarize the correlations among a given group of variables (Tabachnick and Fidell 2013).

Combinations of analytical techniques, such as parallel analysis (PA; Horn 1965), the eigenvalue-greater-than-one criterion (Kaiser 1960), and scree-plot examination (Cattell 1966), can be

employed to ascertain the number of underlying factors (Lowe et al. 2011). Several researchers have empirically demonstrated that PA and minimum average partial (MAP; Velicer 1976) yield results with higher precision than alternative methodologies (O'Connor 2000; Zwick and Velicer 1986). Consequently, our identification of the number of factors for extraction relied on both those techniques in conjunction with the eigenvalue-greater-than-one criterion and scree-plot analysis. The SPSS syntactical framework delineated by O'Connor (2000) was utilized to compute both PA and MAP.

Because the factors in the scale were interrelated, analysis was completed using direct oblimin, an oblique-rotation technique. The validity of the structure revealed by EFA was tested using CFA based on maximum likelihood estimation in the AMOS statistical software package. Finally, the internal consistency coefficient of the proposed instrument was calculated using SPSS 27.

3 | Results

3.1 | Exploratory Factor Analysis

If its Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) result is greater than 0.80, and its Bartlett's test of sphericity is significant, a sample can be deemed highly suitable for factor analysis (Pallant 2016). Our sample's KMO was 0.86 and the *p*-value of its Bartlett test was 0.00.

The eigenvalue is a coefficient taken into account both in deciding on the number of important factors and in calculating the variance explained by them (Pallant 2016). In this study's factor analysis, our criteria for deeming factors important were that their respective eigenvalues be at least 1% and that they collectively explain at least 5% of the total variance in the developed scale. From the scree plot in Figure 1, it can be seen that the developed scale consists of three factors. Those factors, their eigenvalues, the factor-specific variance explained, and the total variance explained are presented in Table 2.

MAP testing revealed that it was advisable to retain three distinct factors, and PA employing the 95th percentile criterion confirmed this. The reductions observed in the scree plot and the eigenvalues-exceeding-one criterion also both indicated that there was a strong rationale for maintaining three factors. Rotated factor patterns and structure matrices of the developed scale are presented in Table 3.

When performing factor analysis, items with factor loadings of 0.50 and above were included in the factor. Items S1, S2, S6, S7, S9, S11, S19, S21, S23, and S24 had factor loading values below 0.50 and differences <0.10 between two high loading values.

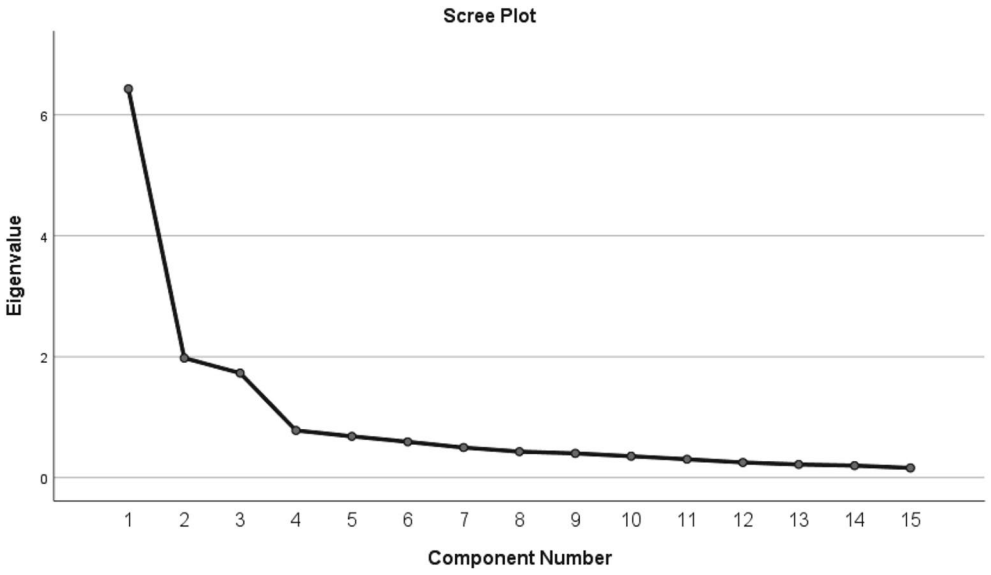

FIGURE 1 | Scree plot of exploratory factor analysis results.

TABLE 2 | Factors and explained variance.

Factors	Eigenvalue	Variance explained (%)	Total variance explained (%)
Questions about interests (e.g., My child asks questions about biology)	6.430	42.867	67.592
Questions about metaphysics (e.g., My child asks questions about God)	1.979	13.195	
Wh-questions (e.g., My child asks How-questions)	1.729	11.530	

TABLE 3 | Rotated factor patterns and structure matrices of the developed scale.

Item	Factor 1		Factor 2		Factor 3	
	P	S	P	S	P	S
Factor 1: Questions about interests						
My child asks questions about science. (I10)	**0.761**	0.812	−0.016	0.150	0.168	0.410
My child asks questions about the Earth. (I13)	**0.719**	0.769	−0.025	0.133	0.172	0.399
My child asks questions about natural sciences. (I14)	**0.917**	0.891	−0.081	0.091	−0.032	0.251
My child asks questions about culture. (I15)	**0.805**	0.831	−0.006	0.159	0.083	0.340
My child asks questions about the social order. (I16)	**0.702**	0.764	−0.011	0.147	0.202	0.424
My child asks questions about natural events. (I17)	**0.748**	0.783	0.152	0.297	0.017	0.274
My child asks questions about biology. (I18)	**0.795**	0.766	0.116	0.250	−0.162	0.106
My child asks questions about physical mechanisms. (I20)	**0.818**	0.759	0.022	0.155	−0.198	0.066
My child asks questions about space. (I25)	**0.819**	0.819	−0.088	0.075	0.050	0.302
Factor 2: Wh-questions						
My child asks How-questions. (I3)	0.063	0.213	**0.775**	0.788	0.007	0.118
My child asks what-questions. (I4)	−0.074	0.115	**0.883**	0.876	0.061	0.142
My child asks why-questions. (I5)	0.020	0.167	**0.791**	0.793	−0.015	0.085
Factor 3: Questions about metaphysics						
My child asks questions about religion. (I8)	0.104	0.368	0.002	0.120	**0.824**	0.858
My child asks questions about death. (12)	0.167	0.389	0.012	0.125	**0.687**	0.742
My child asks questions about God. (I22)	−0.131	0.179	0.063	0.148	**0.932**	0.898

Note: Ps with values of 0.50 or greater are shown in bold.
Abbreviations: P, pattern coefficients; S, structure coefficients.

TABLE 4 | Correlations between the subdimensions of the developed scale.

Subdimension	Questions about interests	Questions about metaphysics	Wh-questions
Questions about interests	1		
Questions about metaphysics	0.427**	1	
Wh-questions	0.167**	0.173**	1

**$p < 0.01$.

Accordingly, the analysis was repeated without them. The same three-factor structure, when applied to the 15 items that remained, explained 67.59% of the total variance. The factor *questions about interests* consisted of nine items and explained 42.9% of the variance. The factor loading values of those nine items varied between 0.702 and 0.917. The *questions about metaphysics* factor, meanwhile, consisted of three items and explained 13.2% of the variance. Its factor-loading values varied between 0.775 and 0.883. Lastly, the *wh-questions* factor, which comprised three items and explained 11.5% of the variance, had factor loading values ranging from 0.687 to 0.932. As can be seen in Table 4, the correlation coefficients of the developed scale's three factors indicate no multicollinearity problem.

3.2 | Confirmatory Factor Analysis

CFA is used to evaluate whether the previously selected factor model fits the data (Plucker 2003) by deriving latent variables from the observed variables (Yaşlıoğlu 2017). Here, the CFA results indicated a good fit, but a better one was achieved via the modifications recommended by the AMOS program, which showed us that there were significant relationships between the error covariances of some items, i.e., 10 with 17, 15 with 16, and 18 with 20. The model was then tested again, but with the high error correlations observed between these items added under the same factor.

The results of CFA are shown in Figure 2. The structural validity of the proposed model is revealed by the fit indices, which show the extent to which it matches reality. However, some fit indices may be sensitive to sample size, others to the degree of freedom, and yet others to the simplicity or complexity of the model (Byrne 2011; Yaşlıoğlu 2017). Therefore, it is best practice to report as many indices as possible. In this study, absolute fit indices (χ^2/SD, RMSEA, GFI) and incremental fit indices (CFI, NFI) were taken as criteria in addition to RMR, SRMR, IFI, and AGFI. In addition to the full names of these indices, Table 5 shows their values as obtained in the present study and the

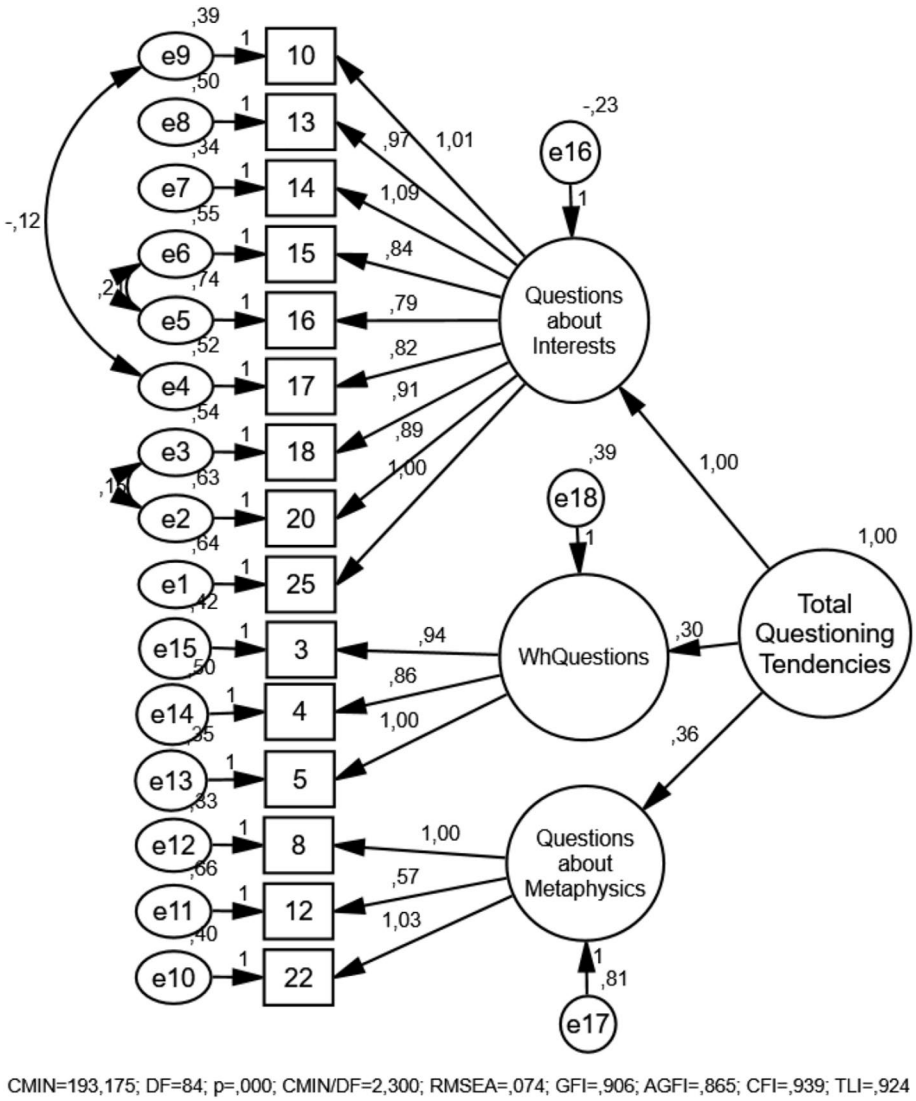

FIGURE 2 | Confirmatory factor analysis results for the three-factor structure.

TABLE 5 | Fit indices and their acceptance limits.

Fit index	Current study's finding	Perfect fit index	Acceptable fit index	Conclusion
χ^2/SD	2.300	0–2	≤5	Acceptable fit
RMSEA	0.074	≤0.05	≤0.08	Acceptable fit
RMR	0.084	≤0.05	≤0.08	Acceptable fit
SRMR	0.076	≤0.05	≤0.08	Acceptable fit
IFI	0.940	≥0.95	≥0.90	Acceptable fit
CFI	0.939	≥0.95	≥0.90	Acceptable fit
NFI	0.898	≥0.95	≥0.90	Acceptable fit
GFI	0.906	≥0.90	≥0.85	Perfect fit
AGFI	0.865	≥0.90	≥0.85	Acceptable fit

Abbreviations: AGFI, adjusted goodness of fit index; CFI, comparative fit index; GFI, goodness of fit index; IFI, incremental fit index; NFI, normed fit index; RMR, root mean square residual; RMSEA, root mean square error of approximation; SRMR, standardized root mean squared residual.

thresholds, derived from prior literature, of their acceptable and perfect fit (Byrne 2011; Hooper et al. 2008; Hu and Bentler 1999; Marcoulides and Schumacher 2001; Miles and Shevlin 1998; Schumacker and Lomax 2010; Tabachnick and Fidell 2013; Waltz et al. 2010; Wang and Wang 2012). Table 5 indicates that the fit indices of χ^2/SD, RMSEA, RMR, SRMR, IFI, CFI, NFI, and AGFI obtained in this study are acceptable, while the GFI index reflects a perfect fit.

3.3 | Findings: Scale Reliability

The reliability of the factors making up the scale of Preschool Children's Questioning Tendencies was measured using Cronbach's alpha (Table 6). The Cronbach's alpha value for the questions about the interests factor was computed as 0.92. For the questions about the metaphysics factor, it was 0.79, and for the wh-questions factor, it was 0.75. Cronbach's alpha for the scale as a whole was 0.89.

4 | Discussion

Children ask questions about a vast range of topics including the cultural and social orders, natural events, biology, and physical mechanisms (Ronfard et al. 2018) as well as the Earth, religion, and death (Samuelsson et al. 2000). Such questions can indicate their cognitive, linguistic, and social development, interests, curiosity, learning motivation, and problem-solving skills (Callanan and Oakes 1992). They have been classified as yes/no vs. open-ended, what vs. why, "real" vs. rhetorical, oral vs. written, and so on (Flammer 1981). Sak (2015, 2020) and Sak and Şahin-Sak (2020) proposed the concept of "difficult questions," based on the fact that adults are sometimes surprised by the questions asked by preschool children and can be unsure how to answer them, and noted that such questions were most often related to religion, sexuality, science, and daily life. Although children's questions have been studied for a very long time, there has not, to our knowledge, been any previous tool for measuring their questioning tendencies for use either in Türkiye or in any other part of the world. The Preschool Children's Questioning Tendencies scale developed in this study effectively addresses that gap. The scale was prepared based on a thorough review of the literature on children's questions.

EFA was used to assess the construct validity of the measure, and the validity of the structure arrived at via EFA was assessed using CFA. Consequently, 10 of the 25 questions were eliminated, leaving 15 items categorized into three factors: questions about interests, questions about metaphysics, and wh-questions. This three-factor structure explained 67.59% of the total variance. Item factor load values were quite high, with the lowest being 0.687 and the highest, 0.932. In large samples, the ratio of degrees of freedom (DF) to χ^2 can serve as a measure of model fit. For this purpose, a ratio of $\chi^2/DF \leq 2$ is ideal, though ratios up to $\chi^2/DF \leq 5$ are deemed acceptable (Kline 2005). In the present investigation, the χ^2/DF value was determined to be 2.300, indicating an acceptable fit.

TABLE 6 | Reliability coefficients of each factor and the overall scale.

Factor	Reliability coefficient
1. Questions about interests	0.929
2. Questions about metaphysics	0.796
3. Wh-questions	0.759
Total Cronbach's alpha value for the scale	0.894

For RMSEA values, a threshold of 0.05 or below is deemed an excellent match (Hu and Bentler 1999), while values above 0.05 and below 0.08 signify a good fit (Jöreskog and Sörbom 1993). Values of 0.10 and higher indicate a poor fit (Tabachnick and Fidell 2013). CFA analysis revealed an RMSEA score of 0.074, indicating an acceptable model fit. An RMR value below 0.05 signifies an optimal match, whereas values between 0.05 and 0.08 are deemed acceptable (Byrne 2005; Hu and Bentler 1999). The RMR value in the present investigation was 0.084: slightly above the limit for acceptable fit, but still arguably indicating such a fit.

IFI values of 0.95 and higher are deemed to indicate a perfect fit, whereas those of at least 0.90 but less than 0.95 fall within the acceptable-fit range (Bollen 1989). Analysis revealed an IFI value of 0.940 in the present study: within the acceptable-fit range, but very close to the perfect-fit threshold.

CFI values of 0.95 and higher are also deemed indicative of a perfect match (Hu and Bentler 1999). In the current study, 0.939 indicated an acceptable fit, but again very close to a perfect fit. NFI values of 0.95 and above are likewise deemed a perfect fit (Tabachnick and Fidell 2013), and those of at least 0.90 but below 0.95 fall within the acceptable-fit range. The NFI value in this case was 0.898. Although this is below the acceptability limit, it is very close to it.

The closer GFI approaches to 1.00, the more closely aligned with the ideal fit it is (Tabachnick and Fidell 2013). GFI value, 0.906, was therefore close to ideal. An AGFI value of 0.90 or higher signifies a perfect match, whereas one of 0.85 or higher denotes an adequate fit (Schermelleh-Engel et al. 2003). The AGFI value in this investigation was 0.865, i.e., within the adequate range.

In short, the indicators were derived from CFA suggest that the developed scale may be elucidated through three sub-dimensions at an acceptable level (Hooper et al. 2008; Hu and Bentler 1999; Marsh and Hau 1996; Miles and Shevlin 1998; Schumacker and Lomax 2010; Tabachnick and Fidell 2013; Waltz et al. 2010; Wang and Wang 2012). The internal-consistency coefficient of the Preschool Children's Questioning Tendencies scale was 0.894.

5 | Conclusion

The Preschool Children's Questioning Tendencies scale, comprising three factors that were identified using EFA and validated through CFA, has high internal-consistency coefficients. The developed scale can be filled out on behalf of children by parents or other adults who spend time with them, including but

not limited to their preschool teachers. High (low) scores on the scale indicate that children have a high (low) tendency to ask questions: a useful window into their social situations and relationships with their social environments. It is hoped that the scale will also be used as a pretest, post-test, and follow-up test in future studies of intervention programs aimed at boosting children's questioning tendencies.

5.1 | Limitations

However, it should be noted that this study has some limitations. First, because its sample consisted only of children aged three to six, the developed scale is only suitable for children in that age range. Second, only the researchers' draft instrument was used when collecting data for scale development. Third, the study sample was relatively non-diverse in terms of its ethnic, socioeconomic, and sociocultural characteristics. Consequently, it may be asserted that the scale's metaphysical inquiries are relevant for children from various ethnic, social, and sociocultural backgrounds, and that the scale is applicable across different nations. Finally, since preschool children are mostly pre-literate, all scale items were filled out by their parents on behalf of the children.

5.2 | Recommendations for Further Research

Alongside the subscales "Questions about interests" and "Wh-questions," this scale includes a subscale dedicated to metaphysical questions. Children from many ethnic, socioeconomic, and sociocultural backgrounds globally pose metaphysical questions (Callanan and Oakes 1992; Harris 2000; Sak 2015, 2020; Sak and Şahin-Sak 2020). Upon examination of the questions within this subscale, it can be stated that they comprise three overarching questions: (My child asks questions about religion. My child asks questions about death. My child asks questions about God). Similar questions are frequently posed by children globally. Consequently, it may be asserted that the scale's metaphysical inquiries are relevant for children from various ethnic, social, and sociocultural backgrounds, and that the scale is applicable across different nations. In other words, the current scale can also be used to compare the questioning tendencies of children from different cultures. The sample of this study consisted of preschool children from the city center of Van in Türkiye. The validity and reliability of the developed Questioning Tendencies Scale for Preschool Children should therefore be re-tested with samples from different cities or countries. In addition to serving as part of the intervention studies proposed above, the scale could be used to compare and contrast parents' and teachers' views of the questioning tendencies of the same children: for instance, as a means of achieving greater alignment in support for preschoolers' learning across their home and school environments.

Author Contributions

Ramazan Sak: conceptualization, investigation, writing – original draft, methodology, validation, visualization, writing – review and editing, software, formal analysis, project administration, resources, supervision, data curation.

Ethics Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by Van Yüzüncü Yıl University Social and Human Sciences Publication Ethics Board (13/05/2025–2025/10–05).

Consent

Informed consent was obtained from all participants involved in the study.

Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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