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Physical and Psychosocial Concept Domains Related to Health-Related Quality of Life (HRQL) in 50 Girls and 52 Boys Between 5 and 18 Years Old in Poland Using the Parent-Reported 50-Item Child Health Questionnaire (CHQ-PF50)

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
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Background: We used the parent-reported 50-item Child Health Questionnaire (CHQ-PF50) to evaluate parental by-proxy responses regarding 102 healthy Polish children and adolescents, aged 5 to 18 years, in 13 physical and psychosocial concept domains linked to health-related quality of life (HRQL) to determine which domains pose the greatest limitations to health.

Material/Methods: Participants were 50 healthy female and 52 healthy male school children (nursery, primary, junior-high, and high), selected randomly and found eligible from 585 participants originally recruited; participants with diseases/ailments and incomplete questionnaires were excluded. The CHQ-PF50 has 50 questions divided into 13 domains that represent physical and mental well-being; parents gave their retrospective responses from memory. Scores were expressed numerically using a standard algorithm and ranged from 0 to 100; higher scores represented more favorable HRQL outcomes. Summary statistics were performed, and age and sex effects were assessed.





Results: Mean HRQL domain scores never attained 100 (maximum value). They were lowest ($P < 0.004$) for domains of Family Cohesion (66.57), Parental Emotional (77.21), and General Health Perceptions (75.41), while highest (but still significantly < 100 , $P < 0.047$) in Physical Functioning (97.11), Role/Social Emotional-Behavioral (96.51), and Role/Social-Physical (96.24). Neither age nor sex significantly affected domain scores. Outcomes were comparable to European and US studies but differed from a previous small-scale Polish study.

Conclusions: None of the CHQ-PF50 domain mean values reached the maximum in apparently healthy Polish children. HRQL was lowest in Family Cohesion, Parental Emotional, and General Health Perceptions. Outcomes are considered a useful control baseline in Polish studies on disease.

Keywords: Child Health • HRQL • Questionnaire • Parents • Quality of Life

Abbreviation: **CHQ-PF-50** – Child Health Questionnaire – Parent Form 50; **HRQL** – health-related quality of life; **STAND** – assessment of the general condition of the child; **PF** – physical functioning; **REB** – role/social emotional-behavioral; **RP** – role/social-physical; **BP** – bodily pain/discomfort; **BE** – general behavior; **MH** – mental health; **SE** – self esteem; **GH** – general health perceptions; **PE** – parental impact-emotional; **PT** – parental impact-time; **FA** – family limitations in activities; **FC** – family cohesion

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Background

Evaluating quality of life is seldom straightforward when considering all criteria relevant to the well-being of any given participant [1,2]. The World Health Organization (WHO) has defined quality of life as 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]. This definition includes areas such as levels of freedom/independence, mental health, physical health, social belonging, the environment, and beliefs (religious systems/convictions/viewpoints) [1-3]. Since then, the term “health-related quality of life” (HRQL) has been introduced into the medical field, because of the wide range of factors covered when defining quality of life [1,2].

Relationship Between Quality of Life and Health Status

In the 1940s, the WHO defined health not only as an absence of illness, but also by physical and mental well-being along with social belonging [3]. The HRQL, however, includes those areas of life directly concerned with patient health [2]. Other factors had not been analyzed [2], such as freedom, income level, or the quality of the natural environment. In the 1970s, the holistic approach was embraced by the medical establishment and generated an interest in the HRQL concept within medicine [4]. Any therapeutic process in a patient should, as much as possible, include an active lifestyle and resemble that of a healthy person [1,2].

The concept of an HRQL was first introduced by Schipper in the 1990s [1,2] and was defined as “the functional effects of an illness and its consequent therapy upon a patient, as perceived by the patient” [3]. The following are included in the HRQL: mental state, physical condition, mobility, social status, and social acceptance. Because of their multiplicity, attempts have so far failed to construct any universal research instruments or tools that cover all factors known to be capable of influencing quality of life [5]. Specific clinical situations and areas of functioning in life that affect quality of life require specific questionnaires for evaluation [6]. Generally speaking, questionnaires can be divided into either generic or specific measures.

Generic Measures

These general questionnaires are used to study the many aspects of health and usually cover many HRQL domains, including physical, emotional, and social functioning. Because of their wide-ranging application, general questionnaires are, however, unsuitable for detecting all significant changes in a patient [4-7]. General purpose questionnaires can be further subdivided into 2 areas: First, health profiles that attempt to assess all important areas within the HRQL consist of multiple

questions grouped into categories that make up the concepts (domains). The results and their grading and scores are presented on a point scale [4-7]. Second is measuring utility (value, satisfaction) in not only assessing health status but, above all, in focusing on its value and worth to the patient. Such outcomes are transformed into a numerical scale ranging between 0.0 (death) and 1.0 (full health) [6]. For example, they are used to investigate the costs incurred by any given treatment or therapy [7-10].

Specific Measures

Questionnaires with specific measures are designed for investigating any given disease entity or individual symptoms. They are intended to analyze those areas of HRQL that are of particular importance to a study group [11-15]. Such questionnaires can be population-specific and applied, for example, to a specific age group, such as adolescents; to those in any given condition at a given moment, such as sleeping; to those with a certain disease, such as diabetes; or to those experiencing any given symptom, such as deafness.

Using an HRQL Questionnaire

The aim of any study on quality of life dictates the choice of an appropriate questionnaire [14-16]. General purpose questionnaires are used for studying large populations with various pathologies and have enabled comparisons to be made between studies, irrespective of the size of the study groups or whether patients were in good health or had illnesses [14,17,18]. It is worth emphasizing that general purpose questionnaires are not applicable to assess any slight changes in a single patient [11-19].

Specific HRQL research questionnaires have thus been created whenever there are specific issues to be investigated. These kinds of questionnaires are much more sensitive in detecting changes which occur over time and they provide information about effectiveness of treatment or the evolution of disease. Nonetheless, they are not suited for evaluating individuals with comorbidities [15-19]. The assessment of quality of life is increasingly recognized as being a part of a patient’s clinical condition and the effectiveness of subsequent therapy, including in children.

It is therefore important to establish a baseline for quality of life determinants in healthy children. HRQL studies on healthy children have been conducted in numerous countries using the parent-reported 50-item Child Health Questionnaire (CHQ-PF50), which has mean scores ranging from 57 to 98 in the domain areas studied [6]. Please note that only 1 study has ever been published in Poland on HRQL in healthy children using the CHQ-PF50 [20]. This study, however, was performed on a small

group of participants (n=13) and therefore has limited value in terms of evidence-based medicine. Furthermore, its outcomes differ from those reported in the literature from other parts of the world on HRQL in healthy children. Our study has been conducted on a much larger group (n=102), and hence, statistically has a much greater value in evidence-based medicine.

The purpose of our study was to evaluate the 13 physical and psychosocial concept HRQL domains in healthy children, via their parents, and to provide a reference point (or baseline) against which HRQL can be compared with studies in children with various clinical conditions in Poland, which we have either conducted or intend to conduct in the future. This will therefore allow us to determine which HRQL concept domains to target so that the greatest benefit could be achieved in modifying and complementing therapeutic interventions for childhood diseases and conditions [21].

HRQL has been studied in Polish children but by using only study-specific questionnaire tests [20], thereby making it impossible to compare results between patients with various diseases and conditions with each other and with healthy children. Our study was thus performed using a general purpose questionnaire to make such comparisons possible, asking parents to retrospectively respond from memory on the relatively recent status of their children's health. As we mentioned, such a study was performed in Poland in 1998-2000, but only on a small group of children, and the outcomes differed from other published studies [20]. The CHQ-PF50 is an all-purpose research instrument that psychometrically measures the emotional and physical well-being of participants between the ages of 5 and 18 years [6], according to parental responses. Developed in the United States [21], the CHQ-PF50 has been used to measure HRQL since 1994 for healthy and sick children [1,2] and was subsequently validated by a large-scale study on Australian children [6]. It is also recognized that a suitably conducted quality of life study on healthy children can serve as a benchmark for other studies investigating the quality of life in children who have various acute and chronic diseases [21]. The present study was designed, first, to determine whether the quality of life scores were equal to a maximum value of 100 and, second, to determine which areas of quality of life posed the greatest limitations for healthy Polish children. A control baseline can thus be established for use in studies in those with disease.

Therefore, this study aimed to evaluate the physical and psychosocial concepts related to HRQL in a suitably large and appropriate group of apparently healthy children; 50 girls and 52 boys aged 5 to 18 years in Poland by using the CHQ-PF50 questionnaire.

Material and Methods

Study Group Participants

The study received bioethics committee approval (KBO/12/11) from the Bioethics Commission at the Warsaw University of Medicine (*Komisja Bioetyczna przy Warszawskim Uniwersytecie Medycznym*). Parents or legal guardians gave their written informed consent that their children could be involved in the study, albeit indirectly. Initially, 585 children and adolescents were recruited at random from randomly chosen schools, comprising nursery, primary, junior high, and high schools. Eligible participants were aged 5 to 18 years, while those excluded were outside this age range, had acute or chronic childhood diseases, or had incomplete questionnaires. Participants underwent a physical examination and a medical history review; 135 were rejected for not fulfilling the admission criteria and were referred to outpatient care. CHQ-PF50 questionnaires were then given to the parents of the remaining 450 participants, of which 102 were deemed healthy children.

Study Methods

The CHQ-PF50 questionnaire was used in this study to evaluate the children's HRQL status of physical and mental well-being. In the CHQ-PF50, a total of 13 physical and psychosocial concept domains are divided into 50 questions, which were answered by the children's parents [6]. The questionnaire domains consist of Assessment of the Child's General Condition (STAND), Physical Functioning, Role/Social-Emotional/Behavioral, Role/Social-Physical, Bodily Pain/Discomfort, General Behavior, Mental Health, Self-Esteem, General Health Perceptions, Parental Impact-Time, Family Limitations in Activities, and Family Cohesion. These areas are precisely defined with their methods of testing in the CHQ user's manual [6]. Response times varied depending on the questions posed. There was no specific timeframe used on General Health Perceptions and Family Cohesion, and a comparison was made between the present health status and that of a year ago. The remaining question groups were confined to evaluating the prior 4 weeks based on the parents' retrospective memory of their children's health status. Each reply was expressed numerically using the following algorithm: summed values were obtained as a ratio to the number of answered questions, from which the lowest value found possible was subtracted and then divided by the range of possible outcomes. Final scores ranged from 0 to 100 [20], whereby better life functioning and well-being had higher scores, with a maximum score of 100.

Statistical Analysis

The Statistica software program was used to analyze data. There were 15 variables, of which 14 were expressed on an interval scale (the 13 physical and psychosocial concept domains plus

Table 1. The effect of age on continuous variables and significance of domain score differences from the maximum score of 100.

	Median age	Mean age	Minimum age (years)	Maximum age (years)	Chi-square	Significance of differences from score of 100
n=102					P	P
STAND	10.00	10.58	5.00	18.00	0.2788	0.0399
PF	10.00	10.58	5.00	18.00	0.2729	0.0472
REB	10.00	10.58	5.00	18.00	0.1793	0.0328
RP	10.00	10.58	5.00	18.00	0.2191	0.0155
BP	10.00	10.58	5.00	18.00	0.3215	0.0351
BE	10.00	10.58	5.00	18.00	0.4932	0.0095
MH	10.00	10.58	5.00	18.00	0.2520	0.0054
SE	10.00	10.58	5.00	18.00	0.1703	0.0220
GH	10.00	10.58	5.00	18.00	0.3713	0.0000
PE	10.00	10.58	5.00	18.00	0.1816	0.0041
PT	10.00	10.58	5.00	18.00	0.5153	0.0319
FA	10.00	10.58	5.00	18.00	0.6411	0.0251
FC	10.00	10.58	5.00	18.00	0.2584	0.0000

STAND – Assessment of the general condition of the child; PF – physical functioning; REB – role/social emotional-behavioral; RP – role/social-physical; BP – bodily pain/discomfort; BE – general behavior; MH – mental health; SE – self esteem; GH – general health perceptions; PE – parental impact-emotional; PT – parental impact-time; FA – family limitations in activities; FC – family cohesion.

age) and 1 on a nominal scale (sex). The variables are as described above and in the questionnaire. The following summary statistics were obtained for each continuous variable: count, arithmetic mean, standard deviation, and minimum/maximum value, and positional statistics of median, skewness, kurtosis, and quartile values, which were used to divide the observations into 4 equal groups, mostly focusing on the first and third quartiles. Statistically, this meant that the first quartile (marked as Q25) segregated the observations according to 25%: 75%, which means that 25% of the observations were less than or equal to the value of the first quartile, and 75% of the observations were equal to or greater than the value of the first quartile. The third quartile (Q75) segregated the observations according to 75%: 25%, which means that 75% of the observations were less than or equal to the third quartile, and 25% of the observations were equal to or greater than the third quartile. Most of these variables were not normally distributed, and the non-parametric median test was used to determine if age significantly affected scores, and the Mann-Whitney test was used whenever the grouping variable was sex. A value of $P \leq 0.05$ was considered significant. The t test was used to test for significant differences between mean scores of the domains and the maximum possible score of 100.

Results

Data were non-parametrically distributed, and therefore the median test was chosen to determine whether any age differences were significant. This test statistic has a chi-square distribution with 1 degree of freedom at a $P=0.05$ level of significance. From the 50 girls and 52 boys (aged from 5 to 18 years) eligible for the study, the study population had median and average ages of 10 and 10.58 years, respectively. There was no effect of age on the levels of continuous variables (domains) as shown in **Table 1**, with P values being well above the required significance level. The difference in age was statistically insignificant between sexes ($P=0.096$). Likewise, sex did not significantly influence levels in any of the studied variables in the remaining 13 domains ($P=0.111$). There were also no significant differences in quality of life ($P=0.223$) between the young children group and adolescent group.

Table 1 shows the summary statistics for the quality of life domains (continuous variables), where means ranged from 66.57 to 97.11, with standard deviations (SD) ranging between 5.17 and 18.66, and medians ranging from 60.00 to 100.00. The means of quality of life domains were significantly lower in

Family Cohesion (SD 66.57, 18.66, $P<0.000$), Parental Emotional (SD 77.21, 14.21, $P<0.004$), and General Health Perceptions (SD 75.41, 13.12, $P<0.00$); whereas, although they were still significantly lower than 100, the smallest limitations were found in Physical Functioning (SD 97.11, 5.17, $P<0.042$), Role/Social Emotional-Behavioral (SD 96.51, 7.49, $P<0.0328$), and Role/Social-Physical (SD 96.24, 9.92, $P<0.0155$).

Family Cohesion is the family's ability to get along, and is rated from poor to excellent [6]. Parental Emotional refers to the ratings of parents experiencing a great deal of emotional worry/concern as a result of a child's physical and/or psychosocial health, ranging from its presence to absence [6]. The score for General Health Perceptions ranges from parents believing that their child's health is poor and likely to get worse to believing that it is excellent and will continue to be so [6].

Discussion

The greatest reduction in quality of life among healthy Polish children was found in the domain areas of Family Cohesion (66.57), Parental Emotional (77.21), and General Health Perceptions (75.41), while the scores of the remaining domains ranged from 75.41 to 97.11. Our mean results for the individual HRQL domains were comparable to those of European and US studies [22,23] and showed that the maximum value of 100.00 was not attained in our participants. Therefore, the present outcomes can serve as a baseline with which to compare the quality of life of Polish children with various diseases.

The differences between our study and that of Romicka et al [20] can likely be attributed to the much smaller study group in the latter. Furthermore, parents' perception of reality may have been influenced by the period of time elapsing between the studies. Other confounding factors were climate change and air pollution, which have been considered to have an indirect and adverse impact on physical condition, mobility, mental state, social status, and social acceptance [24], thereby affecting HRQL.

Many studies have been performed on HRQL for healthy children in numerous countries, including the United States [22], where, for example, 1 study tested 391 children using the CHQ-PF-50, with average results ranging from 72.3 to 96.2 in the areas investigated. A study by Nugent et al in the United Kingdom showed the individual areas of quality of life scores for healthy children ranging from 57.7 to 97.9 [23,25]. In 1998-2000, the study by Romicka et al in Poland [20] was also conducted on HRQL domains on a small group of healthy children ($n=13$) and demonstrated average values ranging from 81.0 to 100.0, which were higher than those in the US studies; however, a score of only 67.5 was obtained in the area of general health.

CHQ-PF50 scores range between 0 and 100 [14], where better life functioning and well-being have the highest scores. Nevertheless, average quality of life ratings have not usually reached 100 in European countries [20,22,23,25-29]. Therefore, it seemed strange that the quality of life in Poland had been rated so highly [20], whereas our results showed that the quality of life of Polish healthy children is comparable to that of children in other countries [23]. Generally, questionnaires for measuring quality of life should meet the following criteria [30,31]: responsiveness (the ability to detect minimal changes during testing), reliability (the ability to obtain reproducible results for consecutive measurements), and validity (the ability to measure intended parameters).

The advantage of the CHQ-PF50 is that it is a research instrument that psychometrically tests well-being (both mental and physical) in participants between the ages of 5 and 18 years. There are, however, specific difficulties in testing HRQL in children, and it becomes necessary to use separate questionnaires [32-35] that are adapted to the developmental changes in children. It is also necessary to account for the differences in perception of various aspects of life between children and adults. Questionnaires used in the pediatric setting should therefore especially assess family relations, activity levels, self-esteem, external appearance of the child, and contacts with peers [32,34-36]. Engaging in sports and physical fitness also significantly impacts the quality of life in children [37]. Both parents/guardians and children can assess HRQL, but their ratings do not always coincide; nevertheless, both ways contribute to an overall evaluation of the child's HRQL [34] because of the parental influence on the therapeutic and diagnostic process of their offspring and because children's physical and mental impairment or immaturity could prevent them from completing the questionnaire on their own. Parental assessment of HRQL that covers a long follow-up period may be more reliable because children's inconsistencies in viewpoints, caused by their ongoing maturation, are removed [32,35]. Greater agreement in evaluating HRQL has been found between parents and offspring when children have chronic diseases than between parents and offspring when the children are healthy [32,33,35].

This study had limitations. The sample size could have been larger, since improved statistical power can always be achieved with having more participants [21]. Certain diseases may have been considered embarrassing by patients or their parents, and therefore, they may have tried to hide them. Conversely, other diseases may have been considered "good form", leading them to be overemphasized [21]. This can be avoided by including several questions on certain aspects that are in accord with psychometric principles [21]. It is also important to consider that replies to any questionnaires can be biased (intentionally or not), and that responses may not always be entirely honest [5]. An additional limitation of the study is that the questionnaire was filled in by parents. Assessing quality

of life at ages 5 to 18 is difficult for a child and can lead to errors due to not understanding given questions. Indeed, assessing children's quality of life by parents is an assessment by a third person who is emotionally close to the respondent, and for this reason it can be less objective [21]. Nevertheless, this issue can be reduced by investigating large populations.

Conclusions

Mean values in all studied areas of the CHQ-PF50 questionnaire did not reach the maximum values of 100 in apparently healthy children studied in Poland. Quality of life was most

reduced in Family Cohesion, Parental Emotional Impact, and General Health Perceptions.

For a parent, the health of his or her child is of fundamental importance, as shown when HRQL was assessed. Our present results may constitute a baseline with which the quality of life of Polish children with various diseases can be compared with that of healthy Polish children.

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