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A protocol for a systematic review to identify self-report measures of emotion regulation and evaluate their psychometric properties

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A protocol for a systematic review to identify self-report measures of emotion regulation and evaluate their psychometric properties

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Abstract

Introduction: Successful emotion regulation (ER) is critical for psychological health. Disturbances in this ability are associated with several psychiatric disorders. There are several self-report questionnaires to assess ER. However, there are no studies synthesizing the evidence on their psychometric properties. We aim to identify all available instruments addressing ER in adolescents or adults and to critically appraise, compare and summarize the quality of their psychometric properties. For this we will use COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) criteria.

Method and analysis: The search process to identify eligible studies will be conducted in April 2021 including the ProQuest, PubMed, Scopus and Web of Science databases with no restriction in terms of publication date. Eligibility criteria include peer-reviewed research articles written in English or Spanish by means of Patient-Reported Outcome Measures (PROMs) focused on Emotion Regulation among participants of 13 years or older. We will assess the quality of measures according to the COSMIN Risk of Bias Checklist. The psychometric properties will be assessed by the COSMIN updated criteria for good measurement. The available evidence will be addressed by the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach. Our findings will be synthesized independently for each measure, including information on their sample, theoretical model and psychometric properties when possible.

Ethics and dissemination: Ethical approval is not required, as this study does not involve any participants or collection of primary data. Results are expected to be published in a peer-reviewed journal in the field of youth mental health and presented at relevant meetings and conferences.

PROSPERO registration number: CRD42021249498

Strengths and limitations of this study

- This protocol for systematic review has been prepared in accordance with the COSMIN updated criteria (COnsensus-based Standards for the selection of health status Measurement INstruments).

- The Cochrane Handbook for Systematic Reviews of Interventions was used to assist the design of this systematic review.

- There are no recent syntheses of the evidence on self-report measurements assessing emotion regulation in young and adult populations.

- This systematic review will be limited to published articles.

- Searches will be limited to studies published in English and Spanish languages.

1 Introduction

Emotion regulation (ER) is the process where behaviours, competencies and strategies interact to modulate, inhibit, or intensify emotional experiences and expressions based on individual objectives, the circumstances they face and the development stage they are in [1, 2]. The ability to properly regulate our emotions is associated with greater subjective well-being [3] and is essential for maintaining good mental health [4] and successfully interacting with others [5]. ER can be an important mediator to cope with adverse and stressful events [6]. It has been observed that a lower ER capacity is related to the increased clinical symptoms [7-9], and that it constitutes a potential risk factor for the development and maintenance of psychopathologies [10, 11], such as anxiety disorders, depression, personality borderline, post-traumatic stress disorder, psychotic spectrum disorders, and risk behaviours including substance use, self-injurious behaviours, and suicide attempts [6, 12-23]. In short, ER represents a complex psychological process associated with the development and manifestation of psychopathology [24], and it has special relevance to intervene on its course and outcomes.

Given the importance that ER has acquired in recent years, there has been a significant increase in its research. Different theoretical models have been developed that differ in the conceptualization of ER, its strategies and the organization of its components [25, 26]. Simultaneously, interventions have been developed to promote resilience and well-being [27] as well as to treat a variety of psychiatric disorders with generally promising results [28]. Likewise, different measures have been designed to assess specific components of ER. These measures include self-report questionnaires, behavioural observations, and peripheral and neural physiological measures. Because these

measurements have different designs and structures, they are not always directly comparable [29, 30].

Despite the fact that literature suggests using multilevel measures to study this type of construct [31], self-report questionnaires are one of the most commonly used tools in ER research. Most of these measurements have focused on the measurement and evaluation of strategies for emotional suppression and cognitive reappraisal [30]. However, other measures have been developed that, in addition to measuring other regulatory strategies, also evaluate aspects such as ER skills [26, 32].

The following elements form the basis of the current systematic review: (i) ER is currently considered as a vital process for understanding psychopathology and developing effective interventions; (ii) it is critical to be clear about the construct being evaluated, the underlying theoretical model, the evidence validity, measurement reliability and the samples used [33]; (iii) there have been no previous reviews that synthesize the validity evidence for self-report measures to assess ER. Therefore, the current systematic review will summarize the evidence on the psychometric properties of self-report questionnaires used to measure ER, particularly among people over the age of 13. The objectives include:

1. To identify all available instruments to assess ER in adolescents, youth and adults.

2. To critically assess, compare and synthesize the measurement properties of the identified instruments, based on the criteria of the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN).

2 Method

The following protocol for systematic review was developed in accordance to the COSMIN initiative's criteria [34]. The protocol's details have been registered in the International Prospective Register of Systematic Reviews (PROSPERO). In the event of modifications to the protocol, these will be informed in the publication of the systematic review. The planned start date for the systematic review was on 1 April 2021 and the end date was planned on 30 December 2021. The procedure is summarized in Figure 1.
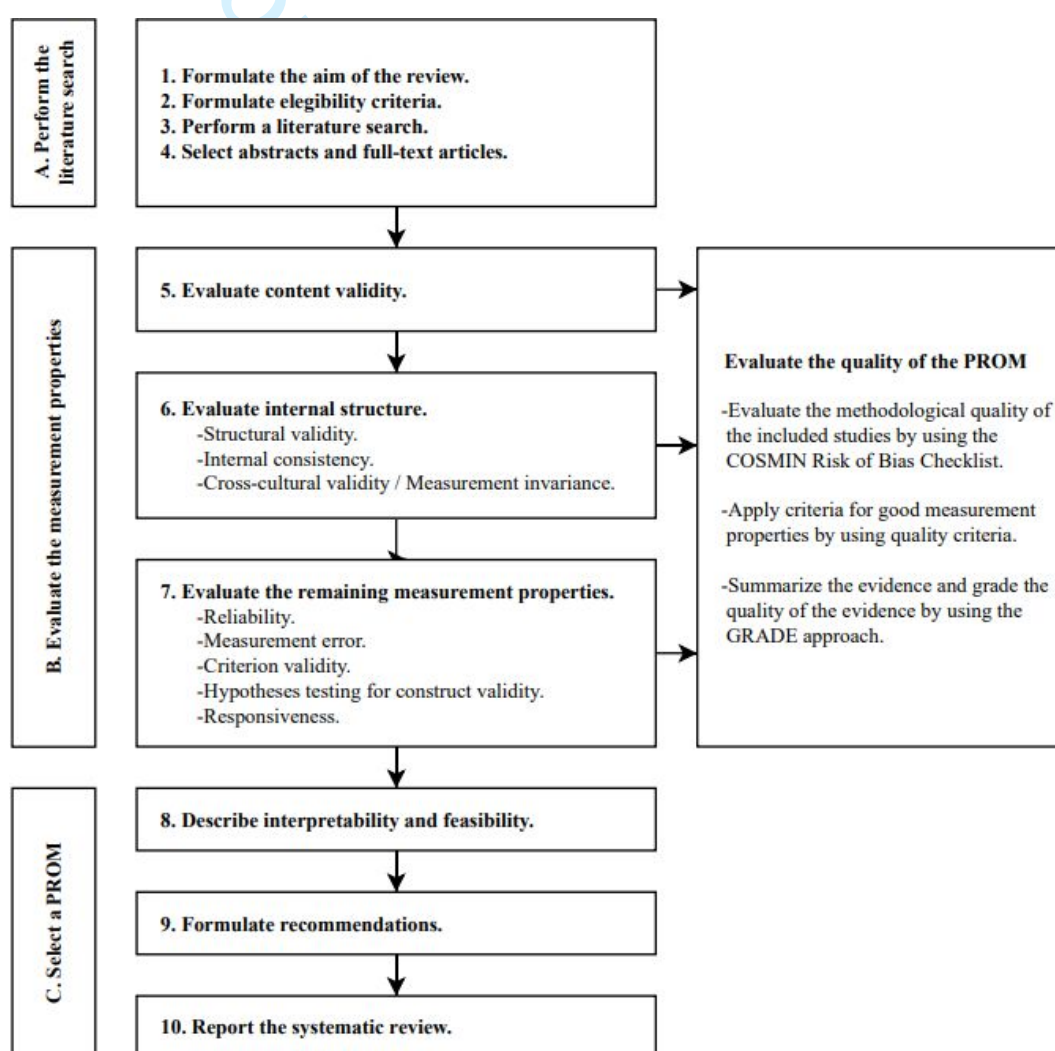

Figure 1. Flowchart for the systematic review process under the COSMIN guidelines

2.1 Search strategy

For the database search, we will combine the following search terms and related free-text grouped in blocks, among which contain "emotion regulation", "emotion dysregulation", "instruments", "scale", "questionnaire", "test", "re-test", "validation" and "psychometrics properties"; these terms can be present in both the title and the abstract. The specific search strategies for each database are included in the Appendix.

2.2 Information sources

An exhaustive literature search will be carried out in electronic databases such as Scopus, Web of Science (WoS), PubMed and ProQuest (MEDLINE). The search began in April 2021. In order to detect studies that may have been omitted during the search (and that may contribute to the systematic review), the search will include a manual review of the references of the included articles.

2.3 Eligibility criteria

2.3.1 Inclusion criteria

The criteria defined for the inclusion of the studies include: i) research articles published in peer-reviewed journals, without a date range for their indexing in the previously described databases; ii) research articles addressing instruments for measuring emotional regulation or deregulation strategies and their psychometric characteristics; iii) research articles written in either English or Spanish.

2.3.2 Exclusion criteria

The criteria defined for the exclusion of the studies include: i) being a theoretical or non-empirical review, case studies, thesis, conference abstract, systematic review or meta-analysis; ii) not presenting psychometric properties of the instruments; iii) the average age of the participants being less than 13 years old; iv) using an ER measure other than a self-report; vi) ER measurement not being the main focus of the study.

Measures of internal consistency, reliability, measurement error, content validity, structural validity, hypothesis testing for construct validity, cross-cultural validity, criterion validity and responsiveness will be understood as psychometric properties.

2.4 Study records

2.4. Data management

All records will be stored in comma-separated values (CSV) files. Microsoft Excel functions along with manual check will be performed to identify potential duplicates.

2.4.2 Study selection process

In the first step, two reviewers (CV and KC) with experience in database management will conduct and consolidate the search results. After identifying the records in the databases and eliminating the duplicates, the study selection process will be carried out. During the second step, the collected articles will be evaluated on their relevance to the particular review by checking their titles and abstracts. If the relevance of an article cannot be determined with this information, the full text will be reviewed to determine its eligibility, applying at all times the inclusion and exclusion criteria previously described.

This assessment will be carried out independently by both reviewers. A third reviewer (DN or JU) will intervene in case of any disagreements regarding the inclusion or exclusion of an article. For the study selection, criteria evaluation and data extraction, a calibration phase will be considered. In this phase, an initial number of studies will be randomly selected and evaluated iteratively until agreement is reached among the reviewers. This process is carried out to guarantee the homogeneity of criteria in the review process.

2.4.3 Data extraction process

In the third step, two reviewers (CV and KC) will independently perform data extraction from included studies, assessment of risk of bias and assessment of the measurement properties' quality based on COSMIN guidelines for systematic reviews of PROMs. To characterize the studies included in the systematic review, a narrative synthesis will be performed accompanied by comparative tables. The assessment of the studies and data extraction will be carried out based on the COSMIN Risk of Bias Checklist and the updated COSMIN criteria for the evaluation of measurement properties [35, 36].

2.4.5 Risk of bias assessment

The COSMIN Risk of Bias Checklist will be adopted to assess the risk of bias. This instrument has been developed exclusively for the systematic review of PROMs. The checklist comprised of 10 main categories will be used to evaluate: i) PROM development; ii) content validity; iii) structural validity; iv) internal consistency; v) cross-

cultural validity; vi) reliability; vii) measurement error; viii) criterion validity; ix) hypothesis testing for construct validity; x) responsiveness [36]. These aspects will be evaluated by both reviewers independently and discussed until a consensus on their quality is reached. Each study will be classified as one of the following: 'very good' (V), 'adequate' (A), 'doubtful' (D), 'indeterminate' (I) or 'not applicable' (N).

2.4.6 Measurement properties assessment

The updated COSMIN criteria for the evaluation of measurement properties will be used to evaluate the psychometric properties of each instrument included in the study. The criteria can assess aspects such as Structural Validity, measures of Internal Consistency, Reliability, Measurement Error, Construct Validity, Cross-cultural Validity, Criterion Validity and Responsiveness. These aspects are evaluated by both reviewers who reach an agreement regarding whether their quality is Sufficient (+), Insufficient (-) or Indeterminate (?). The criteria are summarized in Table 1.

Table 1.

COSMIN updated criteria for good measurement properties

Measurement property	Rating	Criteria
Structural validity	+	**Classical Test Theory (CTT)** CFA: CFI or TLI or comparable measure >.95 or RMSEA <.06 or SRMR <.08 **IRT (Item Response Theory)/Rasch** No violation of unidimensionality: CFA: CFI or TLI or comparable measure >.95 *OR* RMSEA <.06 *OR* SRMR <.08 *AND* No violation of local independence: Residual correlations among the items after controlling for the dominant factor <.20 OR Q3's <.37 *AND* No violation of monotonicity: Adequate looking graphs *OR* item scalability >30 *AND* Adequate model fit: IRT X2>.01 ; Rasch: Infit and outfit mean squares $\geq$.5 and $\leq$ 15 *OR* Z-standardized values >-2 and <2
	?	**CTT** Not all information for '+' reported **IRT/Rasch** Model fit not reported
	-	Criteria for '+' not met.
Internal consistency	+	At least low evidence for sufficient structural validity *AND* Cronbach's alpha(s) $\geq$.70 for each unidimensional scale or subscale.
	?	Criteria for 'At least low evidence for sufficient structural validity' not met.
	-	Criteria for '+' not met.
Reliability	+	Intraclass Correlation Coefficient (ICC) or weighted Kappa $\geq$.70
	?	ICC or weighted Kappa not reported
	-	ICC or weighted Kappa <.70
Measurement error	+	Smallest Detectable Change (SDC) or Limit of Agreement (LoA) < Minimal Important Change (MIC)
	?	MIC not defined
	-	SDC or LoA > MIC
Hypotheses testing for construct validity	+	The result is in accordance with the hypothesis
	?	No hypothesis defined (by the review team)
	-	The result is not in accordance with the hypothesis
Cross-cultural validity/Measurement Invariance	+	No important differences found between group factors in multiple group factor analysis *OR* no important Differential Item Functioning (DIF) for group factors (McFadden's R <.02).
	?	No multiple group factor anaylsis *OR* DIF analysis performed
	-	Important differences found between group factors in multiple group factor analysis *OR* DIF was found.
Criterion validity	+	Correlation with gold standard $\geq$.70 *OR* Area Under the Curve (AUC) $\geq$.70
	?	Not all information for '+' reported.
	-	Correlation with gold standard <.70 *OR* AUC <.70
Responsiveness	+	The result is in accordance with the hypothesis *OR* AUC $\geq$.70
	?	No hypothesis defined (by the review team)
	-	The result is not in accordance with the hypothesis OR AUC <.70

Note: + = Sufficient; ? = Indeterminate; - =Insufficient.

2.4.7 Data synthesis

To characterize the studies included in the systematic review, a narrative synthesis with comparative tables will be performed. In addition, each study will receive a critical evaluation. The psychometric properties of the instruments included will be evaluated through the updated COSMIN criteria for the evaluation of measurement properties. The results will be synthesized through a general evaluation of the PROM with the same criteria. This assessment will consider the article in which the instrument was developed and its subsequent validations. Short or substantially modified versions of an instrument will be evaluated as independent from the original version.

The quality of the available evidence will be assessed through a modified GRADE approach, in which both reviewers reach a consensus on whether the available evidence of each assessed aspects is 'high', 'moderate', 'low' or 'very low' [37]. The results of this evaluation will be included in conjunction with the previously described results.

The evidence for each measurement property will be summarized for each measurement instrument, and the overall result will be determined based on the criteria of good measurement properties. The quality of the evidence will be graded according to a modified GRADE approach ('high', 'moderate', 'low', 'very low' evidence). This general quality synthesis will be used to determine which measures of emotional regulation are more robust for the sample population in which they are used.

Patient and public involvement

This research does not involve any patients or public members. No patients participated in the design of the protocol.

Ethic and dissemination

This study was based on previously published data and did not directly involve any human participants. Therefore, it is exempt from ethical review. Results are expected to be published in a peer-reviewed journal in the field of adolescent and/or youth mental health.

Contributors

DN, JU, AF, RS, NR conceived the idea for the systematic review.

CV and KC designed the study and established the method and procedures.

JU, AF, NR provided critical insight on the procedures and manuscript.

DN, RS, CV established the eligibility criteria.

CV, KC, DN and JU will develop and conduct the search strategy and data extraction.

DN and CV drafted the first version of the protocol manuscript.

All authors contributed and approved the final version of the manuscript.

Competing interest

None of the authors have any conflict of interest to declare.

Data sharing

Data will be available upon request to the corresponding author.

References

1. Calkins SD, Perry NB. The Development of Emotion Regulation: Implications for Child Adjustment. In: Developmental Psychopathology. 2016. doi:10.1002/9781119125556.devpsy306

2. Gross JJ. Emotion Regulation: Current Status and Future Prospects. Psychol Inq Published Online First. 2015. doi:10.1080/1047840X.2014.940781

3. Nolen-Hoeksema S. Emotion regulation and psychopathology: The role of gender. Annu. Rev. Clin. Psychol. 2012. doi:10.1146/annurev-clinpsy-032511-143109

4. Hu T, Zhang D, Wang J, et al. Relation between emotion regulation and mental health: A meta-analysis review. Psychol Rep Published Online First: 2014. doi:10.2466/03.20.PR0.114k22w4

5. Lopes PN, Salovey P, Côté S, et al. Emotion regulation abilities and the quality of social interaction. Emotion Published Online First: 2005. doi:10.1037/1528-3542.5.1.113

6. Stevens NR, Gerhart J, Goldsmith RE, et al. Emotion Regulation Difficulties, Low Social Support, and Interpersonal Violence Mediate the Link Between Childhood Abuse and Posttraumatic Stress Symptoms. Behav Ther Published Online First: 2013. doi:10.1016/j.beth.2012.09.003

7. Allen N, Nelson BW. The Development of Emotion Regulation Across the Transition From Childhood to Adolescence. In: Emotion Regulation. 2020. doi:10.4324/9781351001328-7

8. Hollenstein T, Lanteigne DM. Emotion Regulation Dynamics in Adolescence. In: Emotion Regulation. 2020. doi:10.4324/9781351001328-8

9. Zimmermann P, Iwanski A. Development and Timing of Developmental Changes in Emotional Reactivity and Emotion Regulation During Adolescence. In: Emotion Regulation. 2020. doi:10.4324/9781351001328-6

10. Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across psychopathology: A meta-analytic review. Clin. Psychol. Rev. 2010. doi:10.1016/j.cpr.2009.11.004

11. Contardi A, Imperatori C, Amati I, et al. Assessment of affect lability: Psychometric properties of the ALS-18. Front Psychol Published Online First: 2018. doi:10.3389/fpsyg.2018.00427

12. Campbell-Sills L, Ellard KK, Barlow DH Emotion regulation in anxiety disorders. In: Handbook of emotion regulation (2nd ed.). 2014.

13. Cicchetti D, Toth SL. Child Maltreatment and Developmental Psychopathology: A Multilevel Perspective. In: Developmental Psychopathology. 2016. doi:10.1002/9781119125556.devpsy311

14. Dixon-Gordon KL, Turner BJ, Zachary Rosenthal M, et al. Emotion Regulation in Borderline Personality Disorder: An Experimental Investigation of the Effects of Instructed Acceptance and Suppression. Behav Ther Published Online First: 2017. doi:10.1016/j.beth.2017.03.001

15. Chapman HC, Visser KF, Mittal VA, et al. Emotion regulation across the psychosis continuum. Dev Psychopathol Published Online First: 2019. doi:10.1017/S0954579418001682

16. Heffer T, Willoughby T. The role of emotion dysregulation: A longitudinal investigation of the interpersonal theory of suicide. Psychiatry Res Published Online First: 2018. doi:10.1016/j.psychres.2017.11.075

17. Joormann J, Siemer M. Emotion regulation in mood disorders. Handb Emot Regul (2nd ed) 2014.

18. Kober H. Emotion regulation in substance use disorders. In: Handbook of emotion regulation (2nd ed.). 2014.

19. McLean CP, Foa EB. Emotions and emotion regulation in posttraumatic stress disorder. Curr. Opin. Psychol. 2017. doi:10.1016/j.copsyc.2016.10.006

20. Osborne KJ, Willroth EC, DeVylder JE, et al. Investigating the association between emotion regulation and distress in adults with psychotic-like experiences. Psychiatry Res Published Online First: 2017. doi:10.1016/j.psychres.2017.06.011

21. Shepherd L, Wild J. Emotion regulation, physiological arousal and PTSD symptoms in trauma-exposed individuals. J Behav Ther Exp Psychiatry Published Online First: 2014. doi:10.1016/j.jbtep.2014.03.002

22. Sroufe LA. Attachment and development: A prospective, longitudinal study from birth to adulthood. Attach Hum Dev Published Online First: 2005. doi:10.1080/14616730500365928

23. Strauss GP, Zamani Esfahlani F, Visser KF, et al. Mathematically Modeling Emotion Regulation Abnormalities During Psychotic Experiences in Schizophrenia. Clin Psychol Sci Published Online First: 2019. doi:10.1177/2167702618810233

24. Fernandez KC, Jazaieri H, Gross JJ. Emotion Regulation: A Transdiagnostic Perspective on a New RDoC Domain. Cognit Ther Res Published Online First: 2016. doi:10.1007/s10608-016-9772-2

25. Gross JJ, Jazaieri H. Emotion, emotion regulation, and psychopathology: an affective science perspective. Clin Psychol Sci Published Online First: 2014. doi:10.1177/2167702614536164

26. Greenberg DM, Kolasi J, Hegsted CP, Berkowitz Y, Jurist EL. Mentalized affectivity: A new model and assessment of emotion regulation. PLoS One. 2017 Oct 18;12(10):e0185264. doi:10.1371/journal.pone.0185264

27. Morrish L, Rickard N, Chin TC, et al. Emotion Regulation in Adolescent Well-Being and Positive Education. J. Happiness Stud. 2018. doi:10.1007/s10902-017-9881-y

28. Moltrecht B, Deighton J, Patalay P, et al. Effectiveness of current psychological interventions to improve emotion regulation in youth: a meta-analysis. Eur. Child Adolesc. Psychiatry. 2020. doi:10.1007/s00787-020-01498-4

29. Berking M, Wupperman P. Emotion regulation and mental health: Recent findings, current challenges, and future directions. Curr. Opin. Psychiatry. 2012. doi:10.1097/YCO.0b013e3283503669

30. Adrian M, Zeman J, Veits G. Methodological implications of the affect revolution: A 35-year review of emotion regulation assessment in children. J Exp Child Psychol Published Online First: 2011. doi:10.1016/j.jecp.2011.03.009

31. Young KS, Sandman CF, Craske MG. Positive and negative emotion regulation in adolescence: links to anxiety and depression. Brain Sci. 2019. doi:10.3390/brainsci9040076

32. Burr DA, Pizzie RG, Kraemer DJM. Anxiety, not regulation tendency, predicts how individuals regulate in the laboratory: An exploratory comparison of self-report and psychophysiology. PLoS One Published Online First: 2021. doi:10.1371/journal.pone.0247246

33. Tull MT, Aldao A. New Directions in the Science of Emotion Regulation. Curr Opin Psychol 2015.

34. Prinsen CA, Vohra S, Rose MR, Boers M, Tugwell P, Clarke M, et al. How to select outcome measurement instruments for outcomes included in a "Core Outcome Set" – a practical guideline. Trials. 2016;17(1):449.

35. Prinsen CAC, Mokkink LB, Bouter LM, et al. COSMIN guideline for systematic reviews of patient-reported outcome measures. Qual Life Res Published Online First: 2018. doi:10.1007/s11136-018-1798-3

36. Mokkink LB, de Vet HCW, Prinsen CAC, et al. COSMIN Risk of Bias checklist for systematic reviews of Patient-Reported Outcome Measures. Qual Life Res Published Online First: 2018. doi:10.1007/s11136-017-1765-4

37. Guyatt GH, Oxman AD, Schünemann HJ, et al. Grade guidelines: a new series of articles in the Journal of clinical epidemiology. J Clin Epidemiol 2011;64:380–2.

Appendix: Search Strategies

1. WOS

((TI=(((("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability"))) OR AB=(((("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")))))) AND LANGUAGE: (English OR Spanish) AND DOCUMENT TYPES: (Article)

2. PUBMED

(("emotion regulation"[Title/Abstract] OR "affect regulation"[Title/Abstract] OR "emotion dysregulation"[Title/Abstract] OR "affect dysregulation"[Title/Abstract]) AND ("instrument*"[Title/Abstract] OR "measure"[Title/Abstract] OR "measurement"[Title/Abstract] OR "measuring"[Title/Abstract] OR "questionnaire"[Title/Abstract] OR "questionnaires"[Title/Abstract] OR "scale"[Title/Abstract] OR "scales"[Title/Abstract]) AND ("psychometric"[Title/Abstract] OR "validity"[Title/Abstract] OR "validation"[Title/Abstract] OR "reliability"[Title/Abstract] OR "internal consistency"[Title/Abstract] OR "alpha"[Title/Abstract] OR "cronbach"[Title/Abstract] OR "re-test"[Title/Abstract] OR "retest"[Title/Abstract] OR "temporal stability"[Title/Abstract]))

3. SCOPUS

TITLE-ABS (("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish")) AND (LIMIT-TO (SRCTYPE , "j"))

4. PROQUEST

((TI("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")) OR AB(("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability"))) AND (at.exact("Article") AND la.exact("ENG" or "SPA") AND PEER(yes))

Appendix: Search Strategies

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2. PUBMED

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3. SCOPUS

TITLE-ABS (("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND (

"psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish")) AND (LIMIT-TO (SRCTYPE , "j"))

4. PROQUEST

((TI("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")) OR AB(("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability"))) AND (at.exact("Article") AND la.exact("ENG" or "SPA") AND PEER(yes))

BMJ Open

A protocol for a systematic review to identify self-report measures of emotion regulation and evaluate their psychometric properties

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Manuscripts

1   **A protocol for a systematic review to identify self-report measures of emotion**

2   **regulation and evaluate their psychometric properties**

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14   **Abstract**

15   **Introduction:** Successful emotion regulation (ER) is critical for psychological health.

16   Disturbances in this ability are associated with several psychiatric disorders. There are

17   several self-report questionnaires to assess ER. However, there are no studies

18   synthesising the evidence on their psychometric properties. We aim to identify all

19   available instruments addressing ER in adolescents or adults and to critically appraise,

20   compare and summarise the quality of their psychometric properties. For this we will use

21   COnsensus-based Standards for the selection of health Measurement INstruments

22   (COSMIN) criteria.

23   **Method and analysis:** The search process to identify eligible studies will be conducted

24   in April 2021 including the ProQuest, PubMed, Scopus and Web of Science databases

25   with no restriction in terms of publication date. Eligibility criteria include peer-reviewed

26   research articles written in English or Spanish by means of Patient-Reported Outcome

27   Measures (PROMs) focused on Emotion Regulation among participants of 13 years or

28   older. We will assess the quality of measures according to the COSMIN Risk of Bias

29   Checklist. The psychometric properties will be assessed by the COSMIN updated criteria

30   for good measurement. The available evidence will be addressed by the Grading of

31   Recommendations, Assessment, Development and Evaluations (GRADE) approach. Our

32   findings will be synthesised independently for each measure, including information on

33   their sample, theoretical model and psychometric properties when possible.

34   **Ethics and dissemination:** Ethical approval is not required, as this study does not

35   involve any participants or collection of primary data. Results are expected to be

36 published in a peer-reviewed journal in the field of youth mental health and presented at

37 relevant meetings and conferences.

38 **PROSPERO registration number:** CRD42021249498

39 **Strengths and limitations of this study**

40 • This protocol for systematic review has been prepared in accordance with the

41 COSMIN updated criteria (COnsensus-based Standards for the selection of health

42 status Measurement INstruments).

43 • The Cochrane Handbook for Systematic Reviews of Interventions was used to

44 assist the design of this systematic review.

45 • There are no recent syntheses of the evidence on psychometric properties of self-

46 report measures for assessing emotion regulation in adolescent and adult

47 populations.

48 • This systematic review will be limited to published articles.

49 • Searches will be limited to studies published in English and Spanish languages.

1. Introduction

Emotion regulation (ER) is the process where behaviours, competencies and strategies interact to modulate, inhibit, or intensify emotional experiences and expressions based on individual objectives, the circumstances they face and the development stage they are in [1, 2]. The ability to properly regulate our emotions is associated with greater subjective well-being [3] and is essential for maintaining good mental health [4] and successfully interacting with others [5]. ER can be an important mediator to cope with adverse and stressful events [6]. It has been observed that a lower ER capacity is related to the increased clinical symptoms [7-9], and that it constitutes a potential risk factor for the development and maintenance of psychopathologies [10, 11], such as anxiety disorders, depression, personality borderline, post-traumatic stress disorder, psychotic spectrum disorders, and risk behaviours including substance use, self-injurious behaviours, and suicide attempts [6, 12-23]. In short, ER represents a complex psychological process associated with the development and manifestation of psychopathology [24], and it has special relevance to intervene on its course and outcomes.

Given the importance that ER has acquired in recent years, there has been a significant increase in its research. Different theoretical models have been developed that differ in the conceptualization of ER, its strategies, and the organisation of its components [25, 26]. Simultaneously, interventions have been developed to promote resilience and well-being [27] as well as to treat a variety of psychiatric disorders with generally promising results [28]. Likewise, different measures have been designed to assess specific components of ER. These measures include self-report questionnaires, behavioural observations, and peripheral and neural physiological measures. Because these

73   measurements have different designs and structures, they are not always directly

74   comparable [29, 30].

75   Among the theoretical models that underlie these instruments, it is possible to distinguish

76   approaches that place greater emphasis on the adaptive aspect of ER [31]. Gross' modular

77   model exemplifies this, as it focuses on the implementation of regulatory strategies to

78   achieve the subject's emotional regulation goals [32]. Likewise, Thompson's model

79   highlights the importance of context as a factor influencing the subject's regulatory goals

80   in a particular situation [33]. On the other hand, there are approaches focused on

81   maladaptive aspects of ER that would account for alterations or difficulties in this process

82   [34]. Among these, one of the most representative models is that of Gratz and Roemer,

83   who describe emotion dysregulation as experiencing difficulties in a series of dimensions

84   of ER such as emotional awareness, acceptance and understanding, including the ability

85   to regulate one's own behaviour and impulsiveness in the face of negative emotions and

86   accessing effective ER strategies [35].

87   Despite the fact that literature suggests using multilevel measures to study this type of

88   construct [36], self-report questionnaires are one of the most commonly used tools in ER

89   research. While most of these measures have focused on the assessment of strategies for

90   emotional suppression and cognitive reappraisal [30], others have been developed to

91   assess aspects such as ER skills in addition to other regulatory strategies [26, 37].

92   Interest in measurement of these skills and strategies has risen rapidly in the last few

93   years. As a result, some systematic reviews have been conducted on instruments for

94   measuring ER. In general, these approaches have assessed the measurement of strategies

95   in rather specific age groups and contexts, such as individuals with autism spectrum

96 disorder [38], women with breast cancer [31], children and adolescents with intellectual

97 disabilities [39], children's emotion regulation in a school setting [40] or evaluating

98 specific strategies for coping with emotional states such as sadness [41]. While these

99 reviews have addressed the most relevant instruments and methods used to measure ER,

100 the emphasis has been more on the measurement format (*e.g.* self-report, interviews,

101 behavioural observation) than on the instrument's quality or psychometric properties.

102 Moreover, most studies have reported only basic indicators such as internal consistency

103 indices used to provide a broad assessment of the measure's validity and reliability [41].

104 The usage of self-report questionnaires to assess ER in adolescents has been highlighted

105 as relevant and feasible [42]. However, even if some initiatives have developed self-

106 report measures to assess ER in children, they should be considered with caution because

107 of the cognitive and affective developmental characteristics at this age that could interfere

108 with the comprehension of the questions about emotions and their management [43].

109 Furthermore, there is evidence that the cognitive processes and mechanisms required for

110 effective implementation of ER strategies develop during adolescence [44, 45].

111 Considering these findings, our study focuses on studies involving participants aged 13 or

112 older in order to include adolescence as an age group based on the classification by the

113 World Health Organization [46], while also reducing potential developmental biases in

114 the comprehension of items requiring a higher level of abstract thinking [47].

115 Through our systematic review, we seek to identify the existing self-report instruments

116 for the measurement of ER, determining their psychometric properties and overall

117 quality. With this, our goal is to identify which instruments have the best properties and

118 prove to be the most valid and reliable for measuring strategies for or difficulties in ER

119   skills. Given the advantages of self-report instruments (*e.g.* quick to administer, easy to

120   score, and the suitability for being used as part of a broad survey) [48], we focused on

121   these measures. This fits with the current recognized need to improve the early detection

122   of mental health difficulties by addressing a broad range of symptoms and underlying

123   transdiagnostic mechanisms [49-50].

124   The following elements form the basis of the current systematic review: (i) ER is

125   currently considered as a vital process for understanding psychopathology and

126   developing effective interventions; (ii) it is critical to be clear regarding measurement of

127   ER, its underlying theoretical models, validity evidence and the samples used [51]; (iii)

128   there have been no previous reviews that synthesise the validity evidence for self-report

129   measures to assess ER. Therefore, the current systematic review will summarise the

130   evidence on the psychometric properties of self-report questionnaires used to measure

131   ER, particularly among people over the age of 13. The objectives include:

132   1. To identify all available instruments to assess ER in adolescents and adults.

133   2. To critically assess, compare and synthesise the measurement properties of the

134   identified instruments, based on the criteria of the Consensus-based Standards

135   for the selection of health Measurement Instruments (COSMIN).

136   **2. Method**

137   The following protocol for systematic review was developed in accordance with the

138   COSMIN initiative's criteria [52]. The protocol's details have been registered in the

139   International Prospective Register of Systematic Reviews (PROSPERO). In the event of

140   modifications to the protocol, these will be informed in the publication of the systematic

141   review. The planned start date for the systematic review was on April 1st 2021 and the

142 end date was planned on 30 December 30th, 2021. The procedure is summarised in Figure

143 1.

2.1. Search strategy

145 For the database search, we will combine the following search terms and related free-text

146 grouped in blocks, among which contain "emotion regulation", "emotion dysregulation",

147 "instruments", "scale", "questionnaire", "test", "re-test", "validation" and "psychometrics

148 properties"; these terms can be present in both the title and the abstract. The specific

149 search strategies for each database are included in the Appendix.

2.2. Information sources

151 An exhaustive literature search will be carried out in electronic databases such as Scopus,

152 Web of Science (WoS), PubMed and ProQuest (MEDLINE). The search began in April

153 2021. In order to detect studies that may have been omitted during the search (and that

154 may contribute to the systematic review), the search will include a manual review of the

155 references of the included articles.

2.3. Eligibility criteria

157 *2.3.1. Inclusion criteria*

158 The criteria defined for the inclusion of the studies include: i) research articles published

159 in peer-reviewed journals, without a date range for their indexing in the previously

160 described databases; ii) research articles addressing instruments for measuring emotion

161 regulation or dysregulation strategies and their psychometric characteristics; iii) research

162 articles written in either English or Spanish.

163 *2.3.2. Exclusion criteria*

164 The criteria defined for the exclusion of the studies include: i) being a theoretical or non-

165 empirical review, case studies, thesis, conference abstract, systematic review or meta-

166 analysis; ii) not presenting psychometric properties of the instruments; iii) the average

167 age of the participants being less than 13 years old; iv) using an ER measure other than a

168 self-report; vi) ER measurement not being the main focus of the study. Measures of

169 internal consistency, reliability, measurement error, content validity, structural validity,

170 hypothesis testing for construct validity, cross-cultural validity, criterion validity and

171 responsiveness will be understood as psychometric properties.

172 **2.4 Study records**

173 *2.4.1. Data management*

174 All records will be stored in comma-separated values (CSV) files. Microsoft Excel

175 functions along with manual checks will be performed to identify potential duplicates.

176 *2.4.2. Study selection process*

177 In the first step, two reviewers (CV and KC) with experience in database management

178 will conduct and consolidate the search results. After identifying the records in the

179 databases and eliminating the duplicates, the study selection process will be carried out.

180 During the second step, the collected articles will be evaluated on their relevance to the

181 particular review by checking their titles and abstracts. If the relevance of an article

182 cannot be determined with this information, the full text will be reviewed to determine its

183 eligibility, applying at all times the inclusion and exclusion criteria previously described.

184 This assessment will be carried out independently by both reviewers. A third reviewer

185 (DN or JU) will intervene in case of any disagreements regarding the inclusion or

186 exclusion of an article. For the study selection, criteria evaluation and data extraction, a

187 calibration phase will be considered. In this phase, an initial number of studies will be

188 randomly selected and evaluated iteratively until agreement is reached among the

189 reviewers. This process is carried out to guarantee the homogeneity of criteria in the

190 review process.

191 *2.4.3 Data extraction process*

192 In the third step, two reviewers (CV and KC) will independently perform data extraction

193 from included studies, assessment of risk of bias and assessment of the measurement

194 properties' quality based on COSMIN guidelines for systematic reviews of Patient-

195 Reported Outcome Measures (PROMs). To characterise the studies included in the

196 systematic review, a narrative synthesis will be performed accompanied by comparative

197 tables. The assessment of the studies and data extraction will be carried out based on the

198 COSMIN Risk of Bias Checklist and the updated COSMIN criteria for the evaluation of

199 measurement properties [53, 54].

200 *2.4.5 Risk of bias assessment*

201 The COSMIN Risk of Bias Checklist will be adopted to assess the risk of bias. This

202 instrument has been developed exclusively for the systematic review of PROMs. The

203 checklist comprised of 10 main categories will be used to evaluate: i) PROM

204 development; ii) content validity; iii) structural validity; iv) internal consistency; v) cross-

205 cultural validity; vi) reliability; vii) measurement error; viii) criterion validity; ix)

206 hypothesis testing for construct validity; x) responsiveness [54]. These aspects will be

207 evaluated by both reviewers independently and discussed until a consensus on their

208 quality is reached. Each study will be classified as one of the following: 'very good' (V),

209 'adequate' (A), 'doubtful' (D), 'indeterminate' (I) or 'not applicable' (N).

2.4.6 Measurement properties assessment

The updated COSMIN criteria for the evaluation of measurement properties will be used

to evaluate the psychometric properties of each instrument included in the study. The

criteria can assess aspects such as Structural Validity, measures of Internal Consistency,

Reliability, Measurement Error, Construct Validity, Cross-cultural Validity, Criterion

Validity and Responsiveness. These aspects are evaluated by both reviewers who reach

an agreement regarding whether their quality is Sufficient (+), Insufficient (-) or

Indeterminate (?). The criteria are summarised in Table 1.

Table 1.

COSMIN updated criteria for good measurement properties

Measurement property	Rating	Criteria
Structural validity	+	**Classical Test Theory (CTT)** CFA: CFI or TLI or comparable measure >.95 or RMSEA <.06 or SRMR <.08 **IRT (Item Response Theory)/Rasch** No violation of unidimensionality: CFA: CFI or TLI or comparable measure >.95 *OR* RMSEA <.06 *OR* SRMR <.08 *AND* No violation of local independence: Residual correlations among the items after controlling for the dominant factor <.20 OR Q3's <.37 *AND* No violation of monotonicity: Adequate looking graphs *OR* item scalability >30 *AND* Adequate model fit: IRT χ^2 >.01 ; Rasch: Infit and outfit mean squares $\geq$.5 and $\leq$ 15 *OR* Z-standardised values >-2 and <2
	?	**CTT** Not all information for '+' reported **IRT/Rasch** Model fit not reported
	-	Criteria for '+' not met.
Internal consistency	+	At least low evidence for sufficient structural validity *AND* Cronbach's alpha(s) $\geq$.70 for each unidimensional scale or subscale.
	?	Criteria for 'At least low evidence for sufficient structural validity' not met.
	-	Criteria for '+' not met.
Reliability	+	Intraclass Correlation Coefficient (ICC) or weighted Kappa $\geq$.70
	?	ICC or weighted Kappa not reported
	-	ICC or weighted Kappa <.70
Measurement error	+	Smallest Detectable Change (SDC) or Limit of Agreement (LoA) < Minimal Important Change (MIC)
	?	MIC not defined
	-	SDC or LoA > MIC
Hypotheses testing for	+	The result is in accordance with the hypothesis

construct validity	?	No hypothesis defined (by the review team)
	-	The result is not in accordance with the hypothesis
Cross-cultural validity/Measurement Invariance	+	No important differences found between group factors in multiple group factor analysis *OR* no important Differential Item Functioning (DIF) for group factors (McFadden's R <.02).
	?	No multiple group factor analysis *OR* DIF analysis performed
	-	Important differences found between group factors in multiple group factor analysis *OR* DIF was found.
Criterion validity	+	Correlation with gold standard ≥.70 *OR* Area Under the Curve (AUC) ≥.70
	?	Not all information for '+' reported.
	-	Correlation with gold standard <.70 *OR* AUC <.70
Responsiveness	+	The result is in accordance with the hypothesis *OR* AUC ≥.70
	?	No hypothesis defined (by the review team)
	-	The result is not in accordance with the hypothesis OR AUC <.70

220   Note: + = Sufficient; ? = Indeterminate; - =Insufficient.

221

222   *2.4.7 Data synthesis*

223   To characterise the studies included in the systematic review, a narrative synthesis with

224   comparative tables will be performed. In addition, each study will receive a critical

225   evaluation. The psychometric properties of the instruments included will be evaluated

226   through the updated COSMIN criteria for the evaluation of measurement properties. The

227   results will be synthesised through a general evaluation of the PROM with the same

228   criteria. This assessment will consider the article in which the instrument was developed

229   and its subsequent validations. Short or substantially modified versions of an instrument

230   will be evaluated as independent from the original version.

231   The quality of the available evidence will be assessed through a modified GRADE

232   approach, in which both reviewers reach a consensus on whether the available evidence

233   of each assessed aspect is 'high', 'moderate', 'low' or 'very low' [55]. The results of this

234   evaluation will be included in conjunction with the previously described results.

235   The evidence for each measurement property will be summarised for each measurement

236   instrument, and the overall result will be determined based on the criteria of good

237 measurement properties. The quality of the evidence will be graded according to a

238 modified GRADE approach ('high', 'moderate', 'low', 'very low' evidence). This

239 general quality synthesis will be used to determine which measures of emotional

240 regulation are more robust for the sample population in which they are used.

241 **Patient and public involvement**

242 This research does not involve any patients or public members. No patients participated

243 in the design of the protocol.

244 **Ethic and dissemination**

245 This study was based on previously published data and did not directly involve any

246 human participants. Therefore, it is exempt from ethical review. Results are expected to

247 be published in a peer-reviewed journal in the field of adolescent and/or youth mental

248 health.

249 **Contributors**

250 DN, JU, AF, RS, NR conceived the idea for the systematic review.

251 CV and KC designed the study and established the method and procedures.

252 JU, AF, NR provided critical insight on the procedures and manuscript.

253 DN, RS, CV established the eligibility criteria.

254 CV, KC, DN and JU will develop and conduct the search strategy and data extraction.

255 DN and CV drafted the first version of the protocol manuscript.

256 All authors contributed and approved the final version of the manuscript.

257 **Competing interest**

258 None of the authors have any conflict of interest to declare.

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261 (NCS17_035) and PIA en Ciencias Cognitivas (RU-153-2019), Research Center on

262 Cognitive Sciences, Faculty of Psychology, Universidad de Talca, Chile.

263 **Data sharing**

264 Data will be available upon request to the corresponding author.

265 **References**

266 1. Calkins SD, Perry NB. The Development of Emotion Regulation: Implications for

267   Child   Adjustment.   In: Developmental   Psychopathology.   2016.

268   doi:10.1002/9781119125556.devpsy306

269 2. Gross JJ. Emotion Regulation: Current Status and Future Prospects. Psychol Inq

270   Published Online First. 2015. doi:10.1080/1047840X.2014.940781

271 3. Nolen-Hoeksema S. Emotion regulation and psychopathology: The role of

272   gender. Annu. Rev. Clin. Psychol. 2012. doi:10.1146/annurev-clinpsy-032511-

273   143109

274 4. Hu T, Zhang D, Wang J, et al. Relation between emotion regulation and mental

275   health: A meta-analysis review. Psychol Rep Published Online First: 2014.

276   doi:10.2466/03.20.PR0.114k22w4

277 5. Lopes PN, Salovey P, Côté S, et al. Emotion regulation abilities and the quality of

278   social interaction. Emotion Published Online First: 2005. doi:10.1037/1528-

279   3542.5.1.113

280 6. Stevens NR, Gerhart J, Goldsmith RE, et al. Emotion Regulation Difficulties,

281   Low Social Support, and Interpersonal Violence Mediate the Link Between

282   Childhood Abuse and Posttraumatic Stress Symptoms. Behav Ther Published

283   Online First: 2013. doi:10.1016/j.beth.2012.09.003

284 7. Allen N, Nelson BW. The Development of Emotion Regulation Across the

285   Transition From Childhood to Adolescence. In: Emotion Regulation. 2020.

286   doi:10.4324/9781351001328-7

287 8. Hollenstein T, Lanteigne DM. Emotion Regulation Dynamics in Adolescence. In:

288   Emotion Regulation. 2020. doi:10.4324/9781351001328-8

289 9. Zimmermann P, Iwanski A. Development and Timing of Developmental Changes

290   in Emotional Reactivity and Emotion Regulation During Adolescence. In:

291   Emotion Regulation. 2020. doi:10.4324/9781351001328-6

292 10. Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion-regulation strategies across

293   psychopathology: A meta-analytic review. Clin. Psychol. Rev. 2010.

294   doi:10.1016/j.cpr.2009.11.004

295 11. Contardi A, Imperatori C, Amati I, et al. Assessment of affect lability:

296   Psychometric properties of the ALS-18. Front Psychol Published Online First:

297   2018. doi:10.3389/fpsyg.2018.00427

298 12. Campbell-Sills L, Ellard KK, Barlow DH Emotion regulation in anxiety

299   disorders. In: Handbook of emotion regulation (2nd ed.). 2014.

300 13. Cicchetti D, Toth SL. Child Maltreatment and Developmental Psychopathology:

301   A Multilevel Perspective. In: Developmental Psychopathology. 2016.

302   doi:10.1002/9781119125556.devpsy311

303 14. Dixon-Gordon KL, Turner BJ, Zachary Rosenthal M, et al. Emotion Regulation in

304   Borderline Personality Disorder: An Experimental Investigation of the Effects of

305   Instructed Acceptance and Suppression. Behav Ther Published Online First: 2017.

306   doi:10.1016/j.beth.2017.03.001

307 15. Chapman HC, Visser KF, Mittal VA, et al. Emotion regulation across the

308   psychosis continuum. Dev Psychopathol Published Online First: 2019.

309   doi:10.1017/S0954579418001682

310 16. Heffer T, Willoughby T. The role of emotion dysregulation: A longitudinal

311   investigation of the interpersonal theory of suicide. Psychiatry Res Published

312   Online First: 2018. doi:10.1016/j.psychres.2017.11.075

313 17. Joormann J, Siemer M. Emotion regulation in mood disorders. Handb Emot Regul

314   (2nd ed) 2014.

315 18. Kober H. Emotion regulation in substance use disorders. In: Handbook of

316   emotion regulation (2nd ed.). 2014.

317 19. McLean CP, Foa EB. Emotions and emotion regulation in posttraumatic stress

318   disorder. Curr. Opin. Psychol. 2017. doi:10.1016/j.copsyc.2016.10.006

319 20. Osborne KJ, Willroth EC, DeVylder JE, et al. Investigating the association

320   between emotion regulation and distress in adults with psychotic-like experiences.

321   Psychiatry Res Published Online First: 2017. doi:10.1016/j.psychres.2017.06.011

322 21. Shepherd L, Wild J. Emotion regulation, physiological arousal and PTSD

323   symptoms in trauma-exposed individuals. J Behav Ther Exp Psychiatry Published

324   Online First: 2014. doi:10.1016/j.jbtep.2014.03.002

325 22. Sroufe LA. Attachment and development: A prospective, longitudinal study from

326   birth to adulthood. Attach Hum Dev Published Online First: 2005.

327   doi:10.1080/14616730500365928

328   23. Strauss GP, Zamani Esfahlani F, Visser KF, et al. Mathematically Modeling

329   Emotion Regulation Abnormalities During Psychotic Experiences in

330   Schizophrenia. Clin Psychol Sci Published Online First: 2019.

331   doi:10.1177/2167702618810233

332   24. Fernandez KC, Jazaieri H, Gross JJ. Emotion Regulation: A Transdiagnostic

333   Perspective on a New RDoC Domain. Cognit Ther Res Published Online First:

334   2016. doi:10.1007/s10608-016-9772-2

335   25. Gross JJ, Jazaieri H. Emotion, emotion regulation, and psychopathology: an

336   affective science perspective. Clin Psychol Sci Published Online First: 2014.

337   doi:10.1177/2167702614536164

338   26. Greenberg DM, Kolasi J, Hegsted CP, Berkowitz Y, Jurist EL. Mentalized

339   affectivity: A new model and assessment of emotion regulation. PLoS One. 2017

340   Oct 18;12(10):e0185264. doi:10.1371/journal.pone.0185264

341   27. Morrish L, Rickard N, Chin TC, et al. Emotion Regulation in Adolescent Well-

342   Being and Positive Education. J. Happiness Stud. 2018. doi:10.1007/s10902-017-

343   9881-y

344   28. Moltrecht B, Deighton J, Patalay P, et al. Effectiveness of current psychological

345   interventions to improve emotion regulation in youth: a meta-analysis. Eur. Child

346   Adolesc. Psychiatry. 2020. doi:10.1007/s00787-020-01498-4

347   29. Berking M, Wupperman P. Emotion regulation and mental health: Recent

348   findings, current challenges, and future directions. Curr. Opin. Psychiatry. 2012.

349   doi:10.1097/YCO.0b013e3283503669

350 30. Adrian M, Zeman J, Veits G. Methodological implications of the affect

351   revolution: A 35-year review of emotion regulation assessment in children. J Exp

352   Child Psychol Published Online First: 2011. doi:10.1016/j.jecp.2011.03.009

353 31. Brandão T, Tavares R, Schulz MS, et al. Measuring emotion regulation and

354   emotional expression in breast cancer patients: A systematic review. Clin.

355   Psychol. Rev. 2016. doi:10.1016/j.cpr.2015.10.002

356 32. Gross JJ. Emotion Regulation: Conceptual and Empirical Foundations. Handb.

357   Emot. Regul 2nd ed. 2014

358 33. Thompson RA. Socialization of emotion and emotion regulation in the family.

359   Handb Emot Regul 2nd ed. 2014.

360 34. Daros AR, Williams GE. A Meta-analysis and Systematic Review of Emotion-

361   Regulation Strategies in Borderline Personality Disorder. Harv. Rev. Psychiatry.

362   2019. doi:10.1097/HRP.0000000000000212

363 35. Gratz KL, Roemer L. Multidimensional Assessment of Emotion Regulation and

364   Dysregulation: Development, Factor Structure, and Initial Validation of the

365   Difficulties in Emotion Regulation Scale. In: Journal of Psychopathology and

366   Behavioral Assessment. 2004. doi:10.1023/B:JOBA.0000007455.08539.94

367 36. Young KS, Sandman CF, Craske MG. Positive and negative emotion regulation in

368   adolescence: links to anxiety and depression. Brain Sci. 2019.

369   doi:10.3390/brainsci9040076

370 37. Burr DA, Pizzie RG, Kraemer DJM. Anxiety, not regulation tendency, predicts

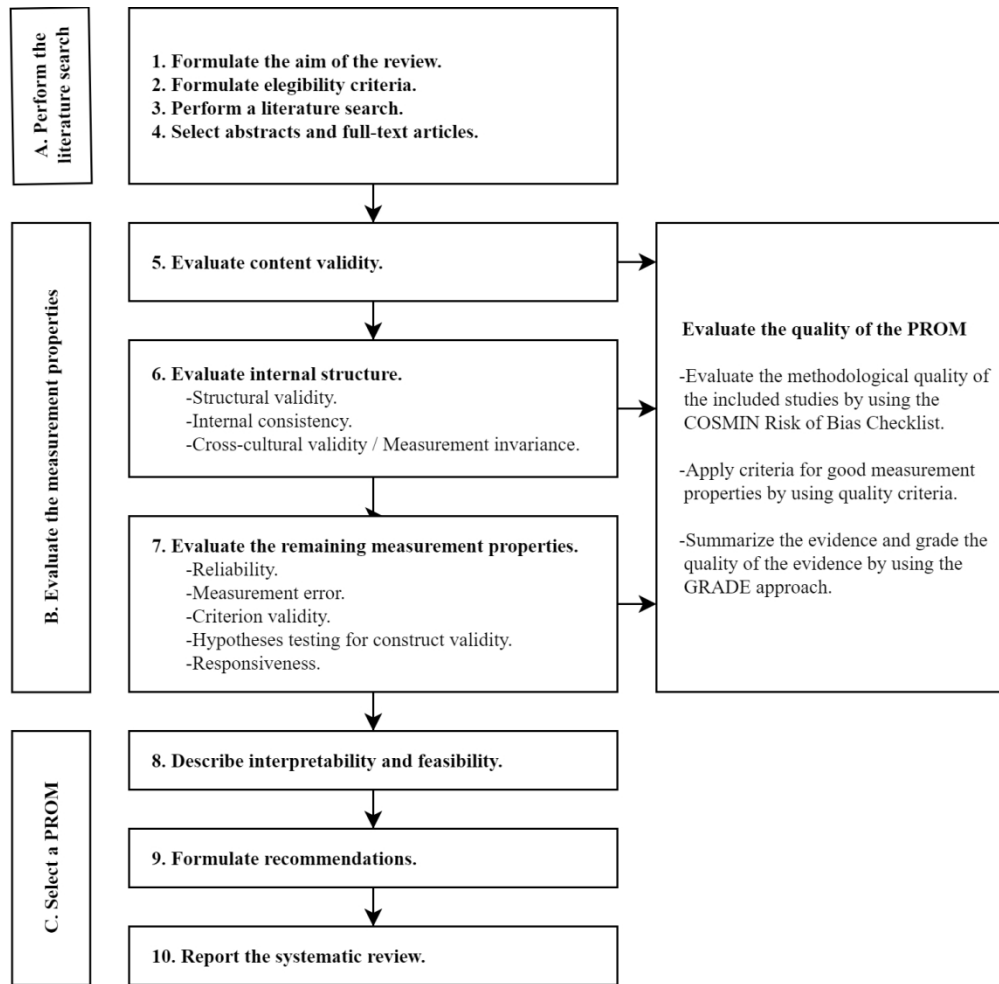371   how individuals regulate in the laboratory: An exploratory comparison of self-

372   report and psychophysiology. PLoS One Published Online First: 2021.

373   doi:10.1371/journal.pone.0247246

374   38. Weiss JA, Thomson K, Chan L. A Systematic Literature Review of Emotion

375   Regulation Measurement in Individuals With Autism Spectrum Disorder. Autism

376   Res. 2014. doi:10.1002/aur.1426

377   39. Girgis M, Paparo J, Kneebone I. A systematic review of emotion regulation

378   measurement in children and adolescents diagnosed with intellectual disabilities.

379   J. Intellect. Dev. Disabil. 2021. doi:10.3109/13668250.2020.1784520

380   40. Schlesier J, Roden I, Moschner B. Emotion regulation in primary school children:

381   A systematic review. Child Youth Serv Rev Published Online First: 2019.

382   doi:10.1016/j.childyouth.2019.02.044

383   41. Zaid SM, Hutagalung FD, Abd Hamid HS Bin, et al. Sadness regulation strategies

384   and measurement: A scoping review. PLoS One. 2021.

385   doi:10.1371/journal.pone.0256088

386   42. Zhou Y, Daukantaitė D, Lundh LG, et al. Adolescents' Emotion Regulation

387   Strategies Questionnaire: Initial Validation and Prospective Associations With

388   Nonsuicidal Self-Injury and Other Mental Health Problems in Adolescence and

389   Young Adulthood in a Swedish Youth Cohort. Front Psychiatry Published Online

390   First: 2020. doi:10.3389/fpsyt.2020.00462

391   43. Walden TA, Harris VS, Catron TF. How I Feel: A Self-Report Measure of

392   Emotional Arousal and Regulation for Children. Psychol Assess Published Online

393   First: 2003. doi:10.1037/1040-3590.15.3.399

394   44. Silvers JA. Adolescence as a pivotal period for emotion regulation development

395   for consideration at current opinion in psychology. Curr. Opin. Psychol. 2022.

396   doi:10.1016/j.copsyc.2021.09.023

397   45. Theurel A, Gentaz E. The regulation of emotions in adolescents: Age differences

398   and emotion-specific patterns. PLoS One Published Online First: 2018.

399   doi:10.1371/journal.pone.0195501

400   46. Young people's health--a challenge for society. Report of a WHO Study Group

401   on young people and 'Health for All by the Year 2000'. World Health Organ

402   Tech Rep Ser 1986.

403   47. Brown K, Cozby P. Research methods in human development. Mountain View,

404   Calif.: Mayfield Pub.; 1999.

405   48. Cibralic S, Kohlhoff J, Wallace N, et al. A systematic review of emotion

406   regulation in children with Autism Spectrum Disorder. Res. Autism Spectr.

407   Disord. 2019. doi:10.1016/j.rasd.2019.101422

408   49. Scott J, Crouse JJ, Ho N, et al. Early expressions of psychopathology and risk

409   associated with trans-diagnostic transition to mood and psychotic disorders in

410   adolescents and young adults. PLoS One Published Online First: 2021.

411   doi:10.1371/journal.pone.0252550.

412   50. Shah JL, Scott J, McGorry PD, et al. Transdiagnostic clinical staging in youth

413   mental health: a first international consensus statement. World Psychiatry

414   Published Online First: 2020. doi:10.1002/wps.20745

415   51. Tull MT, Aldao A. New Directions in the Science of Emotion Regulation. Curr

416   Opin Psychol 2015.

417   52. Prinsen CA, Vohra S, Rose MR, Boers M, Tugwell P, Clarke M, et al. How to

418   select outcome measurement instruments for outcomes included in a "Core

419   Outcome Set" – a practical guideline. Trials. 2016;17(1):449.

420   53. Prinsen CAC, Mokkink LB, Bouter LM, et al. COSMIN guideline for systematic

421   reviews of patient-reported outcome measures. Qual Life Res Published Online

422   First: 2018. doi:10.1007/s11136-018-1798-3

423   54. Mokkink LB, de Vet HCW, Prinsen CAC, et al. COSMIN Risk of Bias checklist

424   for systematic reviews of Patient-Reported Outcome Measures. Qual Life Res

425   Published Online First: 2018. doi:10.1007/s11136-017-1765-4

426   55. Guyatt GH, Oxman AD, Schünemann HJ, et al. Grade guidelines: a new series of

427   articles in the Journal of clinical epidemiology. J Clin Epidemiol 2011;64:380–2.

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430   **Figure legends**

431   Figure 1. Flowchart for the systematic review process under the COSMIN guidelines.

A. Perform the literature search

1. Formulate the aim of the review.
2. Formulate elegibility criteria.
3. Perform a literature search.
4. Select abstracts and full-text articles.

B. Evaluate the measurement properties

5. Evaluate content validity.

6. Evaluate internal structure.
　-Structural validity.
　-Internal consistency.
　-Cross-cultural validity / Measurement invariance.

7. Evaluate the remaining measurement properties.
　-Reliability.
　-Measurement error.
　-Criterion validity.
　-Hypotheses testing for construct validity.
　-Responsiveness.

Evaluate the quality of the PROM

-Evaluate the methodological quality of the included studies by using the COSMIN Risk of Bias Checklist.

-Apply criteria for good measurement properties by using quality criteria.

-Summarize the evidence and grade the quality of the evidence by using the GRADE approach.

C. Select a PROM

8. Describe interpretability and feasibility.

9. Formulate recommendations.

10. Report the systematic review.

Appendix: Search Strategies

1. WOS

((TI=((("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability"))) OR AB=((("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")))))) AND LANGUAGE: (English OR Spanish) AND DOCUMENT TYPES: (Article)

2. PUBMED

(("emotion regulation"[Title/Abstract] OR "affect regulation"[Title/Abstract] OR "emotion dysregulation"[Title/Abstract] OR "affect dysregulation"[Title/Abstract]) AND ("instrument*"[Title/Abstract] OR "measure"[Title/Abstract] OR "measurement"[Title/Abstract] OR "measuring"[Title/Abstract] OR "questionnaire"[Title/Abstract] OR "questionnaires"[Title/Abstract] OR "scale"[Title/Abstract] OR "scales"[Title/Abstract]) AND ("psychometric"[Title/Abstract] OR "validity"[Title/Abstract] OR "validation"[Title/Abstract] OR "reliability"[Title/Abstract] OR "internal consistency"[Title/Abstract] OR "alpha"[Title/Abstract] OR "cronbach"[Title/Abstract] OR "re-test"[Title/Abstract] OR "retest"[Title/Abstract] OR "temporal stability"[Title/Abstract]))

3. SCOPUS

TITLE-ABS (("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND (

"psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Spanish")) AND (LIMIT-TO (SRCTYPE , "j"))

4. PROQUEST

((TI("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability")) OR AB(("emotion regulation" OR "affect regulation" OR "emotion dysregulation" OR "affect dysregulation") AND ("instrument*" OR "measure" OR "measurement" OR "measuring" OR "questionnaire" OR "questionnaires" OR "scale" OR "scales") AND ("psychometric" OR "validity" OR "validation" OR "reliability" OR "internal consistency" OR "alpha" OR "cronbach" OR "re-test" OR "retest" OR "temporal stability"))) AND (at.exact("Article") AND la.exact("ENG" or "SPA") AND PEER(yes))

PRISMA-P Checklist

Section and topic	Item No	Checklist item	Location	Comment
Administrative information				
Title				
Identification	1a	Identify the report as a protocol of a systematic review	Page 1, Line 1-2	Protocol is identified as such in the title.
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	-	Our protocol does not correspond to an update of an existing systematic review.
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	Page 3, Line 38	PROSPERO Registry number is CRD42021249498
Authors:				
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Page 1, Line 7-13	Information on authors names, institutional affiliation and e-mail of corresponding author is available.
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	Page 13, Line 249-256	Information on contributors is provided.
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Page 7, Line 139-141	Our protocol does not correspond to an amendment of an existing protocol. Statement in case of protocol amendments is provided.
Support:				
Sources	5a	Indicate sources of financial or other support for the review	Page 14, Line 259-262	Information on support/funding of the study is provided.
Sponsor	5b	Provide name for the review funder and/or sponsor	Page 14, Line 259-262	Information on support/funding of the study is provided.
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	-	-
Introduction				
Rationale	6	Describe the rationale for the review in the context of what is already known	Page 4-7, Line 50-135	Rationale for the systematic review is provided in the introduction.
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	Page 6-7, Line 115-135	The research question and objectives are described in the introduction.
Methods				
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Page 7-9, Line 136-171	Inclusion criteria and characteristics of the studies included are provided through the method section.
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	Page 8, Line 150-155	Information sources to be used are described on the 'Information sources' section.
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	Supplementary Material	Search strategy for all databases is provided in the Appendix as Supplementary Material.
Study records:				

Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	Page 9-13, Line 173-240.	Records will be managed using Excel, the COSMIN Risk of Bias Checklist, the COSMIN updated criteria and the GRADE approach.
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	Page 9-10, Line 176-199	Two independent reviewers plus an additional reviewer when consensus is required.
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	Page 9-12, Line 172-220	Method for assessing studies is described in the Method section.
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	Page 11, Line 218-220	Variables useful to the study, for instance, coefficients or indices of structural validity, internal consistency, are specified through the COSMIN updated criteria.
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	Page 11, Line 218-220	Variables useful to the study, for instance, coefficients or indices of structural validity, internal consistency, are specified through the COSMIN updated criteria.
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	Page 10-11, Line 200-209	Risk of bias will be assessed using the COSMIN Risk of Bias Checklist.
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	-	Our current study does not involve a quantitative synthesis (meta-analysis).
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	-	Our current study does not involve a quantitative synthesis (meta-analysis).
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	-	Our current study does not involve a quantitative synthesis (meta-analysis).
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	-	Our current study does not involve a quantitative synthesis (meta-analysis). Data on the studies, measures used, sample characteristics and psychometric properties will be adapted into tables for qualitative analysis.
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	-	-
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	Page 12, Line 222-240	Quality of the measures, their properties and evidence will be assessed using the COSMIN Risk of Bias Checklist along with a modified GRADE approach.