PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Psychometric Properties of the French and English Short Form of the Protective Behavioral Strategies for Marijuana Scale in Canadian University Students
AUTHORS	Côté, José; Cossette, Sylvie; Auger, Patricia; Page, G; Coronado-Montoya, Stephanie; Fontaine, Guillaume; Chicoine, Gabrielle; Rouleau, Geneviève; Genest, Christine; Lapierre, Judith; Pedersen, Eric R.; Jutras-Aswad, Didier

VERSION 1 – REVIEW

REVIEWER	Mian, Maha University at Albany
REVIEW RETURNED	11-Aug-2021

GENERAL COMMENTS	Psychometric Properties of the French and English Short Form of the Protective Behavioral Strategies for Marijuana Scale in Canadian University Students This paper provided an analysis of translated assessment tool for protective behavioral strategies for cannabis use. The authors translated the 17-item PBSM scale into French and examined the reliability of the scale among young cannabis users. I believe that translated assessments contribute both essential psychometric evidence for the tool and increase accessibility for its use. I believe this paper offers an important contribution but does need to provide more information about the psychometric analyses conducted and greater discussion of implications and limitations. Introduction -Is there any relevant literature about PBS specific to Canadian samples/cohorts that the authors could include? If no literature exists, that information would bolster the rationale for the paper. -Readers might benefit from further information about previous psychometric findings, re: providing the fit/variance accounted for by the validated scale in previous literature. -The discussion for the value of translating the measure should be further developed, particularly as it the overall rationale for the study. -Could authors provide specific hypotheses for the study? Methods -While the authors did provide citations, readers would benefit with some brief details about the procedure re: translation/adaptation of the scale. -Was case deletion for subjects missing any data or was there a threshold for missing some/majority of data? If so, what was it? Was any missing data imputed?

	Results -Could authors provide the means/ranges/skew of PBSM scales? -Did the PBSM scales differ by gender or race? -Can authors provide more information about the PCA—such as fit statistics and whether assumptions for factorability were met? Discussion -Readers would benefit from greater discussion of the results, particularly specific implications—what are the implications of using this translated scale? What needs are being addressed? Limitations -One thing I noted was that criterion validity was only really assessed with one measure of cannabis use. The lack of problems/consequences measures (which notably inversely relates to PBS) and other relevant measures is an important limitation that needs to be addressed. Additionally, because of the categorical variable choice, we do not exactly know the association of the French PBSM scale and frequency of cannabis use, so further work with frequency/quantity measures is needed. -Authors should discuss the reduction in accounted variance for the French translation of the scale compared to the English. -Another limitation is that measurement invariance across demographics is still not known for the translated measure. Very minor comments! -This could be wrong, but should the figure be a bar chart since the variable is categorical/not over time? -There are few sentences that have extra words/commas that could be edited for clarity. For examples: “PBS use differed by frequency of cannabis use, with, overall, greater use of PBS being associated with lower frequency of cannabis use. “

REVIEWER	Conner, Brad Colorado State University
REVIEW RETURNED	08-Jan-2022

GENERAL COMMENTS	I think this is a well written manuscript that provides important information on a scale that is important in the study of cannabis use. I commend the authors for their work. I am confused as to why they would use PCA to confirm the factor loadings and not CFA?

VERSION 1 – AUTHOR RESPONSE

Reviewer 1

1) This paper provided an analysis of translated assessment tool for protective behavioral strategies for cannabis use. The authors translated the 17-item PBSM scale into French and examined the reliability of the scale among young cannabis users. I believe that translated assessments contribute both essential psychometric evidence for the tool and increase accessibility for its use. I believe this paper offers an important contribution but does need to provide more information about the psychometric analyses conducted and greater discussion of implications and limitations.

Response: Thank you for your comments, they helped improve the manuscript substantially. The various sections were revised and all of the following comments were addressed.

2) Introduction - Is there any relevant literature about PBS specific to Canadian samples/cohorts that the authors could include? If no literature exists, that information would bolster the rationale for the paper.
Response: To our knowledge, no research had been conducted on cannabis PBS among a French-Canadian sample or cohort. The existing literature on cannabis PBS has involved mainly three types of U.S. samples: college and university students (Bravo et al., 2017; Pearson et al., 2013; Riggs et al., 2018), young adults (Pedersen et al., 2016; Pedersen et al., 2017), and young veterans (Pedersen et al., 2018). Very recently, a study was conducted using the PBSM in an English Canadian context (Loverock et al., 2021). To our knowledge, no French-Canadian research team before us has worked with a French translated version of the PBSM-17.

3) Introduction - Readers might benefit from further information about previous psychometric findings, re: providing the fit/variance accounted for by the validated scale in previous literature.
Response: A paragraph was reviewed to add information regarding previous psychometric findings in the Introduction section (page 9).
They developed the PBSM scale in an initial exploratory study with 210 college student marijuana users by reducing a pool of 50 items down to a single-factor 39-item measure through iterative principal component analysis. According to psychometric evaluations, the unique structure of this scale explained 34% of the variance in protective behaviors related to cannabis use.

4) Introduction - The discussion for the value of translating the measure should be further developed, particularly as it the overall rationale for the study.
Response: The primary reason for translating the PBSM-17 into French is that the instrument is a novelty in the French-speaking world. Aside from being translated, however, the instrument also needed to be adapted and validated following a rigorous process. A first article on this endeavour was published in French in the Revue canadienne de psychiatrie/Canadian Journal of Psychiatry. This paper described the translation process and the preliminary psychometric properties measured. In brief, the PBSM-17 was translated and adapted following a rigorous multi-step process based on the method proposed by Sousa and Rojjanasrirat (2011) involving consultation with experts from the research community, cannabis users, and experienced translators. Numerous validation and feedback loops led to a final version of the French scale that was conceptually equivalent to the English version. At this stage of the evaluation, the French version of the scale shows satisfactory preliminary psychometric properties that support its use in the context of prevention, clinical intervention and research. The article being submitted to BMJ Open relates the next steps of the validation process covering the full psychometric properties of the scale.

5) Introduction - Could authors provide specific hypotheses for the study?
Response: Specific hypotheses for the study were added to the Methods section (page 11).
Following a rigorous adaptation and validation process, we expected to obtain alpha coefficients for the French version of the PBSM-17 similar to those obtained by the English versions. Regarding the criterion-related validity, a negative relationship was hypothesized: We expected a higher PBSM-17 mean score (indicating a greater use of protective behavioral strategies) to be associated with a lower frequency of cannabis use.

6) Methods - While the authors did provide citations, readers would benefit with some brief details about the procedure re: translation/adaptation of the scale.
Response: As this procedure was well described in a previous paper published in French in the Revue canadienne de psychiatrie/Canadian Journal of Psychiatry, a brief summary of how we translated and adapted the scale was added to the Methods section (page 10):
Briefly, the process involved members of the research team who were bilingual native French speakers, four translators, researchers with expertise in the development and validation of scales, and researchers with expertise in the area of cannabis use among young adults. It comprised five

steps: 1) the original English instrument was translated to French by two translators separately (forward translation); 2) the two translations were compared and differences were resolved by consensus (synthesis 1); 3) this version was translated back to English by two translators blindly and separately (backward translation); 4) the two back translations were compared against one another and against the original English version (synthesis 2); and 5) the pre-final French version was pilot-tested (Côté et al., 2021).

7) Methods - Was case deletion for subjects missing any data or was there a threshold for missing some/majority of data? If so, what was it? Was any missing data imputed?
Response: Only 211 of the 375 participants who enrolled in the study were considered in the analysis. Of the 164 participants excluded, 61 had incomplete data on our main outcomes of interest (PBSM French and PBSM English), 101 did not meet the inclusion criteria, and 2 repeated data. No data were imputed.

8) Results - Could authors provide the means/ranges/skew of PBSM scales?
Response: As these points were well covered in a previous paper published in French in the Revue canadienne de psychiatrie/Canadian Journal of Psychiatry, a brief summary of this was added to the Results section (page 15):
As proposed by Pedersen et al. (2017), a total raw score was calculated for each participant by summing the scores obtained on the response scales of all 17 items. This total raw score was then converted to a T-score with a possible range of 15 to 73. In our sample, participants presented a mean T-score of 47.95 (SD: 8.53) on the French version and a mean T-score of 47.73 (SD: 9.45) on the original English version of the PBSM-17 scale.

9) Results - Did the PBSM scales differ by gender or race?
Response: Participants completed a brief sociodemographic questionnaire covering gender self-identification and race. The proportion of participants who identified as women and Caucasian is presented in the manuscript. Unfortunately, analyses of the differences between the PBSM scales by gender or race.

10) Results - Can authors provide more information about the PCA—such as fit statistics and whether assumptions for factorability were met?
Response: More information on the principal component analysis (PCA) was added to the Results section (page 16):
The Kayser-Mayer-Olkin (KMO) test and Bartlett's test of sphericity showed that the data were suited for factor analysis (KMO = 0.886, Bartlett 1270.65, df = 130, $p < 0.001$ for the French version and KMO = 0.915, Bartlett 1590.15, df = 136, $p < 0.001$ for the English version).

11) Discussion - Readers would benefit from greater discussion of the results, particularly specific implications—what are the implications of using this translated scale? What needs are being addressed?
Response: As mentioned in the response to comment #4, the primary need addressed by this translated scale relates to the fact that the original English version could not be used with French-speaking individuals. It will be possible to use the translated scale in various contexts around the globe.

12) Limitations - One thing I noted was that criterion validity was only really assessed with one measure of cannabis use. The lack of problems/consequences measures (which notably inversely relates to PBS) and other relevant measures is an important limitation that needs to be addressed. Additionally, because of the categorical variable choice, we do not exactly know the association of the French PBSM scale and frequency of cannabis use, so further work with frequency/quantity measures is needed. Response: Thank you for this comment, which touches on the same points as in editorial

requirement #2. A paragraph regarding the limitations of the study was added to the Discussion section (page 17).

13) Limitations - Authors should discuss the reduction in accounted variance for the French translation of the scale compared to the English.
Response: In our sample, the 17 items of the English version of the scale explained 42.26% of the variance while those of the French version explained 36.46%. Although the difference is small, this suggests that the one-factor structure is less well represented in French. This possibility should be investigated in future research given that this was the first ever attempt to evaluate the factor structure of the 17-item French version of the PBSM-17.

14) Limitations - Another limitation is that measurement invariance across demographics is still not known for the translated measure.
Response: The original scale (Pedersen) was developed in a very large English-speaking population (n > 2000) and ended up with a one-factor structure. We chose to describe the variance explained by the one-factor structure of the original scale as this was the first ever attempt to evaluate the scale in a French-speaking population. The principal author of the original English scale (Pedersen) is a co-author on this paper; he approved and reviewed the analyses presented.

15) Very minor comment - This could be wrong, but should the figure be a bar chart since the variable is categorical/not over time?
Response: The information that was presented in Figure 1 is now presented in a bar chart.

16) Very minor comments -There are few sentences that have extra words/commas that could be edited for clarity. For examples: “PBS use differed by frequency of cannabis use, with, overall, greater use of PBS being associated with lower frequency of cannabis use.
Response: The entire manuscript was reviewed and edited for clarity.

Reviewer 2
1) I think this is a well written manuscript that provides important information on a scale that is important in the study of cannabis use. I commend the authors for their work.
Response: Thank you for your comment.

2) I am confused as to why they would use PCA to confirm the factor loadings and not CFA?
Response: We did not conduct a confirmatory factor analysis (CFA) of the translated and adapted French-Canadian version of the scale because, to our knowledge, no such analysis has been conducted of the original English version. As our study was the first ever attempt to examine the factor structure of the French-Canadian scale, we set out to do what had been done with the original version. Future research would do well to subject both the original English version and translated versions of the scale to CFA.

VERSION 2 – REVIEW

REVIEWER	Mian, Maha University at Albany
REVIEW RETURNED	22-Feb-2022

GENERAL COMMENTS	I thank the authors for their thoughtful responses to my comments, and happy to recommend this paper to be accepted by the journal. I understand this paper builds off of prior work published in another

	article; as it was published in French, I was not able to understand the original reference, and I especially appreciated the authors bringing in those details into the current manuscript. I am certain other readers will benefit as well! Two very minor comments: 1. I think that this response may have been cut off? I assume the authors did not examine differences, so I would simply suggest this be included as a limitation/future direction. 9) Results - Did the PBSM scales differ by gender or race? Response: Participants completed a brief sociodemographic questionnaire covering gender self- identification and race. The proportion of participants who identified as women and Caucasian is presented in the manuscript. Unfortunately, analyses of the differences between the PBSM scales by gender or race. 2. Reviewer 2's comment/prior CFA's—I just wanted to note that Pedersen 2017 (The Protective Behavioral Strategies for Marijuana Scale: Further Examination Using Item Response Theory) did conduct CFA's on the original scale and Mian 2021 (Factor analysis of a short form of the Protective Behavioral Strategies for Marijuana scale) conducted a CFA on the short form 17 item scale.

VERSION 2 – AUTHOR RESPONSE

Reviewer 1
I think that this response may have been cut off? I assume the authors did not examine differences,
so I would simply suggest this be included as a limitation/future direction. 9) Results - Did the PBSM scales differ by gender or race?
Response: This following sentence was added to the Discussion (limitation, page 19): Unfortunately, analyses of the differences between PBSM scales by gender and race have not been
carried out.