The Reliability and Construct Validity of American College Students' Responses to the WHOQOL-BREF

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Abstract

The World Health Organization Quality of Life (WHOQOL-100) instrument was developed to assess quality of life from a multi-dimensional perspective. A shorter 26-item version of the instrument was created called the WHOQOL-BREF, which is the focus of this study. Based on previous research, it is unclear if the WHOQOL-BREF instrument is appropriate for use with English-speaking, American college populations. The purpose of this study was to assess the reliability and construct validity of English-speaking, American College Students' responses to WHOQOL-BREF. One thousand seven hundred and seventy- three American college students from a southeastern university completed the WHOQOL-BREF in a confidential online format. Factor analyses were conducted and model fit was assessed using multiple fit indices. A Confirmatory Factor Analysis indicated that the prescribed four-factor model did not provide a good fit for the current data. An Exploratory Factor Analysis indicated a five-factor model was the best fit. However, the results of goodness-of-fit indices indicated the five-factor model was also a poor fit. This research showed inadequate construct validity through confirmatory factor analysis. Further validation studies of the instrument with English-speaking, American college students are recommended.

***Key words**: QOL, Evaluation- Instruments, School health, WHOQOL-BREF*

Introduction

Quality of life (QOL) is a term used to describe an individual's physical and mental well-being. Like many terms used in health promotion, there is debate about how QOL should be defined and measured. One of the difficulties in defining QOL is that the concept includes both objective and subjective components of mental and physical well-being.[1] The QOL definition applied in this study is "an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns."[2]

Consistent with their definition of QOL, The World Health Organization (WHO) developed a multi-dimensional instrument to assess QOL that can be used across cultures. Initiated in 1991, the WHOQOL project was a collaborative effort to create a measure of cross-cultural QOL. According to the WHO, the WHOQOL-100 instrument assesses aspects of QOL that include culture and value systems, goals, expectations, and concerns.[3] The development of this instrument was collaborative among 15 cultural settings, including three English speaking populations. It has been piloted in 37 field centers and is available in 29 languages. The WHOQOL-100 is intended to measure six domains of health: Physical, Psychological, Independence, Social, Environmental, and Spiritual. Literate participants may take about 30 minutes to complete the assessment, while semi-literate or illiterate populations may take between 40 and 90 minutes. The WHOQOL-BREF, an abbreviated 26-item assessment adapted from the WHOQOL-100, can be used when there is limited time. Both the full length and the brief assessment can be used to measure QOL in clinical, educational, and health promotion settings.

In most languages, the psychometric properties of the WHOQOL-100 and WHOQOL-BREF instruments have been shown to be adequate. However, the only published validation study of the US version of the WHOQOL-100 did not establish construct validity through confirmatory factor analysis due to an inadequate sample size.[4] The authors also pointed out issues with the overall structure of the US version and suggested the need for additional testing of psychometric properties of the instrument. Such results support the need to complete construct validity of the US version through confirmatory factor analysis.

Bonomi[4] questioned the usefulness of the WHOQOL-100 in the elderly population. Power et al [5] described the need to develop the WHOQOL-OLD module for population comparisons. Issues with use of the WHOQOL-100 among the elderly population led to the creation of the WHOQOL-OLD, a 24-item 6-facet module that can be used in conjunction with the WHOQOL-BREF or the WHOQOL-100 for assessment of QOL. Like older adults, college students have specific QOL issues related to stage of lifespan. Furthermore, college students may even have different QOL issues than people of the same age group that are not enrolled in higher education. Consequently, the appropriateness of using the WHOQOL-100 and WHOQOL-BREF in college populations should be explored. In this study, the WHOQOL-BREF was selected due to time limitations for taking the survey. Ultimately, it is important to determine if another version of the instrument and/or supplemental module like the "WHOQOL-BREF-COLLEGE" is warranted.

Past research has explored the use of the WHOQOL-BREF with college students with mixed outcomes. It was used to measure QOL in medical students through pre and post course data .[6] In particular, Wu and Yao [7] used the WHOQOL-BREF with students enrolled at the National Taiwan University to assess sense of control on the relationship between self-certainty and QOL. A two-factor confirmatory factor analysis revealed that a positive relationship existed between self-certainty on interpersonal traits and QOL. However, the researchers only reported internal consistency (Cronbach's alpha) coefficients ranging from .61 to .82 for the four domains of the WHOQOL-BREF, and not the items that fell below the acceptable level of .70.[8]

The aforementioned studies focused on college students' responses to the WHOQOL-BREF. However, it seems construct validity was not conducted in the past. Instead, past researchers opted to cite previous validations of the instrument using mostly adult non-English speaking populations. One study assessed the psychometric properties of the WHOQOL-BREF with Thai college students.[9] While the instrument adequately assessed the QOL of Thai college students, the distribution of items showed that more than half of the 26 items were at risk of the ceiling effect with participants' responses skewing to the highest scores. These results may be explained by the fact that the study sample was from a general college population assumed to have no serious health problems.

The WHOQOL-BREF has been the focus of previous research. However, it is unclear whether the US version of WHOQOL-BREF is a sound measure of QOL for adults and more specifically for American college populations. Thus, the purpose of this study was to assess the reliability and construct validity of English-speaking, American College Students' responses to the WHOQOL-BREF.

Method

Upon approval from the host institution's Institutional Review Board, students enrolled in *Physical Activity & Wellness* (PED 101) were invited to participate in this study during the Fall 2009 and Spring 2010 semesters. An email was sent to all students containing a link to access a secure website for completion of the online survey. Clicking the link indicated consent to participate. An alternative assignment was offered for those students who chose not to participate. The survey was available for two weeks, and two email reminders were sent prior to survey closure.

Instrumentation

Following demographic questions, participants were directed to complete the WHOQOL-BREF, a 26-item self-administered instrument intending to measure four QOL domains: Physical, Psychological, Social**,** and Environmental. All items used a five-point Likert response scale representing the following options: 1-Not at all, 2- A little, 3- A moderate amount, 4-Very much and 5-An extreme amount. Examples of items from each of the domains include:

- Physical - To what extent do you feel that physical pain prevents you from doing what you need to do?
- Psychological - How much do you enjoy life?
- Social - How satisfied are you with your personal relationships?
- Environmental - How safe do you feel in your daily life?

Participants

A total of 2,496 undergraduate students enrolled in a required general education course, *Physical Activity & Wellness*, during the Fall 2009 (1421 students) and Spring 2010 (1075 students) semesters were invited to participate in this study. Seventy-one percent (n=1773) of students agreed to participate and completed a confidential online survey.

Data Analysis

Using PAWS 17.0 (formerly SPSS), descriptive statistics were computed to summarize demographic data elicited from participants. Factor analyses were conducted using PASW 17.0 and AMOS 17.0. As suggested by Bollen[10], model fit was assessed using chi-square (χ^2), χ^2/df, Goodness of Fit Indices (GFI), Root Mean Square Error of Approximation (RMSEA), Tucker-Lewis Index (TLI), and Comparative Fit Index (CFI). The criteria used to determine a good model fit were a non significant χ^2, $\chi^2/df < 2.0$, TLI and CFI $\geq .95$, and RMSEA $< .06$ [11]. Additionally, internal consistency of subscales was assessed using Cronbach's Alpha reliability coefficient.

A review of the literature suggested that this is the first study to investigate the WHOQOL-BREF among English-speaking, American college students. Thus, confirmatory factor analyses (CFA) were first conducted to assess the *goodness-of-fit* of this data with the four-factor model as prescribed by the WHOQOL-BREF implementation manual [2]. In preparation for potential follow-up exploratory factor analyses (EFA), the total sample (n = 1773) was divided into two groups by means of random assignment (n_1 =916, n_2 = 857). Survey data elicited from the first group was used to conduct the CFA.

Results

Descriptive Statistics

Table 1 presents the demographic profile of participants in this study. Although ages of participants ranged from 17-57 years, most participants were 19 or 20 years old (M = 19.74, SD = 3.02). The sample was predominantly female and the most commonly reported race was white or Caucasian. The majority of the sample self-identified as full-time students and most were in their first or second year. At the time of survey administration, most students reported living in an off-campus house or apartment or in a college dormitory or residence hall.

Confirmatory Factor Analysis

CFA was conducted to assess the *goodness-of-fit* of this data with the four-factor model as prescribed by the WHOQOL-BREF. A statistically significant χ^2 value (1425.054; $p < .001$), suggested a bad fit. Additionally, sample size resilient goodness-of-fit indices were calculated, $\chi^2/df = 5.793$, GFI = .879, RMSEA = .072, TLI = .807, CFI = .828, which also suggested a bad fit. Although the internal consistency of factors was at a level that is considered acceptable in the social sciences,[12] based upon goodness-of-fit indices, it was determined that the 4-factor model was a poor fit. A review of reliability coefficients indicated that the internal consistency of factors would not be improved by removing survey items, suggesting modification of the instrument would not improve its construct validity. Therefore, a subsequent exploratory factor analysis (EFA) was conducted to determine the model of best fit. Table 2 illustrates the factors, associated number of survey items, and internal consistency of the originally proposed four-factor model.

Exploratory Factor Analysis

EFA with varimax rotation was conducted to determine the model of best fit. Survey data elicited from the second group was used to conduct the EFA. Initially, an examination of the screen plot indicated that five factors were present. A statistically significant χ^2 value (817.665; $p < .001$) suggested a bad fit. Additionally, sample size resilient goodness-of-fit indices were calculated, $\chi^2/df = 4.568$, GFI = .915, RMSEA = .065, TLI = .872, CFI = .891, which also suggested a bad fit. Although the internal consistency of factors was at a level that is considered acceptable in the social sciences,[12] based upon goodness-of-fit indices it was determined that the five-factor model was also a poor fit. Table 3 illustrates the factors, associated number of survey items, and internal consistency of the model of best fit. A review of reliability coefficients indicated that the internal consistency of Factor 1 would increase from .786 to .789 if item 26 was removed. This negligible improvement of the internal consistency and the degree to which this item loaded on Factor 1 suggested that this item be retained. Additionally, a review of reliability coefficients indicated that the internal consistency of Factor 3 would increase from .816 to .819 if item 7 was removed. Although this improvement of internal consistency was negligible, the degree to which this item loaded on factors suggests that this item be removed.

Traditionally, EFA findings permit researchers to name factors that enable communication with others about the substance of items associated with each factor.[13] Doing so in this study was challenging because an examination of survey items associated with factors did not reveal a simple underlying construct that described the complicated interrelationships. For example, items that loaded on Factor 1 were intended to measure both the psychological and social domains of health in the WHOQOL-BREF.

Discussion

Based on the findings in this study, the WHOQOL-BREF had inadequate construct validity for this English-speaking, American College Student population as indicated through confirmatory factor analysis. Results of descriptive statistical analyses indicated the participants in this study were primarily 19-20 years of age, Caucasian, and female, which is representative of the average American college population as indicated in *Profile of Today's College Student.*[14]

CFA suggested that the intended four factor model of the WHOQOL-BREF is a poor fit for measuring the QOL of an American college student population. This finding is similar to results suggesting that the four-factor model had questionable validity among Thai-speaking college students.[7,9] Although EFA determined that a five-factor model is the best fit, goodness-of-fit indices indicated that this model was also a poor fit. These findings may infer that the WHOQOL-BREF is sensitive to cultural or national characteristics.[15] It is reasonable that the English-speaking, American college student sample represented in this study may not have comprehended survey items as intended. Other instruments with better validity may be utilized or developed to assess QOL in this population. Also, the concept QOL for this population may be different than what can be represented by four or five constructs. Additional research is needed to explore the complex nature of QOL in this population. This could improve understanding of this multi-dimensional domain of well-being among English-speaking, American college students and facilitate the development of more valid instrumentation.

To our knowledge, this is the first time construct validity of the US version of WHOQOL-BREF was assessed. Previously adequate construct validity of the US version of the WHOQOL-100 was established by correlations with other QOL related instruments

and the ability to discriminate between sub-samples of research participants. The two studies are not comparable as one study focused on the WHOQOL-100 and the other assessed the WHOQOL-BREF.

Age and life experience seem to be important factors to consider when developing measures of QOL. The mean age of the participants in this study was 19.74 (3.0), while the mean age of participants in the validation of the US version of the WHOQOL-100 were 48.7 (15.7) for healthy adults, 29.8 (6.2) for childbearing women, and 49 (15.8) for the chronically ill. As stated before, college students are developmentally very different from adult populations. A validation study of the Reason for Smoking scale showed that the instrument did not have adequate construct validity for college students even though construct validity was adequate for other populations.[16] Previous research detailed the development for the WHOQOL-OLD to assess QOL among the elderly.[5] Like the need for an instrument to assess QOL of the elderly population, the findings of this study suggest the need for a "WHOQOL-BREF-COLLEGE" to assess quality of life among college-aged populations.

Limitations

A limitation of this study is that the surveys were self-report, which could have led to socially desirable responses. The negative impact of socially desirable responses was minimized by informing participants that their responses were confidential. Another limitation of the research was that information about health status beyond the WHOQOL-BREF was not collected to provide a clearer picture of the population in this study.

As indicated by a review of the literature, this is the first study focused on construct validity of the WHOQOL-BREF in English-speaking, American college students. The uniqueness of this research is both a strength and limitation. The findings in this study are not supported by previous literature. In addition, the findings cannot be generalized to all English-speaking, American colleges students. Therefore, the results are not conclusive and support the need for further research.

In conclusion, many universities have goals of teaching students' knowledge, attitudes and behaviors that will lead to lifelong well-being. Therefore, instruments that assess QOL are particularly desirable for assessing populations like college students. Valid and reliable measures of QOL may provide insight to what hinders or enriches life-long well-being in college populations. The WHOQOL-BREF has not been shown to be an adequate measure of QOL in this population. Until further research is conducted, the WHOQOL-BREF is not recommended for assessment of QOL in English-speaking, American college student populations.

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Table 1 Demographic Profile of Participants

	n	Percentage
Gender		
Male	648	36.5%
Female	1125	63.5%
Age		
17-20	1427	80.5%
21-25	275	15.5%
26-29	41	2.3%
30-35	19	0.9%
≥36	11	0.6%
Race		
American Indian or Alaska Native	6	0.3%
Asian	25	1.4%
Black or African American	56	3.2%
White or Caucasian	1603	90.4%
Native Hawaiian or Other Pacific Islander	9	0.5%
Other	74	4.2%
Student Status		
Full-time	1752	98.8%
Part-time	21	1.2%
Academic Standing		
First year	660	37.2%
Second year	613	34.6%
Third year	346	19.5%
Fourth year	143	8.1%
Fifth year	11	0.6%

Residence Status		
Off-campus	675	38.1%
College dormitory	544	30.7%
Fraternity or Sorority Housing	349	19.7%
Other University Housing	108	6.1%
Parent or Guardian	79	4.5%
"Other"	18	1.0%

Table 2 Structure of the Four-factor Model (CFA)

Factor	Domain	No. of Items	Survey Items	α
1	Physical	7	Q3, Q4, Q10, Q15, Q16, Q17, Q18	.72
2	Psychological	6	Q5, Q6, Q7, Q11, Q19, Q26	.75
3	Social	3	Q20, Q21, Q22	.70
4	Environmental	8	Q8, Q9, Q12, Q13, Q14, Q23, Q24, Q25	.75

Table 3 Structure of the Five-Factor Model (EFA)

Factor	No. of Items	Survey Items	α
1	6	Q5, Q6, Q20, Q21, Q22, Q26	.79
2	7	Q15, Q23, Q24, Q25, Q8, Q9, Q13	.76
3	6	Q10, Q16, Q17, Q18, Q19, Q7	.82
4	3	Q11, Q12, Q14	.82
5	2	Q3, Q4	.63