

Psychometric properties of the WHO-5 Well-Being Index among health care workers

Ahsan Aziz Sarkar, Rubina Hossain, Nafisa Tabassum

Background: Wellbeing is defined as a state of positive feelings and meeting full potential in the world. The WHO-5 Well-Being Index is a brief, widely used measure of psychological wellbeing. Health care workers (HCWs) exhibit higher rates of mental disorders than the general population. Psychometric properties of WHO-5 are yet to be assessed among HCWs of Bangladesh.

Objectives: To assess the psychometric properties of WHO-5 among HCWs.

Methods: This study was carried out as a part of a nationwide government hospital-based survey in 2022. A total of 775 HCWs (physicians, nurses, medical technologist) were interviewed in this survey. A semi-structured sociodemographic and relevant information questionnaire, WHO-5 Well-Being Index (WHO-5), Satisfaction with Life Scale (SWLS) and Basic Psychological Need Satisfaction & Frustration Scale (BPNSFS) were used to interview the participants.

Results: Mean (SD) total WHO-5 score found was 16.4 (± 5.12) for the total sample and the Cronbach alpha coefficient for the five items of the WHO-5 found was 0.890. Principal component analysis with varimax rotation identified a single component with eigenvalues of more than one (i.e., 3.47) and this one component in total explained 69.4% of the variance. Factor loading for each item was more than 0.71 and communality more than 0.30. Positive correlations were observed between WHO-5, SWLS and autonomy, competence, and relatedness satisfaction domains of BPNSFS scale scores.

Conclusions: The Bangla version of the WHO-5 Well-being Index demonstrated reliable and valid psychometric properties among HCWs in Bangladesh context.

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Introduction

Wellbeing is defined as a state of positive feelings and meeting full potential in the world and is theorized as having hedonic, eudemonic and social components.¹ It can be assessed by measuring: the presence of (1) positive

emotions and the absence of negative emotions (2) mature character traits (3) life satisfaction or quality of life, and (4) character strengths and virtues, such as hope, compassion and courage.² The WHO-5 Well-Being Index (WHO-5) is

a concise self-assessment tool used to evaluate an individual's current mental well-being. It was initially developed by the WHO Regional Office in Europe in 1998 as a component of the DEPCARE project, which aimed to establish well-being measurements in primary health care.³ The tool has been translated into more than 30 languages including Bangla but its psychometric properties among health care workers (HCWs) is yet to be investigated.

There is evidence that HCWs exhibit higher rates of mental disorders than general population.⁴ Poor state of wellbeing creates susceptibility to physical illness like stress increases susceptibility to viral infection, cardiovascular disease, etc.⁵ Smoking, drinking and the consumption of high fat foods could be the maladaptive coping strategy to relieve emotional distress.⁶ In systematic reviews, the prevalence of depressive symptoms in HCWs during the COVID pandemic ranged between 8.9% to 50.4%, anxiety symptoms between 14.5% to 44.6% and sleep disturbance found to be around 34%.⁷⁻⁹ Although the HCWs provides care and assistance to individuals who are ill or in need and the sector is recognized as one of the most hazardous industries. It is crucial to prioritize the occupational health of HCWs and wellbeing assessment tools like WHO-5 can help in this regard.

Methods

A nationwide government hospital-based survey of HCWs under the study titled 'national assessment of the current status of mental wellbeing of the frontline health workers and identifying the needs for additional support in the era of COVID-19 in Bangladesh' was carried out in 2022. Stratified random sampling technique was used to choose 56 health facilities— 24 primary level hospitals, 16 secondary level hospitals and 16 tertiary and COVID-dedicated hospitals. A total of 775 HCWs (doctors, nurses, medical technologists) were enrolled by systematic random sampling technique. A semi-structured sociodemographic and relevant information questionnaire, WHO-5 Well-Being Index (WHO-5),^{3,9} Satisfaction with Life Scale (SWLS)¹⁰ and Basic Psychological Need Satisfaction & Frustration Scale (BPNSFS)^{11,12} were used to interview the participants. The BPNSFS scale is composed of 24 items grouped in six factors measuring satisfaction and frustration of each one the basic psychological needs, proposed by the self-determination theory: satisfaction/frustration of the need for autonomy, competence and relatedness. Beforehand, ethical clearance was obtained from Bangladesh Medical Research Council. Statistical analysis of the results was done by using computer-based statistical software, SPSS-IBM version 22.

Confirmatory factor analysis was done on free online CBID software available at <http://biostats-shinyr.kumc.edu/CBID/>.

WHO-5 is a 5-item and 5-point Likert scale to measure the psychological well-being of the individual. Analysis according to item response theory model, confirmed it as a unidimensional measure of well-being where each item adds unique information regarding the level of well-being. The sensitivity/specificity of the WHO-5 for detecting likely depression was 0.44/0.96 for the ≤ 7 cut-off and 0.79/0.79 for the < 13 cut-off.¹³ Its raw score ranges from 0 to 25, 0 representing worst possible and 25 representing best possible wellbeing. To obtain a percentage score ranging from 0 to 100, the raw score is multiplied by 4. A percentage score of 0 represents worst possible, whereas a score of 100 represents best possible quality of life. The scale is already validated in Bangla among general population.⁹

Results

A total of 775 HCWs were interviewed in this nationwide hospital-based survey. Among them 264 (34.1%) were interviewed from primary, 256 (33%) from secondary and 255 (32.9%) from tertiary level hospitals. Among the HCWs 370 (47.7%) were physicians, 289 (37.3%) nurses and 116 (15%) medical technologists. The mean age of the HCWs was 36.9 ± 9.1 and the mean age of doctors was lower than nurses and technologists. Two-thirds of the participants were in the 18-40 years age range. Gender ratio was equal in overall sample— but nurses showed female predominance (83.7%) and medical technologists male (84.5%). Around 85% of the participants were married.

Reliability

Mean (SD) total WHO-5 score found was $16.4 (\pm 5.12)$ for the total study population with a range between 0 and 25. The Cronbach alpha coefficient for the five items of the WHO-5 found was 0.890.

Table 1: Distribution of item characteristics of WHO-5

Item	Mean	SD	Item-total correlation	Cronbach's alpha if item deleted
Item1	3.26	1.23	0.75	0.858
Item2	3.35	1.20	0.77	0.854
Item3	3.61	1.13	0.72	0.866
Item4	3.35	1.25	0.72	0.864
Item5	2.90	1.33	0.67	0.879

Validity

We proposed a single factor model for the scale and found that chi-square value of 48.3 ($p=0.000$) with chi-square/df value of 9.6 and Root Mean Square Error of Approximation (RMSEA) value of 0.106; Comparative Fit Index (CFI) found was 0.997 and Tucker-Lewis Index (TLI) 0.993.

In exploratory factor analysis, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy - KMO coefficient found was 0.860 for the sample and the χ^2 value in the Bartlett test was 2133 (df=10; $p=0.000$), indicating that factor analysis could be conducted. Principal component analysis with varimax rotation identified a single component with eigenvalues of more than one (i.e., 3.47) and this one component in total explained 69.4% of the variance.

Table 2: Factor structure of WHO-5 obtained by varimax rotation

Item	Factor loading	Extracted communalities
Item1	0.868	0.729
Item2	0.854	0.752
Item3	0.829	0.688
Item4	0.829	0.687
Item5	0.786	0.617

Convergent validity was assessed by correlating the WHO-5 scores with the SWLS scores and scores in autonomy, relatedness, and competence satisfaction domains of the BPNSFS. Divergent validity was assessed by correlating the WHO-5 scores with scores in autonomy, relatedness, and competence frustration domains of the BPNSFS. Table 3 outlines the findings of correlation between scale scores.

Table 3: Convergent and divergent validity of WHO-5

Item	Pearson's correlation coefficient	P value
SWLS	0.537	0.000
Autonomy satisfaction	0.319	0.000
Relatedness satisfaction	0.176	0.000
Competence satisfaction	0.223	0.000
Autonomy frustration	-0.170	0.000
Relatedness frustration	-0.016	0.652
Competence frustration	-0.237	0.000

Discussion

In this study, WHO-5 was standardized in a sample of HCWs consisted of physicians, nurses and medical technologists of different ages across different levels of geographical and hospital settings. Item-total correlation determines the correlation of each item with the total score of the scale. We observed for each item, item total correlation values were more than 0.30, suggesting satisfactory correlation values.¹⁴ Also, the Cronbach's alpha for the resulting scale showed a high level of internal consistency at 0.890, which exceeded the recommended minimum criterion of 0.70 or above for determining internal consistency.¹⁵

On confirmatory factor analysis, a value of χ^2/df ranging from 2 to 1 or 3 to 1 suggests an acceptable fit.¹⁶ CFI and TLI values can range between 0 and 1; values greater than 0.90 indicate good fit.¹⁷ RMSEA values of 0.01, 0.05 and 0.08 indicate excellent, good and mediocre fit respectively, some go up to 0.10 for mediocre.¹⁸ In this study, CFI and TLI values indicated good fit whereas χ^2/df and RMSEA values indicated poor fit of the single component structure. However, model fitness value cannot be considered infallible due to their subjective judgment.¹⁹ Previously, the WHO-5 has been analysed with the item response theory model formulated by Rasch in both younger persons and in elderly persons which confirmed that the five items constitute a unidimensional scale.²⁰ On exploratory factor analysis, we also identified a single component with eigenvalues of more than one. Factor loading of each item was more than 0.71 indicated very strong correlations with the component.²¹ Similarly, acceptable cut off value for extracted communalities is 0.3 and in our study lowest communality extracted was 0.61.

From the self-determination theory perspective, wellbeing is preserved when an individual follows his intrinsic motivations and, in the process, learn, grow and thrive.²² The three needs for self-determination are: autonomy (needing to be self-regulating; to own one's actions and to identify one's self with one's behavior); competence (needing to be effective; to be moving towards greater mastery and skill); and relatedness (needing to feel psychological connection with important others; to support, and be supported by, those others). Positive correlation between the WHO-5 and life satisfaction of the SWLS and self-determination satisfaction domains scores in the BPNSFS suggests good convergent validity. On the other hand, negative correlation between the WHO-5 and self-determination frustration domains scores in the BPNSFS suggests good divergent validity. Relatedness

domain showed weak correlation with the WHO-5; in highly competitive health sector workplaces autonomy and competence might be more important than relatedness in ensuring wellbeing.

Conclusions

Findings of this study will act as eye-opener for the psychiatrists regarding wide variation in patterns of psychiatric diagnoses. It will also help the policy makers for future planning and policy making in the field of mental health.

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