

Evaluation of the Psychometric Properties of the Mental Vulnerability Questionnaire in Undergraduate Students

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Search terms:

Health promotion, mental health, preventive psychiatry, psychiatric nursing, psychometrics

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Conflict of Interest Statement

This work has not been published and is not under being considered for publication elsewhere. The authors report no actual or potential conflicts of interest. No external or intramural funding was received.

First Received December 19, 2015; Final Revision received February 16, 2016; Accepted for publication March 4, 2016

doi: 10.1111/ppc.12164

Vulnerability has a negative impact on sensitivity, undermining the individual's ability to adapt to adverse conditions and, therefore, more likely to suffer from psychopathological disorders. The conceptual approach on mental vulnerability (MV) describes it as the predisposition to experience psychosomatic symptoms, mental impairment, or interpersonal problems (Eplöv et al., 2005; Østergaard et al., 2012). MV characterizes a response pattern closely related to personality traits such as neuroticism (Jess, Jess, Beck, & Bech, 1998).

The World Health Organization (WHO, 2012) identifies people with chronic diseases, minority groups (children and pregnant women), and people exposed to conflict areas (war) as being more vulnerable. Other MV risk factors are also related to resource restrictions (in particular economic constraints; Shi & Stevens, 2005), a low educational achievement and illiteracy (Sebastian, 2014), personal history (negative life experiences; Mental Illness Fellowship

PURPOSE: Translate, adapt the language, and assess the psychometric properties of the Mental Vulnerability Questionnaire (MVQ) in a Portuguese population sample of young adults.

DESIGN AND METHODS: A psychometric validation study was performed. The sample comprised 166 undergraduate students. Factor analysis was applied to extract three indicators.

FINDINGS: The MVQ showed divergent validity with the Positive Mental Health Questionnaire ($p < .001$) and convergent validity with the Mental Health Inventory including five items ($p < .001$). Reliability was verified through the assessment of internal consistency, evidencing positive outcomes (Cronbach's $\alpha = 0.81$).

PRACTICE IMPLICATIONS: The MVQ shows psychometric properties enabling its adaptation to clinical practice and research, essential to an effective screening of mental vulnerability.

of Victoria, 2008), and low cognitive performance (Gelkopf, Berger, Bleich, & Silver, 2012).

There is no precise definition for MV, thus identifying and assessing this concept is still rather difficult. Recent literature has provided two instruments for vulnerability assessment: the Psychological Vulnerability Scale (Sinclair & Wallston, 1999) and the Mental Vulnerability Questionnaire (MVQ; Eplöv et al., 2010). However, an inexistent Portuguese-validated instrument has determined the decision of this study's researchers to translate, adapt the language, and assess the psychometric properties of the MVQ in the Portuguese population.

The MVQ dates back to the 1960s and was initially developed by the Military Psychological Services in Denmark. In the 1970s the Danish National Institute of Social Research reduced the number of items from 27 to 22 (Eplöv et al., 2010), which was later reduced to a version of 12 items (Andersen & Sorensen, 1979). There are no specific

details about the original MVQ, as it was not published. The review on studies using MVQ emphasizes that the translation of the instrument into English demonstrated its reliability for application in clinical context, with a Cronbach's $\alpha = 0.80$ for the version with 22 items (Eplöv et al., 2010). This instrument's dimensions and items provide a rounded assessment of MV and, according to various studies, evidence reliable outcomes (Eplöv et al., 2005, 2006).

This study focused on young adults that, though not considered one of the most vulnerable groups, were identified as relevant study subjects to assess the psychometric properties of the instrument. This is a group exposed to a considerable risk of developing psychopathological symptoms, due to the double transition in which they find themselves: development (adolescence–adult); situational (student–work); and to stressors of academic, economic, and social nature (Sequeira, Carvalho, Borges, & Sousa, 2013).

Purpose/Questions

The aim of this study is to translate, adapt the language, and assess the psychometric properties of the MVQ in a Portuguese population sample of young adults.

The study addressed the following questions: What is the MVQ factorial structure in a sample of young adults? Is there convergent validity between the MVQ and the Mental Health Inventory with five items (MHI-5) subscale concerning the psychological stress dimension? Is there divergent validity between the MVQ the Positive Mental Health Questionnaire (PMHQ), and between the MVQ and the MHI-5? What is the MVQ internal consistency in a sample of young adults?

Methods

Design

This was a quantitative nature research with a transversal methodological design. This psychometric validation study was divided into two phases: translation and language adaptation of the MVQ into Portuguese and assessment of the psychometric properties of the MVQ.

The MVQ was translated into Portuguese using the translation and back translation process described in Figure 1, according to Wild et al. (2005) guidelines.

After the translation process review and validation, the interpretation and cultural relevance of the translated instrument MVQ was conducted by a panel of seven experts comprising a professor with a doctorate in mental health, a psychiatrist, two psychologists, and three nurses' specialists in mental health. The panel members agreed on the conceptual assessment. Pretesting of the questionnaire was then conducted with a random sample of 10 young adults aged between 18 and 25, aiming to identify constraints and set time for the completion of the questionnaire.

Recruitment

Data were obtained from young undergraduate students. A nonaccidental probabilistic sampling technique was applied. The questionnaire was distributed in June 2013 by a higher education nursing school academic department to all 540 undergraduate students. One hundred sixty-six completed questionnaires were returned, constituting the final study sample (response rate = 30.74%). The exclusion criteria identified students with a prior mental disorder diagnosis

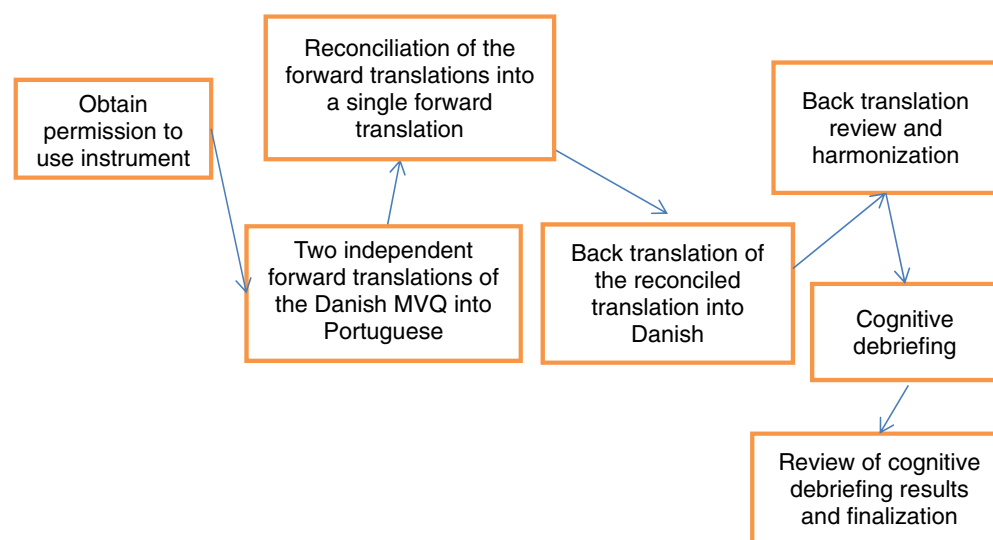


Figure 1. Process of Translation and Back Translation of the MVQ

and students with prior hospitalization at a psychiatry department.

The online questionnaire could only be accessed and completed once and included two topics: the first topic comprised questions on sociodemographic characteristics (age, gender, marital status, residence during the academic year, course, graduation year, scholarship student) and clinical characteristics, namely, pathological history, health monitoring, medication (anxiolytics, sedatives and hypnotics, antidepressants, analgesics, antipsychotics and others), negative life experiences, and consumption of psychoactive substances. The second topic consisted of the MVQ, the Positive Mental Health Questionnaire (Portuguese version validated by Sequeira et al., 2014), and the MHI-5 (Ribeiro, 2001).

Ethical Considerations

The research complied with all ethical guidelines and participants' approval and consent, upon authorization from all parties involved, including the Ethics Committee of the higher education institution. Participants were previously informed of the study objectives, and that no implications were involved if they decided not to complete this process. Further consent was given by the authors of the instruments. An e-mail address was provided in case the participants required any further clarification.

Instruments

Despite the existing 12- and 22-item scales, researchers of this study decided to adopt the MVQ 22-item scale, since it was the one showing the best reliability criteria in the English version (Eplov et al., 2010). Sixteen items are grouped into three dimensions (Table 1), although there is no reference to how these dimensions were obtained. The six remaining items are not included in any dimension; however, the authors (Eplov et al., 2010) decided that these items should be considered in the questionnaire.

The PMHQ is an instrument originally designed by Lluch (2003), and is a self-completed questionnaire comprising 39 items that assess six dimensions of Positive Mental Health (personal satisfaction, positive attitude, self-control, autonomy, problem-solving capacity, and interpersonal relationship skills).

Table 1. Dimensions of the MVQ

Dimensions	Items
Psychosomatic symptoms	1, 2, 4, 6, 10, 15
Mental symptoms	5, 9, 12, 14, 20
Interpersonal problems	13, 16, 18, 21, 22
Other items	3, 7, 8, 11, 17, 19

The MHI-5 is a reduced version of the Mental Health Inventory consisting of five questions. Three questions assess "psychological distress" and the other two "psychological well-being."

The PMHQ and the MHI-5 instruments are validated in the Portuguese population and evidence good psychometric properties.

Analysis

The data analysis and processing was performed using IBM SPSS Statistics 20 for Windows® (IBM Corporation, 2011). The descriptive analysis addressed the central tendency and dispersion measures (mode, median, standard deviation, minimum, and maximum). In the analysis of the psychometric properties, construct validity was assessed by confirmatory factor analysis (CFA; Kline, 2013) and the Pearson correlation coefficient (convergent and divergent validity), and reliability through analysis of internal consistency (Cronbach's α). The inferential statistical analysis involved application of Student's *t*-tests for independent samples and one-way analysis of variance *t*-tests, with a chi-squared test to identify the associations between the variables.

In the CFA, extraction of the main components was limited to three factors, following the three dimensions of MV suggested by Eplov et al. (2010). For the factor loadings, items showing values equal to or higher than 0.30 were described as acceptable, since, according to Hair, Black, Babin, and Anderson (2010), this is the minimum value to assure practical significance. At this level, and to clear any misinterpreting, the following criteria were adopted: maintenance of the MVQ's original structure (Eplov et al., 2010) if there were no significant differences in the factor loadings; maintenance of the MVQ's original structure (Eplov et al., 2010) if the item's factor loading in its original dimension respected the minimal acceptable values; and exclusion of the item if the factor loading in its original dimension was lower than 0.30.

Findings

Expert/Consensus

The panel of seven experts agreed on the construct under assessment and on the suggestion to modify the item assessment type—shifting from a dichotomous assessment to a Likert-type evaluation with five items (1–5), where a higher number corresponds to greater frequency (never = 1; rarely = 2; sometimes = 3; very often = 4; always = 5). Analysis by two psychometricians was requested at a later stage, who also supported the assessment using a Likert-type scale, since they considered it to be a more accurate instrument to assess MV.

Table 2. Sociodemographic and Clinical Characteristics of the Sample

	%	<i>n</i>	Mean	<i>SD</i>
Sociodemographic characteristics				
Gender				
Female	89.8	149	—	—
Male	10.2	17	—	—
Age	—	—	22.53	5.80
Marital status				
Single	90.4	150	—	—
Married	5.4	9	—	—
Civil partnership	3.6	6	—	—
Divorced	0.6	1	—	—
Clinical characteristics				
Health problems				
Yes	31.3	52	—	—
No	68.7	114	—	—
General health problems (dyslipidemia, allergic rhinitis, asthma, and migraine)	20.5	34	—	—
Mental health problems (depression, panic attacks, and anxiety)	7.2	12	—	—
Medication				
Yes	30.7	51	—	—
No	69.3	115	—	—
Negative life experiences				
Yes	80.1	133	—	—
No	19.9	33	—	—
Consumption of substances				
Yes	21.1	35	—	—
No	78.9	131	—	—

Concerning the assessment of the MVQ's conceptual validity, in general, experts issued a positive opinion about its component items. However, the following alterations proposed by the experts were made: removal of the quantitative adjectives that were no longer relevant, since the items comprising the questionnaire were changed to a Likert-type scale format; transformation of the MVQ in a self-report questionnaire, with respondents being the sole participants in the process, and answers reflecting their own personal opinions.

Pretest

The instrument was found to be easily understood and a 10 min completion time was set. It was then possible to validate the final version of the MVQ into European Portuguese. Thus, the MVQ items in the Portuguese version are graded on a Likert scale from 1 to 5 points. The total score of the instrument varies between 22 and 110, and the maximum score corresponds to greater MV.

Psychometric Evaluation

The statistical analysis presented in Table 2 enables to identify the sociodemographic and clinical characteristics

of the study sample. From the 166 participants comprising the MVQ analysis, 154 were included and 12 excluded for suffering some kind of mental health problem. None of the questionnaire respondents referred to prior hospitalization in a psychiatry unit. Further to the previously stated, the average score obtained in the completion of the MVQ was 51 points; with a maximum score of 87 and a minimum score of 24 points.

The convergent validity was assessed by analyzing the correlations between the MVQ total score (higher scores meant higher MV) and the MHI-5 subscale total score for the psychological stress dimension (lower scores meant higher psychological distress; $r = -.70$; $p < .001$).

In order to assess the divergent validity, an analysis was made of the correlations between the MVQ total score and the PMHQ (a higher total score meant better positive mental health; $r = -.57$; $p < .001$) and between the MVQ and the MHI-5 (a higher score meant better mental health; $r = -.67$; $p < .001$).

The MVQ's reliability was evaluated through an analysis of internal consistency using Cronbach's α (dimension 1, Cronbach's $\alpha = 0.85$; dimension 2, Cronbach's $\alpha = 0.84$; dimension 3, Cronbach's $\alpha = 0.61$; total Cronbach's $\alpha = 0.89$).

The Kaiser-Meyer-Olkin (KMO) test demonstrated that the sample showed good internal consistency, with a value of 0.87 concerning the factor analysis process prior to the extraction of the principal components. In the factor matrix, all the items showed values above 0.30, the acceptable minimum value of practical significance according to Hair et al. (2010; Table 3). The decision was to exclude item 13, since its factor loading was below 0.30 in its original dimension "Interpersonal problems" (Table 4).

Considering the proposed changes for each dimension, a new assessment of the MVQ internal consistency was performed (excluding item 13), and a slight decrease of the internal consistency was identified (Table 5).

Discussion

Despite the results evidencing inexistent MV factors in undergraduate students, such as illiteracy, low educational achievement, or low cognitive performance, findings raise a question on the consumption of psychoactive substances (WHO, 2013) or the taking of medication (Lluch-Canut et al., 2013). The high number of students having experienced negative life events should be highlighted. This is a relevant indicator to explain this study outcome, since evidence shows that coping focused on emotions (which includes avoidance) is the most common feature in young people (Augustine et al., 2011), and is often associated with the increased use of psychoactive substances (Patterson & McCubbin, 1987), behavioral problems, depression, and violence (Tolan, Gorman-Smith, Henry, Chung, & Hunt, 2002).

Table 3. Analysis of the Main Components of the MVQ

MVQ items	Components		
	1	2	3
19—Do small things get on my nerves?	0.77		
12—Am I in a bad mood?	0.70		
20—Do I have thoughts which trouble and worry me?	0.69		
22—Do I feel misunderstood by other people?	0.66		0.37
15—Do I feel unwell?	0.64	0.38	
13—Is it difficult for me to concentrate on my work when someone is watching me?	0.62		0.10
9—Do I suffer from bad nerves?	0.55		
3—Do I suffer from severe headache?		0.70	
5—Do I have anxiety attacks?	0.35	0.63	
11—Do I believe that noise bothers me more than it does most other people?		0.60	
8—Do I have pain in different parts of my body, e.g., your stomach, neck, back or chest?		0.58	
10—Do I suffer from fits of dizziness?		0.58	
2—Do I suffer from loss of appetite?		0.58	
7—Do I take medicine, such as headache tablets, sleeping pills, tranquilizers, or the like?		0.57	
14—Does my heart beat very fast for no particular reason?	0.37	0.54	
6—Do I feel very tired?		0.50	
4—Do I suffer from sleeplessness?	0.38	0.46	
1—Do my hands easily shake?		0.42	
18—Do I prefer to keep to myself?			0.83
21—Am I very shy or sensitive?			0.74
16—Is it difficult for me to make friends?			0.60
17—Is it difficult for me to accept that other people decide over me?			0.34
Eigenvalues	7.23	1.89	1.42
Percent variance (total = 47.91)	32.85	8.60	6.45

Table 4. Portuguese Version of the MVQ

	Item	Content of the item
Dimension 1— mental symptoms	4	Do I suffer from sleeplessness?
	5	Do I have anxiety attacks?
	9	Do I suffer from bad nerves?
	12	Am I in a bad mood?
	14	Does my heart beat very fast for no particular reason?
	19	Do small things get on my nerves?
	20 ^a	Do I have thoughts which trouble and worry me?
Dimension 2— psychosomatic symptoms	1	Do my hands easily shake?
	2	Do I suffer from loss of appetite?
	3 ^a	Do I suffer from severe headache?
	6	Do I feel very tired?
	7 ^a	Do I take medicine, such as headache tablets, sleeping pills, tranquilizers, or the like?
	8 ^a	Do I have pain in different parts of my body, e.g., my stomach, neck, back or chest?
	10	Do I suffer from fits of dizziness?
	11 ^a	Do I believe that noise bothers me more than it does most other people?
	15	Do I feel unwell?
Dimension 3— interpersonal problems	16	Is it difficult for me to make friends?
	17 ^a	Is it difficult for me to accept that other people decide over me?
	18	Do I prefer to keep to myself?
	21	Am I very shy or sensitive?
	22	Do I feel misunderstood by other people?

^aNew item included in the dimension.

Table 5. Comparison Between the English Version and the Portuguese Version of the MVQ

Dimension	MVQ English version		MVQ Portuguese version	
	Items	Cronbach's α	Items	Cronbach's α
Mental symptoms	4, 5, 9, 12, 14, 20	0.59	4, 5, 9, 12, 14, 19, 20	0.81
Psychosomatic symptoms	1, 2, 6, 10, 15	0.58	1, 2, 3, 6, 7, 8, 10, 11, 15	0.81
Interpersonal problems	13, 16, 18, 21, 22	0.62	16, 17, 18, 21, 22	0.67
Total (22 items)		0.80		0.81

Regarding the factor analysis to which the MVQ was submitted, outcomes reveal that all of the resulting dimensions show a configuration similar to the one proposed by Eplov et al. (2010), since some items presented higher factor loadings in dimensions different from those included in the original Danish version of the MVQ. Items 13 and 22 shifted from dimension 3 to dimension 1, item 15 shifted

from dimension 2 to dimension 1, and items 5 and 14 shifted from dimension 1 to dimension 2. At this stage it is important to emphasize that the original instrument does not include some items in the three dimensions referred by Eplov et al. (2010). Nevertheless, this study's researchers have decided to maintain the overall structure of the MVQ regarding the

dimensions and respective items, following the previously set criteria. The decision was also to exclude item 13.

Researchers consider the importance of the validation in future research of the factor matrix obtained in the present study and the analysis of relevance concerning the inclusion of the uncategorized items in the dimensions that resulted from the CFA in this study, as they show high factor loadings, and would thus increase the internal consistency of the MVQ.

The correlation between the MVQ and PMHQ, and between the MVQ and MHI-5, enabled to assess divergent validity. The correlations obtained are consistent, confirming that the MVQ has a different assessment of the construct than the PMHQ and MHI-5.

The correlation between the MVQ and the MHI-5 subscale related to the psychological stress dimension enabled to assess convergent validity. This correlation is also as predicted, thus confirming that both instruments assess similar constructs. However, the assessment of the convergent validity may require an additional specific psychometric instrument (since the MHI-5 subscale concerning the psychological stress dimension only assesses psychological distress) or the application of the MHI in its full version (38 items). However the MHI full version and its extended questionnaire was proved inappropriate for this study since it could increase the probability of participants' nonresponse, which was confirmed during the pretest.

Reliability was verified through the analysis of internal consistency, reaching significant values of Cronbach's α . In fact, it showed better results compared to those obtained by Eplov et al. (2010). Dimension 3, compared to the other two dimensions, was the only one revealing a Cronbach's $\alpha < 0.70$, the minimum acceptable value according to Nunnally and Bernstein (1994); however, the result is significantly reliable when considering the only five items dimension. These data are not consistent with the findings obtained by Eplov et al. (2010), which revealed similar values for the internal consistency in the three dimensions of the MVQ, although showing lower values with Cronbach's α around 0.60.

Previous literature support the psychometric properties of the MVQ found in the present study, considering however the few existing studies focused on psychometric properties assessment. Thus, it could be stated that the inclusion of the found uncategorized items into the three dimensions included in the assessment instrument enabled a new approach that emerged from the present study.

The current study findings indicate that since the MVQ emphasizes the symptoms, this could be interpreted by some researchers as an instrument that identifies signs and symptoms more likely to be associated with mild psychopathology than with MV. However, whether MQV is used to assess MV or mild pathological signs and symptoms, due to its psychometric properties the MQV

can be considered a very useful instrument for clinical practice, enabling a reliable assessment of Portuguese young population.

Limitations of the Study

When addressing the study limitations, the literature refers that completion of higher education leads to increased stress levels (Hales, 2009; Roberti, Harrington, & Storch, 2006), and an apparent inability to manage stress situations increasing the risk of mental disorders. Researchers consider that in future studies the application of the MQV to different target populations and risk MV contexts should be considered, since this study's target sample was very specific.

Another relevant issue pertaining to the accomplishment of this study involved the difficulty in finding information on the construct of "MV." In addition to this question, the information provided by the study enabling the translation and assessment of the psychometric properties of the MQV original Danish version was also very limited, since it did not specify the assessment techniques that were used to assess the instrument's psychometric properties.

Introducing a response rate to the MVQ increased the psychometric validity of the instrument. However, for a more accurate assessment of the construct, the Likert scale still provides a more in-depth analysis.

Finally, there is a limitation in identifying people with MV. A maximum score of the MVQ is established at 110, but it is not clear which is the precise limit for a person to be considered having high MV (or considered a risk MV person), hence, it becomes necessary to set a cut-off point.

Implications for Nursing Practice

Researchers find that the study outcomes are relevant for nursing practice since they have enabled the assessment of the psychometric properties of an instrument aiming at screening people with MV or at risk of developing psychopathology. A reliable instrument provides healthcare professionals with the necessary assessment tools to increase and improve the diagnosis accuracy.

This study can also be considered relevant for research, since the assessment of the psychometric properties of psychometric instruments in different contexts will contribute to a more reliable application in research studies, especially for data collection purposes, resulting in increasingly more reliable and valid outcomes. This study aim was to give an important contribution to the understanding of the MVQ characteristics, with major interest at the international level. The results will enable researchers to select the best instrument to assess MV, according to the research purpose.

On the other hand, researchers have highlighted the importance for the development of further studies to validate

the reliability of the instrument, overcoming the sparse existing information on the original version.

Finally, this study has also raised a discussion on an important concept in promoting mental health and preventing mental disorder, but still rather addressed in literature: MV.

Acknowledgments

Elsa Barbosa and Maria José Nogueira carried out the literature search, which was verified by Carlos Sequeira. Francisco Sampaio carried out the data analysis. Elsa Barbosa and Francisco Sampaio carried out the article writing. Carlos Sequeira was responsible for the research supervision and for the article examination.

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