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Validation of a Mental Toughness Scale for Adolescent: A Study of Islamic Boarding School Students in Indonesian

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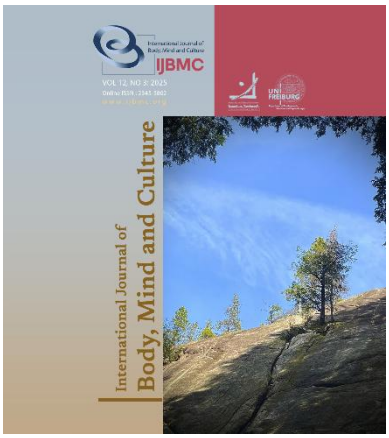

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ABSTRACT

Objective: The aim of this research is to develop the mental toughness instrument (MTS-A) beyond athletic education in Indonesia and countries with similar cultures, particularly for students attending Islamic boarding schools.

Methods and Materials: The selection of respondents from Islamic boarding school students was motivated by the high enthusiasm of Indonesian society for these schools. This study developed the Mental Toughness Scale for Adolescents (MTS-A) for use in Indonesian Islamic boarding schools. The scale was validated through confirmatory factor analysis (CFA) with 234 students from final-year levels.

Findings: The results showed that the MTS-A is a valid instrument for assessing mental toughness in this population. The number of respondents was 234 students, who were at the final education level in Islamic boarding schools. The model fit indices are CMINDF = 1.886, RMSR = 0.043, RMSEA = 0.062, GFI = 0.914, CFI = 0.910, and IFI = 0.912. The CFA results showed that the model fit indices (e.g., CMINDF = 1.886, RMSEA = 0.062) were within acceptable ranges, indicating that the instrument is valid and suitable for use in Islamic boarding schools in Indonesia.

Conclusion: The instrument has accurately reflected the theoretical latent construct, as demonstrated by the following positive model results. The validated MTS-A can now be used in future research and practical applications to assess mental toughness in adolescents, particularly in non-Western educational contexts.

Keywords: Adolescents, Students, Schools, Indonesia.

Introduction

Mental toughness is within the positive psychology category (Rusk & Waters, 2013). The mental toughness theory, which developed with the hardiness theory by Kobasa and Maddi in 1984, explains stable personality traits that can protect an individual from harm and lessen the negative effects of stress on health and work performance. The conceptual framework of psychological theory more closely aligns with resilience (Gucciardi, 2020). Mental toughness is the capacity to focus, endure, recognize oneself, and move past one's limitations (Jones et al., 2007; Thelwell et al., 2005). Mental toughness is defined as *"an individual's ability to consistently perform optimally under pressure and stress, regardless of the circumstances faced."* In the context of this study, mental toughness encompasses three key attributes: focus, endurance, and self-belief. Focus refers to the ability to maintain concentration and remain goal-oriented, even in the face of distractions or challenges. Endurance reflects the capacity to persevere and sustain

effort, particularly in prolonged or high-pressure situations. Meanwhile, self-belief is a strong confidence in one's ability to overcome obstacles and achieve desired outcomes. These three attributes are essential for understanding the role of mental toughness in enhancing individual performance and effectiveness across various conditions. Physical activity-related sectors are where mental toughness research is most prevalent (Gucciardi, 2020). Subsequently, they are created and presented to the public in different areas and populations (Coulter et al., 2010). The next section explores attributes in the context of education (Clough & Sewell, 2002; Jones et al., 2007; Sağkal, 2019).

Supporting research tools, such as scales with diverse backgrounds, can accelerate the development of mental toughness research in the field of education. In the educational context, mental toughness scales will be crucial for student respondents, particularly those in their adolescent years and those who are not athletes. Clough, P., Earle, K., & Sewell, (2002) first explored mental toughness in educational settings using the MTQ-48 scale, which includes dimensions of challenge, commitment, control (life, emotions), and confidence (abilities, interpersonal) (Clough & Sewell, 2002). The need to limit the attributes associated with mental toughness to the general population, outside of the context of sport, motivated the development of this questionnaire (Crust, 2008). St Clair-Thompson et al., (2015) research used the MTQ-48 scale, with respondents being purely non-athlete students in their teens (St Clair-Thompson et al., 2015).

McGeown et al. (2018) and St Clair-Thompson et al. (2015) continue to explore and develop mental toughness scales in adolescent student respondents. The Mental Toughness Scale for Adolescents (MTS-A) is a relatively short questionnaire consisting of 18 items. It is applicable to adolescent development, relevant in the educational context, and related to affective, cognitive, and behavioral aspects (McGeown et al., 2018). We conducted EFA and CFA tests, and the results aligned with CFA factor analysis. The development of the MTS-A instrument shares the same attributes as the MTQ-48 (Clough & Sewell, 2002), which includes the dimensions of commitment, challenge, control (life and emotions), and self-confidence.

St Clair-Thompson et al. (2015) interpret commitment in education as perseverance in completing tasks, interpret challenges as opportunities for self-development, and interpret control as an effort to shape their own future lives and the ability to regulate emotions (St Clair-Thompson et al., 2015). Self-confidence is a form of belief in their ability to complete the difficult tasks at hand. The review of mental toughness measurement scales provides support for the development of mental toughness studies in new domains, and the development of mental toughness scales continues to present significant opportunities. Research (Perry et al., 2021) recommends developing mental toughness studies in various domains, such as education, health, sports, and business, to increase public awareness of mental health issues. Given the increasing prominence of mental toughness, we must establish robust measures and models of mental toughness to match this growing interest.

Although Scotland and England are geographically close, it is advisable to exercise caution when using the MTS-A in different countries and educational systems (McGeown et al., 2018). In the context of education outside the Western cultural sphere, new studies on this instrument are still needed. Particularly in diverse educational systems, such as Indonesian culture and certain regions within neighboring clusters, this instrument requires further research. This research presents the findings from a study and the application of the MTS-A instrument in the Asian region, specifically in Indonesia where the boarding school education system is implemented.

In the context of Islamic boarding schools (*pesantren*) in Indonesia, mental toughness significantly influences academic outcomes such as academic resilience, stress management, and academic success. Students in *pesantren* face a demanding schedule balancing religious and academic responsibilities, and mental toughness enables them to navigate these challenges effectively. It fosters academic resilience by helping students persist through setbacks and view challenges as opportunities for growth. Additionally, mental toughness aids in stress management, allowing students to regulate their emotions, stay focused, and develop coping strategies amidst pressure. Finally, mental toughness contributes to academic success by enhancing qualities like perseverance, focus, and self-belief, empowering students to stay committed to their academic goals,

manage their time efficiently, and perform well despite the demanding environment.

Almost all countries in the world use the boarding school model. There are approximately 170 boarding schools in Australia, 470 in the UK, and 340 in North America (Martin et al., 2014). In Indone-sia, the Islamic boarding school education system is in high demand, with data from 2020/2021 showing nearly 5,324,151 students (satudata.kemenag.go.id), indicating that students in these systems possess mental toughness (Amna et al., 2020). According to Gucciardi et al. (2015) and Sorensen et al. (2016), the social diversity and achievement-oriented stressors in boarding schools can surpass those of sports athletes (Gucciardi et al., 2015; Sorensen et al., 2016). The life of students living away from their families presents a distinct educational ecology compared to the home or family environment, they are separated from significant relational assets at home, which can impact their psychological well-being, motivation, and overall academic engagement (Martin et al., 2014). Islamic boarding schools, or *pesantren*, are a cornerstone of Indonesia's educational and religious landscape, serving as centers for Islamic learning and character development. These institutions are deeply rooted in Indonesian culture and vary widely in size, structure, and focus, from traditional schools emphasizing classical Islamic studies to modern ones integrating secular education. Pesantren typically emphasize discipline, communal living, and a rigorous daily schedule, requiring students to balance academic, religious, and social responsibilities. This environment often involves a structured and hierarchical system, with students expected to adhere to strict rules and develop a sense of collective responsibility. The unique context of *pesantren* can significantly influence the development of mental toughness among adolescents. The challenges of living away from family, adapting to a disciplined lifestyle, and navigating peer interactions within a close-knit community can foster resilience, self-belief, and focus. Additionally, the emphasis on spiritual values and moral discipline in *pesantren* may provide adolescents with coping mechanisms rooted in faith, further enhancing their mental toughness. Studying this population is important because *pesantren* students represent a substantial demographic in Indonesia, contributing to the nation's social and cultural fabric. Understanding how the *pesantren* environment shapes adolescent mental toughness can provide insights into fostering resilience in youth more broadly. Furthermore, this research has implications for developing educational and psychological interventions tailored to enhance mental toughness in similar communal and value-driven settings. This is the background for testing the MTS-A scale on boarding school students.

The gap in the literature that this study aims to address lies in the limitations of existing mental toughness scales, such as the MTQ-48, when applied to Indonesian adolescents, particularly those in Islamic boarding schools (*pesantren*). While the MTQ-48 and similar scales have been widely used in Western contexts, they are primarily based on individualistic cultural values, focusing on personal achievement, self-reliance, and autonomy. These attributes may not fully capture the collective, spiritual, and hierarchical dimensions found in the *pesantren* environment, where communal living, obedience to authority, and spiritual resilience are emphasized. As a result, the constructs measured by these scales may not align with the lived experiences and challenges faced by *pesantren* students. This study aims to fill this gap by developing a more contextually relevant framework for measuring mental toughness in Indonesian adolescents, particularly within the unique cultural and religious setting of *pesantren*. The challenges faced by *pesantren* students—such as adapting to strict discipline, balancing academic and religious responsibilities, and navigating peer relationships within a communal setting—are distinct from those in individualistic environments. By redefining mental toughness to reflect these specific cultural and spiritual factors, the study will enhance the validity and applicability of mental toughness assessments for this population. This research also contributes to a broader understanding of how mental toughness manifests in non-Western, collectivist, and faith-based educational settings.

Methods and Materials

Study Design and Participants

The sampling technique used in this study was purposive sampling, which was the most appropriate choice given the specific objectives and context of the research. Purposive sampling is a non-random technique where participants are selected based on particular

characteristics or criteria relevant to the study. In this case, the researchers aimed to develop and validate a Mental Toughness Scale for Adolescents (MTS-A) specifically for students attending Islamic boarding schools (*pesantren*). Purposive sampling allowed the researchers to select participants who fit the criteria of being final-year students in *pesantren*, a population that was central to the study's objectives. This sampling method ensured that the participants had relevant experiences in the *pesantren* environment, which would provide valuable insights into the specific challenges and aspects of mental toughness that are unique to Islamic boarding school students. By focusing on this particular group, the researchers were able to gather data that directly addressed the study's goals of developing a culturally appropriate and contextually relevant mental toughness scale for adolescents in Indonesian Islamic boarding schools.

We distributed the questionnaire to 234 boarding school students (aged 17–21) at the final level of education. This ensured that the sample represented adolescents who had sufficient experience with the academic and religious demands of *pesantren* life. Exclusion criteria included non-final-year students, students from non-Islamic boarding schools, and those with cognitive or physical disabilities that would interfere with their ability to complete the mental toughness assessment. These criteria ensured the sample was relevant to the study's objectives and that the data collected would be accurate and representative of the target population. We chose the final level to meet the resilience dimension's need for sustained education (Gucciardi, 2020). Boarding school students in Indonesia are not allowed to bring gadgets; the questionnaire was distributed offline on paper, and pencils were distributed to students. Students get benefits (consumption) when filling out the questionnaire given; 234 samples consisted of 109 males (46%) and 125 females (53%). We informed the students that their participation was voluntary, unrelated to their academic grades, and guaranteed data confidentiality.

Instruments

The instrument adapted the MTS-A (Mental Toughness Scale for Adolescents) developed by S. P. McGeown et al. (2016), which was found to have a relationship with educational outcomes and psychological aspects, and was relevant to the investigation of the respondents in this study. The MTS-A consists of 18 items, grouped into six dimensions. The dimensions are challenge, interpersonal confidence, confidence in abilities, control of emotion, control of life, and commitment. It uses a 4-point Likert scale, corresponding to the original MTS. The scale ranges from 1 (strongly disagree) to 4 (strongly agree). The Mental Toughness Scale for Adolescents (MTS-A) is designed to measure key psychological attributes of mental toughness in adolescents, particularly within the context of Islamic boarding schools (*pesantren*). The scale includes several subscales that assess resilience, focus, self-belief, stress management, and commitment. Resilience evaluates the ability to recover from setbacks and adapt to adversity, while focus measures the capacity to maintain concentration and goal orientation in a demanding environment (McGeown et al., 2016). Self-belief reflects an adolescent's confidence in their abilities to overcome challenges, and stress management assesses how effectively they cope with stress in high-pressure situations. Commitment evaluates dedication to long-term goals and persistence despite obstacles. Together, these subscales provide a comprehensive measure of mental toughness, capturing how *pesantren* students handle academic, social, and personal challenges in their unique educational setting.

Intervention

The mindfulness training program was designed based on the Mindfulness-Based Stress Reduction (MBSR) program developed by Kabat-Zinn (2018) and adapted for adolescents. The program consisted of 8 weekly sessions, each lasting 90 minutes (Kabat-Zinn, 2018). The program's key components included Teaching participants to focus on their breath as an anchor to the present moment. A guided exercise in which participants focus on different body parts to increase bodily awareness. Gentle yoga stretches to increase physical awareness and relaxation. Promoting empathy and compassion for oneself and others. Integrating mindfulness into everyday activities, such as eating, walking, and listening.

Each session included a combination of theory, practice, and group discussions. Participants were encouraged to practice mindfulness exercises daily for 15 minutes and keep a mindfulness journal to track their

experiences. Audio recordings of the guided practices were provided to help participants with their home practice. The control group did not receive any intervention during the study period. They were asked to continue their usual school and social activities without any structured program. At the end of the 8-week intervention, all participants (both experimental and control groups) completed the same set of questionnaires (MAAS, CD-RISC, ERQ) as they did in the pre-test phase. This provided post-test data on mindfulness, resilience, and emotional regulation skills. To examine the long-term effects of the intervention, a follow-up assessment was conducted 3 months after the post-test. The participants were asked to complete the same questionnaires to assess the sustainability of mindfulness, resilience, and emotional regulation changes.

Procedures

The instrument underwent an adaptation process, following Beaton (2000) five stages. Before entering the adaptation stage, the author requested permission via email and received approval on January 15, 2024. In Step 1, two linguists from the University Language Centre translated the instrument into Indonesian. In Step 2, the researcher synthesized the translation results, tracing the differences and similarities agreed upon by the two experts, and inquired again if there were any differences in the translation results. Step 3: Translation back to the original language involved two linguists through a different university language center. Step 4 involves a discussion with 6 experts, including 5 doctoral graduates in psychology and 1 doctoral linguist who has lived in a country where English, the language of the MTS-A scale, is the primary language. The experts engaged in a discussion, scrutinized the translated version of the instrument, and assessed the appropriateness of the indicators' intentions. We then made quantitative calculations based on the expert judgments for each item. The researcher used the Content Validity Index (CVI). By choosing the item-CVI (I-CVI) method, the formula divides the agreed-upon items by the number of experts. Step 5 involves conducting a field test with 10 students in a Focus Group Discussion (FGD), where they discuss items they still don't understand and search for word equivalents that they can comprehend.

The Confirmatory Factor Analysis (CFA) process in this study was guided by a theoretical model that conceptualized mental toughness as a multidimensional construct, consisting of five subscales: resilience, focus, self-belief, stress management, and commitment. These subscales were hypothesized to collectively represent the broader concept of mental toughness in Indonesian adolescents attending Islamic boarding schools. To assess the model fit, several indices were used, including CMIN/DF (1.886), RMSEA (0.062), CFI (0.910), GFI (0.914), and IFI (0.912). All these values fell within acceptable ranges, indicating that the model fit the data well and supported the validity of the MTS-A scale in measuring mental toughness in this specific context. The Mental Toughness Scale for Adolescents (MTS-A) was administered on paper to ensure accessibility and accommodate the setting of Islamic boarding schools (*pesantren*), where online platforms might be less accessible. Students filled out the scale independently, without assistance from the researchers, to ensure authentic and unbiased responses. Researchers were present during the administration to provide instructions or clarify any questions, but the students were encouraged to complete the questionnaire on their own. This process was designed to minimize distractions and maintain a focused environment, ensuring that the students' responses accurately reflected their individual experiences with mental toughness.

This study adhered to strict ethical standards to ensure the protection of participants' rights and well-being. Informed consent was obtained from both the students and their parents or guardians, ensuring they understood the purpose of the study, the voluntary nature of participation, and their right to withdraw at any time without consequence. Confidentiality and anonymity were maintained by removing personal identifiers from the data, and all responses were securely stored. The study was designed to minimize harm, with the MTS-A scale being carefully reviewed to prevent distress. Ethical approval was granted by the relevant ethics committee, ensuring that the research complied with ethical guidelines for human participants.

Findings and Results

Translation results

The context of Indonesian boarding schools influences the translation of MTS-A into Indonesian. One item, "I expect to successfully complete my degree in the usual allocated time frame," had the word "my degree" replaced with "graduate". The six experts agreed to change the word because it was more relevant in the context of graduation measures in boarding schools in Indonesia. Beaton (2000) classify this as experiential equivalence, a category that encompasses respondents' experiences from tasks or items that may differ in their country or culture. To enhance the robustness of the results, confidence intervals (CIs) for the factor loadings were calculated at a 95% confidence level. These CIs provide insight into the precision of the factor loading estimates, indicating the range within which the true values are likely to fall. For example, the factor loading for MT1 in the Challenge dimension was 0.66, with a CI of (0.59, 0.73), reflecting a strong and precise estimate. However, items like MT7 from the Confidence Abilities dimension had a factor loading of 0.00, with a CI of (-0.10, 0.10), indicating that the item was invalid and should be excluded. The inclusion of CIs helps provide a more comprehensive understanding of the validity and precision of the scale, highlighting the reliable dimensions and items that may require further refinement.

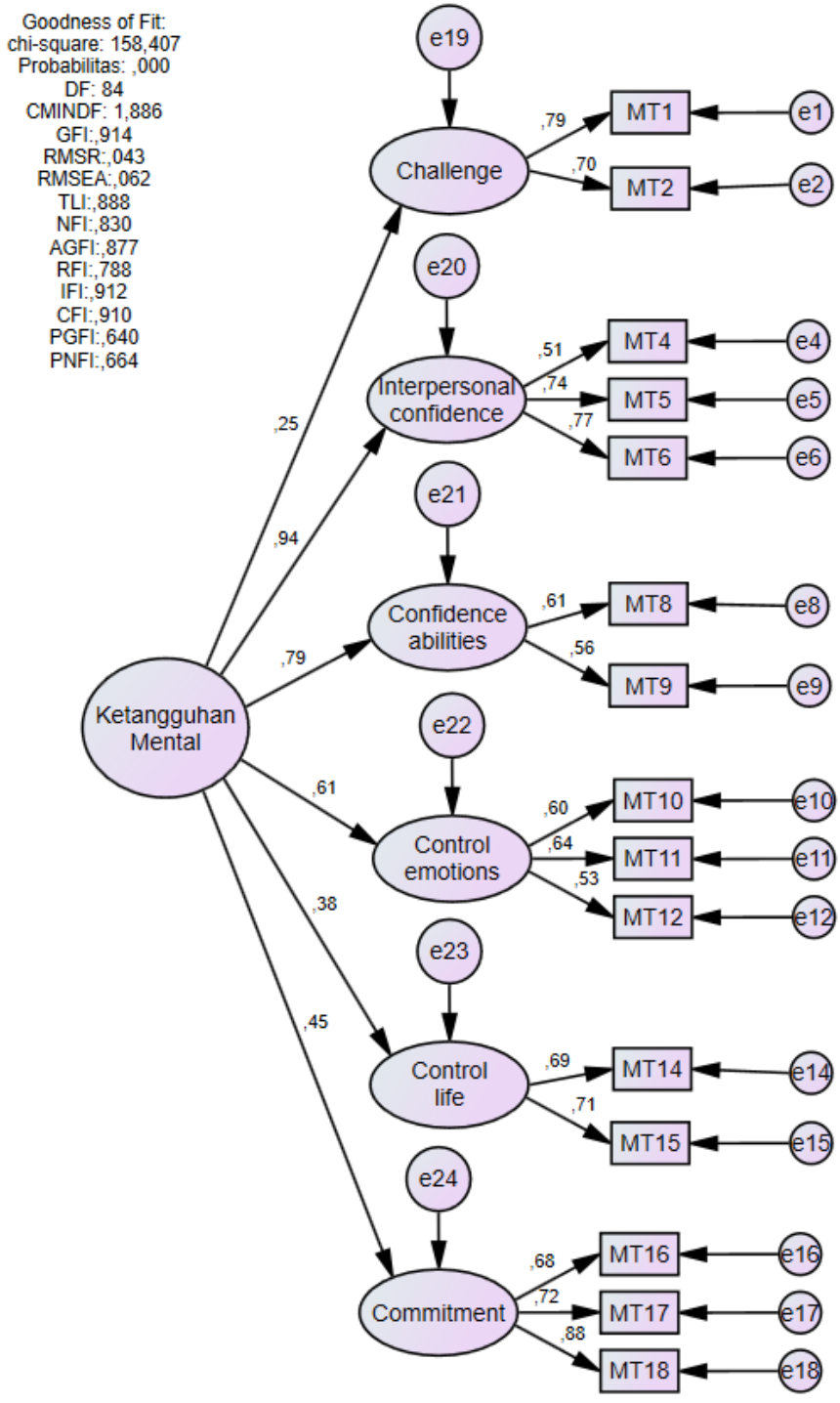
Validation of the MTS-A

The quantitative assessment results from the six experts show that all items are relevant, with values ranging from 0.83 to 1 (Polit, F.Denise, Beck, 2006). For the Confirmatory Factor Analyses (CFA) test, the category of "goodness of fit" is shown by CMIN/DF value of ≤ 2.00, RMSR ≤ 0.05, Root Mean Squares Error of Approximation (RMSEA) value of ≤ 0,08 and values for the Tucker Lewis index (TLI), the normal fit index (NFI), the incremental fit index (IFI), and the comparative fit index (CFI), all of which are greater ≥ 0.90. The results of the validity process for items in the category show CMIN/DF = 1.886, RMSR = 0.043, RMSEA = 0.062, GFI = 0.914, CFI = 0.910, and IFI = 0.912, indicating a good fit category. Referring to the MTS-A CFA results from McGeown et al. (2018), the overall results show a moderate fit, with RMSEA = 0.043, RMSR = 0.051, CFI = 0.942, and TLI = 0.926. The results are shown in the Figure 1.

Factor loading criteria: with 234 participants using the reference ≥ 0.40 (Hair et. al., 2010), the review of the Indonesian version of MTS-A can be done by dropping the items that show invalid = ≥ 0.40. For example, we can review items MT3 = 0,32, MT7 = 0,00, and MT13 = 0,28 in Table 1. The remaining items on each factor are still quite representative of the six dimensions of the Indonesian version of the MTS-A. Table 2 displays the variance extracted (AVE) and construct reliability (CR) results from the validation of the MTS-A in Indonesia. The extracted category of variance ≥ 0.50, indicates that the remaining six dimensions have met the criteria. The construct reliability category, with a score ≥ 0.70, indicates that one dimension, namely confidence abilities, with a score of 0.64, does not meet the criteria. The descriptive statistics of the MTS-A reveal some interesting trends in the mental toughness dimensions of Indonesian adolescents. The highest mean scores were observed in Challenge and Commitment, indicating that students possess strong resilience and determination in facing challenges and staying dedicated to their goals. In contrast, Confidence Abilities and Control Life had slightly lower mean scores, suggesting that while students generally feel confident, they may struggle more with managing their overall life circumstances. Additionally, Control Emotions showed a moderate score, pointing to a potential area for improvement in emotional regulation. These findings highlight that while the students are generally mentally tough in terms of persistence and challenge management, there is room to enhance their emotional control and confidence in their abilities, which are important for holistic mental toughness.

Figure 1

Model with Factor Loadings



Confirmatory Factor Analysis with six dimensions and 15 items. The elements of challenge, interpersonal confidence, confident ability, controlling emotions, managing life, and commitment are included. MT (mental toughness).

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Table 1

Factor loading values of MTS-A (McGeown et al., 2018) and MTS-A (in Indonesia)

Dimension	CFA MTS-A (Mc Geown)	CFA MTS-A (in Indonesia)	Validation of MTS-A in Indonesia*
Dimension Challenge			
MT1	0,59	0,66	0,79
MT2	0,69	0,82	0,69
MT3	0,60	0,32	-
Dimension interpersonal confidence			
MT4	-0,72	0,50	0,50
MT5	0,65	0,73	0,74
MT6	0,80	0,76	0,76
Dimension confidence abilities			
MT7	0,75	0,00	-
MT8	-0,69	0,61	0,60
MT9	0,77	0,55	0,55
Dimension control emotions			
MT10	-0,75	0,59	0,59
MT11	-0,71	0,64	0,64
MT12	0,71	0,53	0,53
Dimension control life			
MT13	0,52	0,28	-
MT14	-0,61	0,78	0,69
MT15	0,72	0,63	0,70
Dimension commitment			
MT16	0,66	0,68	0,68
MT17	0,56	0,71	0,71
MT18	0,79	0,87	0,87

Notes. *valid category = ≥ 0.40

Table 1 compares the factor loading values of the original MTS-A (McGeown et al., 2018) with the adapted Indonesian version. Most items in the Indonesian version show consistent factor loadings with the original, indicating the scale's relevance in this new context. However, several items were excluded due to low loadings below the acceptable threshold of 0.40. For example, items MT3 and MT7 had loadings below this threshold in the Indonesian version and were removed. Other items, such as MT4, MT5, MT6, and MT14, showed strong or improved factor loadings, suggesting that they are well-suited to the Indonesian cultural context. Overall, the validation process confirms that the Indonesian version of the MTS-A maintains the scale's reliability and validity, with all remaining items meeting the minimum factor loading criteria.

Table 2

Variance extracted (AVE) and construct reliability (CR) of validation of MTS-A in Indonesia

Faktors	AVE*	CR**
Challenge	0,86	0,83
Interpersonal_confidence	0,80	0,80
Confidence_abilities	0,75	0,64
Control_emotions	0,74	0,72
Control_life	0,77	0,70
Commitment	0,82	0,84

Notes. *category of variance extracted ≥ 0,50

** category of construct reliability ≥ 0,70

Table 2 shows the variance extracted (AVE) and construct reliability (CR) values for the validation of the MTS-A in Indonesia. All factors meet the minimum AVE threshold of 0.50, indicating sufficient explanatory power for each construct. The Challenge (0.86) and Commitment (0.82) factors have the highest AVE values, reflecting strong variance explanation, while the Confidence Abilities factor has a slightly lower AVE of

0.75 but still meets the criterion. Regarding construct reliability, the Challenge and Commitment factors demonstrate high internal consistency with CR values of 0.83 and 0.84, respectively. However, the Confidence Abilities factor has a CR value of 0.64, which is below the ideal threshold of 0.70, indicating a need for further refinement. Overall, the MTS-A demonstrates good validity and reliability in the Indonesian context, with most factors meeting the established standards.

Discussion and Conclusion

The findings of this study have significant theoretical implications for our understanding of mental toughness and resilience, particularly in the context of Islamic boarding school students in Indonesia. The results highlight several important aspects that both align with and challenge current psychological theories. First, the strong mean scores in the Challenge and Commitment dimensions are consistent with the foundational concepts of mental toughness proposed by psychological theories (Clough & Sewell, 2002; Gucciardi, 2020). These theories emphasize that mental toughness involves persistence, resilience, and the ability to thrive in challenging situations. The findings suggest that the students in this study possess these core attributes, indicating that mental toughness is not only relevant in athletic settings but also in educational and cultural contexts. However, the lower scores in Confidence Abilities and Control Life present an interesting challenge to some existing theories. For instance, Bandura's (1997) Social Cognitive Theory posits that self-efficacy, or confidence in one's abilities, is a key determinant of resilience and overall success. The relatively lower scores in Confidence Abilities imply that while students may be resilient in overcoming external challenges, they may lack internal confidence, particularly in managing their personal lives. This could suggest a need for theories of mental toughness to more explicitly incorporate the psychological and environmental factors that influence confidence in non-Western cultural contexts, such as the collectivist and highly structured environment of Islamic boarding schools.

Moreover, the moderate score in Control Emotions contrasts with theories of emotional regulation and resilience, such as those outlined by Gross (2002). Emotional regulation is considered an essential component of resilience and mental toughness, as it allows individuals to maintain focus and performance under stress. The results of this study suggest that while students may possess strong commitment and challenge management skills, emotional regulation remains a developmental area. This finding invites a re-evaluation of how emotional control is conceptualized within mental toughness frameworks, particularly in educational environments where emotional regulation may be influenced by cultural norms and practices. In summary, the findings align with core psychological theories that emphasize persistence and resilience as key components of mental toughness. However, they also challenge existing models by highlighting the need for greater attention to confidence and emotional regulation, particularly in non-Western, culturally specific contexts. These results suggest that future theoretical models of mental toughness may benefit from incorporating a broader, more culturally nuanced understanding of the interplay between individual characteristics and environmental factors.

The results of the CFA test show that six dimensions are well represented, with the factor loading values for each item meeting the criteria, except for three items that do not meet the criteria, each representing the dimensions of challenge, confidence abilities, and control life. These three items do not invalidate the theoretical load of the dimensions, as they are still sufficiently represented by the remaining two items. The items on the MTS-A S. McGeown et al. (2018) have negative factor loading values, which are classified as unfavourable items (table 1). In this review, value reversal was performed for the unfavourable items, resulting in item values with positive factor loadings. The CFA results of S. McGeown et al. (2018) show that the goodness of fit value category is moderate, with the RMSR value not meeting the category (McGeown et al., 2018). This is different from the value of factor loadings of the Indonesian version of MTS-A, which shows more categories meeting the criteria, specifically 6 categories. Therefore, it can be concluded that this instrument has a more satisfactory model fit test, with six categories meeting the goodness of fit criteria. Referring to Hair, J. F., et al. (2010), the use of 4 to 5 goodness of fit categories is already considered sufficient to assess the feasibility of a model (Hair et al., 2010).

The CMIN/DF value indicates that the existing model is in accordance with the theory, and the model is acceptable. The RMSEA results show a difference between the observed covariance matrix with degrees of freedom and the predicted covariance matrix (Chen, 2007). The GFI value shows a reasonable and acceptable fit, supported by the IFI and CFI values that have been met, although it still requires substantial improvement. To determine how well the total measure of behavioral indicators (factors) fits the theoretical la-tent construct, we use the extracted variance test. We can say that the AVE results of MTS-A in Indonesia show good values; all dimensions have met their theoretical latent constructs and have achieved their in-ternal consistency levels. The commitment dimension indicates that all item values are high, which aligns with various scales (Sheykhangafshe et al., 2020). Students have high mental resilience, excellent consistency, and stability in their studies and continue to learn with sustained motivation; this reflects a high value of commitment. The items on this exam have high validity. According to Gucciardi et al. (2015), the mirror of commitment is a type of consistency that reflects the general concept of mental toughness, which also includes perseverance and task execution skills (Gucciardi et al., 2015), thereby resulting in high values among students (Cowden, 2016).

The dimension of controlling emotions is considered more satisfying than controlling life. Emotional control is a way for students to manage anxiety and other emotions; unlike life control, it relates to their belief in controlling their life goals. Gerber (2019) mental resilience, with moderate to high levels (Gerber, 2019), shows a favorable correlation with forms of emotions such as anxiety and emotional exhaustion (Li et al., 2020). Compared to the results of the CFA MTS-A (McGeown et al., 2018), the dimensions of commitment, interpersonal confidence, and control emotions have quite high values in the complied category. The age factor can influence some of the non-meeting scores, with 11-year-olds demonstrating lower MT scores compared to 14- and 17-year-olds (Zalewska et al., 2019). In this instrument, the average age was 16–19 years, which recommends testing the MTS-A on students with a lower age range and in a different curriculum (outside of boarding schools).

Cultural and religious factors play a crucial role in shaping the development of mental toughness among adolescents in Indonesian Islamic boarding schools. These schools, known as *pesantren*, provide a highly structured environment where students are immersed in both religious teachings and academic learning. The values emphasized in Islamic education, such as perseverance (*sabar*), discipline, and self-control, align closely with the core components of mental toughness. For example, the daily routine in *pesantren*—which includes prayers, fasting, and academic responsibilities—encourages students to develop resilience and the ability to overcome challenges. The practice of *sabar*, or patience, teaches students how to endure hardships without losing motivation or focus, which is a fundamental aspect of mental toughness. The discipline instilled in students also contributes to the development of self-regulation, a key element of mental toughness. The rigorous schedules, which involve balancing religious obligations with academic tasks, help students build strong time-management skills and emotional resilience. Self-control, as promoted in Islamic teachings, is especially relevant in developing the ability to regulate emotions under stress. Practices such as fasting during Ramadan, which require students to control their physical and emotional desires, mirror psychological strategies for emotional regulation, thus strengthening their capacity to manage stress and maintain composure in difficult situations. However, cultural values in Islamic education also introduce nuances to how mental toughness manifests in this context. The value of humility in Islamic teachings may lead students to express their confidence more modestly, which can affect their self-perception and interpersonal interactions. While students may show high levels of perseverance and emotional control, their confidence in their abilities may be tempered by the cultural expectation to remain humble. This balance between resilience and modesty offers a unique perspective on how mental toughness develops in *pesantren* students, influenced by both religious values and cultural norms.

One of the main limitations of this study is its focus on a single cultural context—students from Islamic Boarding Schools (*pesantren*) in Indonesia. While this specific group provides valuable insights into the development of mental toughness within this particular cultural and educational framework, the findings may not be easily generalized to students from other cultural or educational settings. The values, practices, and

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teaching methods in *pesantren* are deeply rooted in Islamic traditions and local customs, which may significantly differ from those in national schools or other countries. Therefore, the mental toughness traits identified in this study might be influenced by these unique cultural and religious factors, limiting the transferability of the results to broader populations. To address this limitation, future research should explore mental toughness across different educational settings, including national schools or schools in non-Islamic cultural contexts, to determine whether the findings are consistent or if they vary according to cultural differences. Another limitation is the relatively small sample size of 234 students, which may impact the robustness and generalizability of the results. While the sample size is adequate for the CFA conducted in this study, it may not be large enough to fully capture the diversity within the broader population of Indonesian students. A larger sample size would increase the statistical power of the analysis, providing more reliable estimates and allowing for a more comprehensive understanding of mental toughness across various student subgroups. Additionally, a small sample size may lead to overfitting the model to the specific characteristics of this sample, reducing the applicability of the findings to the wider student population. To enhance the generalizability of the results, future studies could aim to include a larger and more diverse sample, encompassing a range of educational contexts, age groups, and demographic backgrounds.

The MTS-A instrument, both in its original form (McGeown et al., 2018) and its adapted version for Indonesia, has demonstrated an acceptable level of model fit and goodness of fit based on key statistical indicators. Specifically, the model fit indices, such as CMIN/DF = 1.886, RMSR = 0.043, and RMSEA = 0.062, fall within acceptable thresholds, suggesting that the instrument is valid for use in measuring mental toughness in the Indonesian context. Furthermore, the Average Variance Extracted (AVE) and Construct Reliability (CR) values for most of the dimensions met the recommended criteria, indicating that the scale has adequate convergent validity and internal consistency. However, the analysis revealed some invalid items, particularly MT3, MT7, and MT13, which showed low factor loadings and failed to meet the threshold of ≥ 0.40 for validity. These items should be removed or revised in future applications of the scale. Despite these adjustments, the MTS-A remains a promising tool for assessing mental toughness in Indonesian Islamic boarding school students. The findings underscore the importance of refining the instrument to ensure its relevance and accuracy in different cultural and educational contexts. For instance, dimensions such as "confidence abilities" exhibited lower CR values (0.64), which suggests that this dimension needs further review and refinement to align with the theoretical construct of mental toughness. Additionally, the study highlights the potential for using this scale in broader educational settings, particularly in schools with curricula different from Islamic boarding schools, to assess the universality of the mental toughness construct across diverse student populations.

Looking ahead, future research should focus on exploring the MTS-A instrument in other educational contexts within Indonesia and internationally, particularly in settings with curricula distinct from Islamic boarding schools. This will help assess the scalability and adaptability of the instrument. Additionally, attention should be given to refining the confidence abilities dimension, as its construct reliability did not meet the desired threshold, indicating the need for further adjustments. By addressing these issues and expanding the research context, the MTS-A can be more robustly validated and applied in various educational settings, contributing to a deeper understanding of mental toughness and its role in academic and personal development.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines

for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional. Approval was obtained from the ethics committee of State University of Malang No.23.08.5/UN32.14.2.8/LT/2024. Declared to be ethically appropriate in accordance to 7 (seven) WHO 2011 standards.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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