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Validation of Warwick-Edinburgh Mental Well-being Scale (WEMWBS) in Pakistani healthcare professionals

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Background This study was carried out to evaluate the psychometric properties of Warwick-Edinburgh Mental Well-being Scale in Pakistani healthcare professionals. **Methods** A cross-sectional survey was carried out from June, 2013 to December, 2014 among 1271 Pakistani health personnel (HCPs) belonging to seven different cities of Punjab province, Pakistan, to study the construct and reliability of Warwick-Edinburgh Mental Well-being Scale in Pakistani population. All data were analyzed in SPSS v.21. **Results** Our analysis demonstrated a unidimensional construct, a high internal consistency (0.89), good convergent validity and easy readability of WEMWBS among Pakistani HCPs. **Conclusion** WEMWBS is both reliable and valid for use in Pakistani population.

Validation of Warwick-Edinburgh Mental Well-being Scale (WEMWBS) in Pakistani healthcare professionals

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Abstract

Background

This study was carried out to evaluate the psychometric properties of Warwick-Edinburgh Mental Well-being Scale in Pakistani healthcare professionals.

Methods

A cross-sectional survey was carried out from June, 2013 to December, 2014 among 1271 Pakistani health personnel (HCPs) belonging to seven different cities of Punjab province, Pakistan, to study the construct and reliability of Warwick-Edinburgh Mental Well-being Scale in Pakistani population. All data were analyzed in SPSS v.21.

Results

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Conclusion

WEMWBS is both reliable and valid for use in Pakistani population.

Introduction

The current state of mental health in low and middle income (LAMI) countries has emerged as a major public health concern. Similar to most of the LAMI countries, Pakistan has a weak psychiatric care system [1] and the field of mental health is still deemed a stigma even among the medical fraternity and educated strata of our society [2].

According to World Health Organization, neuropsychiatric disorders account for an estimated 11.9% of the overall burden of diseases in Pakistani population [3]. A lot has been published on psychology of medical students but data on mental health of Pakistani healthcare professionals (HCPs) is still found wanting. The field of medicine is very stressful due to its highly demanding professional commitments. Even during school years, HCPs are exposed to a plethora of academic, psychosocial and health-related stressors [4]. This stressful environment produces profound changes in personalities of HCPs who exhibit more type A traits, perfectionism, self-reliance and compulsive tendencies than the general population [5]. A number of studies have reported a very high prevalence of anxiety, depression, high stress levels and burn out among physicians and other healthcare professional both in Pakistan and abroad [6–9] highlighting the need to address the issues of poor job satisfaction, sleep deprivation, patient overload, poor doctor-patient relationship, less authority, low salaries, night shifts, poor peer and social support [8–10].

A systematic review published in 2007 has identified a paucity of psychiatric rating scales that have been cross-culturally validated in Pakistani population [11]. Many of these scales such as Hospital Anxiety and Depression scale and Aga Khan University Anxiety and Depression scales

have been shown valid and reliable for Pakistani population for assessing psychiatric morbidity. In contrast to LAMI countries, the developed world is now looking beyond the concept of mental illness. Mental wellbeing is a multidimensional construct including concepts of subjective wellbeing (hedonic) and positive functioning (eudaimonic) and nurtures a positive psyche that is capable to thrive, cope, work productively to its full potential and thus, contribute to the community as a whole [12,13]. At present, the Western world is devising public health strategies, policies and psychometric instruments to improve the "mental wellbeing" of the general population [12,14]. However, no such policies, plans or psychometric instruments assessing mental wellbeing have yet been developed or rigorously validated for the Pakistani populace.

Above cited reasons warranted the validation of instruments assessing mental wellbeing in the Pakistani populace especially the HCPs. WEMWBS was considered suitable for this purpose as it has been very extensively validated in different populations of the UK such as Scottish undergraduate, postgraduate students and general population [15], English and Scottish teenagers [16], Pakistani and Chinese ethnic minorities in the UK [17]. It has also demonstrated high internal consistency, good content, face validity, normal distribution and no floor and ceiling effects in previous validation studies [15–17].

Materials and methods

Questionnaire and Instrument

The questionnaire consisted of two sections. First section recorded information related to demographics and profession of the respondents and the second section assessed mental wellbeing levels with WEMWBS.

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS) was developed and extensively validated in the UK [15]. It is a self-administered questionnaire and comprises 14 positively worded items assessing eudemonic and hedonic constructs of mental wellbeing. Responses are recorded on a 5 point Likert scale ranging from "none of the time" to "all the time". For analysis, scores ranging from 14-70 are obtained by summing all of the items. There is no reverse coding. Higher scores indicate higher levels and lower scores indicate lower levels of mental well-being.

Pilot Survey

A pilot study was conducted on 50 healthcare professionals including doctors, nurses and dentists in Combined Military Hospitals, Lahore, to assess if the WEMWBS could be answered and interpreted by them with ease. We received positive comments from the participants that WEMWBS was very easy to understand. Therefore, we did not feel the need to translate WEMWBS to Urdu language.

Sample size calculation

In general terms sample size calculation is based on variability in the sample and the size of effects expected. Usually both of these are unknown before starting the study and figures are estimated from previous studies or sometimes "rules of thumb" based on previous experience are used. Most of the studies on validation of questionnaires in social sciences use 5-10 respondents per questionnaire item for factor analyses [18]. Factor analyses are subject to the strength of

communalities and factor loading and these statistical tests should instead be based on large samples for reliable results [19]. Comrey and Lee recommend at least 500 cases and according to their rating scale a sample size of 1000 or more is considered as excellent for factor analytic studies [20]. Therefore, the data collectors aimed for a sample size of at least 1000 HCPs.

Participants

This cross-sectional survey was carried out from June, 2013 to December, 2014. The study sample consisted of practicing doctors, nurses, physiotherapists, pharmacists and dentists practicing either in hospital based or private settings in various cities of the province of Punjab, Pakistan. Seven districts; Lahore, Faisalabad, Gujrat, Multan, Rawalpindi, Islamabad and Sheikhupura were included in the survey for a study sample that is representative of Punjabi population. However, due to lack of resources and funding, we could not ensure random sampling. Therefore, data was collected by convenience sampling approach. Sixteen medical students (Currently Final year MBBS) were entrusted with the task of data collection on the preformed questionnaire. They underwent a two day workshop on interviewing skills under the supervision of an experienced clinical psychologist. Ethical approval was obtained from the Ethical Review committee of CMH Lahore Medical College, Lahore Cantt, Pakistan. Written informed consent was signed by all participants. The respondents were ensured anonymity and that only group level findings would be reported.

Statistical analysis

All data were analyzed in SPSS v. 21 (IBM Chicago, IL, USA). Frequencies and descriptive statistics were calculated for demographic variables and total scores on WEMWBS. Histograms and QQ-plots were visualized to assess the assumption of normality for WEMWBS scores and

floor and ceiling effects in the response distribution of WEMWBS. Factor analysis with principal component analysis (PCA) and Quartimax rotation method was done to evaluate the construct of WEMWBS. Prior to performing principal component analysis (PCA), its suitability was assessed with following criteria: correlation coefficient > 0.3 for all variables, an overall Kaiser-Meyer-Olkin (KMO) greater than 0.6 and a statistically significant Barlett's Test of Sphericity test ($P < .05$). Number of components to retain were assessed with Cartell's scree plot, eigen values > 1, interpretability criterion, amount of variance explained and reliability analysis.

Only those statements were included that had a factor loading > 0.3. Cronbach's alpha coefficient was calculated to assess the internal consistency of WEMWBS in our study sample and a value of 0.70 - 0.9 was considered acceptable [21]. Total item correlations were used to assess the convergent validity of the questionnaire. Correlations were calculated using Pearson's product moment correlation coefficient, and values ≥0.2 were considered acceptable [21].

Floor and ceiling effects were assessed by examining response patterns for each of the factors derived from factor analysis. Scores were graphed as a histogram and the distribution of scores inspected; the percentage of individuals with the lowest and highest possible score in each of the factors was recorded, and values greater than 20% were considered as floor and ceiling effects.

Although focus groups have been used to evaluate understanding and meaning to participants in previous studies on WEMWBS [17], its readability had not been assessed. Therefore, we used the Flesch Reading Ease score and Flesch-Kincaid Grade level functions to assess the readability of the questionnaire [22].

Results

Demographics

Most of the respondents had a mean age (SD) of 31.7 years (9.4), were females and practicing as doctors in Lahore. Detailed demographics have been presented in Table 1.

Descriptive Statistics and floor or ceiling effects

Mean and median scores (SD) on WEMWBS were 48.1 (9.4) and 48 respectively. The mean scores exhibited mild skewness of -.31 (.07) and kurtosis of .42 (.14). Visual inspection of histogram and QQ plots did not reveal any significant deviation of response distribution from normality. Mean values for individual items ranged from 2.88 (1.1) for “I’ve had energy to spare” and 3.74 (.99) for “I’ve been feeling confident” (Table 2). Histogram representing distribution of mean scores of participants on WEMWBS is given in Fig. 1. Based on these results, it can be concluded that WEMWBS validated for Pakistani population is free from any floor or ceiling effects.

Factor analysis with Principal Component Analysis (PCA)

A principal components analysis (PCA) was run on MWEBS scale. It measured levels of mental well-being in 1271 health professionals. Inspection of the correlation matrix showed that all variables had at least one correlation coefficient greater than 0.3. The overall Kaiser-Meyer-Olkin (KMO) measure was 0.83 with individual KMO measures all greater than 0.7, classifications of 'middling' to 'meritorious' according to Kaiser (1974). Bartlett's Test of Sphericity was statistically significant ($p < .0005$), indicating that the data was suitable for factor analysis. PCA revealed two components that had eigenvalues greater than one and which explained 42.1%% and 8.5% of the total variance, respectively. Eigen values, visual inspection

of the Catell's scree plot, interpretability criterion and Cronbach's alpha value, indicated that one component should be retained. One-component solution explained 42.1% of the total variance. Total score was obtained by summing all of the items. Factor loadings of one-component solution for 14-item WEMWBS are presented in Table 3. Scree plot is given as Fig. 2.

Internal Consistency and convergent validity

The WEMWBS consists of 14 items. The Cronbach's alpha value obtained for one factor structure of WEMWBS was found to be .89. Corrected item correlations of all the items were greater than 0.3, thus, exhibiting the same construct of all the statements of WEMWBS. Item total statistics for all items of WEMWBS is given in Table 4.

Readability

The values for Flesch reading ease and FK grade level score were calculated on Microsoft Word 2013. Flesch reading ease score for 14-item WEMWBS and FK grade level score 73.5 and 4.4 respectively which indicates the easy readability and understanding level of WEMWBS.

Discussion

The present study confirms one factor construct, a high internal consistency, convergent validity, high readability and of WEMWBS in the Pakistani population. It also indicates no floor and ceiling effects exist in response distribution of WEMWBS for Pakistani population. Our study sample consisted of a large sample size of diverse range of healthcare professionals such as

physicians, surgeons, general practitioners, nurses, pharmacists, dentists and physiotherapists which is an important strength of this study.

According to our knowledge, this is the first study validating a scale for assessing mental wellbeing in Pakistan and thus, it is an important addition t o a scarce arsenal of validated psychometric instruments that exist for the Pakistani population. Similar to other studies conducted in the general population of the UK, our analysis has confirmed the unidimensional construct of WEMWBS and a high internal consistency [15,16]. A study conducted among the UK-Pakistani populace also showed a very high internal consistency [17] but the factor structure was less clear. In the UK study the model showed three factors but the second and third factors had Eigen values barely above 1 and a significant drop in variance explained by second and third factor suggested a one factor model. WEMWBS can also prove useful for assessing mental wellbeing of undergraduates due to its easy readability and lucid content as demonstrated by its values for Flesch reading ease and FK grade level score of 4.4. This fact was also supported by favorable comments from the participants in the pilot survey. Based on this data, we can speculate that this scale can be easily used in teenagers, college and university students as well.

Limitations

WEMWBS was not assessed for its test and retest reliability which is an important limitation of this study. Although, it is suitable for assessing mental wellbeing in a diverse range of HCPs, however, it cannot be used for the general population because of two reasons: 1) We did not use the version translated into the Urdu language which is the national language of Pakistan and widely understood by the Pakistani populace, 2) our sample consisted of HCPs only who are generally well educated and capable of reading and writing in English language.

WEMWBS assesses hedonic and eudaimonic constructs of mental wellbeing but does not have any items assessing spiritual and religious wellbeing of an individual which predominate Eastern traditions and culture of Pakistan where religious tendencies have emerged as an important coping mechanism [2,23]. This fact has also been emphasized in a study conducted in ethnic minority groups of Malay, Chinese and Indian Muslims and Hindus [24]. Therefore, it is suggested that new generation of psychometric instruments should include items assessing these constructs as well.

Recommendations

Future studies on mental wellbeing in Eastern cultures should include items assessing spiritual wellbeing in addition to hedonic and eudaimonic constructs. This scale is particularly useful in monitoring mental wellbeing levels of HCPs and medical students working in a highly demanding environment. More studies are required to validate an Urdu version of this scale in the general community. It can also be employed in evaluating efficacy of stress reduction programs such as mindfulness based stress reduction programs, relaxation exercises, cognitive therapies, hypnosis and social support and group therapies that have proven useful in academic and hospital based settings [25].

Conclusion

WEMWBS has demonstrated excellent psychometric properties in Pakistani HCPs and it is a valid and reliable tool for use in Pakistan.

References

1. W.H.O. WHO-AIMS report on mental health system in Pakistan. 2009

2. Waqas A, Zubair M, Ghulam H, Wajih Ullah M, Zubair Tariq M. Public stigma associated with mental illnesses in Pakistani university students: a cross sectional survey. PeerJ. 2014;2: e698. doi:10.7717/peerj.698

3. WHO. Mental Health Atlas. Geneva, Switzerland. 2008.

4. Waqas A, Khan S, Sharif W, Khalid U, Ali A. Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: a cross sectional survey. PeerJ. 2015;3: e840. doi:10.7717/peerj.840

5. Shaw D, Wedding D, Zeldow P, Diehl N. Special problems of medical students. D Wedding (ed) Behavior and Medicine. 2001. pp. 66–84.

6. Nabi N, Yousuf A, Iqbal A. Prevalence of Anxiety and Depression Among Doctors Working in a Private Hospital. ASEAN J Psyhiatry. 2012;13.

7. Wu H, Liu L, Wang Y, Gao F, Zhao X, Wang L. Factors associated with burnout among Chinese hospital doctors: a cross-sectional study. BMC Public Health. BMC Public Health; 2013;13: 786. doi:10.1186/1471-2458-13-786

8. Aslam HD, Mansoor N, Suleman Q. Analysis of Level of Stress among Doctors in Public and Private Hospitals of Pakistan. Int J Learn Dev. 2013;3: 109–135. doi:10.5296/ijld.v3i2.6247

9. Fradelos E, Mpelegrinos S, Mparo C, Vassilopoulou C, Argyrou P, Tsironi M, et al. Burnout syndrome impacts on quality of life in nursing professionals : The contribution of perceived social support. Prog Heal Sci. 2014;4: 102–109.

10. Usman R, Nafees F, Farooqui SI, Faruq NM. Level of satisfaction of physiotherapists with regards to their profession. Pakistan J Rehabil. 2013;2: 41–47.

11. Ahmer S, Faruqui R a, Aijaz A. Psychiatric rating scales in Urdu: a systematic review. BMC Psychiatry. 2007;7: 59. doi:10.1186/1471-244X-7-59

12. World Health Organisation. Promoting Mental Health: Concepts, Emerging Evidence, Practice. Summary report Geneva; World Health Organisation. 2004.

13. Ryan R, Deci E. On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. Annu Rev Psychol. 2001;52: 141–166.

14. HM Government Department of Health. No health without mental health: a cross-government mental health outcomes strategy for people of all ages. [Internet]. 2011. Available: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_124058.pdf

15. Tennant R, Hiller L, Fishwick R, Platt S, Joseph S, Weich S, et al. The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. Health Qual Life Outcomes. 2007;5: 63. doi:10.1186/1477-7525-5-63

16. Clarke A, Friede T, Putz R, Ashdown J, Martin S, Blake A, et al. Warwick-Edinburgh Mental Well-being Scale (WEMWBS): validated for teenage school students in England and Scotland. A mixed methods assessment. BMC Public Health. BioMed Central Ltd; 2011;11: 487. doi:10.1186/1471-2458-11-487

17. Taggart F, Friede T, Weich S, Clarke A, Johnson M, Stewart-Brown S. Cross cultural evaluation of the Warwick-Edinburgh mental well-being scale (WEMWBS) -a mixed methods study. Health Qual Life Outcomes. Health and Quality of Life Outcomes; 2013;11: 27. doi:10.1186/1477-7525-11-27

18. Costello A, Osborne J. Best practices in exploratory factor analysis: four recommendations for getting the most from your analysis. Pr Assess Res Eval. 2005;10: 1–9.

19. MacCallum R, Widaman K, Zhang S, Hong S. Sample size in factor analysis. Psychol Methods. 1999;4.

20. Comrey AL, Lee H. A first course in factor analysis. Hillsdale, NJ: Erlbaum. 1992.

21. Streiner D. Health measurement scales: a practical guide to their development and use. 4th ed. Oxford University Press; 2008.

22. Flesch R. A new readability yardstick. J Appl Psychol. 1948;32: 221–33.

23. Voll JO. Conservative and Traditional Brotherhoods. Ann Am Acad Polit Soc Sci. 1992;524: 66–78.

24. Vaingankar J, Subramaniam M, Chong S, Abdin E, Orlando E, Picco L, et al. The positive mental health instrument: development and validation of a culturally relevant scale in a multi-ethnic Asian population. Health Qual Life Outcomes. 2011;9: 1–18.

25. Shapiro SL, Shapiro DE, Schwartz GE. Stress management in medical education: a review of the literature. Acad Med. 2000;75: 748–59. Available: http://www.ncbi.nlm.nih.gov/pubmed/10926029

Table 1(on next page)

Demographic characteristics of HCPs participating in the survey (n=1271)

Table 1. Demographic characteristics of HCPs participating in the survey (n=1271)

Variable		Frequency (n)	P-value
Gender	Male	551 (43.4%)	< .001
	Female	720 (56.6%)	
Healthcare Profession	Doctor	840 (66.1%)	< .001
	Nurse	218 (17.2%)	
	Pharmacist	53 (4.2%)	
	Physiotherapist	25 (2%)	
	Dentist	135 (10.6%)	
City	Lahore	893 (70.3%)	< .001
	Multan	86 (6.8%)	
	Sheikhupura	54 (4.2%)	
	Gujrat	58 (4.6%)	
	Rawalpindi	101 (7.9%)	
	Faisalabad	54 (4.2%)	
	Islamabad	25 (2%)	
Age	<= 30	805 (63.3%)	< .001
	< 30	466 (36.7%)	

Table 2(on next page)

Item level statistics for WEMWBS for Pakistani HCPs (n = 1271)

Table 2. Item level statistics for WEMWBS for Pakistani HCPs (n = 1271)

Statement	Mean	Std. Deviation
I've been feeling optimistic about the future	3.36	1.109
I've been feeling useful	3.74	.991
I've been feeling relaxed	3.03	1.085
I've been feeling interested in other people	2.97	1.140
I've had energy to spare	2.88	1.113
I've been dealing with problems well	3.53	.959
I've been thinking clearly	3.59	1.034
I've been feeling good about myself	3.58	1.052
I've been feeling close to other people	3.33	1.053
I've been feeling confident	3.74	.999
I've been able to make up my own mind about things	3.72	.992
I've been feeling loved	3.64	1.038
I've been interested in new things	3.58	1.111
I've been feeling cheerful	3.42	1.022

Table 3(on next page)

Factor loadings for 14 item WEMWBS in Pakistani health personnel (n = 1271)

Table 3. Factor loadings for 14 item WEMWBS in Pakistani health personnel (n = 1271)

Statements	Factor Loading	
	I	II
I've been feeling confident	.789	
I've been feeling good about myself	.776	
I've been thinking clearly	.744	
I've been able to make up my own mind about things	.722	
I've been dealing with problems well	.703	
I've been feeling cheerful	.686	
I've been feeling close to other people	.670	
I've been feeling useful	.637	
I've been feeling loved	.625	
I've been interested in new things	.578	
I've been feeling optimistic about the future	.541	
I've been feeling interested in other people	.390	.663
I've had energy to spare	.378	.646
I've been feeling relaxed	.508	.528

Extraction Method: Principal Component Analysis.

Rotation Method: Quartimax with Kaiser Normalization.

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Table 4(on next page)

Item total statistics for 14-item WEMWBS (n = 1271)

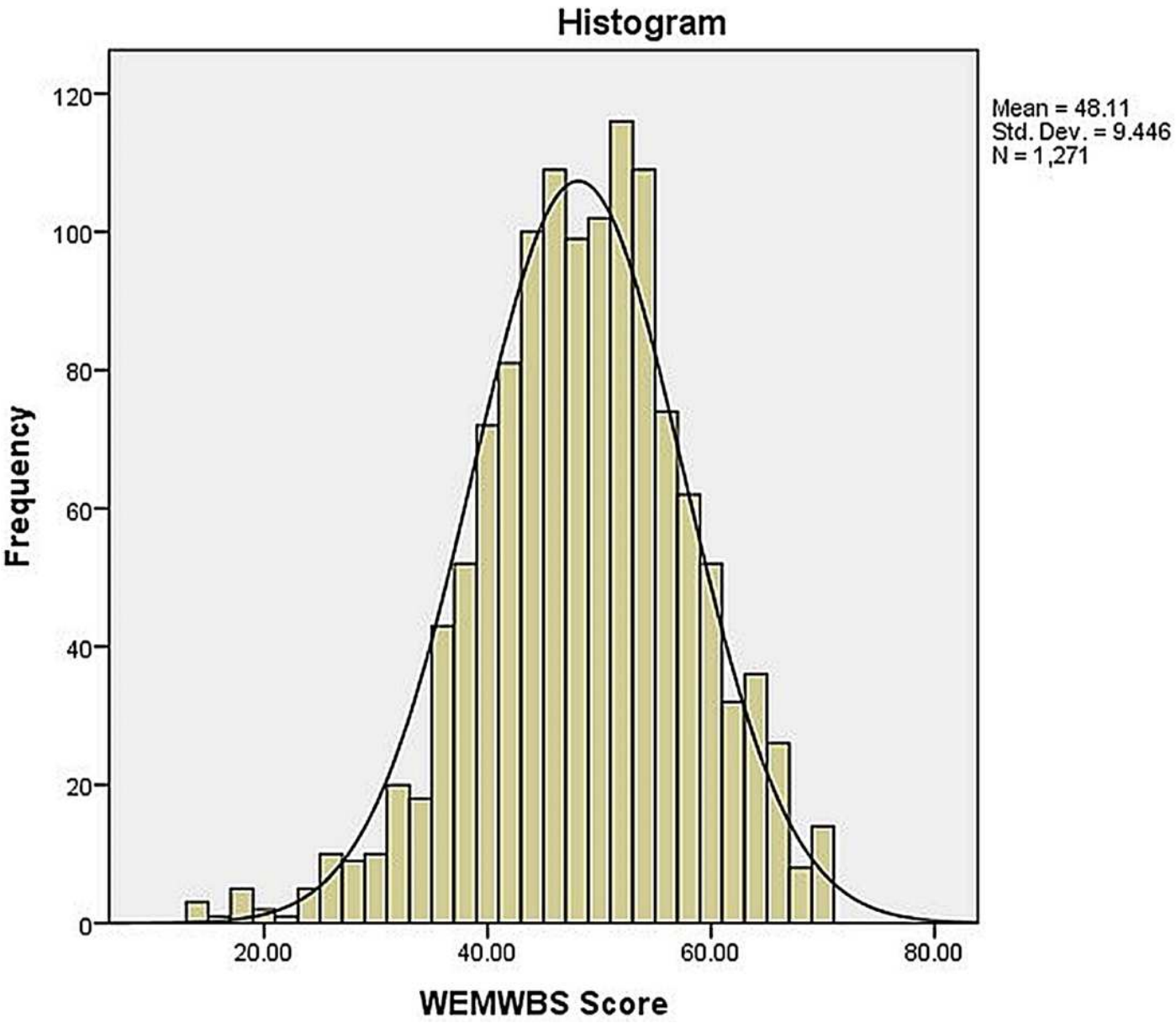
Table 4: Item total statistics for 14-item WEMWBS (n = 1271)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I've been feeling optimistic about the future	44.75	78.422	.488	.293	.887
I've been feeling useful	44.37	78.627	.548	.350	.884
I've been feeling relaxed	45.08	77.650	.544	.355	.884
I've been feeling interested in other people	45.13	78.590	.462	.292	.888
I've had energy to spare	45.23	79.177	.445	.289	.889
I've been dealing with problems well	44.58	77.894	.616	.447	.881
I've been thinking clearly	44.52	76.722	.631	.490	.880
I've been feeling good about myself	44.53	75.597	.684	.525	.878
I've been feeling close to other people	44.78	76.788	.614	.424	.881
I've been feeling confident	44.37	76.938	.644	.518	.880
I've been able to make up my own mind about things	44.39	77.959	.587	.421	.882
I've been feeling loved	44.47	78.118	.547	.348	.884
I've been interested in new things	44.52	77.251	.550	.352	.884
I've been feeling cheerful	44.69	76.463	.656	.492	.879

2

1

Frequency distribution of total scores of Pakistani HCPs on WEMWBS (n = 1271)



2

Scree plot for 14-item WEMWBS