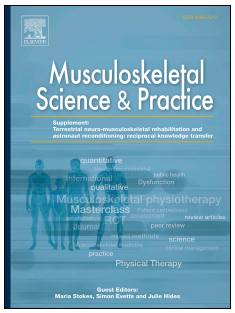
Journal Pre-proof



European Portuguese version of the Child Self-Efficacy Scale: A contribution to cultural adaptation, validity and reliability testing in adolescents with chronic musculoskeletal pain

Rosa Andias, Anabela G. Silva

PII: S2468-7812(19)30382-0

DOI: https://doi.org/10.1016/j.msksp.2020.102176

Reference: MSKSP 102176

To appear in: *Musculoskeletal Science and Practice*

Received Date: 9 August 2019

Revised Date: 20 April 2020

Accepted Date: 27 April 2020

Please cite this article as: Andias, R., Silva, A.G., European Portuguese version of the Child Self-Efficacy Scale: A contribution to cultural adaptation, validity and reliability testing in adolescents with chronic musculoskeletal pain, *Musculoskeletal Science and Practice* (2020), doi: https://doi.org/10.1016/j.msksp.2020.102176.

TITLE PAGE

Title

European Portuguese version of the Child Self-Efficacy Scale: a contribution to cultural adaptation, validity and reliability testing in adolescents with chronic musculoskeletal pain

Authors

Rosa Andias, MD[1,2], Anabela G. Silva, PhD[1,3]

[1]School of Health Sciences (ESSUA), University of Aveiro, Campus Universitário de Santiago, 3810-193 Aveiro, Portugal

[2]Center for Health Technology and Services Research (CINTESIS), Piso 2, Edifício nascente, Rua Dr. Plácido da Costa, s/n, 4200-450 Porto, Portugal

[3]Center for Health Technology and Services Research (CINTESIS.UA), University of Aveiro, Campus Universitário de Santiago, 3800-193 Aveiro, Portugal

Corresponding author

Rosa Andias

PhD student

School of Health Sciences (ESSUA), University of Aveiro,

Campus Universitário de Santiago, 3810-193 Aveiro - Portugal

Telephone: 234401558, ext: 23899 Fax: 234401597

rosaandias@ua.pt

Acknowledgments

This work is part of a PhD scholarship from the Foundation for Science and Technology (SFRH/BD/119528/2016), Portugal.

Conflict of Interest

Although there are no conflicts of interest, we would like to inform you that four of the articles referenced in this study are studies developed by the authors of this study.

Ethical Approval

Ethical approval was obtained from the Ethics and Deontology Council of the University of Aveiro.

European Portuguese version of the Child Self-Efficacy Scale: a contribution to cultural adaptation, validity and reliability testing in adolescents with chronic musculoskeletal pain

ABSTRACT

Background: Pain Self-efficacy is an important resilience mechanism in adolescents with chronic musculoskeletal pain. The Child Self-Efficacy Scale (CSES) was developed to assess self-efficacy related to functioning despite pain. **Objectives**: This study aimed to cross-culturally adapt the CSES into European Portuguese and to assess its validity and reliability in a sample of adolescents with chronic musculoskeletal pain. **Methods**: The original version of the CSES was translated and pilot tested in line with international guideless. Then, the European Portuguese version was filled in by 1730 adolescents, who also completed the following instruments: Nordic Musculoskeletal Questionnaire; Numeric Pain Rating Scale; Pain Catastrophizing Scale; Depression, Anxiety and Stress Scale; Tampa Scale of Kinesiophobia, and Basic Scale on Insomnia Complaints and Quality of Sleep. Sixty-three of these adolescents, with at least one painful body site, completed the questionnaire twice to assess test-retest reliability and measurement error. Internal consistency was obtained, and hypothesis testing, and factor analysis were used to assess validity. **Results**: Cronbach's alpha ranged from 0.89 and 0.92, ICC was 0.83 (95%CI: 0.71;0.89), the SEM and MDD were 2.49 and 6.9, respectively. Fair and moderate to good correlations were found between CSES and catastrophizing (r_s from 0.45 to 0.48), depression, anxiety and stress (r_s from 0.35 to 0.38), fear of movement (r_s from 0.38 to 0.49) and sleep (r_s from 0.20 to 0.29). The factor analysis resulted in 1-factor model. **Conclusion**: The European Portuguese version of the CSES appears to be valid and reliable in adolescents with chronic musculoskeletal pain.

Keywords: Child Self-Efficacy Scale; Validity; Reliability; Chronic musculoskeletal pain

European Portuguese version of the Child Self-Efficacy Scale: a contribution to cultural adaptation, validity and reliability testing in adolescents with chronic musculoskeletal pain

INTRODUCTION

Chronic musculoskeletal pain is one of the most common somatic complaints affecting up to 40% of children and adolescents, (King et al., 2011), who usually present with multisite body complaints (Paananen et al., 2010; Silva et al., 2017). Nevertheless, the neck and lumbar regions are the body sites with the highest prevalence of chronic musculoskeletal pain, with estimates of 20.9% and 17.5%, respectively, in the age group of 16 to 18 years old. Chronic pain is associated with limitations in daily living activities, including those related to school and family (Roth-Isigkeit et al., 2005), and it has been associated with several functional and psychosocial changes that are not present in age-matched asymptomatic adolescents (Andias & Silva, 2018, 2019).

Pain self-efficacy has been identified as one of the psychosocial factors that is relevant in the context of chronic musculoskeletal pain in adolescents (Bursch et al., 2006; Kalapurakkel et al., 2015). Pain self-efficacy is defined as an individual resilience mechanism, activated in response to pain, which may positively influence pain management capacity (Tomlinson et al., 2017). Specifically, higher levels of pain self-efficacy have been found to be associated with a better emotional and physical functioning (Bursch et al., 2006), less disability and fewer depressive and anxiety symptoms (Carpino et al., 2014; Kalapurakkel et al., 2015). Furthermore, Carpino et al. (2014) suggested that pain self-efficacy is a mediator factor between pain-related fear and disability and school functioning.

A recent systematic review aiming to summarize all self-report measures of pain self-efficacy used in children and adolescents, identified twelve instruments, of which the

Child Self-Efficacy Scale (CSES), and the Pain Beliefs Questionnaire, were the only instruments rated as “well-established” measure to assess self-efficacy related to functioning despite pain, according to the criteria of the Society of Pediatric Psychology (Cohen et al., 2008; Stahlschmidt et al., 2019). Also, the use of CSES is recommended in pediatric guidelines (Tomlinson et al., 2017). CSES is a 7-item self-report scale, developed by Bursch et al. (2006), that can be used in the age group of 8 to 18 years old, in conditions of acute and chronic pain (Bursch et al., 2006; Wallace et al., 2011). Each of the 7 items is answered using a 5-point Likert scale, ranging from “very sure” (pointed as 1) and “very unsure” (pointed as 5), to determine the confidence in performing certain activities despite pain, such as, “make it through a day of school” or “be with your friends”. Total score ranges from 7 to 35 points and higher scores indicate lower self-efficacy. The psychometric properties of the original version of the CSES demonstrated that it is valid and has good internal consistency (Bursch et al., 2006), but a European Portuguese version of CSES is currently not available. The main aims of this study were i) to cross-culturally adapt the CSES into European Portuguese language and ii) to assess its validity and reliability in a sample of adolescents with chronic musculoskeletal pain, and in subsamples of adolescents with neck and low back pain as main complaints.

METHODS

A two-stage study was conducted. First, an initial translation and cross-cultural adaptation of the CSES, from English to European Portuguese, was performed. Then, a sample of 1730 adolescents was used to assess the psychometric characteristics of the European Portuguese CSES. This study received ethical approval from the Ethics and Deontology Council.

Cross-cultural adaptation

The process of cross-cultural adaptation of the CSES followed international guidelines (Sousa & Rojjanasrirat, 2011). After obtaining authorization of the author of the original version, two European Portuguese native speakers' and physiotherapists who were fluent in English independently translated the original CSES into European Portuguese. These 2 versions were synthesized into a consensus version in a face-to-face meeting of the two translators and a third bilingual physiotherapist (reconciliation process). This version was back-translated into English by an independent bilingual translator who did not know about the scale. The back-translated version was compared against the original. In the translation process, the emphasis was on conceptual and cultural equivalence and not linguistic equivalence. Both the Portuguese European version and the back-translation were sent to the author of the original version for comment. The authors of the original version made no suggestions of amendment and this pre-final version of the European Portuguese CSES was deemed to be appropriate and was tested in a sample of 10 Portuguese adolescents with chronic musculoskeletal pain. In this final pre-testing, no changes were suggested, the scale did not cause any confusion, so the European Portuguese CSES was considered appropriate and easy to understand by adolescents with chronic pain.

Psychometric properties of the European Portuguese CSES

Procedures

The final version of the European Portuguese CSES was administered to a homogeneous group of 1730 adolescents belonging to the 10^{th}, 11^{th} and 12^{th} grades of four high schools, in Portugal. All adolescents and legal guardians gave their written informed consent. For those aged 18 years old, only the adolescent's written consent was needed. Adolescents with non-musculoskeletal pathology were excluded.

To assess the reliability and standard error of measurement (SEM), the European Portuguese CSES was completed twice in a subsample of 63 adolescents with at least

one painful body site with a gap between measurements of four weeks. The sample size was established according to the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) guidelines (Mokkink et al., 2012), which suggest a minimum sample size of 50 participants for reliability studies.

Measuring Instruments

Adolescents were asked to complete an online questionnaire encompassing sociodemographic information and the European Portuguese versions of seven self-report instruments (in addition to the CSES):

1. The Nordic Musculoskeletal Questionnaire (NMQ) was used to determine the presence of pain in any of nine anatomic regions: neck, shoulders, wrists/hands, thoracic region, lumbar region, hips/thighs, knees and ankles/feet (Mesquita *et al.*, 2010). In the present study, we used two recall periods – 3 months (instead of the 12 months of the original version) and seven days. When participants reported pain in more than one of the 9 body sites, they were prompted to answer an additional question asking them to order the painful body sites from the most painful to the least painful.
2. The Numeric Pain Rating Scale (NRS) ranging from 0 (“no pain”) to 10 (“the worst imaginable pain”) was used to assess pain intensity “now” for each body site reported as painful in the last 7 day and it has been used in young populations (Castarlenas et al., 2017).
3. Pain Catastrophizing Scale (PCS) (Jacome & Cruz, 2004): This is a 13 items scale that assesses catastrophic thinking and inappropriate coping strategies about pain (Sullivan et al., 1995). The items can be classified on a 5-point Likert scale, ranging from 0= “never” and 4= “always”, with higher scores indicating elevated levels of catastrophizing. The European Portuguese version showed construct validity and high internal consistency (Cronbach's alpha - α=0.91)

(Jacome & Cruz, 2004). It has already been used in children and adolescents (Parkerson et al., 2013; Andias et al., 2018). A recent systematic review with meta-analysis established good psychometric properties of PCS in children and adolescents and showed an internal consistency of 0.90 and test-retest reliability of 0.71 (Fisher, Heathcote, Eccleston, Simons, & Palermo, 2018).

4. Depression, Anxiety and Stress Scale for Children (DASS-C) (Leal et al., 2009). This is a 21-item scale, rated from 0= "Did not apply to me at all" and 3= "Applied to me very much, or most of the time", that assess symptoms of depression, anxiety and stress in children. Total score ranges from 0 to 21 points for each of the three subscales (depression, anxiety and stress) and higher scores indicate a more negative affective condition (Pais-Ribeiro et al., 2004). The DASS-C showed a good internal consistency (α=0.78, α=0.74 and α=0.75) for depression, stress and anxiety subscales, respectively (Leal et al. 2009).
5. The Tampa Scale of Kinesiophobia (TSK), which is a 17 items questionnaire developed to identify fear of movement and the degree of confidence for the movement. Items are scored on a 4-point Likert scale, ranging from 1= "strongly disagree" and 4= "strongly agree". Total score ranges from 13 to 52 points and higher scores indicate increased levels of fear of movement. The European Portuguese version of the TSK showed good psychometric properties (Cordeiro et al., 2013). No studies were found in the literature that assess the psychometric properties of the TSK in children or adolescents.
6. The Basic Scale on Insomnia complaints and Quality of Sleep (BaSIQS) is a 7 items scale covering the assessment of difficulties with sleep onset and maintenance and the quality and depth of sleep during the last month and considering a normal week of classes (Allen Gomes et al., 2015). Total scores range from 0 to 28 points and higher scores are associated with poor quality of sleep. The European Portuguese version of this scale was considered valid and

reliable, with good internal consistency (α>0.7) and test-retest reliability (ICC ≥ 0.8) in healthy Portuguese adolescents (Allen Gomes et al., 2015).

Data Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics (mean, standard deviation, and percentage) were used to characterize the sample.

Internal consistency was assessed using Cronbach's alpha (α) (Streiner et al., 2015) for each of the following groups i) at least 1 painful body site, ii) Neck pain (NP) as the main complaint, and iii) Low back pain (LBP) as the main complaint. Cronbach's α was interpreted as acceptable if between 0.60 and 0.70, and very good if between 0.80 and 0.95 (Tavakol & Dennick, 2011; Ursachi et al., 2015). The Intraclass Correlation Coefficient (ICC) (2,1), two-way random effects, was calculated for test-retest reliability (Koo & Li, 2016). Excellent reliability was considered when the ICC >0.90, good reliability when 0.75< ICC ≤0.90, moderate reliability when 0.50≤ ICC ≤0.75 and poor reliability when ICC <0.50 (Koo & Li, 2016). The Standard Error of Measurement (SEM) was estimated using the following equation (SEM = sd × (√1- ICC)). The Minimal Detectable Difference (MDD) was estimated as ($MDD_{95\%}$= SEM × 1.96 ×√2) (Terwee et al., 2007).

For factor analysis, a principal component factor analysis was conducted using Varimax rotation, as used in the initial validation study (Bursch et al., 2006). Preliminary analysis was conducted to ensure that all requirements and factorability criteria were met, including the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. In line with the original version study (Bursch et al., 2006), to select items loading, 0.4 was considered the relevant cutoff.

Finally, Spearman's correlation (r_s) and chi-square tests (X^2) were used to examine the relationship between self-efficacy and the remaining outcomes. Our prespecified

hypotheses were based on previous research and are as follows: i) no correlation between age, gender or pain intensity and CSES scores (Bursch et al., 2006; Kalapurakkel et al., 2015), ii) a positive and moderate to good correlation between self-efficacy and fear of movement (TSK) (Costa et al., 2011), iii) a positive and fair correlation between self-efficacy and depressive and anxiety symptoms (Carpino et al., 2014; Kalapurakkel et al., 2015), sleep (Miró et al., 2011), and catastrophizing (Cheng et al., 2018). To the established hypotheses of the catastrophizing, fear of movement and sleep, studies in adults were used due to the lack of studies in adolescents. The strength of the correlation was interpreted as little or no correlation (<0.25), fair (0.25-0.50), moderate to good (0.50-0.75) and good to excellent (*0.75* -1) (Portney & Watkins, 2000). Also, it was hypothesized that the European Portuguese CSES would be able to discriminate between adolescents with and without pain (discriminant validity), assessed using a *t-student* test. Significance was set at $p<0.05$ for all comparisons.

Results

A total of 1730 adolescents entered the study (mean±standard deviation age=16.3±1.2 years old; range: 14 to 21 years old), 1435 (82.9%) reported at least one painful body site for the last three months, and 295 (17.1%) did not report pain. Of these 1435 adolescents who reported chronic pain, 123 (8.6%) reported NP as their main complaint and 230 (16.0%) reported LBP as their main complaint. The average of painful body sites (range 1-9) was 3.03 (±1.67) in the group of adolescents with at least one painful body site, 3.63 (±1.53) in the subgroup with NP and 3.59 (±1.44) in the subgroup with LBP. The intensity of pain was 4.20 (±2.27) and 4.99 (±2.36) in the subgroup with NP and LBP, respectively. Concerning self-efficacy, the scores of the CSES ranged from 16.28±6.04 for the group with at least one painful body site and

16.70±6.39 and 17.50±6.40 for the subgroups with NP and LBP as the main complaint, respectively (Table 1).

Reliability

Internal Consistency

The European Portuguese version of the CSES showed very good internal consistency (Table 2), with an overall α of 0.92 in the three groups.

Test-retest reliability, standard error of measurement and minimally detectable difference

These indicators were calculated for the subsample of 63 adolescents that filled the CSES twice. Mean(±sd) CSES scores were 17.63 (±6.05) in the first assessment and 17.27 (±5.91) in the second assessment and no significant differences were found (t=0.63; p=0.53). ICC was 0.83 (95% CI: 0.71; 0.89) indicating good reliability. SEM and MDD were 2.49 and 6.90, respectively.

Validity

Hypotheses testing

Age showed no correlation with self-efficacy and pain intensity in the NP group ($r \leq 0.14$). In the group with at least one painful body site and with LBP, age showed no to little correlation with self-efficacy ($r \leq 0.17$). Pain intensity showed no to little correlation with self-efficacy ($r \leq 0.17$) in the group with LBP. No association was found between self-efficacy and gender in the group with LBP, but in the groups with at least one painful body site ($X^2=107.91$) and with NP ($X^2=36.21$), boys were found to have greater self-efficacy than to girls ($p<0.05$). All the remaining variables showed a positive and fair correlation with self-efficacy (Table 3). The highest correlations were

found between i) PCS and CSES scores, specifically, r_s = 0.47, r_s =0.48 and r_s =0.45 in the group of adolescents with at least 1 painful body site and subgroups with NP and LBP as main complaint, respectively, and ii) TSK and CSES scores, r_s = 0.44, r_s =0.49 and r_s =0.38 45 in group with at least 1 painful body site and in subgroups with NP and LBP as main complaint, respectively. For the sleep variable, no correlations were found with self-efficacy in the group with at least 1 painful body site and the subgroup with NP. A fair correlation (r_s =0.29) was found in the subgroup with LBP.

Discriminant validity

The European Portuguese version of the CSES was able to discriminate between the group of adolescents without pain and adolescents i) with at least one painful body site (Z=-5.48; p<0.001), ii) with NP as main complaint (Z=-3.66; p<0.001) and iii) with LBP as main complaint (Z=-5.69; p<0.001).

Structural validity

The recommendation for the factor analysis was excellent for the group with at least one painful body site (KMO=0.92). For the subgroups with NP and LBP as the main complaint, the KMO was 0.89 and 0.90, respectively, showing a good recommendation for the factor analysis. One factor resulted from the principal component analysis for each of the three groups assessed, which included all items of the scale. This factor corresponds to the assessment of self-efficacy in the various domains assessed (in school, with friends, taking care of yourself, with family) and explained 67.5% of variance in the group of at least one painful body, 66.7% in the group with NP and 67.6% in the group with LBP (Table 4).

Discussion

The European Portuguese version of the CSES was found to be easy to understand by adolescents with chronic musculoskeletal pain and demonstrated good psychometric properties both in a sample of adolescents with chronic musculoskeletal pain in at least one body site and two subsamples of this larger sample (participants with NP as the main complaint and participants with LBP as the main complaint). Specifically, the European Portuguese CSES was shown to have internal consistency and to be reliable and valid.

The mean scores of the CSES were similar in the main group and the two subgroups, but previous studies have reported both lower and higher mean scores. Kalapurakkel et al. (2015) found lower self-efficacy (mean±sd=22.3±6.38) in adolescents with headaches. On the other hand, Bursch et al. (2006) found higher levels of self-efficacy (mean±sd=3.10±0.98), in adolescents with several chronic pain conditions. The heterogeneity of studies regarding pain conditions and pain intensity may explain these differences.

The internal consistency of the European Portuguese CSES in the three groups of this study (α= 0.89) was higher than the values reported in previous studies. Bursch et al. (2006) in a sample of 67 adolescents (mean age of 14.2 years) with several chronic pain conditions, including chronic musculoskeletal pain, found an α of 0.89. Similarly, Wallace et al. (2011), using the same version of the CSES, found values of 0.87 in 109 adolescents with chronic pain, including neck and back pain (mean age of 15.2±2.0 years). These differences can be explained by the higher sample size in our study, and also by the fact that only adolescents with chronic musculoskeletal pain have been included, making the sample more homogeneous, contrary to the studies mentioned that simultaneously used various chronic pain conditions. The test-retest reliability of the European Portuguese version of the CSES was categorized as good however, no

studies were found in the literature that assessed test-retest reliability on CSES to compare against our results.

In this study, the association between the European Portuguese version of the CSES and age, pain intensity, catastrophizing, depression, anxiety, stress, and sleep were in line with our pre-defined hypothesis. Age and pain intensity showed no correlation with CSES in the NP group, as reported in previous studies (Bursch et al., 2006; Kalapurakkel et al., 2015). Although the age has been significantly correlated in the groups with at least one painful body site (r_s =0.07) and LBP (r_s =0.16) and pain intensity has been correlated with self-efficacy (r_s =0.14) in the group with LBP, the magnitude of this correlation was very low and suggests little or no correlation. No studies were found that examined the association between the CSES and the PCS in adolescents. However, the values found in the present study are similar to those previously reported for adults with chronic pain (Cheng et al., 2018), suggesting that decreased self-efficacy is associated with increased pain catastrophizing. Fair correlations were found for depression and anxiety, against previous findings in adolescents with chronic headache (Kalapurakkel et al., 2015). No studies were found that explored the relationship between self-efficacy and stress, but our findings suggest that decreased self-efficacy is associated with increased levels of stress in adolescents with chronic pain. It may be true considering that self-efficacy is an individual's ability to achieve a behavior or goal, that determines thoughts and behaviors in stressful situations (Meints & Edwards, 2018). These stressful situations are defined as a continuous effort to preserve an internal dynamic state of balance when confronted with any physical, psychosocial or emotional stressor factor (Lindfors et al., 2017). Therefore, better levels of self-efficacy may be associated with better stress management in chronic pain conditions. A fair correlation between self-efficacy and sleep was found only in the subgroup of adolescents with LBP, as related in a previous study of Miró et al. (2011) in adults with fibromyalgia. However, the magnitude of the

correlation was higher in the study of Miró et al. (2011), and different instruments and chronic pain conditions can contribute to explaining these findings. Contrary to the pre-defined hypothesis, our results found a fair association between fear of movement and self-efficacy, but the magnitude of this association was just slightly lower than that reported for adults with chronic pain (Costa et al., 2011). Different measurement instruments were used to assess self-efficacy in previous studies, and this may impact results. Concerning gender, no association was found in the group with LBP, as suggested by Bursch et al. (2006). However, it was suggested that in the groups with at least one painful body site and with NP, boys showed higher levels of self-efficacy than girls, in line with previous studies (Schmitz, Vierhaus, & Lohaus, 2013; Stone, Walker, Laird, Shirkey, & Smith, 2016). Thus, these findings support the construct validity of the Portuguese version of the CSES.

Regarding structural validity, the factor analysis yielded a 1-factor model, as suggested in the validation of the original version of the CSES (Bursch et al., 2006). Therefore, all items of the CSES represent a single dimension and assess self-efficacy in diverse contexts, specifically, at school, at home, with friends and with the family. The original study did not present the factor loadings for each item. However, it specified that all items were loaded above 0.58. In the factor analysis of our study, the factors loaded at 0.75 and higher. The smaller sample size (n=67) of the original study may have had an impact on the magnitude of the factors loading (Hogarty et al., 2005).

Limitations and future research

The present study has a few limitations that should be considered. Our age group was restricted to adolescents belonging to the 10th, 11th and 12th grades of high school, and other studies used broader age groups. Although we have divided the analysis into three groups, with at least 1 painful body site, and NP and LBP as the main complaint, these two subgroups were part of the first group. We performed test-rest reliability with

a gap of 4 weeks between measurements, a longer period than that usually reported in the literature (Mokkink et al., 2012). Nevertheless, it did not seem to affect results as reliability was found to be good.

Future studies may explore the psychometric properties of the European Portuguese version of the CSES in adolescents with other non-musculoskeletal painful conditions.

Conclusion

The European Portuguese version of the CSES seems to have internal consistency and to be reliable and valid when used in adolescents with chronic musculoskeletal pain. Further studies are needed to explore the psychometric properties of the European Portuguese version of the CSES in adolescents with other painful syndromes.

References

Allen Gomes, A., Ruivo Marques, D., Meia-Via, A. M., Meia-Via, M., Tavares, J., Fernandes da Silva, C., & Pinto de Azevedo, M. H. (2015). Basic Scale on Insomnia complaints and Quality of Sleep (BaSIQS): Reliability, initial validity and normative scores in higher education students. *Chronobiology International*, *32*(3), 428–440. https://doi.org/10.3109/07420528.2014.986681

Andias, R., Neto, M., & Silva, A. G. (2018). The effects of pain neuroscience education and exercise on pain, muscle endurance, catastrophizing and anxiety in adolescents with chronic idiopathic neck pain: a school-based pilot, randomized and controlled study. *Physiotherapy Theory and Practice*, *34*(9), 682–691. https://doi.org/10.1080/09593985.2018.1423590

Andias, R., & Silva, A. G. (2018). Psychosocial variables and sleep associated with neck pain in adolescents: a systematic review. *Physical & Occupational Therapy In Pediatrics*, 31:1-24.

Andias, R., & Silva, A. G. (2019). A systematic review with meta□analysis on functional changes associated with neck pain in adolescents. *Musculoskeletal Care*, *17*(1), 23–36. https://doi.org/10.1002/msc.1377

Bursch, B., Tsao, J. C. I., Meldrum, M., & Zeltzer, L. K. (2006). Preliminary validation of a self-efficacy scale for child functioning despite chronic pain (child and parent versions). *Pain*, *125*(1–2), 35–42. https://doi.org/10.1016/j.pain.2006.04.026

Carpino, E., Segal, S., Logan, D., Lebel, A., & Simons, L. E. (2014). The interplay of pain-related self-efficacy and fear on functional outcomes among youth with headache. *The Journal of Pain : Official Journal of the American Pain Society*, *15*(5), 527–534. https://doi.org/10.1016/j.jpain.2014.01.493

Castarlenas, E., Jensen, M. P., von Baeyer, C. L., & Miró, J. (2017). Psychometric Properties of the Numerical Rating Scale to Assess Self-Reported Pain Intensity in Children and Adolescents. *The Clinical Journal of Pain*, *33*(4), 376–383.

https://doi.org/10.1097/AJP.0000000000000406

Cheng, S.-T., Leung, C. M. C., Chan, K. L., Chen, P. P., Chow, Y. F., Chung, J. W. Y., … Tam, C. W. C. (2018). The relationship of self-efficacy to catastrophizing and depressive symptoms in community-dwelling older adults with chronic pain: A moderated mediation model. *PLOS ONE*, *13*(9), e0203964. https://doi.org/10.1371/journal.pone.0203964

Cohen, L. L., La Greca, A. M., Blount, R. L., Kazak, A. E., Holmbeck, G. N., & Lemanek, K. L. (2008). Introduction to special issue: Evidence-based assessment in pediatric psychology. *Journal of Pediatric Psychology*, *33*(9), 911–915. https://doi.org/10.1093/jpepsy/jsj115

Cordeiro, N., Pezarat-Correia, P., Gil, J., & Cabri, J. (2013). Portuguese Language Version of the Tampa Scale for Kinesiophobia [13 Items]. *Journal of Musculoskeletal Pain*, *21*(1), 58–63. https://doi.org/10.3109/10582452.2012.762966

Costa, C., Maher, C. G., Mcauley, J. H., Hancock, M. J., & Smeets, R. J. E. M. (2011). *Self-efficacy is more important than fear of movement in mediating the relationship between pain and disability in chronic low back pain*. European Journal of Pain, 15(2), 213-219. https://doi.org/10.1016/j.ejpain.2010.06.014

Fisher, E., Heathcote, L. C., Eccleston, C., Simons, L. E., & Palermo, T. M. (2018). Assessment of Pain Anxiety, Pain Catastrophizing, and Fear of Pain in Children and Adolescents With Chronic Pain: A Systematic Review and Meta-Analysis. *Journal OfPediatric Psychology*, *43*(3), 314–325. https://doi.org/10.1093/jpepsy/jsx103

Hogarty, K. Y., Hines, C. V, Kromrey, J. D., Ferron, J. M., & Mumford, K. R. (2005). *The quality of factor solutions in exploratory factor analysis: the influence of sample size, communality, and overdetermination*. https://doi.org/10.1177/0013164404267287

Jacome, C., & Cruz, E. (2004). Adaptação Cultural e contributo para a Validação da

Pain Catastrophizing Scale (PCS). *Instituto Politécnico de Setúbal*.

Kalapurakkel, S., A. Carpino, E., Lebel, A., & E. Simons, L. (2015). “Pain Can’t Stop Me”: Examining Pain Self-Efficacy and Acceptance as Resilience Processes Among Youth With Chronic Headache. *Journal of Pediatric Psychology*, *40*(9), 926–933. https://doi.org/10.1093/jpepsy/jsu091

King, S., Chambers, C. T., Huguet, A., MacNevin, R. C., McGrath, P. J., Parker, L., & MacDonald, A. J. (2011). The epidemiology of chronic pain in children and adolescents revisited: A systematic review. *Pain*, *152*(12), 2729–2738. https://doi.org/10.1016/j.pain.2011.07.016

Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *Journal of Chiropractic Medicine*, *15*(2), 155–163. https://doi.org/10.1016/j.jcm.2016.02.012

Leal, I. P., Antunes, R., Passos, T., Pais-Ribeiro, J., & Maroco, J. (2009). Estudo da escala de Depressão, Ansiedade e Stress para Crianças (EADS- C). *Psicologia, Saúde & Doenças*, *10*(2), 277–284.

Lindfors, P., Folkesson Hellstadius, L., & Östberg, V. (2017). Perceived stress, recurrent pain, and aggregate salivary cortisol measures in mid-adolescent girls and boys. *Scandinavian Journal of Psychology*, *58*(1), 36–42. https://doi.org/10.1111/sjop.12347

Meints, S. M., & Edwards, R. R. (2018). Evaluating psychosocial contributions to chronic pain outcomes. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *87*(Pt B), 168–182. https://doi.org/10.1016/j.pnpbp.2018.01.017

Mesquita, C. C., Ribeiro, J. C., & Moreira, P. (2010). Portuguese version of the standardized Nordic musculoskeletal questionnaire: cross cultural and reliability. *Journal of Public Health*, *18*(5), 461–466. https://doi.org/10.1007/s10389-010-0331-0

Miró, E., Martínez, M. P., Sánchez, A. I., Prados, G., & Medina, A. (2011). When is pain related to emotional distress and daily functioning in fibromyalgia syndrome?

The mediating roles of self-efficacy and sleep quality. *British Journal of Health Psychology*, *16*(4), 799–814. https://doi.org/10.1111/j.2044-8287.2011.02016.x

Mokkink, L. B., Terwee, C. B., Patrick, D. L., Alonso, J., Stratford, P. W., Knol, D. L., & Bouter, L. M. (2012). *COSMIN checklist manual*. Retrieved from www.emgo.nl

Paananen, M. V., Auvinen, J. P., Taimela, S. P., Tammelin, T. H., Kantomaa, M. T., Ebeling, H. E., … Karppinen, J. I. (2010). Psychosocial, mechanical, and metabolic factors in adolescents' musculoskeletal pain in multiple locations: A cross-sectional study. *European Journal of Pain*, *14*(4), 395–401. https://doi.org/10.1016/j.ejpain.2009.06.003

Pais-Ribeiro, J. L., Honrado, A., & Leal, I. (2004). Contribuição para o estudo da adaptação portuguesa das escalas de Ansiedade, Depressão e Stress (EADS) de 21 items de Lovibond. *Psicologia, Saúde & Doenças*, *5*(2), 229–239.

Parkerson, H. A., Noel, M., Pagé, M. G., Fuss, S., Katz, J., & Asmundson, G. J. G. (2013). Factorial Validity of the English-Language Version of the Pain Catastrophizing Scale–Child Version. *The Journal of Pain*, *14*(11), 1383–1389. https://doi.org/10.1016/j.jpain.2013.06.004

Portney, L., & Watkins, M. (2000). Foundations of Clinical Research: Applications to Practice (second edition). In *Upper Saddle River, N.J: Prentice Hall Health*.

Roth-Isigkeit, A., Thyen, U., Stöven, H., Schwarzenberger, J., & Schmucker, P. (2005). Pain Among Children and Adolescents: Restrictions in Daily Living and Triggering Factors. *Pediatrics*, *115*(2), e152–e162. https://doi.org/10.1542/peds.2004-0682

Schmitz, A.-K., Vierhaus, M., & Lohaus, A. (2013). Pain tolerance in children and adolescents: Sex differences and psychosocial influences on pain threshold and endurance. *European Journal of Pain*, *17*(1), 124–131. https://doi.org/10.1002/j.1532-2149.2012.00169.x

Silva, A. G., Sa-Couto, P., Queirós, A., Neto, M., & Rocha, N. P. (2017). Pain, pain intensity and pain disability in high school students are differently associated with physical activity, screening hours and sleep. *BMC Musculoskeletal Disorders*,

18(1), 194. https://doi.org/10.1186/s12891-017-1557-6

Sousa, V. D., & Rojjanasrirat, W. (2011). Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. *Journal of Evaluation in Clinical Practice*, *17*(2), 268–274. https://doi.org/10.1111/j.1365-2753.2010.01434.x

Stahlschmidt, L., Hübner-Möhler, B., Dogan, M., & Wager, J. (2019). Pain Self-Efficacy Measures for Children and Adolescents: A Systematic Review. *Journal of Pediatric Psychology*, *44*(5), 530–541. https://doi.org/10.1093/jpepsy/jsz002

Stone, A. L., Walker, L. S., Laird, K. T., Shirkey, K. C., & Smith, C. A. (2016). Pediatric Pain Beliefs Questionnaire: Psychometric Properties of the Short Form HHS Public Access. *J Pain*, *17*(9), 1036–1044. https://doi.org/10.1016/j.jpain.2016.06.006

Streiner, D., Norman, G., & Cairney, J. (2015). *Health measurement scales-a practical guide to their development and use (Fifth edition)*. Oxford.

Sullivan, M. J. L., Bishop, S. R., & Pivik, J. (1995). The Pain Catastrophizing Scale: Development and validation. *Psychological Assessment*, *7*(4), 524–532. https://doi.org/10.1037/1040-3590.7.4.524

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53. https://doi.org/10.5116/IJME.4DFB.8DFD

Terwee, C. B., Bot, S. D. M., de Boer, M. R., van der Windt, D. A. W. M., Knol, D. L., Dekker, J., … de Vet, H. C. W. (2007). Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology*, *60*(1), 34–42. https://doi.org/10.1016/j.jclinepi.2006.03.012

Tomlinson, R. M., Cousins, L. A., Mcmurtry, C. M., & Cohen, L. L. (2017). *The power of pain self-efficacy: Applying a positive psychology framework to pediatric pain* (Vol. 19). Retrieved from Nicholas website: www.pubmed.gov/11194620

Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How Reliable are Measurement Scales? External Factors with Indirect Influence on Reliability Estimators. *Procedia*

Economics and Finance, *20*, 679–686. https://doi.org/10.1016/S2212-5671(15)00123-9

Wallace, D. P., Harbeck-Weber, C., Whiteside, S. P. H., & Harrison, T. E. (2011). Adolescent Acceptance of Pain: Confirmatory Factor Analysis and Further Validation of the Chronic Pain Acceptance Questionnaire, Adolescent Version. *The Journal of Pain*, *12*(5), 591–599. https://doi.org/10.1016/J.JPAIN.2010.11.004

Acknowledgments

This work is part of a PhD scholarship from the Foundation for Science and Technology (SFRH/BD/119528/2016), Portugal.

Table 1. Sample characteristics

		Without Pain	With Pain[a]	With NP[b]	With LBP[d]
N	n (%)	295 (17.1)	1435 (82.9)	123 (8.6)	230 (16.0)
Gender	Girls - n (%)	103 (34.9)	919 (64.0)	90 (73.2)	164 (71.3)
	Boys - n (%)	192 (65.1)	516 (36.0)	33 (26.8)	66 (28.7)
Age (years)	mean±sd	16.47±1.19	16.30±1.17	16.25±1.08	16.42±1.21
Scholar level	10º - n (%)	94 (31.9)	522 (36.4)	42 (34.2)	72 (31.3)
	11º - n (%)	91 (30.8)	442 (30.8)	41 (33.3)	68 (29.6)
	12º- n (%)	110 (37.3)	471 (32.8)	40 (32.5)	90 (39.1)
Family situation (Lives with…)	Father and mother- n (%)	210 (71.2)	964 (67.2)	79 (64.3)	149 (64.8)
	Mother- n (%)	58 (19.6)	287 (20.0)	32 (26.0)	53 (23.0)
	Father- n (%)	7 (2.4)	34 (2.4)	1 (0.8)	6 (2.6)
	Other- n (%)	20 (6.8)	150 (10.4)	11 (8.9)	22 (9.6)
Pain intensity (0-10)	mean±sd		[e]	4.20±2.27	4.99±2.36
Number of pain sites	1 - n (%)		295 (20.6)	6 (4.9)	5 (2.2)
	2 - n (%)		350 (24.4)	27 (21.9)	54 (23.5)
	3 - n (%)		292 (20.3)	31 (25.2)	67 (29.1)
	4 - n (%)		210 (14.6)	20 (16.3)	44 (19.1)
	5 or more - n (%)		288 (20.1)	39 (31.7)	60 (26.1)
Number of pain sites	mean±sd		3.03±1.67	3.63±1.53	3.59±1.44
FDI (0-60)	mean±sd	1.27±2.94	5.36±6.16	5.75±5.85	7.47±7.35
DASS-C (0-63)	Total score (mean±sd)	3.84±5.92	10.96±11.40	14.02±13.23	14.99±13.21
	Anxiety (subscale score	0.84±1.68	2.78±3.63	3.92±4.43	3.85±4.40

	DASS-C) (mean±sd)				
	Depression (subscale score DASS-C) (mean±sd)	1.54±2.68	4.10±4.59	5.31±5.26	5.40±5.09
BaSIQS (0-28)	Stress (subscale score DASS-C) (mean±sd)	1.46±2.33	4.08±4.27	4.80±4.56	5.74±4.94
BaSIQS (0-28)		6.49±3.74	8.83±4.70	8.87±5.27	9.72±4.51
PCS (0-52)	Total score (mean±sd)	5.85±7.96	10.98±10.62	10.33±9.67	13.70±11.90
	Rumination (mean±sd)	2.23±3.29	4.03±4.13	4.07±4.14	5.04±4.60
	Magnification (mean±sd)	1.26±1.95	2.49±2.69	2.00±2.37	3.07±2.99
TSK (13-52)	Helplessness (mean±sd)	2.36±3.36	4.47±4.69	4.26±4.22	5.59±5.30
TSK (13-52)	(mean±sd)	20.53±7.59	23.69±7.14	22.94±7.07	24.41±6.90

[a]Adolescents with at least 1 painful body site

[b]Adolescents with NP

[d]Adolescents with LBP

[e]It was not possible to determine the intensity of pain for this group, since in the questionnaire the pain intensity was only assessed by painful body area and not in general

Legend: NP, Neck Pain; LBP, Low Back Pain; DASS-C, Depression, Anxiety and Stress Scale for Children; BaSIQS, Basic Scale on Insomnia complaints and Quality of Sleep; PCS, Pain Catastrophizing Scale; TSK, Tampa Scale of Kinesiophobia; CSES, Child Self-Efficacy Scale; sd, standard deviation.

Table 2. Internal consistency

CSES item	At least 1 painful body site [a] **(n=1435)**	NP [a] **(n=123)**	LBP[a] **(n=230)**	Subsample moment 1[a] **(n=63)**	Subsample moment 2[a] **(n=63)**
1. How sure are you that you can make it through a day of school when you have pain?	0.91	0.91	0.91	0.88	0.91
2. How sure are you that you can be with your friends when you have pain?	0.90	0.90	0.90	0.87	0.88
3. How sure are you that you can do well in school when you have pain?	0.91	0.91	0.90	0.88	0.88
4. How sure are you that you can do house chores when you have pain?	0.91	0.90	0.91	0.89	0.90
5. How sure are you that you can take care of yourself when you have pain?	0.91	0.90	0.92	0.89	0.90
6. How sure are you that you can do your homework when you have pain?	0.91	0.90	0.91	0.87	0.88
7. How sure are you that you can do things with your family when you have pain?	0.90	0.90	0.90	0.86	0.89
α Cronbach Total	0.92	0.92	0.92	0.89	0.91

[a] α Cronbach if the item is excluded

Legend: NP, Neck Pain; LBP, Low Back Pain.

Table 3. Correlations between CSES and intensity of pain, catastrophizing, depression, anxiety and stress, fear of movement and sleep for the groups with at least 1 painful body site, neck and low back pain

	Self-efficacy (high scores=lower levels of self-efficacy)		
Scales	At least 1 painful body site (n=1435)	NP (n=123)	LBP (n=230)
Age	0.07*	0.02	0.16*
Pain intensity	-	0.13	0.14*
PCS	0.47**	0.48**	0.45**
DASS-C	0.35**	0.38**	0.37**
Depression (subscale score DASS-C)	0.32**	0.36**	0.31**
Anxiety (subscale score DASS-C)	0.29**	0.32**	0.34**
Stress (subscale score DASS-C)	0.32**	0.34**	0.34**
TSK	0.44**	0.49**	0.38**
BaSIQS	0.23**	0.20**	0.29**

*Correlation is significant at the 0.05 level (2-tailed)

**Correlation is significant at the 0.01 level (2-tailed)

Legend: NP, Neck Pain; LBP, Low Back Pain; PCS, Pain Catastrophizing Scale; DASS-C, Depression, Anxiety and Stress Scale for Children; TSK, Tampa Scale of Kinesiophobia; BaSIQS, Basic Scale on Insomnia complaints and Quality of Sleep.

Table 4. Factor loadings based on principal components factor analysis for groups with at least 1 painful body site, neck and low back pain

	At least 1 painful body site (n=1435)		**NP (n=123)**		**LBP (n=230)**	
CSES item (response option: likert scale 1 to 5**)**	Mean (sd)	Factor 1 E=4.73	Mean (sd)	Factor 1 E=4.67	Mean (sd)	Factor 1 E=4.73
1. How sure are you that you can make it through a day of school when you have pain?	2.26 (1.01)	0.83	2.35 (1.14)	0.75	2.37 (1.07)	0.83
2. How sure are you that you can be with your friends when you have pain?	2.12 (1.00)	0.85	2.24 (1.10)	0.86	2.20 (1.05)	0.87
3. How sure are you that you can do well in school when you have pain?	2.52 (1.09)	0.83	2.59 (1.11)	0.79	2.75 (1.12)	0.84
4. How sure are you that you can do house chores when you have pain?	2.57 (1.07)	0.80	2.50 (1.07)	0.81	2.73 (1.11)	0.78
5. How sure are you that you can take care of yourself when you have pain?	2.22 (1.05)	0.78	2.36 (1.15)	0.83	2.42 (1.16)	0.75
6. How sure are you that you can do your homework when you have pain?	2.30 (1.09)	0.81	2.34 (1.14)	0.84	2.52 (1.19)	0.82
7. How sure are you that you can do things with your family when you have pain?	2.30 (1.05)	0.85	2.32 (1.11)	0.84	2.51 (1.11)	0.86

Legend: NP, Neck Pain; LBP, Low Back Pain; sd, standard deviation; E, Eigenvalue.

Highlights

- The European Portuguese version of the CSES was considered easy to understand by adolescents with chronic pain.
- The European Portuguese version of the CSES appears to be valid in adolescents with chronic pain.
- The European Portuguese version of the CSES appears to be reliable in adolescents with chronic pain.