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Gamified Assessment of the Emotion-Regulation Abilities in Youths: Validation of the RETHink Online Game-Based Assessment System

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Abstract

Objective: Emotional problems in the youth population are a major issue that can have a significant negative impact for their future development as adults. Their emotion regulation (ER) abilities represent a preventive measure for those emotional problems. RETHink is an online therapeutic game that was proved to be effective in rigorous studies, and is based on the rational emotive behavioral therapy, with seven levels built to train various emotional regulation skills. Each level has a section that can be used for the assessment of the targeted skills within the level. The present study aimed at investigating the reliability and validity of the evaluation modules from the RETHink game regarding the assessment of ER abilities in children/adolescents.

Methods: In accordance with established guidelines, 110 children and adolescents aged 8–14 years old were recruited. Following parental informed consent, the participants filled out the standard questionnaires and, subsequently, they played the evaluation module of the RETHink game. The reliability aspect was investigated by evaluating internal consistency, while validity was evaluated by using concurrent and predictive validity analyses.

Results: The results revealed statistically significant positive associations between the game scores obtained by the participants and the emotion regulation scale. In terms of predictive validity, there were significant negative associations between game scores and the presence of emotional and behavioral problems. Moreover, in terms of the reliability of the RETHink game, an acceptable value for the internal consistency was observed.

Conclusion: In conclusion, the RETHink therapeutic game was proved to be a valid measure for assessing emotion regulation abilities in children and adolescents.

Clinical Trial Registration No. NCT04788901

Keywords: Game-based assessment, Emotion regulation, Children and adolescents.

Introduction

GIVEN THE HIGH prevalence rates of psychopathology in children and adolescents, it becomes especially important to reliably identify early on documented transdiagnostic risk factors, such as emotion regulation (ER) difficulties, with relevance for mental health.¹ ER refer to the abilities, strategies, and processes, be them external and internal, which are responsible for awareness, monitoring, or modifying the emotional reactions

in relation to specific individual goals.^{2,3} Indeed, the use of maladaptive ER strategies (e.g., avoidance, suppression) is associated with an increase in emotional and behavioral problems, while the use of adaptive ER strategies (e.g., reappraisal, problem-solving) in both children and adolescents has been consistently associated with physical and mental health, well-being, achievement, and relationship quality.⁴⁻⁷

Emotional competencies (ECs) refer to an umbrella concept that incorporates various features of emotional

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functioning, such as ER or emotional awareness (EA) abilities, which refer to the meta-knowledge about emotional experience abilities. Various dimensions of EA, such as the ability to differentiate emotions, awareness of physical sensations of emotions, the ability to analyze emotions, verbal sharing of emotions, or attend to others' emotions, are currently considered to be essential for the use of adaptive regulation of emotions.⁸ Higher levels of EC in childhood and EA abilities were related to better emotional health, and social and academic functioning.^{1,9}

Middle to late childhood and adolescence are considered critical points in children's acquisition of EC. Indeed, as children are maturing, they are increasingly able to reflect on their own internal emotional states and to use more sophisticated strategies for coping with emotions. Moreover, by the age of eight, children learn to regulate their emotions or the emotions of others using cognitive change strategies.¹⁰

A major obstacle to conducting ER research in childhood and for providing targeted interventions is the lack of valid accessible, attractive, and age-appropriate measures. Given the subjective nature of ER processes, standardized self-report measures have been developed and considered appropriate assessment methods for youths.^{11,12} However, retrospective self-report assessment methods have many limitations that hinder the accuracy of the data, among which are memory biases, social desirability, or the lack of motivation to recollect requested information. Other forms of ER assessment such as behavior coding or child interview are costly and time-consuming to implement. Performance-based assessments of ER can be seen as offering such a solution, by capturing youths' ability to apply ER in real-world-like situations.

Online games offer relevant simulations with immersive contents that provide an excellent opportunity measuring ER abilities and performance on a large scale.¹³ Indeed, game-based assessment of ER/EC offers immense advantages, given their attractiveness for youths, immersive designs with relevance to applied ER situations and supporting youth engagement, affordability, and real-time access to various analytics in terms of user actions and decisions. There are a few global initiatives for developing such tools to measure social emotional learning variables (e.g., Zoo U for elementary school-aged children,¹⁴ Hall of Heroes for adolescents¹⁵) with promising results in terms of criterion validity.

The RETHink therapeutic online game and its game-based assessment system represent an initiative to provide an evidence-based scalable, accessible, and attractive system for the assessment of ER abilities and their training for the prevention of psychopathology in youths.^{16–18} The RETHink online therapeutic game protocol and scoring system can be found in Supplementary Annex 1.

This study aimed at testing the validity of the RETHink game-based assessment in measuring ER abilities, as a component of EC, in youths aged 8–14 years old. More specifically, we aimed at testing the concurrent validity of the in-game scores in relation to standardized self-report assessment, and the predictive validity of RETHink game-based assessment in relation to youths' self-reported mental health scores.

We hypothesized that the total scores of the RETHink game-based assessment will be associated significantly with ER abilities, measured using relevant self-report standardized measures. As such, we expected that higher scores,

scores obtained in terms of total scores of the game, and scores obtained specifically at Level 7 will be significantly correlated with better scores in standardized assessment of differentiating emotions, verbal sharing of emotions, analysis of emotions, EA, emotional control, situational responsiveness, and compassion for others. Moreover, we expected that, based on the specific ER abilities, each specific level will be positively correlated with its standardized measure counterpart from the Emotion Awareness Questionnaire (EAQ) and the Emotion Regulation Index for Children and Adolescents (ERICA). More specifically, Level 1 will be positively associated with the Attending to Others' Emotions subscale, Level 2 will be positively associated with the Situation Responsiveness subscale, Level 3 will be positively associated with the Differentiating Emotions subscale, Level 4 will be positively associated with the Analyses of Emotions subscale, Level 5 will be positively associated with the Emotional Control subscale, and Level 6 will be positively associated with the Emotional Control subscale.

In terms of predictive validity, we expected that the in-game assessment total score and Level 7 scores will be negatively associated with the self-reported mental health total score and the emotional symptoms scores, respectively, the externalizing syndromes.

Methods

Participants

Participants in the study were children and adolescents aged 8–14 years old recruited within schools with the help of school counselors. The inclusion criteria were to be between 8 and 14 years, with reading abilities developed enough so that they could read the instructions from the questionnaires and the game, and to have a mobile device (Android or iOS) suited for installing the required apps. The exclusion criteria were the presence of an intellectual disability or physical limitations that precluded the use of the mobile app, had a major mental health disorder, or not having access to a mobile device. All enrolled participants had parental consent before performing any activity within the study.

Procedure

After receiving parental consent, children and adolescents enrolled in the study were asked to complete the self-report questionnaires, and then, they were asked to complete the assessment module of the game. Both the self-report questionnaire and the assessment module had an hour completion time, and they were performed on separate days.

Measures

We used the ERICA,¹⁹ the EAQ,²⁰ the Compassion Scale for Children (CSC),²¹ the Strengths and Difficulties Questionnaire—child version (SDQ),²² and the Child Behavior Checklist (CBCL).²³ The description and psychometric proprieties of the instruments can be found in Supplementary Annex 2.

Data analysis

Data analysis was conducted using IBM SPSS Statistics version 26²⁴ and JASP version 0.16.3.²⁵ We used bivariate

correlation analysis to test the concurrent and predictive validity of each game level and of the total game scores, using Pearson's correlation coefficient. This coefficient is also representative of the effect size of the association between variables in concurrent and predictive validity analyses. In bivariate correlation, an approximate value of 0.1 is indicative of a small effect size, an approximate value of 0.3 is indicative of a medium effect size, while an approximate value of 0.5 and above is indicative of a large effect size.^{26,27}

To ensure the detection of at least a medium association ($r=0.30$) between the game levels and the standardized self-report measures, with a type I error probability of $\alpha=0.05$, in a two-tailed correlation and a statistical power of at least 0.80, we conducted a power analysis that yielded an estimation of 84 needed participants. Finally, we conducted an independent-sample *t*-test to investigate the potential differences between males and females regarding their respective total game scores.

Results

Descriptive statistics

The final sample consisted of 110 participants, aged between 8 and 14 years ($M=10.38$, standard deviation [SD]=1.95), 66% of which were female from four different schools from Cluj-Napoca, Romania. The total game scores varied between 1826 and 2830 ($M=636.81$, $SD=1094.21$) and there were no statistically significant differences between males ($M=543.16$, $SD=1160.94$) and females ($M=699.24$, $SD=1051.79$) regarding the total game score, $t(108)=-0.73$, $P=0.466$ (see Table 1 and Fig. 1).

Internal consistency

Regarding the internal consistency of the RETHink game, the Cronbach's alpha coefficient had a standardized value of 0.59. When conducting the analysis with the more robust split-half method, both the Spearman-Brown and the Guttman split-half coefficients yielded values of 0.68 for reliability.

Concurrent validity

In terms of ER abilities, results have shown that the total game score was positively associated with the Emotional Self-Awareness subscale [$r(107)=0.29$, $P=0.002$], with the Emotional Control subscales [$r(107)=0.29$, $P=0.002$] and with the Situational Responsiveness subscale [$r(71)=0.26$, $P=0.024$] of the ERICA inventory (see Fig. 2).

Regarding the association between the game-based assessment total score and specific abilities reported by the participants, we identified statistically significant associations for aspects of EA measured with EAQ. More specifically, the total game score was positively associated with the following subscales from the EAQ: Differentiating Emotions [$r(110)=0.21$, $P=0.023$], the Verbal Sharing of Emotions [$r(110)=0.22$, $P=0.020$], and the Analyses of Emotions [$r(110)=0.25$, $P=0.007$].

We have also identified significant associations first, between the ER abilities as reflected in the subscales of both the abovementioned scales and the Level 7 of the RETHink game, and second, between each of the levels of the game and a specific ER ability (Levels 1–5), except for Level 6 (see Table 2). High-level significant correlations were found

between the Compassion for Others subscale of the CSC and Level 7 of the game-based assessment.

Predictive validity

Regarding emotional and behavioral problems, we identified first a statistically significant negative association between the total game-based assessment score and the SDQ Conduct Problems subscale [$r(110)=-0.23$, $P=0.015$], and second, a statistically significant positive association between the total game-based assessment score and the SDQ Prosocial Behaviors subscale [$r(110)=0.20$, $P=0.033$]. There were also associations that tentatively approached the significance threshold for the total game score and the Hyperactivity SDQ subscale [$r(110)=-0.17$, $P=0.062$], or between the total game score and the total SDQ score [$r(110)=-0.17$, $P=0.063$].

Moreover, regarding the specific levels of the game, we have identified significant associations between the Level 7 scores and the Youth Self-Report Affective Problems subscale [$r(85)=-0.22$, $P=0.042$]. Level 3 was only marginally associated with the YSR Anxiety Problems subscale [$r(85)=-0.20$, $P=0.056$]. Significant associations were also found between Levels 5 or 7, and the Conduct Problems and Hyperactivity/Inattention SDQ subscales, or the SDQ Total Problems score (see Table 2).

Discussion

Regarding internal consistency, although the coefficients that we observed were relatively modest, the split-half method approached the interval of alpha values that is considered to be acceptable (i.e., 70–95).^{28,29} Moreover, since the Cronbach's alpha coefficient is based on the tau-equivalent assumption (i.e., each test item measures the same latent trait on the same scale),³⁰ and given the fact that, although there is considerable overlap between the game levels in terms of ER abilities, there are also differences in terms of the specific ability that is evaluated at each level, meaning that the Cronbach's alpha coefficient that was observed in the present study may be underestimated. In practice, when heterogeneous test items are evaluated, Cronbach's alpha represents a lower bound estimate.³¹ Moreover, it has been shown that when the tau-equivalent assumption is not met, the alpha estimates tend to be underestimated by a value between 0.6% and 11.1%.³²

In terms of concurrent validity between the RETHink game and ER abilities, the total game scores were positively associated with emotional control, emotional self-awareness, and emotional responsiveness, the strength of the associations being a medium one. Moreover, Level 7 scores were positively associated with the aforementioned ER dimensions, with similar effect sizes. This result is in line with our hypothesis, providing evidence for the concurrent validity of Level 7 and the total game scores. Similarly, Level 7 scores and the total game scores were positively associated with other aspects of ER. More specifically, Level 7 scores were positively associated with verbal sharing of emotions and analyses of emotions scores, while the total game scores were similarly positively associated with differentiating emotions, verbal sharing of emotions, and analysis of emotions scores.

The strength of these associations was lower than in the case of emotional control, self-awareness, and responsiveness, possibly owing to the fact that in the literature there is a low level of agreement between life use self-report and

TABLE 1. DESCRIPTIVE STATISTICS FOR GAME-BASED ASSESSMENT SCORES EACH LEVEL, TOTAL SCORE, AND INTERCORRELATIONS BETWEEN GAME LEVELS

	N	Missing	Mean	SD	Min	Max	Percentiles			Skewness (SE)	Kurtosis (SE)
							25th	75th	Total		
Level 1	110	0	730.27	62.68	575.00	800.00	680.00	783.75	-0.73 (0.23)	-0.48 (0.45)	
Level 2	110	0	297.26	129.55	-135.00	794.00	240.00	360.00	-0.95 (0.23)	3.29 (0.45)	
Level 3	110	0	-278.29	324.14	-1155.00	75.00	-382.50	-45.00	-1.30 (0.23)	0.49 (0.45)	
Level 4	110	0	-365.72	416.42	-1140.00	580.00	-680.00	-80.00	0.17 (0.23)	-0.73 (0.45)	
Level 5	110	0	-285.09	79.65	-480.00	-200.00	-320.00	-240.00	-1.00 (0.23)	0.20 (0.45)	
Level 6	110	0	527.27	138.05	0.00	640.00	480.00	640.00	-1.56 (0.23)	2.20 (0.45)	
Level 7	108	2	11.31	579.31	-1440.00	1600.00	-320.00	324.00	-0.16 (0.23)	0.24 (0.46)	
Total	110	0	636.81	1094.21	-1826.00	2830.00	-154.75	1465.25	-0.39 (0.23)	-0.59 (0.45)	
r	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Total			
Level 1	—										
Level 2	0.25**	—									
Level 3	0.14	0.02	—								
Level 4	0.19*	0.10	0.24**	—							
Level 5	0.13	0.14	-0.04	0.09	—						
Level 6	0.32***	0.29**	0.12	0.21*	0.04	—					
Level 7	0.18	0.17	0.31**	0.40***	0.12	0.15	—				
Total	0.34***	0.31***	0.57***	0.72***	0.19*	0.38***	0.83***	—			

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

N = number of participants; SD, standard deviation; SE, standard error;

r, Pearson's r.

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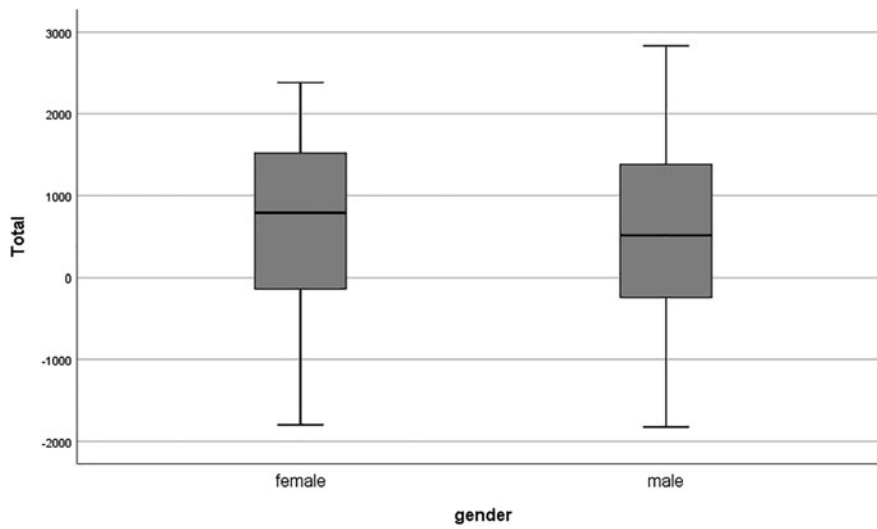


FIG. 1. The distribution of total game scores by gender.

performance measures of abilities.³³ Nonetheless, these results also lend credence to the concurrent validity between Level 7 scores and the total game score on one hand and the established ER measures on the other hand. We also observed a medium effect size for the positive association between Level 7 game scores and the Compassion for Others subscale scores. This result can be partially attributed to the fact that in Level 7, in addition to neutralizing irrational thoughts, the participants were given the option to respond with compassion in certain situations (i.e., helping instances) and the level’s score reflected this. If participants responded with compassion, the score increased substantially.

Thus, higher Level 7 scores were positively associated with higher compassion toward others scores. This specific association is in accordance with the mission of the game and indicates that the game manages to best evaluate these rel-

evant skills for mental and relational health and building a better world in times of crises.

Also pertaining to the concurrent validity aspect, we had a series of specific hypotheses about how specific levels of the game are associated with specific aspects of ER. First, we hypothesized that Level 1 scores will be associated with Attending to Others’ Emotions subscale scores, a hypothesis that was confirmed. Second, we expected associations between game Level 2 scores and situational responsiveness, respectively, and between Level 2 game scores and emotional self-awareness. This hypothesis was only partially confirmed, Level 2 game scores being significantly associated only with situational responsiveness scores. This result can be explained by the fact that the game task that was selected for the assessment system was related to situational awareness of external stimuli and not to own or others’ emotions.

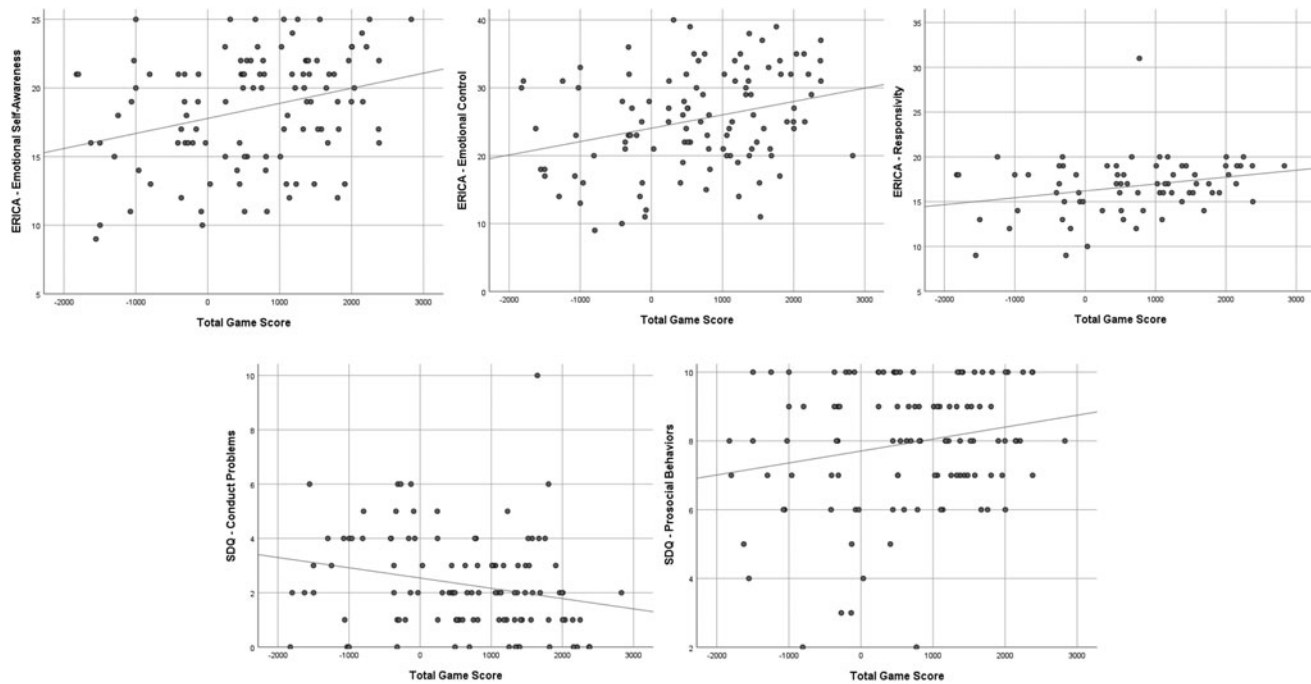


FIG. 2. Correlation plots for the main outcomes.

TABLE 2. CORRELATIONS, WITH 95% CONFIDENCE INTERVALS, BETWEEN GAME-ASSESSMENT SCORES AND STANDARDIZED ASSESSMENT

Variable/game level	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Total score
ERICA: Emotional self-awareness						0.41*** (0.24 to 0.56)		0.29** (0.11 to 0.45)
ERICA: Emotional control						0.38*** (0.21 to 0.54)		0.29** (0.11 to 0.46)
ERICA: Situational responsiveness		0.26* (0.03 to 0.47)				0.41*** (0.19 to 0.59)		0.26* (0.03 to 0.47)
EAQ: Differentiating emotions			0.20* (0.02 to 0.38)					0.21* (0.03 to 0.38)
EAQ: Verbal sharing of emotions						0.27** (0.08 to 0.43)		0.22* (0.03 to 0.39)
EAQ: Attending to others' emotions	0.22* (0.03 to 0.39)							
EAQ: Analyses of emotions				0.23* (0.04 to 0.40)		0.20* (0.01 to 0.38)		0.25** (0.07 to 0.42)
CSC: Compassion for others				0.21* (0.02 to 0.38)		0.22* (0.03 to 0.39)		
YSR: Affective problems						-0.22* (-0.41 to -0.008)		
YSR: Anxiety			-0.20 (-0.39 to 0.006)					
SDQ: Conduct problems					-0.22* (-0.39 to -0.04)	-0.28** (-0.44 to -0.09)		-0.23* (-0.40 to -0.04)
SDQ: Prosocial behaviors								0.20* (0.01 to 0.37)
SDQ: Hyperactivity/Inattention					-0.23* (-0.40 to -0.05)	-0.20* (-0.37 to -0.01)		
SDQ: Total problems					-0.22* (-0.39 to -0.03)	-0.23* (-0.40 to -0.04)		

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

CSC, Compassion Scale for Children; EAQ, Emotion Awareness Questionnaire; ERICA, Emotion Regulation Index for Children and Adolescents; SDQ, Strengths and Difficulties Questionnaire—child version; YSR, Youth Self-Report.

Third, we expected an association between Level 3 game scores and the Differentiating Emotions subscale scores, a hypothesis that was confirmed. Moving beyond easily recognizable positive emotions such as happiness or joy, this result could be explained by the fact that an increased ability to differentiate between rational and irrational beliefs can be associated with an increased ability in recognizing adaptive or maladaptive emotions that can be a direct product of those beliefs, which is in line with cognitive-behavioral theory. Fourth, we expected associations between Level 4 game scores and the Analyses of Emotions subscale scores, respectively, between Level 4 game scores and Emotional Control subscale scores.

This hypothesis was partially confirmed, Level 4 game scores being positively associated only with the analysis of emotions scores. In other words, an increase in successfully neutralizing irrational beliefs is associated with an increase in participants' willingness to face their own emotions. An explanation for this result is that more instances of cognitive change might be needed to also represent the emotional control component. Fifth, we expected associations between Level 5 game scores and emotional control. This hypothesis was not confirmed since we did not find specific associations with emotional control. An unexpected result is that we observed a significant positive association between Level 5 game scores and compassion for others.

This finding might be related to the task of the player to help the inhabitants of the Earth, which has been followed up to this level. Also, as empathy is a key component in compassionate responding to others,^{34,35} this result is congruent with previous findings, in which it has been shown that there is a positive, medium-to-strong association between empathy scores and the confidence in problem-solving skills in primary school students.³⁶ Finally, we expected an association between Level 6 game scores and Emotional Control subscale scores, a hypothesis that was not confirmed.

Regarding predictive validity, our hypothesis was that the Level 7 game scores and the total game score will be significantly associated with mental health and externalizing syndromes. This hypothesis was confirmed, Level 7 game scores being negatively associated with affective problems, conduct problems, hyperactivity/inattention, and the Total Difficulties subscale scores. The total game score was also negatively associated with the Conduct Problems subscale scores and positively associated with the Prosocial Behaviors subscale scores. This represents strong evidence toward the predictive validity of Level 7 scores and the total game scores, namely that increases in these scores are associated with lower mental health and externalizing problems. Moreover, there was evidence for the predictive validity of Level 5, higher scores from this game level being associated with lower conduct problems, lower hyperactivity/inattention, and lower total difficulties.

This result is in line with previous findings, which showed that problem-solving abilities in adolescents explained a significant amount of variance in externalizing behaviors.³⁷ These results have important implications for early identification of ER difficulties in a nonstigmatized way.

Limitations

Given that there is substantial disagreement between self-other-reports and the use of a performance task for measuring the ER abilities and that self-reports of EC are weakly related to

performance on ability tests in the literature, future studies should use various forms of standardized measurement of ER abilities.

Moreover, based on these results, we identified a need to adapt the scoring of the game so that game scores begin at 0, thus making them more easily interpretable and more suited to future scale norming endeavors. Also, we need to adapt the RETHink therapeutic game to the children in need (e.g., with special needs or specific diagnosis) and personalize the content of the game using the precision medicine approach.

Conclusions

REThink game-based assessment system is an innovative and valid instrument for the assessment of emotional and behavioral mental health-related abilities in youths aged 8–14 years.

Authors' Contributions

O.A.D.: Conceptualization and writing the article. C.T.: Collecting data and writing the article. L.A.F.: Data analysis and writing the article.

Ethical Approval

All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional research committee. No. 2213/05.03.2021, The Scientific Council of the Babeş-Bolyai University of Cluj Napoca.

Informed Consent

Informed consent was obtained from all parents for the children included in the study.

Author Disclosure Statement

No competing financial interests exist.

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Supplementary Material

Supplementary Annex 1
Supplementary Annex 2

References

- Sendzik L, Schäfer JO, Samson AC, et al. Emotional awareness in depressive and anxiety symptoms in youth: A meta-analytic review. *J Youth Adolesc* 2017;46(4):687–700; doi: 10.1007/s10964-017-0629-0
- Thompson RA. Emotion regulation: A theme in search of definition. *Monogr Soc Res Child Dev* 1994;59(2–3): 25–52; doi: 10.2307/1166137#
- Gross JJ. Emotion regulation: Current status and future prospects. *Psychol Inq* 2015;26(1):1–26; doi: 10.1080/1047840X.2014.940781
- Flouri E, Mavroveli S. Adverse life events and emotional and behavioural problems in adolescence: The role of coping and emotion regulation. *Stress Health* 2013;29(5): 360–368; doi: 10.1002/smi.2478

5. Ivcevic Z, Eggers C. Emotion regulation ability: Test performance and observer reports in predicting relationship, achievement and well-being outcomes in adolescents. *Int J Environ Res Public Health* 2021;18(6):3204; doi: 10.3390/ijerph18063204
6. Verzeletti C, Zammuner VL, Galli C, et al. Emotion regulation strategies and psychosocial well-being in adolescence. *Cogent Psychol* 2016;3(1):1199294; doi: 10.1080/23311908.2016.1199294
7. Schäfer JÖ, Naumann E, Holmes EA, et al. Emotion regulation strategies in depressive and anxiety symptoms in youth: A meta-analytic review. *J Youth Adolesc* 2017; 46(2):261–276; doi: 10.1007/s10964-016-0585-0
8. Gross JJ, Jazaieri H. Emotion, emotion regulation, and psychopathology: An affective science perspective. *Clin Psychol Sci* 2014;2(4):387–401; doi: 10.1177/2167702614536164
9. Ahmed Z, Julius SH. Academic performance, resilience, depression, anxiety and stress among women college students. *Indian J Posit Psychol* 2015;6(4):367.
10. Zimmer-Gembeck MJ, Skinner EA. The development of coping across childhood and adolescence: An integrative review and critique of research. *Int J Behav Dev* 2011; 35(1):1–17; doi: 10.1177/0165025410384923
11. MacDermott ST, Gullone E, Allen JS, et al. The emotion regulation index for children and adolescents (ERICA): A psychometric investigation. *J Psychopathol Behav Assess* 2010;32(3):301–314; doi: 10.1007/s10862-009-9154-0
12. Lahaye M, Mikolajczak M, Rieffe C, et al. Cross-validation of the Emotion Awareness Questionnaire for children in three populations. *J Psychoeduc Assess* 2011;29(5): 418–427; doi: 10.1177/0734282910390013
13. Seelow D. The art of assessment: Using game based assessments to disrupt, innovate, reform and transform testing. *J Appl Test Technol* 2019;20(S1):1–16.
14. DeRosier ME, Thomas JM. Video Games and Their Impact on Teens' Mental Health. In: *Technology and Adolescent Mental Health*. Springer: Cham; 2018; pp. 237–253; doi: 10.1007/978-3-319-69638-6_17
15. DeRosier ME, Thomas JM Hall of heroes: A digital game for social skills training with young adolescents. *Int J Comput Games Technol* 2019:1–12; doi: 10.1155/2019/6981698
16. David OA, Cardoso RA, Matu S. Is RETHink therapeutic game effective in preventing emotional disorders in children and adolescents? Outcomes of a randomized clinical trial. *Eur Child Adolesc Psychiatry* 2019;28(1):111–122; doi: 10.1007/s00787-018-1192-2
17. David OA, Cardoso RAI, Matu S. Changes in irrational beliefs are responsible for the efficacy of the RETHink therapeutic game in preventing emotional disorders in children and adolescents: Mechanisms of change analysis of a randomized clinical trial. *Eur Child Adolesc Psychiatry* 2019;28:307–318; doi: 10.1007/s00787-018-1195-z
18. David OA, Fodor LA. Are gains in emotional symptoms and emotion-regulation competencies after the RETHink therapeutic game maintained in the long run? A 6-month follow-up. *Eur Child Adolesc Psychiatry* 2023;32(10): 1853–1862; doi: 10.1007/s00787-022-02002-w
19. Biesecker GE, Easterbrooks MA. Emotion Regulation Checklist for Adolescents; 2001. Adapted from Shields AM, Cicchetti D. Unpublished manuscript; 1997, Tufts University.
20. Rieffe C, Oosterveld P, Miers AC, et al. Emotion awareness and internalising symptoms in children and adolescents; the Emotion Awareness Questionnaire revised. *Pers Individ Dif* 2008;45:756–761; doi: 10.1016/j.paid.2008.08.001
21. Nas E, Sak R. A new compassion scale for children and its psychometric properties. *Child Psychiatry Hum Dev* 2021; 52(3):477–487; doi: 10.1007/s10578-020-01034-0
22. Goodman R. The Strengths and Difficulties Questionnaire: A research note. *J Child Psychol Psychiatry* 1997;38(5) : 581–586; doi: 10.1111/j.1469-7610.1997.tb01545.x
23. Achenbach T. Child Behavior Checklist (CBCL), Achenbach System of Empirically Based Assessment. ASEBA: Burlington; 2001.
24. IBM Corp. IBM SPSS Statistics for Windows, Version 26.0. IBM Corp.: Armonk, NY; Released 2019.
25. JASP Team. JASP (Version 0.16.3) [Computer Software]; 2022.
26. Swank JM, Mullen PR Evaluating evidence for conceptually related constructs using bivariate correlations. *Measure Eval Counsel Dev* 2017;50(4):270–274; doi: 10.1080/07481756.2017.1339562
27. Sink C, Stroh H. Practical significance: The use of effect sizes in school counseling research. *Prof School Counsel* 2006;9:401–411; doi: 10.5330/prsc.9.4.283746k664204023
28. Bland J, Altman D. Statistics notes: Cronbach's alpha. *BMJ* 1997;314:275; doi: 10.1136/bmj.314.7080.572
29. De Vellis RF. Scale Development: Theory and Applications (2nd ed., Vol. 26). Sage Publications: Thousand Oaks, CA; 2003.
30. Tavakol M, Dennick R. Making sense of Cronbach's alpha. *Int J Med Educ* 2011;2:53–55; doi: 10.5116/ijme.4dfb.8dfd
31. Cortina J. What is coefficient alpha: An examination of theory and applications. *J Appl Psychol* 199378:98–104; doi: 10.1037/0021-9010.78.1.98
32. Green SB, Yang Y. Commentary on coefficient alpha: A cautionary tale. *Psychometrika* 2009;74:121–135; doi: 10.1007/s11336-008-9098-4
33. Irava V, Pathak A, DeRosier M, et al. Game-based socio-emotional skills assessment: A comparison across three cultures. *J Educ Technol Syst* 2019;48(1):51–71; doi: 10.1177/0047239519854042
34. Stevens F, Taber K. The neuroscience of empathy and compassion in pro-social behavior. *Neuropsychologia* 2021; 159:107925; doi: 10.1016/j.neuropsychologia.2021.107925
35. Strauss C, Lever Taylor B, Gu J, et al. What is compassion and how can we measure it? A review of definitions and measures. *Clin Psychol Rev* 2016;47:15–27; doi: 10.1016/j.cpr.2016.05.004
36. Imece S, Cansever BA. Investigation of the relationship between the empathic tendency skills and problem solving skills of Turkish Primary School Students. *Int J Progress Educ* 2019;15(5):19–31; doi: 10.29329/ijpe.2019.212.2
37. Jaffee WB, D'Zurilla TJ. Adolescent problem solving, parent problem solving, and externalizing behavior in adolescents. *Behav Ther* 2003;34(3):295–311; doi: 10.1016/S0005-7894(03)80002-3

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