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Measuring and Valuing Health Benefits for Economic Evaluation in Adolescence: An Assessment of the Practicality and Validity of the Child Health Utility 9D in the Australian Adolescent Population

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ABSTRACT

Objectives: The Child Health Utility 9D (CHU9D) is a new generic preference-based measure of health-related quality of life developed for children aged 7 to 11 years. There is increasing interest in its potential for application in adolescents, and previous research has demonstrated that it shows good construct validity here. This article further examines its practicality and validity in adolescents by comparing it with KIDSCREEN-10, a short generic measure for assessing children and adolescents' health-related quality of life and well-being. **Methods:** A Web-based survey, including the CHU9D, a general health question, questions on the presence of long-standing illness, disability, or medical conditions, sociodemographic variables, and KIDSCREEN-10, was administered to 961 consenting adolescents. The practicality and face and construct validity of the CHU9D were examined, and the CHU9D and KIDSCREEN-10 were compared in terms of their coverage, correlations between dimensions, and overall scores. **Results:** Both measures demonstrated good practicality and validity. The strongest degree of correlation was found with the only dimension in common for the CHU9D and KIDSCREEN (sad). The lowest correlations were found between all the CHU9D dimensions and the "have you had enough time for yourself" dimension of KIDSCREEN-10. **Conclusions:** The findings from this study provide further support for the practicality and validity of the application of the CHU9D in the economic evaluation of adolescent health care and public health programs. Further research to test the psychometric performance of the CHU9D in more diverse clinical samples of adolescents is desirable including tests of reliability.

Keywords: adolescent, health-related quality of life, utility, validation.

Introduction

Economic evaluation of child and adolescent health care and public health interventions is receiving increasing interest, for example, in the prevention of obesity and the role that economic evaluation can play [1]. Until recently there has been a paucity of reliable and valid instruments available to measure self-reported health status in this age group, in particular preference-based measures (PBMs) that allow the calculation of quality-adjusted life-years (QALYs) [2]. PBMs offer a key advantage over many other existing measures of pediatric and adolescent quality of life as they allow the calculation of QALYs. QALYs are commonly used as the denominator in a particular form of economic evaluation, cost-utility analysis, which allows for comparison both within and across clinical areas [3]. This makes them extremely useful for health care resource allocation decision making. Measures that do not allow the calculation of QALYs such as the PedsQL [4] and KIDSCREEN-10 [5], although widely validated, are more limited in terms of their usefulness in economic evaluation and health care resource allocation decision making. Historically, no PBM has been demonstrated to be valid and reliable in children of all ages. This has meant that often a wide variety of measures and approaches have been used, including the use of proxy measures, adult measures, or even expert opinion [2]. Proxy measures are not desirable, as the ideal in health status measurement is for the patient to self-complete as it is increasingly recognized in clinical trials and health services research that descriptions of the experience of a health state should be elicited from the patients to reflect the actual experience of the disease and its treatment [6]. In addition, if a child can provide reliable and valid data, then self-report is the optimal [7]. Adult PBMs such as the EuroQol five-dimensional (EQ-5D) questionnaire [8] or the six-dimensional health state short form (derived from short form 36 health survey) [9] may not be suitable for young people as they may contain dimensions that are irrelevant for this age group or may not include those that are relevant and hence not capture important health-related quality-of-life (HRQOL) effects of treatments or interventions [10]. There is a growing recognition that the use of adult instruments may not be appropriate in children and adolescents, and recently work has been undertaken to develop new instruments specifically for the population in question [2].

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While a number of non-PBMs of HRQOL for children and adolescents (e.g., the PedsQL [4]) have been developed and are widely utilized internationally, until recently the only PBM suitable for application in this age group was the Health Utilities Index 2 [11]. Since then, three more PBMs have been developed for application in children and young people—the EQ-5DY [12], the assessment of quality of life (AQOL)-6D [13], and the Child Health Utility 9D (CHU9D) [10]. The EQ-5DY has been derived from the existing adult measure, the EQ-5D questionnaire [8], and conceptually contains the same five dimensions, the only difference being that the language has been adapted so that it can be understood by young people [12]. The developers recognize that it may not be applicable to apply the existing adult preference weights to calculate QALYs, and they also recognize that work needs to be done to ensure the content validity for this age group, that is, whether the measure contains all aspects of HRQOL that are important to children and adolescents [12]. It is essential to demonstrate that the descriptive system is valid and reliable prior to the development of preference weights [12]. The AQOL-6D was also adapted from an adult PBM. A previous article in this journal reported on this adaptation process (which included some reduction of dimensions by removing those deemed to be unsuitable for adolescents and slight changes in phraseology to others) and the development of preference weights for the AQOL-6D directly from adolescents [13].

The CHU9D is a new generic PBM of HRQOL for application in the economic evaluation of health care interventions in young people. In contrast to other PBMs for application in this age group, the CHU9D was developed from scratch rather than representing an adaptation of an existing instrument and was developed exclusively with children [10]. It contains nine dimensions (worried, sad, pain, tired, annoyed, schoolwork/homework, sleep, daily routine, and activities), each with five levels and is designed to be self-completed by the young person [14]. It was originally developed for application with children in the 7- to 11-year-old age group [10], but there is increasing interest in the potential for its application with children in older age groups. Recently, work has been undertaken to test its validity in an Australian adolescent population in relation to the existing widely used utility measure, the Health Utilities Index 2 [15]. It was found that the CHU9D demonstrated good practicality and good face and construct validity in this population.

KIDSCREEN-10 is a generic measure of HRQOL and well-being for application with young people aged 8 to 18 years that was developed simultaneously in several different countries. It is designed as a self-report measure that is applicable for both healthy and chronically ill young people. Because of its development and testing in many countries [16], it is viewed as a cross-national measure. The KIDSCREEN-10 index was derived from the longer 27-item version, which was, in turn, derived from the 52-item version. It allows the calculation of a global HRQOL score and usually takes 5 minutes for completion. It consists of 10 items, each with five response categories. The measure has demonstrated good internal consistency reliability and test-retest reliability and has been shown to be able to differentiate between different groups [5].

Although KIDSCREEN-10 in its present form is not suitable for application in economic evaluation, it has been widely validated across several European countries with children and adolescents aged 8 to 18 years with a sample size of 22,830 [16]. This means that it is a useful instrument for comparison when assessing the validity of other instruments that may be applicable in this age group.

In this article, we continue the work in testing the validity of the CHU9D in an adolescent population undertaken by Ratcliffe et al. [15] by further examining the practicality and validity of the CHU9D in relation to KIDSCREEN-10. We also compare the CHU9D and KIDSCREEN-10 in terms of their coverage and correlation.

Methods

A Web-based survey was developed for administration to a community-based sample of adolescents aged 11 to 17 years living in Australia. The survey was administered in collaboration with an independent market research company who has an existing online panel of parents who have given approval for their children to participate in research studies and have provided information on their home address, age, and gender. Parent and adolescent dyad consent was required prior to participation in the survey. Once consent from both parties was obtained, the adolescents were asked to complete a survey that included the CHU9D, a self-reported general health question with five response options (excellent, very good, good, fair, and poor), sociodemographic variables (gender, age, and socioeconomic status as measured by the Family Affluence Scale [FAS]), the KIDSCREEN-10 instrument, and whether they had a long-standing disability, illness, or medical condition. In addition, participants were asked to answer a series of Best Worst choice discrete choice experiment questions that we have reported previously in a separate article [17]. The time taken to complete the survey was recorded as well as the respondents' rating of how difficult they found the survey to complete.

The individual responses to the nine CHU9D questions were converted to utilities (on the 0–1 dead–perfect health QALY scale) by using the existing UK adult general population algorithm developed by Stevens [18], which is based on the standard gamble method of health state valuation. The responses to KIDSCREEN-10 items were first summed to give a score, with each question scoring 5 for the best level and 1 for the worst. This gives a maximum sum score of 50 and a minimum of 10. These sum scores were then converted to a score by assigning Rasch person parameters to each possible sum score. The person parameters were transformed into values with a mean of 50 and an SD of approximately 10 [19]. A low score indicates a poor HRQOL, and a high score indicates good HRQOL.

The practicality and face validity of the CHU9D were examined by assessing the time taken to complete the survey, the response and completions rates, and how difficult respondents found the survey. Construct validity was examining the extent to which the CHU9D was able to discriminate between groups with known health differences (where these data were available). We tested to see whether the CHU9D could discriminate by the adolescents' overall rating of their general health, whether it could discriminate between those who had a long-standing disability, illness, or medical condition or not, and whether it could discriminate between those who had a KIDSCREEN-10 score lower and higher than the median by comparing the mean utility of these two groups. Those respondents who rated their health higher on the general health rating question would be expected to have higher utility scores on the CHU9D. This measure of self-rated health has been previously used in large surveys of adolescent health and has been shown to be a valid measure of subjective health [20]. Similarly, adolescents who have a long-term disability, illness, or medical condition would be expected to have a lower utility score than those who don't, and the group who has a KIDSCREEN-10 score lower than the median would be expected to have a lower mean utility. We tested all these differences to see whether they were statistically significant.

The relationship between the CHU9D and KIDSCREEN-10 and a number of sociodemographic variables (gender, age, and socioeconomic status) was also investigated where the data were available. Kolmogorov-Smirnov tests indicated that both the CHU9D and KIDSCREEN-10 were not normally distributed. Therefore, nonparametric tests were used to test for difference between groups. Respondents were split according to age in