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Psychometric Investigation of the Revised Children's Manifest Anxiety Scale, Second Edition, Short Form among the Korean Youth Population

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The Revised Children's Manifest Anxiety Scale, Second Edition (RCMAS-2) has long been used to measure anxiety levels in youth. Its introduction of a 10-item short form has enriched the efficiency and applicability of the scale; however, more research is warranted to elucidate its psychometric properties. This study aims to investigate the factor structure and the measurement invariance of the RCMAS-2 short form (RCMAS-2 SF) in Korean youth. In total, 1,525 participants from seven different cities of South Korea were included in the analysis (Mean Age = 12.49, *SD* = 2.54). After randomly assigning participants into two groups, we consecutively performed exploratory and confirmatory factor analyses. The results of both analyses demonstrated that pediatric anxiety assessed using the RCMAS-2 SF is composed of two distinct latent factors: physiological anxiety and cognitive anxiety. Furthermore, the results supported strong invariance across gender and age. The RCMAS-2 SF score also showed good indices of internal consistency, test-retest reliability, and concurrent validity. These findings highlight that the scale can be widely used as a time-efficient screening tool that enables valid score comparisons between boys and girls of different ages.

Keywords: anxiety, RCMAS-2, short form, measurement invariance, reliability, validity

Introduction

Childhood and adolescence are the core risk phases for developing anxiety symptoms (Costello et al., 2004; Merikangas et al., 2010). If left untreated, such symptoms persist throughout adulthood, conferring a debilitating threat of secondary conditions such as poor academic achievement, lowered self-esteem, eating disorder, depression, and even attempted suicide (Bittner et al., 2007; Keller et al., 1992; Copeland et al., 2014; Schaumberg et al., 2019, Van Oort et al., 2009). However, less than one third of children with anxiety symptoms utilize mental health services (Barker et al., 2019; Bienvenu & Ginsburg, 2007). With meta-analytic reviews reporting the global prevalence of pediatric anxiety disorders as high as up to 25%, it has long been a public priority to discover anxious youth in advance and make early intervention to protect them from pathogenic complications (Chisholm et al., 2016). With this regard, attempts have been made to develop sound instruments to measure the severity of childhood anxiety.

Amongst many self-report questionnaires designed to assess anxiety in youth, the Revised Children's Manifest Anxiety Scale, Second Edition (RCMAS-2; Reynolds & Richmond, 2008) is one of the most frequently used instruments (Fenley et al., 2021). It is a 49-item scale that yields the Total Anxiety score (TOT) and three following subscale scores: 1) Physiological Anxiety (PHY), 2) Worry

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(WOR), and 3) Social Anxiety (SOC). Several studies have supported its psychometric properties, reporting good internal consistency, test-retest reliability, and construct validity estimates in clinical and nonclinical populations (Ahmad & Mansoor, 2011; Raad, 2013; Mahakwe et al., 2021). It has been translated into diverse languages and is widely used to screen out anxious children or measure therapeutic effects in relieving anxiety (Gaesser & Karan, 2017; McEvoy et al., 2019; Zhou et al., 2019).

One of the most compelling advantages of RCMAS-2 is indeed its 10-item short form (RCMAS-2 SF; Reynolds & Richmond, 2008). The length of a self-report is of paramount importance to its usability (Ahlen et al., 2018; Ebesutani et al., 2012). Short forms provide several advantages over lengthy questionnaires because the latter causes response bias and measurement error by making a respondent more inattentive and careless (Billieux et al., 2012; Li & Lopez, 2007). Some findings also emphasize that too many items lower the completion rate, ultimately resulting in information loss (Rolstad et al., 2011). In light of these circumstances, the short form total anxiety score (SF-TOT) of the RCMAS-2 is suggested as a competent alternative to the original TOT of 49-items, and its correlation coefficient was reported as high as .90 (Reynolds & Richmond, 2008).

Despite its widespread use, research on the RCMAS-2 SF is scarce. There are only three rudimental studies that examined the psychometric properties of the scale. Once the one-factor model was initially suggested and conceptualized as reflecting general manifest anxiety by Lowe (2015a), two confirmatory factor analysis (CFA) studies examined the unidimensionality of the scale (Lowe, 2015b; Lowe & Ang, 2016). The results achieved adequate fit; however, the limited age-range and cultural background of the prior study participants highlight the necessity of an additional examination on the dimensionality underlying the RCMAS-2 SF. Notably, the one-factor model was supported exclusively among American students or English-speaking youth population; thus, it remains unclear whether a consistent factor structure would be observed in cultures where verbal expressions and social acceptance on anxiety symptoms are different.

Culture is indeed a potential candidate that can cause factorial invariance of pediatric anxiety across studies. Few studies have documented such cultural disparities (Chan & Leung, 2015; Varela & Biggs, 2006). For example, data on collectivism-oriented Latin American children showed a different factor structure for the RCMAS than their individualistic European American counterparts. Likewise, a study on Hong Kong adolescents whose culture exerts a high amount of restraint over one's expression of anxiety failed to replicate the original five-factor structure of the Screen for Child Anxiety Related Emotional Disorders (SCARED). The authors argue that such a gap may stem from different social norms and parenting attitudes that wield a strong influence on children's development and expression of anxiety (Pina et al., 2009; Weisz et al., 1987; Valera & Hensley-Maloney, 2009). More specifically, collectivistic cultures that emphasize self-restraint may lead children to express their anxiety in forms of internalizing problem (e.g., shyness, worry) whereas externalizing symptoms (e.g., crying out, anger) may are more linked to individualistic cultures (Weisz et al., 1987; Weitkamp & Seiffge-Krenke, 2019). Another potential suggestion is that children in collectivistic culture may exhibit their anxiety as a somatic symptom because the culture and controlling parents place more importance on the suppression of psychological problems and community harmony than individualistic cultures do (Kim et al., 2019).

Furthermore, a wealth of studies has yielded strong supports for the multi-dimensionality of childhood anxiety. Unlike studies that uniformly propose a single factor underlying the RCMAS-2 SF, no study on the original 49-item RCMAS-2 has claimed to have one factor; instead, researchers have generally suggested a five-factor model with three distinct anxiety subscales and two validity subscales. Studies conducted in Asian countries, in particular, seem to converge into a four-factor model that incorporates two Defensiveness factors, the PHY factor, and one other factor that integrates both the WOR and SOC items (Cha et al., 2020; Raad, 2013; Wu et al., 2016; Zhu & Lowe, 2018). In addition, researches on other questionnaires on childhood anxiety, such as Spence Children's Anxiety Scale (SCAS) and the Youth Anxiety Measure for DSM-5 (YAM-5) have repeatedly supported multidimensional factor structures that reflect complex facets of childhood anxiety (Hale et al., 2011; Simon et al., 2017; Spence et al., 2003). Therefore, it is necessary to examine alternative models other than the one-factor model for the RCMAS-2 SF to reconfirm whether the scale is composed of a single factor that is less supported by the literature.

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Meanwhile, the RCMAS-2 SF, is commonly used to compare anxiety levels among youth. Yet, to ensure whether the differences in summary statistics denote true gender or age effects, measurement invariance (MI) must be tested prior to the utilization of the scale (Cheung & Rensvold, 2002; Meredith, 1993; Van de Schoot et al., 2012). Since the response tendency can vary systematically depending on how different groups interpret each item, the confirmation of a unified interpretation by respondents is important. Hence the establishment of MI in RMCAS-2 SF is also needed to argue for age and gender differences in the youth.

Building on the recommendations and limitations aforementioned in the literature, the current study aimed to elucidate the factors underlying pediatric anxiety in Korean community-dwelling sample using the RCMAS-2 SF and to examine if any factors contribute to the measurement invariance of the instrument. Specifically, we firstly examined the factor structure of the RCMAS-2 SF using exploratory factor analysis (EFA) and CFA. Considering the lack of prior studies, we not only examined one factor but also inspected the validity of two and three factor structures. We then investigated the reliability and validity of the scale by calculating Cronbach's alpha, the test-retest reliability index, and correlation coefficients with other measures of childhood psychopathology. Furthermore, we examined the measurement invariance of the RCMAS-2 SF across gender and age.

Method

Participants

The study protocol was approved by the Institutional Board of Chungbuk National University (CBNU-201708-SB-503-01). The process of translation and validation into Korean has been well documented by Cha et al. (2020). A community sample of 1,565 youth aged 8 to 18 years was recruited from seven different cities in South Korea, hence enabling a nationwide study. All the participants provided written consent after the purpose and ethical considerations of the study were addressed. Among 1,565 students, ten cases with missing demographic data were firstly excluded. Questionnaires were considered incomplete if 1) more than five items (>10% of total 49 items) in RCMAS-2 or 2) any of the RCMAS-2 SF items were left unanswered. All the incomplete responses were excluded from further analysis. As a result, a total of 1,525 participants (M=12.49, SD=2.54) with 651 boys (42.7%) and 874 girls (57.3%) were included in the final sample. These participants were then randomly assigned into either the EFA or CFA group. No significant differences were observed in any of the demographic variables between the groups. The statistics are presented in Table 1.

Furthermore, a subset of 191 participants (M=11.27, SD=1.57) was analyzed in a test-retest analysis because they completed a second administration of the RCMAS-2 two weeks after the first administration. Furthermore, a total of 799 students with a mean age of 10.89 (SD=1.32) also completed Spielberger's State-Trait Anxiety Inventory for Children (STAIC) and Children's Depression Inventory 2 (CDI 2) for the test of concurrent validity.

Measures

Revised Children's Manifest Anxiety Scale, Second Edition (RCMAS–2)

The RCMAS-2 is a self-report inventory that assesses anxiety lev-

Table 1. *Demographic Characteristics of Participants*

	Total (N=1,525)	Group1_EFA (n=785)	Group2_CFA (n=740)	t/χ^2	p
Age, mean (*SD*)	12.49 (2.54)	12.49 (2.51)	12.50 (2.56)	.062	.950
Gender, No. (% of Female)	874 (57.31)	452 (57.60)	422 (57.02)	-.218	.828
School, No. (% of Elementary students)	929 (60.92)	477 (60.76)	452 (61.08)	-.127	.899
PHY, mean (*SD*)	3.21 (2.59)	3.24 (2.63)	3.19 (2.54)	-.379	.704
WOR, mean (*SD*)	6.01 (4.34)	5.99 (4.40)	6.03 (4.28)	.186	.852
SOC, mean (*SD*)	2.74 (2.82)	2.77 (2.91)	2.71 (2.71)	-.397	.692
TOT, mean (*SD*)	11.97 (8.69)	12.00 (8.93)	11.93 (8.44)	-.149	.882
SF-TOT, mean (*SD*)	3.24 (2.70)	3.29 (2.75)	3.18 (2.64)	-.773	.440

Note. PHY = Physiological Anxiety score; WOR = Worry score; SOC = Social Anxiety score; TOT = Total Anxiety score; SF-TOT = Short Form Total Anxiety score.
*p < .05.

Table 2. *Factor Solution for K-RCMAS-2 SF Items and Loadings*

Item	Factor	
	PHY	COG
1. Often I feel sick in my stomach	.698	.002
2. I am nervous	.505	.212
5. I have too many headaches	.743	-.067
7. I wake up scared sometimes	.322	.141
3. I often worry about something bad happening to me	.427	.496
4. I fear other kids will laugh at me in class	-.040	.944
6. I worry that others do not like me	.150	.816
8. I get nervous around people	.145	.510
9. I feel someone will tell me I do things the wrong way	.115	.772
10. I fear other people will laugh at me	-.122	1.022

Note. PHY = physiological anxiety score for short form; COG = cognitive anxiety score for short form.

els in children aged 6-19 years (Reynolds & Richmond, 2008). The scale comprises 49 items to which the child must respond in a yes/no manner. This study used TOT along with three other subscales, namely PHY, WOR, and SOC. Furthermore, we calculated SF-TOT by adding up the number of 'yes' responses for the first ten items inRCMAS-2 as the manual recommends (Reynolds & Richmond, 2008). The contents of each item are listed in Table 2. The internal consistency of the SF-TOT in the Korean normative data was good (α = .92). In the current sample, Cronbach's alpha was within the acceptable range (α = .79).

Spielberger's State–Trait Anxiety Inventory for Children (STAIC)

The State-Trait Anxiety Inventory for Children includes two separate 20-item scales that measure life-long enduring tendencies (trait version) and transitory (state version) level of childhood anxiety, respectively (Cho & Choi, 1989; Spielberger et al., 1973). However, since manifest anxiety of the RCMAS was originally conceptualized as a time-stable anxious disposition that indicate underlying emotional conflict or repressed feelings, the fluctuating nature of the STAIC state version was considered to not correspond to RCMAS-2 SF (Saviola et al., 2020; Schisler et al., 1998). Thus, we decided to use the trait version exclusively as trait anxiety is assumed to be a chronic tendency that determines individual differences in coping with external threats. The items specifically ask about the degree to which anxiety is felt in general and are rated on a 3-point Likert scale (1 to 3). The total score ranges from 20 to 60, with higher scores indicating greater severity of anxiety. The internal consistency of the STAIC in the current sample was good (α = .91).

Children's Depression Inventory, Second Edition (CDI 2)

Anxiety and depressive disorders are known as the most typical childhood internalization disorders (Strauss et al., 1988; Chorpita et al., 2000; Garber & Weersing, 2010; Zahn-Waxler et al., 2000). Several recent studies with the latest technologies such as network analysis posit that their boundary is rather vague (Boschloo et al., 2016; McElroy et al., 2018). In similar vein, as the importance of a dimensional approach toward psychopathology is increasingly emphasized, we tried to confirm the concurrent validity of the RCMAS-2 SF using CDI 2 (Kim et al., 2018; Kovacs, 2010) to examine if it can soundly measure children's internalization symptoms. The CDI 2 is a self-report questionnaire that assesses the level of depressive symptoms in children aged 7-17 years. It consists of 28 items; each of which offers three descriptive sentences that represent different levels of symptoms. The total score ranges from 0 to 56 and demonstrates strong internal consistency in the Korean normative data (α = .85). In this study, the scores exhibited good reliability (α = .84).

Data Analysis

A series of analyses on demographic data are performed in R version 4.0.0 (R Core Team, 2020) using "dplyr" (Wickham et al., 2019). To determine the number of factors to retain in EFA, we conducted a parallel analysis utilizing the "psych" package in advance (Revelle, 2015). We consecutively carried out EFA and CFA to randomly assigned groups with the "lavaan" package (Rosseel, 2012). As the scale is an ordered-categorical measure whose values are simultaneously dichotomous yet hierarchical, we applied the weighted least square mean and variance adjusted chi-square (WLSMV) estimator with Geomin oblique rotation for the parameter estimation (Flora & Curran, 2004; Muthén, 1984; Muthén & Muthén, 2012). Since chi-square test of model fit is highly sensitive to the sample size, we used sample size-free indices, namely the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA) values. As in line with common standards, the goodness of fit was evaluated using the following robust criteria: CFI $\geq$ .95, TLI $\geq$ .95, and RMSEA $\leq$ .08 (Hu & Bentler, 1999).

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To test the measurement invariance of the scale, three models that gradually increase the invariance stringency, specifically (a) configural, (b) metric, and (c) scalar models, were estimated using the lavaan package (Rosseel, 2012). Each model was compared with its preceding simpler model with the chi-square difference test. However, since it bears the same inherent issue of the sample size-dependent aspect that amplifies the magnitude of negligible model differences, we report chi-square values but make decisions depending on change values in CFI and RMSEA, (Chen, 2007). This implies that the difference in each index lesser than .01, .015, and .03, respectively, was used to reject the more parsimonious model and proceed with the next comparison. As for the test of measurement invariance across age, we dichotomized our participants into two groups: elementary school children (aged 8–13) and secondary school adolescents (aged 14–19). Moreover, we tested partial invariance when significant fit-indices disparity between preceding and subsequent models were found.

Internal consistency was evaluated using Cronbach's alpha to assess the reliability of the scale. The test-retest reliability of the scale was also examined using Pearson correlation. For the test of concurrent validity, the correlation between SF-TOT and other proxies of childhood anxiety and depression severity, namely, STAIC and CDI 2 were investigated.

Results

Factor Analysis

Based on the results of the parallel analysis, which recommended retaining up to three factors, models with one-, two-, and three-factor structures were examined using EFA. According to the robust criteria, the unifactorial model exhibited an unacceptable model fit. By contrast, statistics for the two-factor model suggested a good fit. The fit indices of the three-factor model were also in a good range, but the inspection of the item loadings on each factor was inconsistent with theory and previous suggestions. In particular, item 7 ("I wake up scared sometimes") loaded on WOR but not PHY. Furthermore, Item 9 ("I feel someone will tell me I do things the wrong way") loaded on WOR and SOC simultaneously, making the patterns of item loadings less clear compared to the preceding models. The two-factor model was selected as the best fit concerning the parsimony of the structure and item loadings. Such model was again verified to be appropriate in the results of the CFA performed on separate subgroups. The fit indices for estimated models of the RCMAS-2 SF are shown in Tables 3 and 4.

The standardized factor loadings for two-factor model are demonstrated in Table 2. After carefully examining the semantic contents and cultural backgrounds of the items, we found out that the first factor embraced the same items (items 1, 5, and 7) as the original PHY did. Yet, item 2 ("I am nervous") was newly added to PHY in the current study. This was rather interesting because the item was previously classified as the WOR domain in the literature (Reynolds & Richmond, 2008). Meanwhile, we designated the second factor as Cognitive Anxiety (COG) since it included items representing cognitive concerns about the future and social settings, integrating items originally included in WOR and SOC. The factor correlation was found to be .425, indicating a moderate positive association between PHY and COG. No item exhibited factor loading less than .30. Item 3 ("I often worry about something bad happening to me") had cross-loadings larger than .30 but were kept as a COG item due to structural and cultural considerations.

Table 3. *Results of Exploratory Factor Analysis for K-RCMAS-2 SF*

Model	χ^2	*df*	RMSEA (90% CI)	CFI	TLI
1-factor model	235.512*	35	.085 (.075–.096)	.965	.955
2-factor model	45.667*	26	.031 (.015–.046)	.997	.994
3-factor model	26.005*	18	.024 (.000–.043)	.999	.997

Note. RCMAS-2 SF = Revised Children's Manifest Anxiety Scale, Second Edition Short Form; *df* = degree of freedom; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.
*$p < .05$.

Measurement Invariance across Gender and Age

All the fit indices of the model fit regarding measurement invariance are demonstrated in Table 5. As shown, the minor fit changes

Table 4. *Result of Confirmatory Factor Analysis for K-RCMAS-2 SF*

Model	χ^2	*df*	RMSEA (90% CI)	CFI	TLI
2-factor model	107.928	34	.054 (.043–.066)	.986	.982

Note. RCMAS-2 SF = Revised Children's Manifest Anxiety Scale, Second Edition Short Form; *df* = degree of freedom; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index.
*$p < .05$.

Table 5. *Goodness-of-Fit Indices and Model Comparisons for Measurement Invariance across Gender and Age*

	Model	χ^2	*df*	CFI	ΔCFI	RMSEA	ΔRMSEA
Gender	1. Configural	141.808	68	.986		.054	
	2. Metric	141.579	76	.988	|.002|	.048	|.006|
	3. Scalar	152.559	74	.985	|.003|	.054	|.006|
Age	1. Configural	155.457	68	.985		.059	
	2. Metric	162.214	76	.985	|.000|	.055	|.004|
	3. Scalar	169.525	74	.983	|.002|	.059	|.004|

Note. *df* = degree of freedom; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index.

in CFI and RMSEA between configural, metric, and scalar models supported strong invariance across gender. Strong measurement invariance was also observed for age, implying that the factor structure, item loadings, and item thresholds of the RCMAS-2 SF were invariant across boys and girls of divergent ages.

Reliability and Validity of the RCMAS–2 SF

The internal consistency of the SF-TOT measured using Cronbach's alpha was satisfactory (α = .79). This was comparable to the original RCMAS-SF in the normative sample (α = .92) (Reynolds & Richmond, 2008). The examination of the item-total correlation exhibited that, with a range of .39 to .72, each item similarly contributed to the SF-TOT. Furthermore, the RCMAS-2 SF demonstrated a good two-weeks test-retest reliability, $r = .80$, $p < .05$. We then examined the concurrent validity of the SF-TOT based on the correlation coefficients between the STAIC-T and CDI 2. The results indicated strong correlations, $r = .70$, $p < .05$, $r = .83$, $p < .05$, respectively.

Discussion

This study validated the validation of the 10-item RCMAS-2 SF. Concerning the large body of literature that underscores cross-cultural differences and the complexity of pediatric anxiety, we explored the factor structure of the RCMAS-2 SF to shed light on the question whether the scale is solely composed of a single factor. Our analyses suggest that the two-factor structure is an optimal representation of the items in the RMCAS-2 SF, thus providing a broader understanding of the childhood anxiety and its measurement. Furthermore, the result exhibited satisfactory coefficients of reliability, validity, and measurement invariance across both gender and age.

Most notably, the anxiety of children and adolescents measured by RCMAS-2 SF was not unidimensional. The results highlight that physiological anxiety should be considered as a construct independent of cognitive anxiety that incorporates worry and social concerns. The concept goes along the lines of the traditional information-processing theory of anxiety that proposes physiological arousal and cognitive bias as two principal features of anxious youth (Chorpita et al., 2000; Daleiden & Vasey, 1997; Lau & Waters, 2017). According to the theory, the cognitive component represents the interpretation bias of taking neutral or ambiguous situation as threatening stimuli (Creswell et al., 2005). Physiological component, on the other hand, is reflective of autonomic respondence of nervous system to threats such as increased blood pressure, elevated body temperature, discomfort within gastrointestinal system, and headache. These two markers of anxiety have been used as a proxy for the measurement of the efficacy of cognitive behavioral therapy on youth anxiety (Krebs et al., 2018). For instance, cognitive restructuring which challenges catastrophic thinking concerning threats and relaxation techniques for physiological arousal are two major non-pharmacological go-to techniques for anxiety relief (Beard et al., 2012; Reuland & Teachman, 2014). As a result, our data provide grounds for the creation of composite PHY and COG subscale scores that can be beneficial in research settings where the evaluation of the therapeutic effect of anxiety-CBT is needed.

Despite the separation of PHY, WOR and SOC were still combined as a single factor. One possible explanation for this convergence may arise from the semantic similarity between the items. For example, item 6 ("I worry that others do not like me") and item 8 ("I get nervous around people") were developed as WOR

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items but their contextual meanings are very similar to that of SOC items (e.g., item 10 "I fear other people will laugh at me"). Besides, social anxiety intrinsically holds a worrying-nature because individuals with social anxiety engage in anticipatory concerns and post-event rumination (Clark & Wells, 1995; Rachman et al., 2000; Wells, 1995). In support of this, worry scores are found to be powerless in differentiating children with a generalized anxiety disorder from those with a social anxiety disorder (Whitmore, 2014). Furthermore, more than half of the children and adolescents with generalized anxiety disorder as their primary diagnosis have a comorbid social anxiety disorder (Holmes et al., 2014; Walkup et al., 2008). Hence, it seems logical that WOR and SOC remain as united construct whereas PHY was found to be a separate entity.

The item-level interpretation of the result was also notable. It is interesting that item 2 ("I am nervous") was previously included in WOR but is now newly incorporated into the PHY construct. Although speculations remain to be examined, this may reflect the tendency of Asian parents who are more likely to accept somatic symptoms, such as stomachache or headache, rather than affective disturbance like anxiety (Essau et al., 2011; Yen et al., 2010). Due to such parenting attitude, Asian students may intrinsically find the source of nervousness in physiological symptoms rather than in cognitive or affective elements. Furthermore, in collectivistic Eastern culture, adolescents are taught to take uncomfortable feelings as temporal hindrance to endure or overcome; thus they may easily think of nervousness as a matter of momentary somatic ordeal without in-depth consideration. Also, item 3 ("I often worry about something bad happening to me") held cross-loadings on both PHY and COG, indicating the likelihood of Asian students taking 'something bad' as physical or somatic symptoms.

Next, we examined the measurement invariance of the total score of the RCMAS-2 SF across gender and age. It is particularly noteworthy that scalar invariance was found in both tests, providing the basis of direct comparison of the SF-TOT scores between boys and girls in different age. This result concurs with the original RCMAS-2 SF study where strong and partial strong invariance across gender and age, respectively, were achieved (Lowe & Ang, 2016). It is also interesting that changes in fit indices of CFI RMSEA did not consistently decrease for more restricted models as expected. For example, when testing invariance across gender, metric model with more constraints depicted a better CFI value than a less restricted configural model. However, such pattern supposedly arises from the nature of WLSMV estimation used toward ordered-categorical variables (Bieda et al., 2016; Scholten, Velten, Bieda, Zhang, & Margraf et al., 2017). Our result, in sum, demonstrated that SF-TOT of RCMAS-2 and its underlying meanings can be validly compared across any group of youth.

Reliability analysis yielded acceptable internal consistency with a Cronbach's alpha of .79. Furthermore, the two-weeks test-retest reliability coefficient was .80, demonstrating that the scale was credible in the time-stable aspect. This is in line with the theoretical assumptions of the RCMAS as manifest anxiety is assumed to be a life-long tendency toward perceived threats. The concurrent validity of the scale was supported by a moderate positive correlation found between the scores of the RCMAS-2 SF, STAI-C, and CDI 2. This proves that the SF-TOT to be a robust instrument that well represents the general psychopathology of the youth.

This study has several limitations that warrant comment. One was the lack of clinical participants in the study. Although our data had a large sample size, the inclusion of the clinical population would have heightened the usability of the scale. However, regarding the literature emphasizing that healthy children can report anxiety symptoms prior to the onset of anxiety disorders, the scale can still be widely used to detect probable pathogenic anxiety early. Another limitation is the absence of the measurement of participants' socioeconomic status and other background information. More work is required to examine if other factors influence the SF-TOT score. Third, despite a wide range of age groups in our data, children between the ages six to seven (grades 1-2) were not included in the sample due to the possible misunderstanding of the item sentences. Future work may benefit from including younger children who can also suffer from anxiety.

In conclusion, this study provides psychometric evidence for the use of the RCMAS-2 SF. Convincing results of both reliability and validity analyses all demonstrate that it can be used in diverse areas such as research field or therapeutic settings where the measurement of baseline anxiety level is needed. Furthermore, it offers a more accurate understanding of the complex nature of pediatric

anxiety as the unidimensionality of the scale is rejected. The RCMAS-2 SF score would benefit those who are interested in time-efficient comparisons of the anxiety severity between boys and girls.

Author contributions statement

HYY, a clinical psychology resident in the Department of Psychiatry at Samsung Medical Center, analyzed the data and wrote the manuscript. EHL, a clinical psychologist at the Depression Center at Samsung Medical Center, contributed to the data interpretation. He also led the preparation and correction of the manuscript. STH, a professor from the Department of Psychology at Chungbuk National University, designed the study process in general. He also vastly contributed to data collection the data for this study. SHH, a professor at the Chinju National University of Education, assisted in data collection and clitically revised the article. JHK, a supervisor of the Department of Psychiatry at Samsung Medical Center and a processor of Sungkyunkwan University School of Medicine, served as the principal investigator of the research and supervised the research process in general. All the authors provided critical feedback, participated in the revision of the manuscript, and approved the final submission.

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