



Cross-Cultural Adaptation and Psychometric Validation of the Implicit Theory of Intelligence Scale for Middle School Students

Emre Koçak

School of Graduate Studies, Canakkale Onsekiz Mart University, ekocak@outlook.com

Derya Girgin

School of Graduate Studies, Canakkale Onsekiz Mart University, deryagirgin@comu.edu.tr

This study aimed to adapt and validate the Implicit Theory of Intelligence Scale, originally developed for children and early adolescents, for use with Turkish middle school students in response to the limited availability of validated measurement tools for this population. The sample consisted of 622 students enrolled in grades 5 to 8 (aged 10–15), representing late childhood and early adolescence. The adaptation process followed a back-translation procedure, and content validity and cultural relevance were examined through expert review conducted by specialists in educational psychology, language education, and measurement and evaluation. Psychometric analyses indicated that the scale demonstrated satisfactory reliability and validity. Internal consistency was acceptable, with a Cronbach's alpha coefficient of .795, and corrected item–total correlations ranged from .505 to .632 across the subscales. Factor structure analyses supported the original two-factor model and yielded acceptable model fit indices ($\chi^2/df = 1.599$; RMSEA = .031). Overall, the findings indicated that the Turkish version of the Implicit Theory of Intelligence Scale was a valid and reliable instrument for assessing middle school students' implicit beliefs about intelligence within the Turkish educational context.

Keywords: fixed mindset, growth mindset, implicit theory of intelligence, mindset theory, scale adaptation

INTRODUCTION

Understanding individuals' beliefs about themselves can offer valuable insights into their untapped potential, especially regarding intelligence. In an educational setting, exploring what students believe about their intelligence can equip educators and academicians with critical knowledge that helps define students' motivational drivers and learning behaviors. However, detecting and measuring these underlying beliefs is not straightforward, as there are no completely universal standardized procedures for doing so. Moreover, the variables that shape students' beliefs about intelligence are diverse and influenced by cultural context. Therefore, any instrument designed to

Citation: Koçak, E., & Girgin, D. (2026). Cross-cultural adaptation and psychometric validation of the implicit theory of intelligence scale for middle school students. *International Journal of Instruction*, 19(3), 593-610.

measure these beliefs must undergo rigorous statistical validation to ensure its reliability and validity within the intended cultural setting. In this regard, adapting and validating existing scales into different languages and educational systems is essential for advancing research and developing effective educational interventions tailored to students' needs.

Theoretical Background

Carol Dweck, widely recognized as the founder of Mindset Theory, has extensively studied individuals' beliefs about intelligence for over four decades (Dweck, 1999). Also referred to in the literature as Implicit Theories of Intelligence or Self-Theories, her framework seeks to explain how individuals' beliefs shape their motivation, learning strategies, and behavior. In developing Mindset Theory, Dweck conducted numerous studies with students in real-life educational contexts, observing how their beliefs about intelligence influenced their academic engagement and achievement.

According to Dweck (1999, 2006), individuals possess meaning systems that direct how they organize their beliefs, decisions, and behaviors. Therefore, she used the term Self-Theories to indicate that individuals develop these theories based on their unique interpretations. These theories bifurcate depending on what beliefs individuals have about their intelligence overall; how they react when setbacks come; what goals they would like to achieve; why they strive for and how they attribute praise and criticism/feedback in general terms. In this bifurcated framework, the implicit theory of intelligence provides perspectives to elicit reasons behind why some individuals can achieve to improve their potential within the limit of selves and the others cannot (Dweck & Leggett, 1988).

Two Framework Explaining Beliefs About Intelligence

Dweck (1999, 2006) proposed that individuals' prior experiences shape their beliefs about their own intelligence, which subsequently influences their perception of whether they possess the capacity to overcome future challenges. This framework suggests that an individual's past successes and failures inform their self-efficacy regarding intellectual endeavors, thus determining their approach to new obstacles.

The theoretical framework posits a dichotomy of beliefs: the fixed mindset and the growth mindset. Historically, Dweck and her colleagues (Bandura & Dweck, 1985; Dweck, 1999; Dweck & Bempechat, 1983; Dweck & Leggett, 1988; Mueller & Dweck, 1998) utilized the terminology entity theory to denote the fixed mindset and malleable/incremental theory to describe the growth mindset.

Some individuals possess the belief that their intelligence constitutes a fixed entity, a characteristic they cannot alter regardless of effort expended. The implicit theory of intelligence defines individuals with this fixed mindset. People characterized by a fixed mindset often favor easy successes, perceive effort as largely meaningless, and tend to give up easily when confronting setbacks or challenges, rather than persisting for improvement. Moreover, the success of others is perceived as a threat, leading to a fear of appearing less intelligent. Criticism is taken as proof of inability and incompetence. Also, they prefer keeping the distance unfamiliar things and focus entirely on the outcome, ignoring the specifics. On the other hand, the other perspective maintains that

an individual's intellectual capacity is not a static attribute but rather a malleable trait that can be enhanced under necessary conditions. Such individuals are identified as possessing a growth mindset within the framework of the implicit theory of intelligence. Those who are characterized by a growth mindset usually seek maximal achievements, consider effort and diligence as the key to improvement, and tend to persevere with utmost effort when encountering obstacles and hindrances. Besides, they can be inspired by others' success without jealousy and fear of being perceived as less intelligent. They eagerly accept criticism and use it as a patch to fill the gaps. Additionally, they can easily step out of their comfort zone to explore opportunities and take a comprehensive approach to the entire procedure. The following diagram summarizes these two frameworks, highlighting their core differences in beliefs, motivations, and behaviors.

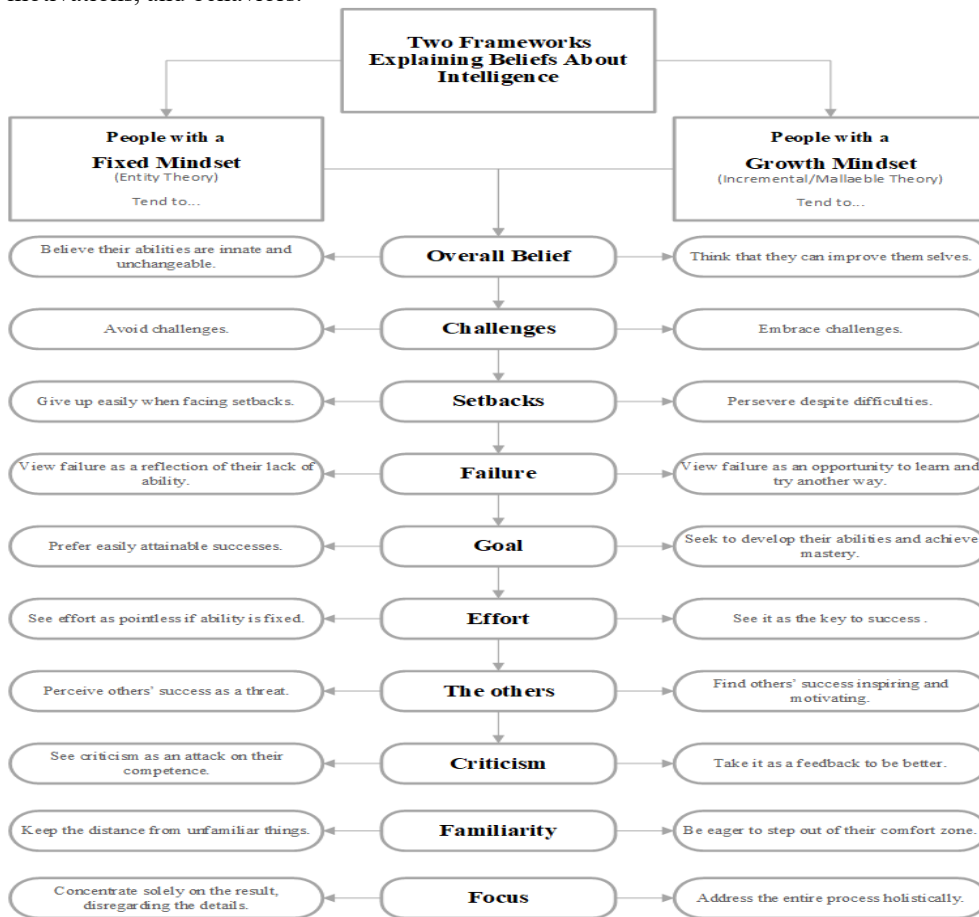


Figure 1
An overview of two frameworks of the implicit theory of intelligence, also known as Mindset Theory

Theoretical Background

The diagram illustrates two fundamental frameworks regarding beliefs about intelligence. The fixed mindset conceptualizes intelligence as a static attribute, shaping a tendency towards self-limiting beliefs, defensive learning orientations, and avoidance of situations that might expose perceived weaknesses in competencies.

In contrast, the growth mindset frames intelligence as a dynamic and malleable quality, fostering adaptive learning behaviors, openness to experience, and a motivation system oriented towards development and mastery. These differing mindsets influence how individuals interpret experiences, approach learning, and engage with challenges throughout their educational trajectories.

Mindset theory has important implications for education since students' perceptions of intelligence influence their study habits, academic motivation, and overall accomplishment, as confirmed by comprehensive meta-analytic findings (Costa & Faria, 2018). A robust body of literature supports the view that students who have a growth mindset are more likely to accept challenges, persevere in the face of adverse circumstances, and utilize effective learning practices (Dweck, 2006; Yeager et al., 2019). These students tend to view effort as a necessary step toward mastery rather than a sign of incompetence. Furthermore, recent findings suggest that growth mindset is positively associated with self-regulated learning strategies and acts as a protective factor against academic burnout (Burnette et al., 2023). In line with this evidence, meta-analytic findings indicate that growth mindset is linked to lower psychological distress and adaptive coping processes (Burnette et al., 2020). On the other hand, students with a fixed mindset frequently avoid challenges, give up easily, and may perform poorly academically due to fear of failure and negative self-perceptions (Blackwell et al., 2007).

Dweck and her colleagues emphasize the domain-specific nature of mindsets, stating that “people need not have one sweeping theory that cuts across all human attributes” (Dweck et al., 1995, p. 269). This theoretical claim is consistently supported by empirical research showing that learners often construct distinct beliefs about intelligence depending on the academic domain. For instance, in the context of language learning, research has shown that students' general epistemological beliefs are largely uncorrelated with their specific beliefs about language acquisition (Mori, 1999). Extending this view, evidence from qualitative research indicates that such beliefs do not operate as fixed categories but rather as a flexible spectrum that is shaped by contextual learning experiences (Mercer & Ryan, 2009). Similarly, in STEM domains, instructional practices appear to play a critical role in shaping domain-specific mindsets, as participation in open-ended design projects has been shown to mitigate fixed mindset tendencies in engineering (Reid & Ferguson, 2014), while targeted teaching interventions in mathematics significantly improved both achievement and students' beliefs about their learning potential (Boaler et al., 2021). Taken together, these findings indicate that mindset functions as a context-sensitive and malleable belief system rather than a stable, global trait.

In light of this evidence, these findings underscore the relevance of mindset theory across educational contexts and provide a strong rationale for the adaptation and validation of the Implicit Theory of Intelligence Scale for Turkish middle school students.

Literature on Implicit Theory of Intelligence/Mindset Theory in Turkey

While numerous studies have addressed implicit theories of intelligence in the Turkish context (Erden & Yildiz, 2023; İlhan & Çetin, 2013; Yılmaz, 2022), no study to date has adapted the specific scale originally developed and directly applied by Dweck and her colleagues for children and early adolescents (typically ages 10–15). Existing research in Turkey varies significantly in terms of target population, scale origin (adaptation vs. development), and factorial structure, often diverging from the original two-factor model proposed by Dweck.

Research focusing on older age groups illustrates this variation. For instance, İlhan and Çetin (2013) adapted Abd-El-Fattah and Yates' (2006) scale for university students, confirming a two-factor structure with high reliability. Similarly, Yılmaz (2022) conducted a scale development study with a sample of 1145 high school and university students (aged 14–22). Rather than retaining the original conceptual structure, Yılmaz's analysis yielded a four-factor model comprising 19 items, namely Procrastination, Immutability of Belief, Belief in Improvement, and Effort. While these instruments are valid for their respective populations, their age focus and expanded factorial structure limit their direct applicability to middle school contexts.

Regarding the specific target population of middle school students, Erden and Yildiz (2023) developed a measurement tool involving 1213 students. Their exploratory and confirmatory factor analyses supported a 9-item, two-factor structure (fixed and developmental mindset) with strong fit indices (CFI = 0.984; RMSEA = 0.047) and high internal consistency ($\alpha = 0.85$). Although this study provides a psychometrically sound instrument, it represents a locally developed scale rather than an adaptation of Dweck's original measure. To enable cross-cultural comparisons and empirically test the transferability of Dweck's theoretical framework, adapting the original Implicit Theory of Intelligence Scale for Children is therefore essential. Consequently, the present study aims to fill this gap by providing a direct and theory-faithful adaptation of the original scale for Turkish middle school students.

Purpose of the Study

Despite the growing interest in mindset theory in Turkey, there is a notable lack of standardized measurement tools directly adapted from Dweck's original framework specifically for early adolescents. Given that implicit beliefs are culturally sensitive and that existing local instruments limit the possibility of cross-cultural comparisons, a validated adaptation of the original scale is essential. Therefore, the principal objective of this research is to adapt the Implicit Theory of Intelligence Scale into the Turkish language and to evaluate its psychometric properties, specifically its validity and reliability, for application with middle school students. To accomplish this, the scale was translated following established international adaptation protocols, and its construct

validity, reliability, and item characteristics were rigorously analyzed. Successful validation of this instrument will facilitate more robust empirical investigation into mindset theory within the Turkish educational context.

METHOD

Participants

The sample for this study consisted of 622 middle school students recruited from six public schools located in the central, Malkara, and Şarköy districts of Tekirdağ province. Middle school students were specifically targeted as the study population because early adolescence represents a critical developmental period where implicit beliefs about intelligence become increasingly stable. Furthermore, in the Turkish educational context, this stage corresponds to a period of increased academic demand and preparation for the transition to high school, making the role of mindset particularly relevant.

The participants were enrolled in grades 5 through 8, with ages ranging from 10 to 15 years. A random sampling procedure was employed to select schools and classes. This sample size ($N = 622$) is considered robust and sufficient for confirmatory factor analysis (CFA). This aligns with scholarly recommendations, such as those of Kline (2005), who posits that a sample size exceeding 200 is generally adequate for such structural equation modeling techniques. To ensure a representative characterization of the sample, demographic data including age, gender, and grade level were systematically recorded. The detailed demographic breakdown is presented below.

Table 1
Demographic statistics of participants

Variable	Demographics	(f)	%
Grade	5. grades	193	31%
	6. grades	122	19.6%
	7. grades	202	32.5%
	8. grades	105	16.9%
Gender	Female	306	49.2%
	Male	316	50.8%
Age	10	35	5.6%
	11	134	21.5%
	12	159	25.6%
	13	186	29.9%
	14	103	16.6%
	15	5	.8%

The demographic characteristics of the student sample are presented in Table 1. The participants consisted of 622 students in total, with grade levels distributed as follows: fifth grade ($n=193$, 31%), sixth grade ($n=122$, 19.6%), seventh grade ($n=202$, 32.5%), and eighth grade ($n=105$, 16.9%). The largest group of participants were seventh-grade students, while the smallest group were eighth-grade students. The gender distribution was nearly equal, with 306 female students (49.2%) and 316 male students (50.8%). In terms of age, the largest group of students were 13 years old ($n=186$, 29.9%), followed by 12-year-olds ($n=159$, 25.6%) and 11-year-olds ($n=134$, 21.5%). The remaining

participants included 14-year-olds (n=103, 16.6%), 10-year-olds (n=35, 5.6%), and a small number of 15-year-olds (n=5, 0.8%). While the distribution across grades reflects natural enrollment fluctuations, the sample maintains a strong gender balance and sufficient subgroup sizes for valid statistical analysis.

The Instrument: Implicit Theory of Intelligence Scale for Children by Dweck

Although there are other adaptations and development studies of the Implicit Theory of Intelligence Scale in Turkish (Erden & Yildiz, 2023; Ilhan & Çetin, 2013; Yilmaz, 2022), this study is rigorously focused on the adaptation and validation of Dweck's (1999) Implicit Theory of Intelligence Scale for children aged 10 and older. This scale has been extensively used in studies conducted by Dweck and her colleagues (Blackwell et al., 2007; Dweck, 1999). The instrument assesses implicit theories of intelligence dichotomously, distinguishing between entity theory (fixed mindset) and incremental theory (growth mindset). It comprises two subscales, each containing three items, resulting in a total of six items. A 6-point Likert scale was employed, ranging from 1 (Strongly Disagree) to 6 (Strongly Agree). The intermediate response options were defined as 2 (Disagree), 3 (Mostly Disagree), 4 (Mostly Agree), and 5 (Agree). Consistent with the scale design, there was no neutral choice available for participants. The measure demonstrated strong internal consistency, with a Cronbach's alpha of .78. Descriptive statistics revealed a mean of 4.45 and a standard deviation of .97, within the possible range of 1 to 6. Furthermore, the temporal stability of the measure was supported by a test-retest reliability coefficient of .77 over a two-week interval.

Adaptation Phase of Implicit Theory of Intelligence Scale for Children

First, the researchers obtained permission for the adaptation process by contacting Carol Susan Dweck, the original developer of the scale. For the Turkish translation, three English teachers (one of whom is also an academic) translated the scale, while two other English teachers conducted a back-translation to ensure linguistic equivalence (Brislin, 1970): a method used quite extensively in adaptation studies (Kecici & Aydın, 2019; Nascimento et al., 2024). Subsequently, two Turkish teachers reviewed the translated items to identify any grammatical or punctuation errors.

Following this initial review, expert evaluations were sought from a panel of 4 specialists selected based on their academic experience. While each expert contributed their specific expertise to ensure technical validity, the Turkish language specialist ensured item comprehensibility, educational psychology and curriculum experts verified content validity, and the measurement specialist reviewed the scale's format, all experts collectively contributed to ensuring the scale's cultural appropriateness. This rigorous process aimed to identify and eliminate any culturally specific expressions, ensuring the instrument was conceptually equivalent and suitable for the Turkish context.

A pilot study was conducted with a randomly selected sample of 22 students meeting the criterion of enrollment in grades 5–8, who were not included in the main study. The primary objective of this pilot was to assess the clarity, comprehensibility, and linguistic suitability of the items and instructions. Feedback confirmed that the scale was age-

appropriate; thus, no items were revised or removed. Following these validation steps, a confirmatory factor analysis (CFA) was directly conducted using SPSS 25 and AMOS 22.

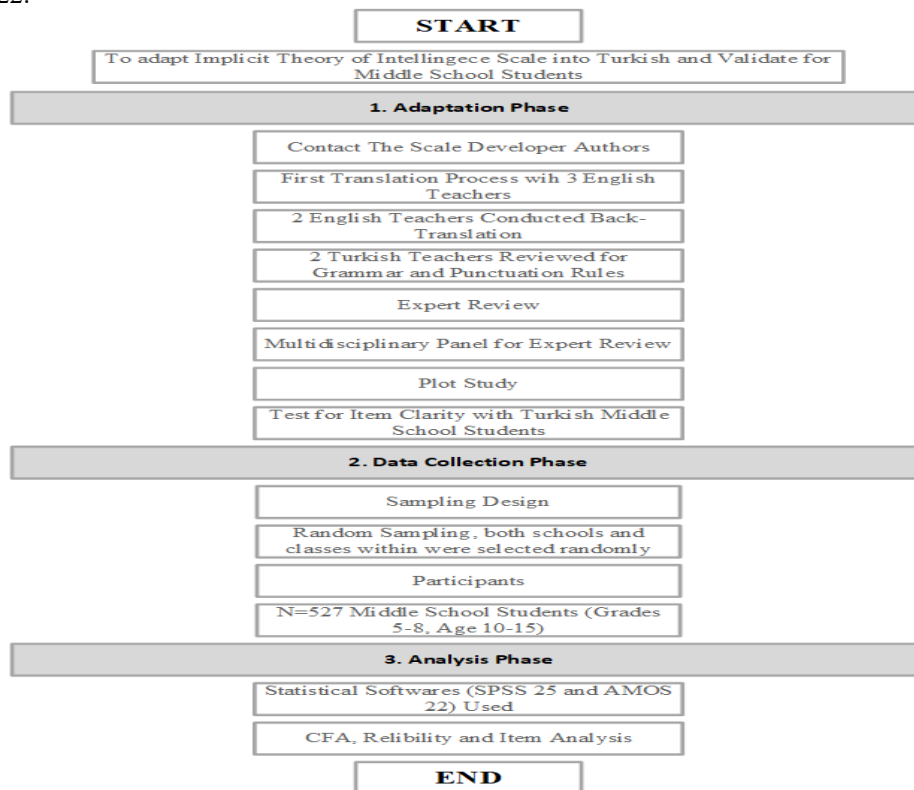


Figure 2

An overview of two frameworks of the implicit theory of intelligence, also known as Mindset Theory

FINDINGS

The internal consistency of the scale was examined through the calculation of Cronbach's alpha coefficients based on data from 622 participants. The overall reliability of the scale was found to be strong, with an alpha value of $\alpha = 0.80$, which is considered approaching excellent reliability according to Kline (2005). Hair et al. (2009) suggest that alpha values ranging between 0.70 and 0.90 reflect substantial internal consistency, a standard met comfortably in this study. The reliability estimates for the subscales were also acceptable, with the Fixed Mindset (Entity Theory) subscale showing $\alpha = 0.73$ and the Growth Mindset (Incremental Theory) subscale yielding $\alpha = 0.77$. These results, each exceeding the conventional minimum of $\alpha = 0.70$, provide evidence for the dependable internal consistency of both subscales and the total scale. Moreover, corrected item-total correlation coefficients ranged between 0.505 and 0.632

for the subscales, demonstrating that each item showed a moderate to strong correlation with its respective subscale total (Clark & Watson, 1995; Streiner et al., 2015).

Table 2
Internal consistency in statistics

Item number	Mean	Standard deviation	Corrected item-total correlation	Cronbach's Alpha if item deleted
1	4.00	1.64	0.58	0.76
2	4.02	1.59	0.52	0.77
3	3.71	1.63	0.50	0.77
4	4.45	1.51	0.63	0.74
5	3.99	1.49	0.50	0.77
6	4.17	1.56	0.55	0.76

The discriminatory power of the items was assessed following the guidelines of Ebel and Frisbie (1991) by conducting an upper-lower group comparison based on the top and bottom 27% of participants, determined according to their total scale scores. The discrimination indices (d-index) for the items ranged from 0.490 to 0.590, with mean score differences between the upper and lower groups varying from 2.452 to 2.952. Independent samples t-tests were used to compare item mean scores across these groups. Items yielding statistically significant differences ($p < .05$) were deemed to have satisfactory discrimination ability.

Table 3
27% Upper-Lower group comparison-based item discrimination indices

Item number	Upper group mean	Lower group mean	Mean difference	t-value	p-value	d-index
1	5.46	2.51	2.95	24.43	.001	0.59
2	5.34	2.69	2.65	22.52	.001	0.53
3	5.03	2.33	2.71	21.58	.001	0.54
4	5.60	2.76	2.85	25.61	.001	0.57
5	5.16	2.71	2.45	19.46	.001	0.49
6	5.40	2.69	2.71	22.45	.001	0.54

The Adapted Implicit Theory of Intelligence's Construct Validity for Turkish Middle School Students via Confirmatory Factor Analysis

With expert opinions establishing the absence of culturally specific features within the items, a confirmatory analysis was directly performed to assess the validation of the hypothesized model, which has become a gold standard for construct validity (Ayçiçek & Yelken, 2021; Kazykhankyzy & Alagözlü, 2019). A confirmatory factor analysis was conducted using AMOS 22 with maximum likelihood estimation to examine the hypothesized two (2) factor Implicit Theory of Intelligence Scale for Turkish middle school students. The model postulated that two different but correlated latent factors: Factor 1-Fixed Mindset (Entity Theory), Factor 2-Growth Mindset (Incremental Theory). As this study involved adaptation into Turkish language, Sabit Zihin Yapısı represented Fixed Mindset (Entity Theory) and Gelişim Odaklı Zihin Yapısı represented Growth Mindset (Incremental Theory). The hypothesized four-factor model indicates good fit to the data based on multiple fit indices: χ^2/df : 1.599, P : .130, AGFI: 0.982,

GFI: 0.994, NFI: 0.990, CFI: 0.996, IFI: 0.996, TLI: 0.992, RMSEA: 0.031 and SRMR: 0.022. Although there is no definite consensus on threshold values (Hair et al., 2009; Hu & Bentler, 1999; Kline, 2005) for goodness-of-fit statistics, most commonly cited threshold value intervals and some relevant references are presented in the Table 4.

Table 4
The Threshold Values of Model-Data Fit with References

Index (Result)	Thresholds	Reference
RMSEA (0.031)	Perfect < .05; Good < .06; Acceptable < .10	(Brown, 2006; Byrne, 2016; Hu & Bentler, 1999; Schumacker & Lomax, 2016)
SRMR (0.0229)	Perfect < .05; Good ≤ .08; Acceptable ≤ .10	(Brown, 2006; Byrne, 2016; Hu & Bentler, 1999; Schumacker & Lomax, 2016)
NFI (0.990)	Perfect ≥ .95; Good ≥ .95; Acceptable ≥ .90	(Byrne, 2016; Hu & Bentler, 1999; Schermelleh et al., 2003; Schumacker & Lomax, 2016)
CFI (0.996)	Perfect ≥ .97; Good ≥ .95; Acceptable ≥ .90	(Byrne, 2016; Hair et al., 2009; Hu & Bentler, 1999; Schermelleh et al., 2003)
GFI (0.994)	Perfect ≥ .90; Good ≥ .90; Acceptable ≥ .85	(Byrne, 2016; Hair et al., 2009; Hu & Bentler, 1999; Schermelleh et al., 2003; Schumacker & Lomax, 2016)
AGFI (0.982)	Good ≥ .90; Acceptable ≥ .85	(Byrne, 2016; Schermelleh et al., 2003; Schumacker & Lomax, 2016;)
P (0.130)	Good ≤ .01; Acceptable .01–.05	
TLI (0.992)	Good ≥ .95	(Byrne, 2016; Schermelleh et al., 2003; Schumacker & Lomax, 2016)
χ^2/df (1.599)	Perfect ≤ 2; Good ≤ 3; Acceptable ≤ 5	(Hair et al., 2009; Kline, 2005)

As can be seen in Table 4, the model's goodness of fit was evaluated using a series of widely-accepted statistical indices. The results indicate that the proposed model provides mostly excellent fit to the data. The Root Mean Square Error of Approximation (RMSEA) was found to be 0.031 and the Standardized Root Mean Square Residual (SRMR) was 0.0229, both of which are below the widely accepted perfect fit threshold of 0.05. The Comparative Fit Index (CFI = 0.996), Tucker-Lewis Index (TLI = 0.992), and Normed Fit Index (NFI = 0.990) all exceeded the recommended benchmark of 0.95 for a good fit. Furthermore, the Goodness-of-Fit Index (GFI = 0.994) and Adjusted Goodness-of-Fit Index (AGFI = 0.982) were well above their respective thresholds. The chi-square to degrees of freedom ratio (χ^2/df) was calculated as 1.599, falling comfortably within the ideal range of less than 2, with an associated p-value of 0.130. Collectively, these findings strongly suggest that the proposed model is valid and demonstrates an excellent fit to the observed data.

The hypothesized model and factor loadings are presented in Figure 3.

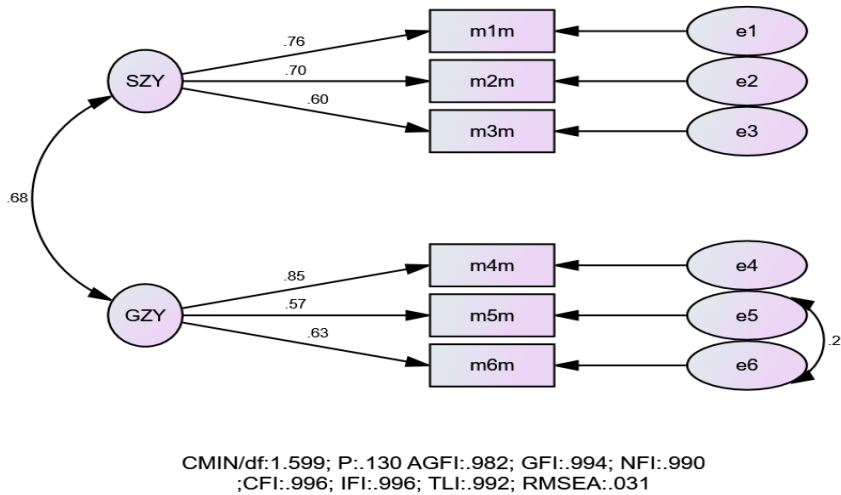


Figure 3
Results of Confirmatory Factor Analysis for the hypothesized model

As presented in Figure 3, The confirmatory factor analysis (CFA) demonstrated robust construct validity, with factor loadings ranging from .57 to .85. These loadings are well within the acceptable to strong range, aligning with the established guidelines for CFA (Brown, 2015; Hair et al., 2009).

DISCUSSION

The primary objective of this study was to adapt and validate Dweck’s (1999) Implicit Theory of Intelligence Scale for Turkish middle school students. The findings provide robust empirical evidence supporting the scale’s psychometric properties within this specific cultural and educational context. More importantly, the results demonstrate that the theoretical assumptions underlying mindset theory are empirically supported in this population. Consistent with Dweck’s original theoretical framework, the confirmatory factor analysis (CFA) validated the two-factor structure, distinguishing between entity (fixed) and incremental (growth) theories of intelligence. The high factor loadings and excellent fit indices indicate that the construct of implicit intelligence is perceived by Turkish middle school students in a manner conceptually equivalent to the original Western samples.

The reliability and item analyses further corroborated the utility of the scale. Internal consistency coefficients for both subscales exceeded acceptable thresholds, demonstrating that the translated items function coherently to measure the targeted constructs. Furthermore, item discrimination analysis confirmed that each item effectively distinguishes between students with varying levels of mindset endorsement. Notably, unlike prior studies that necessitated item removal or major structural modifications, the present adaptation retained the original six-item structure without alteration. This structural integrity suggests that the core concepts of mindset theory are

cross-culturally transferable and can be meaningfully assessed without expanding the construct beyond its original scope in the Turkish middle school context.

While previous studies have addressed mindset measurement in Turkey, the present research fills a specific methodological gap. For instance, İlhan and Çetin (2013) adapted a different instrument (Abd-El-Fattah & Yates, 2006) for university students, a population developmentally distinct from middle schoolers. Similarly, Yılmaz (2022) and Erden and Yıldız (2023) developed new, culture-specific scales or included broader constructs such as effort and procrastination in their models. Although these instruments are psychometrically sound, they diverge from Dweck's original conceptualization of mindset. In contrast, this study provides a direct adaptation of Dweck's original parsimonious measure. By strictly adhering to Dweck's established two-factor model, this adaptation facilitates direct cross-cultural comparisons and offers a focused assessment of implicit beliefs, unconfounded by adjacent motivational or behavioral constructs.

Implications

The present study addresses a critical gap by providing a direct Turkish adaptation of Dweck's (1999) original Implicit Theory of Intelligence Scale for middle school students. Prior to this research, no validation study had specifically examined the psychometric properties of Dweck's authentic six-item form within the specific dynamics of the Turkish educational context. As evidenced by the literature review, previous attempts were either restricted to university samples (İlhan & Çetin, 2013) or prioritized the development of new, expanded measures (Erden & Yıldız, 2023; Yılmaz, 2022). Consequently, this study establishes the first direct cross-cultural baseline for the scale in this population. This effort aligns with recent scholarship in educational measurement, which underscores the necessity of validating psychological constructs across different cultures to ensure accurate assessment in local contexts (Lang & Şorgo, 2024; Moreira et al., 2024).

Beyond providing a reliable measurement tool, this adaptation holds several practical and academic implications for multiple stakeholders. For academicians and researchers, the validated scale enables robust empirical inquiry into mindset-related constructs in Turkish educational settings. By retaining the original theoretical architecture of Dweck's model, researchers can now conduct longitudinal and cross-cultural studies with theoretical consistency, contributing to the broader international literature on implicit theories of intelligence. Moreover, the availability of a psychometrically sound Turkish version of this scale fills a methodological gap, allowing scholars to explore complex interactions between mindset, socio-demographic variables, academic achievement, and motivational orientations in middle school populations.

For school counselors and educational support specialists, the scale serves as a practical diagnostic tool to identify students' prevailing beliefs about intelligence. Understanding whether a student adopts a fixed or growth mindset enables educators to design pedagogical interventions tailored to students' cognitive and motivational profiles. For example, students with fixed mindsets may benefit from curriculum modifications emphasizing effort, feedback, and the malleability of intelligence. The tool can also

support school psychologists and guidance counselors in developing individualized support strategies to foster academic resilience, especially in underperforming or at-risk student groups.

For teachers, the scale offers a classroom-level lens through which mindset-sensitive teaching strategies can be evaluated and refined. Teachers may use pre- and post-assessments to gauge the impact of instructional practices or mindset-focused interventions on students' beliefs about learning. This can be particularly valuable in professional development programs aimed at fostering growth-oriented classroom environments. Through such teacher-led interventions, students can be guided toward more adaptive learning attitudes, equipping them with the necessary resilience to navigate the high-stakes testing pressures inherent in the Turkish educational system. Additionally, the scale can contribute to teacher reflection practices by prompting consideration of how teacher beliefs and feedback styles influence student mindsets.

Lastly, policy-makers and curriculum developers may find this tool useful when incorporating socio-emotional learning and motivation-focused frameworks into national education strategies. Given its alignment with international standards, the scale could also serve in large-scale educational assessments and comparative educational policy analyses.

Limitations and Future Directions

While the scale presents wide-ranging potential for research and practice, certain limitations must be acknowledged. First, the sample was limited to middle school students from a specific region in Turkey, which may restrict the generalizability of the findings to other educational levels or cultural contexts. In this regard, the participant distribution across grades reflects the natural ecological structure of school enrollments. However, the substantial size of each subgroup and the equitable gender ratio preserve the psychometric stability and representativeness of the findings against these demographic variances. Second, as data were collected through self-report measures, students' responses might have been influenced by social desirability or misunderstanding of some items. Additionally, the study focused solely on the adaptation and validation process without examining predictive validity in relation to academic performance or motivation outcomes.

Future research could build on these findings by validating the scale with more diverse student populations across different regions and educational levels to enhance generalizability. Longitudinal studies are also needed to examine how students' mindset beliefs evolve over time and influence their academic motivation and performance. Additionally, integrating qualitative methods such as interviews or reflective journals may provide deeper insights into students' personal interpretations of intelligence and learning. Finally, intervention studies testing the effectiveness of mindset-based educational programs using this adapted scale could offer valuable evidence for practical applications in classrooms.

CONCLUSION

The Turkish adaptation of the Implicit Theory of Intelligence Scale for middle school students demonstrated robust reliability and validity, successfully confirming the scale's original two-factor structure without item modification. This study is anticipated to fill an important gap in the field of educational psychology in Turkey by providing a measurement tool that is not only culturally sensitive and developmentally suitable but also strictly aligned with Dweck's original mindset theory frameworks. By offering a parsimonious instrument that distinguishes itself from prior expanded adaptations, it is recommended that this instrument be employed by researchers and educators alike to deepen the understanding and support of student motivation processes within Turkish educational contexts.

ACKNOWLEDGMENTS

We would like to thank the students who participated in our study. This study is derived from a doctoral thesis prepared by the first author under the supervision of the second author.

Ethics Statements

Ethics committee approval was obtained from the Çanakkale Onsekiz Mart University ethics committee: 20.01.2024/ E-84026528-050.99-2400021516

Conflict of Interest

The authors report no competing interests to declare.

Informed Consent

The participants' informed consent has been obtained.

Data availability

The data of this study can be shared upon a justified request.

REFERENCES

- Abd-El-Fattah, S. M., & Yates, G. C. R. (2006, November). *Implicit theory of intelligence scale: Testing for factorial invariance and mean structure*. Paper presented at the Australian Association for Research in Education Conference, Adelaide, South Australia.
- Ayçiçek, B., & Yelken, T. Y. (2021). Classroom life perception scale: A scale development study. *International Journal of Instruction*, 14(1), 253–264. <https://doi.org/10.29333/iji.2021.14115a>
- Bandura, M., & Dweck, C. S. (1985). *The relationship of conceptions of intelligence and achievement goals to achievement-related cognition, affect and behavior*. Unpublished manuscript, Harvard University.

- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246–263. <https://doi.org/10.1111/j.1467-8624.2007.00995.x>
- Boaler, J., Dieckmann, J. A., LaMar, T., Leshin, M., Selbach-Allen, M., & Pérez-Núñez, G. (2021). The transformative impact of a mathematical mindset experience taught at scale. *Frontiers in Education, 6*. <https://doi.org/10.3389/educ.2021.784393>
- Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology, 1*(3), 185–216. <https://doi.org/10.1177/135910457000100301>
- Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. Guilford Publications.
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). Guilford Publications.
- Burnette, J. L., Billingsley, J., Banks, G. C., Knouse, L. E., Hoyt, C. L., Pollack, J. M., & Simon, S. (2023). A systematic review and meta-analysis of growth mindset interventions: For whom, how, and why might such interventions work? *Psychological Bulletin, 149*(3-4), 174–205. <https://doi.org/10.1037/bul0000368>
- Burnette, J. L., Knouse, L. E., Vavra, D. T., O'Boyle, E., & Brooks, M. A. (2020). Growth mindsets and psychological distress: A meta-analysis. *Clinical Psychology Review, 77*, 101816. <https://doi.org/10.1016/j.cpr.2020.101816>
- Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*.
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*(3), 309–319. <https://doi.org/10.1037/1040-3590.7.3.309>
- Costa, A., & Faria, L. (2018). Implicit Theories of Intelligence and Academic Achievement: A Meta-Analytic Review. *Frontiers in psychology, 9*, 829. <https://doi.org/10.3389/fpsyg.2018.00829>
- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development* (1st ed.). Psychology Press.
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House.
- Dweck, C. S., & Bempechat, J. (1983). Children's theories of intelligence. In S. Paris, G. Olsen, & H. Stevenson (Eds.), *Learning and motivation in the classroom* (pp. 239–256). Erlbaum.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256–273. <https://doi.org/10.1037/0033-295x.95.2.256>

Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories and their role in judgments and reactions: A word from two perspectives. *Psychological Inquiry*, 6(4), 267–285. https://doi.org/10.1207/s15327965pli0604_1

Ebel, R. L., & Frisbie, D. A. (1991). *Essentials of educational measurement*. Prentice-Hall International.

Erden, B., & Yıldız, S. (2023). Gelişim odaklı zihniyet inançları ölçeği geliştirme çalışması ve psikometrik özellikleri. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi [Abant İzzet Baysal University Journal of the Faculty of Education]*, 23(1), 98–117. <https://doi.org/10.17240/aibuefd.2023...-1162857>

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis* (7th ed.). Pearson.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>

İlhan, M., & Çetin, B. (2013). The Turkish adaptation of implicit theory of intelligence scale: The validity and reliability study. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi [Necatibey Faculty of Education Journal of Electronic Science and Mathematics Education]*, 7(1), 191–221. <https://doi.org/10.12973/nefmed159>

Kazykhankyzy, L., & Alagözlü, N. (2019). Developing and validating a scale to measure Turkish and Kazakhstani ELT pre-service teachers' intercultural communicative competence. *International Journal of Instruction*, 12(1), 931–946. <https://doi.org/10.29333/iji.2019.12160a>

Keçici, S. E., & Aydın, M. (2019). The adaptation of learning strategies for higher education scale for Turkish context. *International Journal of Instruction*, 12(1), 1413–1430. <https://doi.org/10.29333/iji.2019.12190a>

Kline, R. B. (2005). *Principles and practice of structural equation modeling*. Guilford Publications.

Lang, V., & Šorgo, A. (2024). Motivation to learn biology: Adaptation and validation of a science motivation questionnaire with slovene secondary school students. *International Journal of Instruction*, 17(3), 137–156. <https://doi.org/10.29333/iji.2024.1738a>

Mercer, S., & Ryan, S. (2009b). A mindset for EFL: Learners' beliefs about the role of natural talent. *ELT Journal*, 64(4), 436–444. <https://doi.org/10.1093/elt/ccp083>

Moreira, S., Silva, H., Lopes, J., Moreira, J., Moreira, L., & Barros, R. (2024). Development and validation of the teachers' perceptions of classroom climate scale for the portuguese population. *International Journal of Instruction*, 17(4), 163–178. <https://doi.org/10.29333/iji.2024.17410a>

- Mori, Y. (1999). Epistemological beliefs and language learning beliefs: What do language learners believe about their learning? *Language Learning*, 49(3), 377–415. <https://doi.org/10.1111/0023-8333.00094>
- Mueller, C. M., & Dweck, C. S. (1998). Intelligence praise can undermine motivation and performance. *Journal of Personality and Social Psychology*, 75, 33–52.
- Nascimento, L., Correia, M. F., & O’Sullivan, G. (2024). The upside of teachers’ technostress: Adaptation and validation of a techno-eustress scale. *International Journal of Instruction*, 17(4), 1–18. <https://doi.org/10.29333/iji.2024.1741a>
- Reid, K. J., & Ferguson, D. M. (2014, March). Do design experiences in engineering build a “growth mindset” in students? In *2014 IEEE Integrated STEM Education Conference (ISEC)* (pp. 1–5). IEEE. <https://doi.org/10.1109/ISECon.2014.6891046>
- Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8, 23–74. http://www.stats.ox.ac.uk/%7Esnijders/mpr_Schermelleh.pdf
- Schumacker, R. E., & Lomax, R. G. (2016). *A beginner’s guide to structural equation modeling*.
- Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health measurement scales*. In *Oxford University Press eBooks*. <https://doi.org/10.1093/med/9780199685219.001.0001>
- Yeager, D. S., & Dweck, C. S. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, 47(4), 302–314. <https://doi.org/10.1080/00461520.2012.722805>
- Yeager, D.S., Hanselman, P., Walton, G.M. et al. A national experiment reveals where a growth mindset improves achievement. *Nature* 573, 364–369 (2019). <https://doi.org/10.1038/s41586-019-1466-y>
- Yilmaz, E. (2022). Development of mindset theory scale (growth and fixed mindset): A validity and reliability study (Turkish version). *Research on Education and Psychology*, 6(Special Issue), 1–26. <https://doi.org/10.54535/rep.1054235>

APPENDIX

The Translated and Adapted Form of Implicit Theories of Intelligence Scale for Children—Self Form

YÖNERGE: Aşağıdaki ifadeleri dikkatle okuyunuz ve samimiyetle cevaplayınız. İfadelerin doğru ya da yanlış cevabı bulunmamaktadır. İfadelere **katılma derecenize** göre seçim yapınız.

Örtük Zekâ Kuramı Ölçeği	Kesinlikle Katılmıyorum	Katılmıyorum	Çoğunlukla Katılmıyorum	Çoğunlukla Katılıyorum	Katılıyorum	Kesinlikle Katılıyorum
Belli bir zekâ seviyesine sahipsinizdir ve bunu değiştirmek pek de mümkün değildir.						
Zekânız sizinle ilgili çok fazla değiştiremeyeceğiniz bir şeydir.						
Yeni şeyler öğrenebilirsiniz, ama temel zekanızı gerçekten değiştiremezsiniz.						
Kim olursanız olun, zekanızı oldukça değiştirebilirsiniz.						
Ne kadar zeki olduğunuzu her zaman büyük ölçüde değiştirebilirsiniz.						
Ne kadar zekaya sahip olursanız olun, zekanızı her zaman oldukça çok değiştirebilirsiniz.						

Note:

In this scale, the first three items are designed to measure a fixed mindset (entity theory), while the following three items assess a growth mindset (incremental theory). For administration purposes, these items should be presented in a mixed order.