



CER Comparative European Research 2015

Proceedings | Research Track

of the 4th Biannual
CER Comparative European Research
Conference

International Scientific Conference for Ph.D. students of EU countries

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Published in November, 2015 by Sciemcee Publishing, London.

Proceedings document published in collaboration with SCIEEMCEE - Scientific Conference Platform.
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ISBN 978-0-9928772-8-6



VALIDITY AND RELIABILITY OF SINGLE-ITEM SELF-REPORT MEASURES OF GENERAL QUALITY OF LIFE, GENERAL HEALTH AND SLEEP QUALITY

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Abstract: *Different aspects of quality of life are important variables in the study of wellbeing and psychosocial functioning. For that reason, measurement of quality of life is indispensable in any researches related to health or wellbeing, which are often large scale surveys, frequently including repeated measurements. Hence, valid and easily applied measures are essential. Self-report questionnaires of different aspects of quality of life are often lengthy, which may result in a substantial burden to participants and a threat to the validity of measurement due to the effects of fatigue. To overcome these difficulties validity and reliability of single-item, self-report measures of general quality of life, general health and sleep quality were examined in a sample of 1451 university students. These three measures were administered in a subsample of 135 students on two occasions with three weeks interval between them. Intraclass correlation coefficients (ICC) for test-retest reliability were mostly high and all were satisfying, .86 for general quality of life, .72 for general health and .81 for sleep quality. All measures were related in predictable ways to perceived stress, depressiveness, anxiety, loneliness and daily hours of sleep. The study provides evidence for the validity and reliability of these single-item measures. These scales are potentially convenient measures of general quality of life, general health and sleep quality in large surveys.*

Keywords: *reliability, health, quality of life, single-item scale, sleep*

1. Introduction

Quality of life is one of the most important variables in the study of the overall mental wellbeing. Usually it is associated with health, success in personal life, self-esteem, satisfactory social contacts, and the ability to cope with difficult situations [1]. For example, in medicine, epidemiological measures used so far became insufficient to assess a more complete picture of many illnesses. Therefore, the quality of life assessment was introduced to medical science, and it is used among others to predict the consequences of many disorders [2].

Another factor which has a huge impact on physical and psychological health is the quality of sleep. It is particularly relevant to psychological wellbeing. Factors related to anxiety and stress are one of the most important concomitants of sleep complaints in general population [3]. There is some support for the relationship between measures of well-being and good sleep quality [4]. Studies examining sleep quality have found a positive relationship between good sleep quality and self-reported health [5].

Cognitive studies continue to show that physical condition affects the way people interpret their environment. That includes the way of thinking about their bodies as well. Health is a crucial area of life, so every precariousness about it can interrupt self-regulation of a person and turn into anxiety. Negative evaluation of one's own health often results in visiting a doctor. Subjective assessment of persons health is, next to physicians opinion, the most complete information about one's physical well-being.

Each of these dimensions of psychological wellbeing demand proper research tools which would not be time consuming, especially when surveying large numbers of people. The quality of life, general health and sleep quality are good predictors of various disorders. The information

about these aspects of wellbeing can be used in the prophylaxis.

Recently published study showed that different aspects of wellbeing may be also crucial variables in educational research. A newly established construct of study addiction shows that learning may be unhealthy [6], and consequently there is a need for short and convenient measures of quality of life, general health and quality of sleep in educational research. These studies often require large samples and encompass multitude of relevant variables including socioeconomic background, school or university environment, personality, cognitive functioning, different learning attitudes and behaviours, school or academic performance, and diverse measures of wellbeing and health [7, 8, 9, 10, 11, 12].

2. General quality of life

The quality of life is defined as an individual way of perceiving own position in life in the context of the culture and value systems in which people live and in relation to their goals, expectations, standards and concerns [13]. Researches show that quality of life could be an effective prognostic indicator of treatment success. For instance, patients with a good quality of life at the beginning of treatment benefit from it far more than those with a poorer baseline score [14]. Additionally, quality of life was negatively related to anxiety and depression, and it was found to be positively associated with social support [15, 16]. Studies also showed the relationship between physical, functional capacity and quality of life [17]. Moreover, stress plays a significant role in evaluating quality of life, explaining a significant amount of the variance of all of its aspects [18]. This characteristic of well-being is commonly measured by *The World Health Organization Quality of Life Questionnaire*, which is

especially used in a large epidemiological surveys, clinical settings and clinical trials [19]. In this context quality of life is reflected by its four domains: physical, psychological, social and environment. It is designed for use in a wide spectrum of psychological and physical disorders.

3. General health

Health can be understood as “a state of physical, mental, and social well-being and not merely the absence of disease or infirmity” [20]. Health status is related with many factors, including individual factors, living and working conditions, general socioeconomic, cultural and environmental conditions, and access to health care services [21]. It is important to examine people's general health because it detects a wide range of psychological disorders, including the anxiety/depression spectrum [22].

4. Sleep quality

Sleep quality represents a complex phenomenon, which includes quantitative aspects of sleep, such as sleep duration, sleep latency, or number of arousals, as well as more purely subjective aspects, such as “depth” or “restfulness” of sleep. Sleep quality, relative to sleep quantity, is better related to health, affect balance, satisfaction with life, and feelings of tension, depression, anger, and fatigue. Therefore it is postulated that health care professionals should focus on sleep quality in addition to sleep quantity in their efforts to understand the role of sleep in daily life [23]. Most anxiety disorders are moderately associated with reduced sleep quality [24]. There is also evidence of its relation with loneliness, for example in research conducted by Cacioppo and associates lonely, relative to non-lonely, participants were characterized by significantly lower subjective sleep quality [25]. Most common measure of sleep quality is *Pittsburgh Sleep Quality Index (PSQI)*, a 19-question self-report questionnaire that assesses the sleep quality over a one-month time frame.

5. Single-item scales

Single item scales are increasingly more often used, especially in large surveys, possibly including repeated measurements, in which there is necessity for controlling multitude of different variables. Frequently they prove to be reliable and valid tools. Slowly recommendations and guidelines on the usage of single-item measures are being developed [26]. Gradually, the use of ultra-brief scales becomes more common practice in health research [27, 28, 29], marketing research [30], and educational research [31]. Still, it has to be emphasized that not always single-item measures are best solution. In some contexts their performance is significantly inferior to multi-item questionnaires, e.g. in studies on sexual satisfaction and behaviors [32]. Consequently, it is highly recommended to thoughtfully think through advantages and disadvantages of the use of single-item measures in a specific research setting, following current data available on the subject.

One of the reasons which make single-item measures useful tools, which can be applied in statistical testing of complex models, is the fact that analysis of Likert response format data at the item level is statistically robust [33, 34]. Nevertheless, in cases in which single-item measures are used it is recommended to use more stringent alpha level in order to make cautious statistical decisions.

On the basis of previous theoretical frameworks and empirical research into quality of life, health and sleep, it is hypothesized that: (H1) quality of life, general health and sleep quality are negatively related to perceived stress, depressiveness, anxiety, and loneliness, and (H2) positively related to hours of sleep, especially sleep quality which is, relative to quality of life and general health, most strongly related to this variable.

6. Methods

Participants. A total of 1451 students from different universities in Pomerania Region in Poland took part in the study, 675 men (46.5%) and 751 women (51.5%), 25 (1.7%) persons did not report gender, with mean age of 21.75 years (SD = 3.11). Students were from different faculties, courses of study, years and modes of study. One hundred thirty five participants took part in test-retest procedure, 87 females and 77 males, 5 persons did not report gender, with mean age years $M = 21.17$, $SD = 1.86$.

Measures. Three single-item, self-report measures were developed on the basis of items from WHOQOL Bref scale [19]. Originally used 5-point response scales have been modified to 9-point response scales, in compliance with recommendations to use at least 7-point Likert format response data when conducting statistical analyses on single item measures [33]. General quality of life was measured by question: “How would you rate your quality of life?” with 9-point response scale, from 1 - “Very poor” to 9 - “Very good”. General health was measured by question: “How satisfied are you with your health?” with 9-point response scale, from 1 - “Very dissatisfied” to 9 - “Very satisfied”. Sleep quality was measured by question: “How satisfied are you with your sleep?” with 9-point response scale, from 1 - “very dissatisfied” to 9 - “Very satisfied”. Other measures were widely used valid and reliable scales adapted in Poland. Perceived stress was measured with *Perceived Stress Scale (PSS-4)*, a 4-item, 5-point Likert response format scale [35]. Depressiveness and anxiety were measured by *Hospital Anxiety and Depression Scale*, which includes 14 items with 4-point response format, seven items for anxiety and seven for depression [36]. Loneliness was measured by *Short Loneliness Scale*, which includes three items with 3-point response format [37].

Procedure. Data collection used opportunistic sampling. Students were invited to participate anonymously in the study during lectures or classes. More than 90% of all present students agreed to do so. Ninety one percent of participants filled in ‘paper and pencil’ questionnaires and nine percent of students completed online versions of the questionnaires. The study took place from 2013 to 2015. General quality of life, general health and sleep quality were measured on two occasions with three week interval

between them. Anonymous way of coding participants was applied in order to match responses from both measurement occasions. Participation in the study was anonymous and no monetary or other material rewards were offered to the participants.

Statistical analyses. Intraclass correlation coefficient (ICC) along with the 95% confidence interval (CI) was used as a measure of test-retest reliability [38, 39]. Means, standard deviations, percentages and correlation coefficients were calculated. All statistical analyses were conducted in IBM SPSS 22.

7. Results

The three measures were highly intercorrelated: correlation of general quality of life ($M = 6.72$; $SD = 1.36$) with general health ($M = 5.88$; $SD = 2.09$) was $r = .40$, $p < .001$, and with quality of sleep ($M = 5.55$; $SD = 2.10$) it was $r = .35$, $p < .001$. The correlation between general health and quality of sleep was $r = .44$, $p < .001$. An intraclass correlation coefficient (ICC) of .86 (95% CI = .81-.90, $p < .001$) was obtained for general quality of life, .72 (95% CI = .60-.80, $p < .001$) for general health and .81 (95% CI = .74-.87, $p < .001$) for sleep quality. These results on test-retest reliability correspond to previously reported coefficients measured in a smaller subsample [6]. Means, standard deviations and correlations of general quality of life, general health and quality of sleep with studied variables are presented in table 1.

Table 1. Means, standard deviations and correlations of general quality of life, general health and quality of sleep with perceived stress, depressiveness, anxiety, loneliness and hours of sleep

Scale	M (SD)	General quality of life	General health	Sleep quality
Perceived stress	10.53 (3.05)	-.39**	-.31**	-.31**
Depressiveness ^a	13.88 (4.13)	-.46**	-.33**	-.36**
Anxiety ^a	12.00 (3.88)	-.40**	-.36**	-.36**
Loneliness	4.60 (1.71)	-.37**	-.22**	-.22**
Hours of sleep	7.24 (1.67)	.09**	.06*	.29**

* $p < .05$; ** $p < .01$

^aSubsample of 1074 students, 481 men (44.8%) and 572 women (53.3%), 21 (2.0%) persons did not report gender, with mean age of 21.77 years ($SD = 3.24$).

8. Conclusions

The study provided evidence for good test-retest reliability of single-item measures of quality of life, general health and sleep quality. The results suggest that subjective evaluations of quality of life and sleep tend to be more stable in time than subjective assessment of general health. The measures were moderately interrelated indicating that they share common variance but they are also independent to a significant degree.

The obtained data on concurrent validity also provided initial support for the construct validity of the measures.

All hypotheses were substantiated and the measures related in predictable ways to the indicators of wellbeing measured by widely used, valid and reliable psychometric tools. Quality of life, general health, and quality of sleep were negatively related to perceived stress, depressiveness, anxiety and loneliness, and they were positively related to daily hours of sleep. Sleep quality was significantly more strongly related to hours of sleep than quality of life and general health. These results also supported previous findings that quality and quantity of sleep are overlapping but different characteristics of sleep and researchers should not equate them.

The results provided support for the validity and reliability of the measures of quality of life, general health and sleep quality. These measures are very quick to fill and therefore low-burden and low-cost measurement options, and can be easily applied in large surveys when important aspects of wellbeing and quality of life have to be measured along with many other variables. They can prove to be convenient in studying relationships between constructs and controlling important variables in complex models. On the other hand, the scales are not useful in precise individual evaluation of quality of life, general health or sleep for the purposes of diagnosis or direct comparison between individuals. The biggest strengths of the study are large and heterogeneous sample of university students and the use of widely applied, valid and reliable psychometric tools for measuring different aspects of wellbeing and psychosocial functioning. The main limitation of the study is a lack of data on the convergent validity with widely used, valid and reliable measures of quality of life, general health or quality of sleep. The future studies should investigate this type of validity also using different methods of measurement, such as observation or experience sampling methodology. There is also need for data on discriminant validity, as well as predictive validity of these measures. Direct comparisons with multidimensional multi-item scales of quality of life, general health and sleep quality in terms of their predictive value will enable more adequate evaluation of the usefulness of these brief measures. Research on more representative samples is also necessary.

Acknowledgements

Grant: Grant badawczy w ramach projektu młodych naukowców i uczestników studiów doktoranckich Uniwersytetu Gdańskiego. Number of grant: 538-7422-B121-13 in 2013 and 538-7422-B450-14 in 2014. On the basis of decision number DEC-2013/08/T/HS6/00403 the author (Paweł Andrzej Atroszko) received funds from National Science Centre Poland within doctoral scholarship for preparing PhD dissertation.

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