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Validation of the Turkish version of the psychological distress scale in children and adolescents

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Abstract
The measurement of psychological distress in children and adolescents plays an important role in assessing their emotional and mental health. This study includes two distinct studies focussing on psychological distress in Turkish adolescents aged 11–18 years (N_1 = 467, N_2 = 383). In Study I, Confirmatory Factor Analysis, Item Response Theory, validity, and reliability analyses were conducted for the adaptation of the Psychological Distress Scale for Children and Adolescents (CAPDS-10). In Study II, we tested whether mental toughness is a mediator in the relationship between optimism-pessimism and psychological distress and highlighted their role in the predictive validity analysis. This analysis was deemed to provide additional evidence for the adapted scale and was therefore deemed a supportive analysis. The study's findings demonstrate the validity and reliability of the Turkish version of CAPDS-10, validating its use in measuring psychological distress in children and adolescents. However, the results of the study suggest that mental toughness mediates the relationship between optimism-pessimism and psychological distress. The scores obtained from The Psychological Distress Scale for Children and Adolescents adapted into Turkish within the scope of this study were found to be valid and reliable.

Keywords Psychological distress · Optimism-pessimism · Mental toughness · Scale adaptation

Introduction

Psychological distress is defined as the experience of being exposed to an event that poses a threat to one's physical and mental health, with the individual being unable to effectively cope with this threat (Horwitz, 2007). The presence of psychological distress leads to decreased functionality in daily life activities, social relationships, and school life and the development of mental health problems (Pratt et al., 2007). In addition, low well-being also indicates psychological distress (Burnette et al., 2020). Therefore, this concept is used as an indicator of mental health problems and deterioration in mental health (Drapeau et al., 2012).

Considering that children and adolescents are a vulnerable and sensitive group due to their developmental period, psychological distress is of critical importance, especially for this age group (Qin et al., 2021). The prevalence of problematic behaviors during this critical transition to adulthood is indicative of the potential for internalizing and externalizing problems (Loeber & Burke, 2011). Research has examined depression, stress, anxiety (Radez et al., 2021; Ravens-Sieberer et al., 2022), sleep disorders (Ma et al., 2021), and behavioral problems (Non-Weiler et al., 2020; Yıldırım et al., 2023), substance use, self-harm behaviors and suicidal behaviors (Pompili et al., 2012) as indicators of psychological distress in adolescents. However, it is also known that mental health problems in children and adolescents have long-term negative psychological consequences (Tommy, 2020). As a result, psychological distress in children and adolescents is seen as a cause for concern (Memmott-Elison et al., 2020). Therefore, measuring psychological distress may be important for early diagnosis and intervention studies. In this way, it may also be possible to discover the mechanisms underlying psychological distress. For this purpose, the Children and adolescent psychological distress scale was developed (De Stefano et al., 2022). This study examines the adaptation of this scale to Turkish culture and the relationships between optimism-pessimism, mental toughness, and psychological distress.

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Psychological distress, which is extremely important for the mental health and quality of life of children and adolescents, is related to optimism-pessimism and mental toughness, which are also important for the mental health of children and adolescents and is a topic worthy of research. According to theories focusing on identity and social roles (Burke, 1991; Thoits, 1992), psychological distress is caused by external conditions. Identities are an individual's perception of the self about a role he/she assumes. If the reactions of the social environment regarding this role are incompatible with the individual's self-perception, psychological distress is expected to occur (Burke, 1991). Therefore, psychological distress is a person's current situation consisting of characteristics such as values, abilities, and resources and their relationship with external conditions (Aneshensel, 1992; Burke, 1991). In Lazarus and Folkman's (1984) stress model, psychological distress is considered as a result of the individual's cognitive evaluations. When an individual first encounters a stimulus, he/she first evaluates whether it is threatening or not. Then he/she evaluates coping resources. Here, coping is what is effective in achieving well-being or psychological distress. These coping skills can affect individuals' optimistic and pessimistic perspectives on the situation. Previous research also shows that negative life events and crises (Champion et al., 2020; Petzold et al., 2020), self-perception and family functioning (Huang et al., 2009), coping skills, optimism-pessimism (Nes, 2016; Scheier et al., 2001) and mental toughness (Haghighi & Gerber, 2019) predict psychological distress.

Optimism and pessimism express positive or negative expectations about the possible outcomes of a situation (Scheier et al., 2001). Optimistic people are known to use problem-focused coping skills whereas pessimistic people use emotion-focused coping strategies (Carver et al., 1989). High optimism and low pessimism allow focusing on adaptive coping skills, goals for solving the problem, and what to do to achieve the goals rather than focusing on negative emotions (Carver et al., 2005; Shifren, 1996). Studies show that optimism reduces the risk of experiencing psychological distress and increases well-being indicators, whereas pessimism, on the contrary, decreases well-being and increases psychological distress (Arslan et al., 2021; Augusto-Landa et al., 2011; Eid & Diener, 2004). This is explained by the fact that optimistic individuals have a positive perspective and high motivation in the face of challenging life conditions and events (Carver et al., 2010). Thus, coping and an optimistic outlook are known to increase an individual's mental toughness, that is, the ability to recover after stressful situations (Jin & Wang, 2018; Nicholls et al., 2008).

Individuals' expectations about the outcomes of events are an important mechanism underlying mental toughness (Coulter et al., 2010). Mental toughness is a multifaceted psychological trait that enhances people's ability to cope with challenging experiences and contributes to maintaining their mental health even under high stress (Jin & Wang, 2018). Individuals with mental toughness believe that they are in control of the events they experience (Clough et al., 2002). The individual's striving to achieve life goals despite all the negativity is seen as a force that prevents the occurrence of psychological distress and heals the individual (Gucciardi et al., 2015). Thus, mental toughness, which includes positive traits such as control, commitment, perseverance, motivation, self-efficacy, and self-confidence, is expected to increase well-being by reducing psychological distress (McGeown et al., 2018). Conversely, low mental toughness is known to lead to psychological distress such as depression, anxiety, and stress (Gerber et al., 2018; Mutz et al., 2017). Studies in adolescents have shown that mental toughness supports positive social, academic, and emotional developmental tasks and predicts positive mental health outcomes (Gerber et al., 2015; St Clair-Thompson et al., 2015).

To better understand the relationships between psychological distress and different variables and to make more comprehensive measurements, there is a need for measurement tools that reveal psychological distress in a reliable and valid way. When the literature is examined, we come across the psychological distress scale (K10), which measures psychological distress and is widely used in adults (Kessler et al., 2002) (K10). The 10-item, unidimensional scale focuses on symptoms of depression and anxiety experienced in the last 30 days. However, there is also a short version of the K10 (K6), which has psychometric properties as good as the K10 (Kessler et al., 2002). Adaptation studies of this scale to Turkish culture have been conducted in adult samples (Altun et al., 2019; Fassaert et al., 2009) and also in another adult sample of caregivers of cancer patients (Eskin et al., 2021). The fact that these adapted scales were studied in adult samples reveals the need for a measurement tool for children and adolescents measuring psychological distress. In addition, Renshaw and Bolognino (2016) developed a scale consisting of psychological well-being and psychological distress sub-dimensions to assess adolescents' school mental health. This scale was also adapted to Turkish culture by Renshaw and Arslan (2019). Considering that psychological distress, which is a sub-dimension of this scale, consists of five items and the whole scale is aimed at school mental health, it was considered necessary to adapt a psychological distress scale, which can assess the general life of children and adolescents, to Turkish culture.

The adaptation study of the Child and Adolescent Psychological Distress Scale may be considered necessary in terms of representing Turkish culture. We can make the expression of Turkish culture mentioned here can be better described with the 6-D model of Hofstede et al. (2005).

According to this model, Turkish culture is known to be dominated by a collectivist structure in which all individuals in society are not equal, power is unequally distributed and this is accepted. In Turkish culture, consensus and sympathy for the oppressed are encouraged, communication is indirect, and open discussions are avoided. People in this culture have a strong concern for getting to the truth. However, they make extensive use of rituals and traditional patterns to avoid negative emotions. It seems important to adapt this scale to see the effect of these structures in Turkish culture on psychological distress in children and adolescents and to compare it with other cultures. Considering that adolescence is the emergency period of many harmful habits and psychological problems (Kaltiala-Heino et al., 1999), the adaptation of this scale to Turkish culture may also be important in terms of screening psychological distress in children and adolescents and identifying students at risk. In addition, it may have other uses such as cross-sectional and longitudinal studies on psychological distress.

In addition to these local contributions, the adaptation of this scale to Turkish culture may contribute to the universality of the measurement tool by providing an understanding of cultural diversity and cultural differences. In addition, the adaptation of this scale allows generalizations to be made about the construct being measured and the sample group in which the construct is measured by providing the opportunity to make comparisons between different cultures. Finally, the adapted scale can be used as a tool for effective communication and collaboration between participants and researchers in different countries around the world. As a result, the adaptation of this scale to Turkish culture can lead to qualified and comprehensive research in the international arena.

In this context, our research attempts to assess the reliability and validity of the Child and Adolescent Psychological Distress Scale in the Turkish culture. In addition, the mediating role of mental toughness in the relationship between optimism-pessimism and psychological distress was also investigated. Therefore, a stepwise psychometric analysis was conducted with different participants at different times. In this process, the conceptualization of validation and the presentation of results followed the measurement standards framework of the American Educational Research Association (AERA) et al. (2014). Therefore, the Study I and Study II parts of the research focused on test content, response processes, internal structure, relationships with other variables, and outcomes.

Method

Study I

In Study I, the construct validity and measurement invariance of the Child and Adolescent for Psychological Distress Scale were examined using confirmatory factor analysis. Furthermore, Item response theory analyses were also conducted to assess item validity. Reliability analyses of the scale adapted after construct validity and Item Response Theory were conducted. The criterion-related validity of the Psychological Distress Scale for Children and Adolescents was also tested in Study I. For this purpose, the relationship between life satisfaction, psychological resilience depression, stress, and anxiety variables, which are thought to be related to psychological distress, was examined.

Participants and procedure

A total of 467 Turkish children and adolescents [246 (52.7%) girls and 221 (47.3%) boys] participated in Study I. The ages of the children and adolescents ranged from 11 to 18 years (M = 14.31, SD = 2.48). Of the children and adolescents, 78 (16.7%) were 5 th-grade students, 76 (16.3%) were 6 th-grade students, 48 (10.3%) were 7 th-grade students, 52 (11.1%) were 8 th-grade students, 37 (7.9%) were 9 th-grade students, 40 (8.6%) were 10 th-grade students, 71 (15.2%) were 11 th-grade students and 65 (13.9%) were 12 th-grade students. In addition, participants were also asked about their perceived socio-economic status. Perceived socioeconomic status is known as an individual's subjective perception of their social and economic status in society or their environment (Sulemana et al., 2016). When the participants' perceptions of their socioeconomic status were analyzed, 48 (10.3%) of them stated that they had a low socioeconomic status, 363 (77.7%) a medium socioeconomic status, and 56 (12%) a high socioeconomic status.

Before starting the research, institutional approval was obtained from the administration of the schools where the research would be conducted and ethics committee approval was obtained from XXX University Social and Human Sciences Ethics Committee. Then, the research was announced in schools, and the Child Consent Form and Informed Consent Form were obtained from students and parents who volunteered to participate. Asking participants to sign the informed consent form after explaining the importance of carefully completing the scales has prevented careless responses. Children and adolescents were assured of the confidentiality of their data and that they could withdraw from the study at any time. However, they were instructed to complete the questionnaires in their classrooms using the paper and pencil method. The average time taken to

complete the scales was approximately 15 min. There is no missing data in the study. The study was carried out by the Declaration of Helsinki.

Measures

Children and Adolescent Psychological Distress Scale-CAPDS-10 The scale was developed by De Stefano et al. (2022) to measure the psychological distress in children and adolescents. The CAPDS-10 is a unidimensional scale and consists of 10 items (e.g. "I have felt irritable or depressed, or I have felt angry"). However, the scale is answered on a 4-point Likert scale (0 = never a day, 1 = a few days, 2 = more than half of the days, 3 = almost every day). When completing the scale, children and adolescents are asked to think about the last two weeks and high scores indicate high psychological distress. The Cronbach's alpha coefficient of 0.86 indicates that the scores obtained from the scale are reliable and CFA results show that the scale has a good fit level (RMSEA = 0.07, CFI = 0.95. However, the validity and reliability of the scores obtained from the scale were also supported by various analyses during the scale development process (for more details, see De Stefano et al., 2022). In this study, the psychometric properties of CAPDS-10 are presented in the results section of the study.

The Child and Youth Resilience Scale (CYRS-12) This scale was developed by Liebenberg et al. (2013) to measure psychological resilience in children and adolescents and adapted to Turkish culture by Arslan (2015). CYRS-12 is a unidimensional scale and consists of 12 items (e.g. "When things don't go the way I want, I can solve the situation without hurting other people or myself, for example, without resorting to violence or saying mean things"). However, the scale is answered on a 5-point Likert scale (1 = does not describe me at all, 5 = describes me completely). Higher scores on the scale suggest heightened levels of psychological resilience. The adaptation study conducted by Arslan (2015) that the scores obtained from the scale were reliable (α = 0.91) and CFA results show a high level of fit for the scale (CFI = 0.97; NFI = 0.94; GFI = 0.94; RMSEA = 0.06). In this study, the reliability coefficient of the scale was 0.87.

Depression, Anxiety, and Stress Scale (DASS-21) The DAS-42 scale developed by Lovibond and Lovibond (1995) was converted into a short form by Henry and Crawford (2005) and the DAS-21 scale was created. This short form (DAS-21) was adapted into Turkish by Saricam (2018) in normal and clinical samples. This scale has also been used to determine the level of depression, anxiety, and stress in Turkish adolescents (see Akkuş Çutuk & Kaya, 2018; Demir & Kumcağız, 2020). The scale consists of three factors and 21 items (e.g. "I was worried about situations in which I would panic and make a fool of myself", "I felt scared for no valid reason"). However, the scale is answered on a 4-point Likert scale (0 = does not apply to me at all, 5 = completely applies to me). The scale does not give a total score. High scores on the subscales indicate high scores in depression, anxiety, and stress subscales. The adaptation study conducted by Sarıçam (2018) shows that the scores obtained from depression (α = 0.85), anxiety (α = 0.80), and stress (α = 0.76) subscales are reliable. In addition, the results show that the CFA results of the subscales show a high level of fit (GFI = 0.91, CFI = 0.91, TLI = 0.90, RMSEA = 0.06, SRMR = 0.06). The reliability coefficients obtained in this study show that each of the sub-dimensions of depression (α = 0.86), anxiety (α = 0.86) and stress (α = 0.82) is a reliable measurement tool.

Satisfaction with Life Scale The scale was developed by Diener et al. (1985) to measure life satisfaction and adapted to Turkish culture by Durak et al. (2010). The scale is unidimensional and consists of 5 items (e.g. "If I could live my life all over again, I would want everything to be the same"). However, the scale is answered on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). High scores on the scale indicate high life satisfaction. The adaptation study conducted by Durak et al. (2010) showed that the scores obtained from the scale were reliable (α = 0.85) and CFA results showed that the scale had a good fit level (IFI = 0.99, TLI = 0.99, CFI = 0.99, SRMR = 0.02, RMSEA = 0.03). In this study, the reliability coefficient of the scale was found to be 0.87.

Data analyses

In analyzing the data, a confirmatory factor analysis (CFA) of the scale was first carried out. CFA is used for a variety of purposes such as psychometric evaluation, construct validity, and assessment of measurement invariance.CFA is frequently used in scale development and adaptation studies and is used to examine the latent structure of a measurement instrument to verify the number of principal dimensions (factors) and the pattern of item-factor relationships (factor loadings) (Hoyle, 2012). Since the scale items were continuous variables and the distribution showed normal distribution, maximum likelihood estimation was performed in the AMOS program. While evaluating the model fit, indices such as SRMR, RMSEA, and CFI were used. Subsequently, the item-total correlations of the scale were examined. We extend the validation process by modeling the Children and Adolescents for Psychological Distress Scale through Item Response Theory (IRT) using Stata. In Item Response Theory, item properties and validity are examined, and the suitability of the items is determined.

Several reliability coefficients were also calculated, including Cronbach's alpha (α), and McDonald's omega (ω).In addition, after examining the psychometric properties of the Child and Adolescent for Psychological Distress Scale, we examined the relationships between Child and Adolescent for Psychological Distress and life satisfaction, psychological resilience and depression, anxiety, and stress.

Results

We performed CFA as a maximum likelihood estimator to test the adequacy of the Psychological Distress Scale for Children and Adolescents and to validate the CAPDS-10 model previously reported by De Stefano and colleagues (2022). The CFA revealed an acceptable model fit 10-item Child and Adolescent for Psychological Distress Scale; $\chi^2_{(35,\ n\ =467)}$= 154.788, SRMR (0.04 ≤0.08), RMSEA (0.08 ≤0.08), and, CFI (0.945 ≥0.90). SRMR and RMSEA values below 0.08 and, CFI value above 0.90 is acceptable (Hoyle & Panter, 1995). Table 1 displays the factor loadings, descriptive statistics, and item-total correlations. Factor loadings varied between 0.544 (item-8) and 0.824 (item-9). Table 2 displays measurement invariance of the variables at males and females.

After confirming the structure of the scale, an Item Response Theory (IRT) analysis was carried out. The values of the discrimination parameter (a) are presented in Table 3, ranging from 1.36 to 3.23. According to Baker (2001), 9 items were classified as very high, while 1 item was classified as high. These results reveal the very high discriminative power of the Child and Adolescent for Psychological Distress Scale.

The reliability coefficients of the Child and Adolescent for Psychological Scale were assessed using Cronbach's alpha, and McDonald's omega. The reliability estimates for the Child and Adolescent for Psychological Distress Scale showed highly satisfactory values, all within the accepted range (α =0.90; ω= 0.91; (λ6 =0.90).

Measurement invariance

Following the validation of the structure of the Psychological Distress Scale for Children and Adolescents, the adapted scale was analyzed according to gender. A review of the literature on psychological distress shows that gender differences are more pronounced in adolescents. When examining the studies conducted, it is noted that girls are more likely to report psychological distress such as depression, anxiety, and stress than boys (Marsh et al., 2018; Pengpid & Peltzer, 2020; Rescorla et al., 2007). Therefore, in this study, invariance according to gender was addressed. Therefore, this study addressed gender invariance. The results revealed that the scale showed an adequate fit for both genders, females =$\chi^2_{(35,\ n\ =246)}$= 117.067, p<.05; CFI =0.94, and males =$\chi^2_{(35,\ N=221)}$= 78.638, p<.05; CFI =0.95. Subsequently, configurational, metric and scalar invariance were conducted. The results are presented in Table 4. As shown in Table 4, measurement invariance analysis supported configural and metric invariance (ΔCFI =0.002) of the Child and Adolescent for Psychological Distress Scale across genders. Conversely, scalar invariance (ΔCFI =0.014) was not substantiated, attributing to the model's goodness of fit.

Finally, Table 3 presents descriptive statistics, including the mean and standard deviation (SD), as well as correlation coefficients. Psychological distress was negatively correlated with life satisfaction (r= −.501, p<.01), and psychological resilience (r= −.52, p<.01). On the other hand, psychological distress was positively correlated with depression (r=.736, p<.01), anxiety (r=.709, p<.01), and stress (r=.744, p<.01).

Study II

In the Study II phase of the research, the hypothesis was examined as to whether mental toughness would mediate the relationship between optimism and pessimism in psychological distress. This analysis was considered to provide additional evidence for the adapted scale and was therefore

Table 1 Factor loadings, descriptive statistics, skewness, kurtosis, item-total correlations, and IRT results

Item	Factor loadings	Mean	SD	Skewness	Kurtosis	Item-total correlations	a coefficient	SE	Confidence interval	z	p>|z|
Item 1	0.752	1.50	0.983	0.233	−1.009	0.767	2.43	0.20	2.02–2.84	11.66	0.000
Item 2	0.697	1.10	1.006	0.627	− 0.658	0.733	2.05	0.17	1.70–2.40	11.48	0.000
Item 3	0.668	0.88	0.995	0.902	− 0.288	0.713	1.92	0.17	1.59–2.26	11.18	0.000
Item 4	0.733	1.29	1.040	0.382	−1.010	0.765	2.10	0.18	1.75–2.46	11.61	0.000
Item 5	0.721	1.00	0.989	0.735	− 0.486	0.751	2.14	0.18	1.78–2.51	11.52	0.000
Item 6	0.723	1.38	1.058	0.331	−1.111	0.756	2.15	0.18	1.79–2.52	11.49	0.000
Item 7	0.650	1.15	1.096	0.543	−1.025	0.707	1.73	0.15	1.42–2.04	10.96	0.000
Item 8	0.544	0.65	0.847	1.276	0.960	0.600	1.36	0.14	1.08–1.64	9.59	0.000
Item 9	0.824	1.23	1.051	0.451	− 0.982	0.831	3.23	0.29	2.65–3.81	10.98	0.000
Item 10	0.623	0.70	0.935	1.257	0.608	0.670	1.72	0.16	1.40–2.04	10.52	0.000

Table 2 Measurement invariance of the variables at males and females

Invariance	χ^2	df	χ^2/df	$\Delta\chi^2$	Δdf	*p*	IFI	TLI	SRMR	RMSEA	CFI	ΔCFI	ΔMc NCI	Δgamma hat
Configural invariance	195.705	70	2.79	-	-	-	0.941	0.923	0.0482	0.062	0.940	-	-	-
Metric invariance	203.477	79	2.57	7.772	9	0.55	0.941	0.933	0.0501	0.058	0.941	0.002	0.001	0.002
Scalar invariance	242.313	88	2.75	38.83	9	0.00	0.927	0.925	0.0499	0.061	0.927	0.014	0.027	0.014

Table 3 Relationship of the psychological distress with the variables

Variable			Correlations with psychological distress	
	Mean	SD	*r*	*p*
Life Satisfaction Scale	15.97	5.275	−0.501	< 0.001
Psychological Resilience Scale	46.30	9.526	−0.521	< 0.001
DASS				
Depression	15.04	5.645	0.736	< 0.001
Anxiety	14.49	5.042	0.709	< 0.001
Stress	14.40	5.672	0.744	< 0.001

Table 4 Indirect effects for the mediational models

Indirect Effect	Effect	SE	95% C.I.	
			Lower	Upper
Optimism Mental Toughness Psychological Distress	−0.062	0.028	−0.119	−0.011
Pessimism Mental Toughness Psychological Distress	0.027	0.013	0.006	0.057

considered a supportive analysis. The hypotheses of the study are as follows:

H1: Mental toughness mediates the relationship between optimism-pessimism and psychological distress.

Participants and procedure

A total of 410 Turkish children and adolescents participated in Study II, 228 (55.6%) girls and 182 (44.4%) boys. The ages of the children and adolescents ranged from 11 to 18 years (M = 14.22, SD = 2.48). Of the children and adolescents, 80 (19.5%) were 5 th-grade students, 63 (15.4%) were 6 th-grade students, 48 (11.7%) were 7 th-grade students, 52 (12.7%) were 8 th-grade students, 31 (7.6%) were 9 th-grade students, 33 (8.0%) were 10 th-grade students, 34 (8.3%) were 11 th-grade students and 69 (16.8%) were 12 th-grade students. However, in terms of the participant's perception of their socioeconomic level, 39 (9.5%) of the participants had a low socioeconomic status, 292 (71.2%) had a medium socioeconomic status and 79 (19.3%) had a high socioeconomic status. Children and adolescents completed the questionnaires in their classrooms using the paper and pencil method. There are no missing data in the study. On average, it took about 15 min to complete the scales.

Measures

Mental Toughness Scale for Adolescents-Short Form (MTS-A) The scale was developed by McGeown et al. (2018) to measure the mental toughness in adolescents and adapted to Turkish culture by Soylu et al. (2019). The long form of

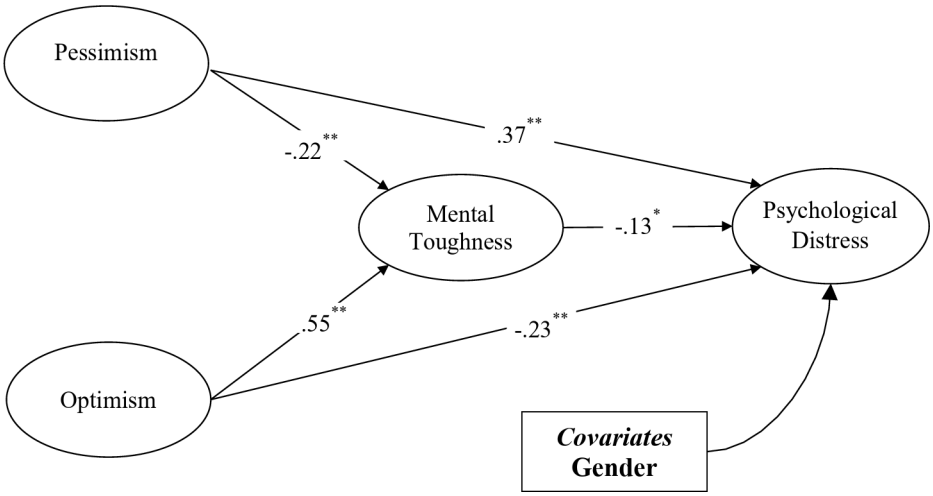

Fig. 1 Mediation models for optimism-pessimism and psychological distress via mental toughness. Note. $^{**}p<.01$, $^{*}p<.05$

the MTS-A is a six-dimensional scale and consisting of 18 items. The short form of the MTS-A is unidimensional and consists of 6 items (e.g., "It is difficult for me to stop my anger/sadness/stress"). However, the scale is answered on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree). The adaptation study conducted by Soylu et al. (2019) shows that the scores obtained from the scale are reliable (α = 0.72), and CFA results show that the scale has a good fit level (CFI = 1.00, TLI = 1.00, RMSEA = 0.00). In this study, the reliability coefficient of the scale was 0.74.

Optimism-pessimism Scale The scale was developed by Caliskan and Uzunkol (2018) to measure the optimism-pessimism levels of adolescents. The scale consists of two dimensions (optimism-pessimism) and 16 items (e.g. "When I face difficulties, I believe that I will find a way out", and "No matter what I do, things will not go well"). However, the scale is answered on a 5-point Likert scale (1 = Not at all appropriate, 5 = Completely appropriate). When scoring the scale, the sub-dimensions are evaluated separately and a total score is not derived from the scale. In the adaptation study conducted by Caliskan and Uzunkol (2018), Cronbach's alpha coefficients of 0.86 for the optimism subscale and 0.82 for the pessimism subscale indicate that the scores obtained from the scales are reliable. In addition, CFA results also show that the scale has a good fit level (GFI = 0.94, NFI = 0.97, CFI = 0.98, IFI = 0.98, RMSEA = 0.05). In this study, the reliability coefficient of optimism was 0.91 and the reliability coefficient of pessimism was 0.85.

Data analysis

In the Study II phase of the research, the relationships between optimism, pessimism, mental toughness, and psychological distress variables were first analyzed by Pearson correlation. Then, structural equation modeling was carried out. Gender was included as a control variable in the models tested. Furthermore, the mediation model was analyzed over 5,000 bootstrapped samples. This method generated 95% confidence intervals (CIs) of indirect effects. Bootstrap 95% CIs that are not different from zero are considered statistically significant (Hayes, 2018). The analyses were conducted using SPSS 22, AMOS 24, and JASP programs.

Results

Psychological distress showed a significant and adverse association with mental toughness ($r = -.484$, $p<.01$), and optimism ($r = -.518$, $p<.01$), while showing a positive correlation with pessimism ($r=.569$, $p<.01$). The results of the structural equation model examining the effect of optimism and pessimism on psychological distress through mental toughness indicated a saturated model: $\chi^2_{(3,\ N=383)} = 1.924$; CFI = 1.000; RMSEA = 0.00; SRMR = 0.21. Figure 1 shows mediation models for optimism-pessimism and psychological distress through mental toughness.

As can be seen in Table 4, through bootstrapping, the indirect effects were found to be significant ($\beta = -0.062$, SE = 0.028, 95% CI = − 0.119, −0.011), confirming the association between optimism with psychological distress mediated by mental toughness. Additionally, bootstrapping supported the role of mental toughness as a mediator in the association between pessimism and psychological distress ($\beta = 0.027$, SE = 0.013, 95% CI = 0.006, 0.057).

Discussion

Measuring psychological distress in children and adolescents plays an important role in assessing their emotional and mental health. Identifying psychological distress at an early age, which will affect an individuals' life, is a crucial

step for early intervention. The measurement of psychological distress and thus early intervention can help children and adolescents to have a healthier developmental process. This study aims to adapt the Psychological Distress Scale for Children and Adolescents to the Turkish culture. The results of the research are discussed below.

Based on the results of the Confirmatory Factor Analysis (CFA) conducted in Study 1, the CAPDS-10 had acceptable goodness-of-fit indices and the standardized factor loadings were significant. The results of the CFA validated the 10-item format through the unidimensional structure, which is consistent with the original scale proposed by De Stefano et al. (2022). Item Response Theory (IRT) was used to examine the interaction between item responses. The IRT results indicated that 90% of the items were classified as having very high discriminative power, with the remaining 10% classified as having high discriminative power. These results underscore the significant discriminative power of the scale, as demonstrated by the high discriminative power of the Children and Adolescents for Psychological Distress Scale.

The study examined the measurement invariance of the research. In assessing configurational and metric invariance, the proposed unidimensional structure about gender produced comparable results for both males and females. Conversely, the scalar invariance analyses failed to support the model under investigation in this research. The lack of support for scalar invariance may be due to several factors. From a cultural point of view, Turkish culture is characterized by indirect communication where open discussions are avoided. The family structure in Turkish society may inhibit adolescents' ability to openly express their feelings. In Turkish culture, males are more likely to use traditional methods of avoiding negative emotions rather than expressing them. In this context, there may be differences between female and male adolescents. Furthermore, it is important to note that adolescents may be inclined to respond in a socially desirable way, avoiding the expression of negative emotions and potentially leading to social desirability bias. In addition, the developmental stage of the adolescents and their responses to the scale items may also contribute to variations in their responses. Furthermore, in the criterion-related validity study in Study I, the negative relationship between psychological distress and life satisfaction and psychological resilience was significant, while the positive relationship between psychological distress and DASS was significant (Aliyev et al., 2024; Aloba et al., 2017; Dong et al., 2023; Kartol et al., 2023; Milicev et al., 2023). According to related studies, it has been found that the life satisfaction of individuals with high psychological distress may be negatively affected. Therefore, it is suggested that individuals who experience intense discomfort related to stressful life events may also have negative evaluations of their quality of life. A review of the literature shows that psychological distress is also negatively related to psychological resilience (Aliyev et al., 2024; Jacobson et al., 2022; Jiang et al., 2024). This suggests that individuals with high psychological resilience may be less likely to experience psychological distress. In addition, the literature emphasizes the positive significant relationship between psychological distress and depression, anxiety, and stress (Thompson et al., 2022). Therefore, it can be argued that the study results and criterion-related validity are in line with the literature.

In Study 2, the incremental validity of CAPDS-10 was tested. Two models were constructed to examine the mediating role of mental toughness in the relationship between optimism and psychological distress and the mediating role of mental toughness in the relationship between pessimism and psychological distress. According to the results of the study, it can be said that optimism levels can increase mental toughness and this increase can reduce psychological distress. In the focus of positive psychology, optimism appears as a structure that expresses positive expectations about future outcomes (Scheier & Carver, 1985). According to positive psychology, optimistic individuals can produce more positive emotions when they are in difficult situations (Carver et al., 2011). Evidence suggests that optimistic individuals are more effective in psychological and physical recovery processes, which may lead to increased mental toughness. According to positive psychology, pessimistic individuals may produce more negative emotions and expect more negative outcomes in stressful situations (Carver et al., 2011). This may lead to a decrease in mental toughness in pessimistic individuals. At the same time, increased negative emotions may lead to increased psychological distress. The literature supports these results (Chiesi et al., 2022; Ji et al., 2022; Liu et al., 2022).

In the process of adapting the scale to Turkish culture, it was also found that the psychometric parameters were appropriate to the cultural context. Factor analysis results show that the items on the scale are compatible with the values and norms specific to Turkish culture. For example, the items "I have felt angry, stressed out or worried" and "I have felt irritable or unpleasant or I have lost my temper" showed high factor loadings among Turkish participants, indicating that stress and anger are important dimensions in the cultural context. Ögel's (2014) study on the prevalence of mental illnesses in Turkey is consistent with this finding. Moreover, in terms of external validity, the item "I haven't managed to overcome my stress or to deal with it" was found to be effective in measuring Turkish participants' coping mechanisms and showed significant correlations with mental toughness. Existing literature also confirms that individuals' mental toughness is related to how they cope with stress and pressure (St Clair-Thompson et al., 2015).

These findings support the validity and reliability of the scale in measuring psychological distress in Turkish culture. In addition, it may also be important to emphasize how the validity and reliability parameters of the scale are maintained and validated in Turkish culture. The item "I haven't felt like doing things or enjoyed doing things" was used to understand how depressive symptoms are expressed in a cultural context and was supported by high-factor loading. Furthermore, the item "I have felt physical pain, I have felt tired or I have had trouble sleeping" showed that somatic symptoms are an important indicator of psychological distress in Turkish culture. Recent evidence in the literature on the prevalence of somatic symptoms in Turkish society supports the validity of these items. For example, a study conducted by Polat Kara (2022) shows that stress and distress are often expressed through somatic symptoms among individuals in Turkey. In this context, the item "I have felt physical pain, I have felt tired or I have had trouble sleeping" showed that somatic symptoms are an important indicator of psychological distress in Turkish culture. In conclusion, the results of this study show that the cultural adaptation of the scale was successful and that it is a valid and reliable measurement tool among Turkish participants. Therefore, it was concluded that the cultural factors considered in the adaptation process were consistent and compatible with the psychometric properties.

Finally, the reliability coefficients of CAPDS-10 were also analyzed. The results showed that the reliability coefficient of CAPDS-10 in the original study was 0.86. The reliability coefficients in this study were 0.91 for Study I and 0.90 for Study 2, and it can be said that the scores obtained from the scale are reliable. Therefore, the criterion of being above 0.70 required for reliability was met in this study (Nunnally, 1978). As a result, the Psychological Distress Scale for Children and Adolescents, which was adapted to the Turkish culture in this study, proved to be a valid and reliable scale that can be used to measure psychological distress in children and adolescents.

Limitations

This study has several limitations. The first is that the sample of the study consists of a non-clinical group and targets middle and high school students in Turkey. In future research, cross-cultural studies involving children and adolescents living in different countries of the world can be designed. The average age in Study I was 14.31 and in Study II the average age was 14.22. Future studies with different mean ages can be conducted. The scale could also be validated in a clinical sample. Second, the collection of research data was based on self-report questionnaires. In addition, the use of a cross-sectional design in the study constitutes a limitation since such studies prevent the establishment of causal relationships. It may also be a limitation that the authors did not mention some innovative aspects that this study will present and which have not been analyzed in previous studies. In future studies, for example, modeling irrelevant responses with random intercept factor analysis may be suggested. Finally, gender invariance was examined in this study. Future research could address measurement invariance in different cultures. Furthermore, the lack of scalar invariance across gender groups is an important limitation.

Conclusions

This study aimed to adapt the psychological distress scale for children and adolescents using techniques such as measurement invariance, incremental validity, and item response theory. The results of the study show that the Turkish version of the CAPDS-10 has validity and reliability and can be used to measure psychological distress in children and adolescents. However, when optimism, which has an impact on coping with problems, is high, children and adolescents may increase their mental toughness against the difficulties they experience. This leads to a decrease in symptoms of psychological distress. Conversely, when pessimism is high, children and adolescents may have less mental toughness to the difficulties they experience. This can lead to an increased risk of psychological distress. Thus, optimism and pessimism may be determinants of psychological distress in children and adolescents.

Implications

The CAPSD-10 adapted in this study and the results obtained from the research have some practical implications. School counselors can use this adapted scale to identify students at risk of psychological distress when working with children and adolescents. It can also guide counselors in identifying participants for individual and group interventions and determining interventions. In addition, intervention studies aimed at reducing psychological distress can design activities to increase optimism and mental toughness and decrease pessimism based on the research findings.

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Author contributions All authors contributed to the study's conception and design. Conceptualization and formal analysis were performed by HYK, ST. Investigation and methodology were performed by HYK, ST, NO, YK, SAS, and MED. Data curation, resources, software, supervision and validation were performed by HYK, ST, NO and YK. The first draft of the manuscript was written by HYK, ST and MED. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data availability Data will be available on request.

Declarations

Ethical approval The study protocol has been approved by Yildiz Technical University Scientific Research and Ethical Review Board (ID: 20231202509). The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its following updates.

Consent to participate Informed consent was obtained from all the individual participants that were included in the study.

Pre-registration statement This study was not pre-registered.

Conflict of interest No conflict of interest exists for this manuscript for any of the authors.

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