

The Children's Quality of Life Questionnaire: A Multidimensional Measure for the Assessment of Quality of Life in Children and Adolescents

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The paper presents a new tool for the assessment of quality of life (QOL) in children. There is a great need for a new tool in this domain because most existing tools were designed for assessing health-related quality of life in children. The new tool is called the Children's Quality of Life (CH-QOL) questionnaire and is designed to assess primarily the QOL of healthy children. However it was shown to be adequate also for assessing the QOL of sick children. The CH-QOL is based on extensive preparatory interviewing of various groups of children. It includes 55 items, each with three response alternatives, representing 15 scales, with acceptable reliabilities. It was administered to 3,594 children including 2,734 Jewish and 840 Arab (432 from the north, who are mainly residents of towns and villages, and 408 children from the south, who are mainly Bedouins), of both genders (1,295 boys, 1,387 girls), of different ages (7-9 years old 213, 10-12 years old 1,008, 13-14 years old 949, 15-18 years old 539) and residing in localities of different sizes (small 1,213, medium 396, large 1,122) and 127 children with pediatric cancer. Confirmatory factor analysis was performed and yielded a model which was adequate also for each of the 13 different samples. In addition to the stability of the whole model, the model manifested differences in standardized regression weights between the samples which enable specifying different characteristics of the various samples, such as differences between groups differing in ethnicity, gender, age and residential locality.

Keywords: Quality of life, children, Jewish, Arab, gender, age, locality size

Introduction

The purpose of the study was to construct and test a new measure of quality of life (QOL) for children and adolescents. The measure was designed to cover major domains of life of a broad section of the population of children. Since the 1989 Convention on the Rights of the Child, reinforced by the Children's Act 2004 which stressed the child's right to adequate circumstances for physical, mental, and social development, there has been a growing awareness of the importance of the QOL of children. This has led to a surge of publications

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about the QOL of children. A survey of the literature for the key words QOL and children (9.25.2015) yields 15.803 items, of which 9.045 explicitly deal with health issues, ranging from cancer to asthma, from arthritis to mental problems, and at least 3.119 more refer to health more indirectly. Even an item-by-item search of the files reveals only a minority of the publications that deal with healthy children (e.g., Gillison, Standage, & Skevington, 2008; Houben-van, Bai, Hafkamp, Landgraf, & Raat, 2015; Scott, 1994). Thus, surprisingly little is known about the QOL of healthy children and the field is actually under researched (Hu, Stewart-Brown, Twigg, & Weich, 2007). A major reason for this situation is the lack of appropriate tools. This situation is due largely to a conceptual tendency to equate QOL with physical well being (Goldbeck, Schmitz, Besier, Herschbach, & Henrich, 2007). As noted by several reviews of children's QOL scales, the majority of the existing tools focus on some health condition or disability of the child (Eiser & Morse, 2001; Harding, 2001; Schmidt, Garratt, & Fitzpatrick, 2002; Spieth & Harris, 1996; Wallander, Schmitt, & Koot, 2001). Most lists of QOL scales for children include mainly scales for chronic health states and very few for healthy children (e.g., Law, 2004). Notably, even if the studied population was not characterized by health conditions, the applied QOL measure focused on health-related quality of life (e.g., Casey et al., 2014; Ellert, Brettschneider, Ravens-Sieberer, & KiGGS Study Group, 2014; Hullman, Ryan, Ramsey, Chaney, & Mullins, 2011; Hyndman, Benson, Ullah, & Telford, 2014). Even the best known tools for children's QOL, that ostensibly were not constructed with health as the major target, devote to health an inordinately large part of the scale and are often characterized as "health related" scales, e.g., PedsQL 4.0 - Generic core scales (Varni, Seid, & Kurtin, 2001) or KIDSSCREEN (Devine et al., 2014; Ravens-Sieberer et al., 2014).

Health is undoubtedly a highly important characteristic of QOL at all ages, but it is no less evident that there are other factors involved in QOL in children, such as change of schools, the load of studies, bullying, relations with teachers and with classmates, friends, or family issues, just to mention a few (Patrick, Bell, Huang, Lazarakis, & Edwards, 2013; Palsdottir, Asgeirsdottir, & Sigfusdottir, 2012). Moreover, it is generally accepted that QOL includes domains that are not related to health or affected by it, e.g., emotional and social functioning. However, assessing QOL with a tool that is based on health-related QOL is highly likely to bias the results of the assessment.

In sum, most reviews of the assessment of QOL in children note the following shortcomings (Davis et al., 2006; Eiser & Morse, 2001; Harding, 2001; Pal, 1996; Schmidt, Garratt, & Fitzpatrick, 2002; Spieth & Harris, 1996): the majority of tools assess health-related QOL, are non-generic and are destined for children with disabilities or sickness; many tools are not designed to be responded to by children but by parents or by proxy-caretakers; many tools cover domains that seem important to adults but not necessarily to children or not in the same manner (e.g. having a close friend may seem to adults to be part of social functioning but is often mentioned by children as a basic need, like food or sleep); many tools report testing reliability in overall general terms and not for separate scales too; many tools lack an explicitly stated or adequate conceptual basis (e.g., the criteria are health status and functional ability); the tools are mostly constructed in line with the paradigms of health-related QOL instruments for adults.

In view of the dearth of adequate tools for the assessment of QOL in children, it is evident that there is a need for an instrument of QOL designed to assess the QOL of children in general, which will be based primarily on considerations relevant for healthy children, reflecting their special needs, concerns and views of their life. An updated modern tool of this kind may be adapted for use also for special goals in the case of different disablements or circumstances. This was the major goal of this study.

The starting point of the project was the selection of the theoretical point of view which does justice both to the scientific criteria characterizing research which is a candidate for evidence-based findings as well as to the respondents' personal views. The theoretical basis is reflected in the following five major characteristics: QOL is a subjective, phenomenological, experiential-evaluative, dynamic and multidimensional construct (S. Kreitler & M. M. Kreitler, 2006, 2012). These five characteristics have guided the construction of two assessment instruments for QOL. One is the Multidimensional Quality of Life Inventory for Adults (S. Kreitler & M. M. Kreitler, 2006), which includes in its latest version (QOL-A4) 63 items along 15 scales, with satisfactory reliability and validity. The other tool is the children's QOL questionnaire that was constructed originally for children with cancer (S. Kreitler & M. M. Kreitler, 2004, 2012). It included 55 items grouped into 15 scales (S. Kreitler & M. M. Kreitler, 2004, pp. 157-158). However, a closer scrutiny of the structure and psychometric characteristics of these two tools revealed that the items and scales of the tool for adults did not match completely those used in the tool for the sick children and that the reliability coefficients of some of the scales in the tool for sick children were too low to enable simple improvement of items (Cronbach's alpha coefficients were lower than .6 for 9 of the 15 scales) (ibid, p. 159). Hence, it became evident that construction of a general tool for the QOL of children would require further preparatory explorations.

Preparatory phase of the study. The preparatory phase was devoted to constructing the Children's QOL questionnaire (CH-QOL). The total number of children who participated in the first phase was 105. They included healthy as well as sick or disabled children, of different ages (3-18), different social status, different ethnic background (Jewish, Druze, Circassians, Armenian), different religions (Jewish, Moslem, Christian catholic and orthodox), and different geographical regions (mountains, desert, sea shore). The children were invited to participate in focus groups (in each 10-12 children) and discuss specific themes. In the first set of groups they were asked to discuss QOL and define its domains. The results of this set were used in the next set of focus groups whose participants were asked to evaluate the definition of the domains of QOL and suggest items for each domain. The participants in the third set of focus groups were asked to evaluate the adequacy of the items and suggest response alternatives for each item. The resulting questionnaire which included 64 items was administered to a pretest group of 50 children 10-12 years old who were asked to respond to the items and also comment about them. This stage resulted in dropping 9 items either because they were judged to be unclear or because the distribution of responses across the presented alternatives was curtailed. The remaining 55 items were grouped into 15 domains, which were considered as scales. Notably, the titles of the scales matched 11 of the 17 scales of the Multidimensional Inventory for QOL of Adults (S. Kreitler & M. M. Kreitler, 2006) and 12 of the 15 scales of the Children's QOL constructed for children with cancer (S. Kreitler & M. M. Kreitler, 2012) but even for scales with similar titles not all items were the same.

Method

Participants

The total number of participants in the study was 3,594 children, 2,734 Jewish and 840 Arab. The Arab group included 432 children from the northern part of Israel, who are mainly residents of towns and villages, and 408 children from the southern part of Israel, who are mainly Bedouins. As table 2 show, the sample included children of both genders (1,295 boys, 1,387 girls), of different ages (7-9 years old 213, 10-12 years old 1,008; 13-14 years old 949; 15-18 years old 539) and inhabitants in localities of different sizes (small 1,213; medium 396; large 1,122).

The data of an additional group of participants was used for some analyses. This was the group of 123 pediatric cancer patients of both genders, aged 6-18 years, partly on and partly off treatment. This sample was described in detail in another publication (S. Kreitler & M. M. Kreitler, 2012).

Tools

The single tool used in the study was the CH-QOL questionnaire. It included 55 items. The instructions for children who can read were as follows:

Hi, we would like to know better how you are and how you feel. For this purpose we prepared a list of questions. After each question there are three possible answers. Please read each question and check (or color or circle) the response which seems to you most correct. It is not a test and there are no grades. The most important thing is that you check the response which describes best your state and expresses best what is true for you.

For children who cannot read the instructions were read aloud and the child was instructed to point out or say the adequate responses.

Each item referred to a specific theme (see Table 1). The 55 items are grouped into 15 scales, each of which represents a domain defined by the children in the preparatory phase. All items were presented consecutively in a sequence that had no thematic order or relation to the scales to which the items belonged. Each item had three response alternatives, described both verbally and graphically in the form of small elliptical circles (one circle for a response indicating low QOL, three for a response indicating medium QOL, and six for a response indicating good QOL). For example, "I play at home": almost never/a little/a lot; "I have many friends": not so true/fairly true/ very true; "My memory...": very often I forget things/not always functions well/is very good. The order of the response alternatives was randomized. The response could be given verbally or by indicating the selected alternative by pointing or coloring or circling. The scores are based on summing the points for the items: 1, 2 or 3 in line with whether the response indicated low, medium or high QOL, respectively. Scores are given to each scale separately as well as for the whole questionnaire. Table 1 presents the reliability coefficients for the different scales and the whole questionnaire. These coefficients are within the acceptable range for the whole questionnaire and all scales except the scale of "Worries" (see Discussion).

Procedure

The children for the study were selected from different ethnic groups, age groups and residential localities in accordance with the criteria defining the objectives of the study. The children were sampled from 47 different schools, in different parts of the country. Within each cluster, say, age group, the specific selection of the school classes of participants was random. The questionnaires were administered in classrooms at school, at the beginning of predetermined lessons. Research assistants, who did not know the hypotheses of the study, provided an explanation of the instructions for answering the questionnaires and offered help when requested by the participants. Questionnaire completion lasted 20-30 minutes. The original sample included 3,634 children. From this sample 40 questionnaires (which form 1.1% of the total) were removed either because the children refused to fill them ($n = 14$) or because the number of unanswered questions exceeded 5% ($n = 26$). Thus, the final sample included 3,594 children.

The questionnaires were administered after getting the permissions of the Helsinki Ethics Committee of Tel-Aviv University and of the Chief Scientist of the Ministry of Education in the Israeli government.

Table 1

The Scales of the Children's QOL Questionnaire: Items and Reliability Coefficients

Scale	No. of items	Examples of items	Cronbach's α reliability coefficients
Family functioning	4	Fulfilling duties at home; doing things for one's parents; doing things for one's siblings; talking about one's problems with one's family	0.745
Fun	3	Playing at home; playing outdoors;; having fun with friends or family	0.697
Basic needs	5	Feeling safe; feeling healthy; economic/financial state ; accommodation; nutrition	0.905
Negative feelings	8	Nervousness; jealousy; sadness; loneliness; ;guilt; anger; fear; confusion	0.878
Physical state	5	Having pain; feeling pain of any strength; ability to move; tiredness; difficulties sleeping	0.707
Mastery and independence	5	There are things one likes to do; ability to keep busy even when alone; ability to manage by oneself; feeling successful; being able to do things without help	0.796
Cognitive functioning	4	Ability to concentrate; having good memory; ability to think and understand things; being curious and interested in what goes on around	0.873
Worries	4	Health worries; not having enough time to do everything required; having to do things one is not good at; existence of something that disturbs one and about which one thinks	0.496
Positive feelings	3	Hope; being happy; being able to enjoy many things; being satisfied with one's life	0.819
Functioning at school	4	School (or Kindergarten) attendance; fulfilling duties at school (or Kindergarten); attending classes at school (or sessions/meetings in the kindergarten); activity during recess at school (or Kindergarten).	0.931
Body image	2	Liking the way one looks; taking care of the way one looks	0.793
Social	2	Having many friends; having at least one good friend with whom one can share all one's secrets	0.612
Stress	2	Feeling one has no control over what happens to oneself; not knowing exactly what happens with oneself	0.716
Self esteem	2	Feeling worthless; being miserable (in a poor state)	0.908
Motivation	2	Readiness to make efforts and go on; having something worthwhile to live for	0.865
Total scale	55		0.978

Results

Table 2 presents the means and SDs for each of the subsamples in the study for the whole questionnaire as well as for each of the 15 scales. Mean comparisons by Anova (Table 2) show that for the whole questionnaire as well as for the 15 scales the scores of the Arab children were significantly higher than for the Jewish children. Comparisons between the Arabs in the north and the south of the country showed that the scores of the Arabs in the north were in all cases higher than of those in the south except for the scale of worries in which the difference was not significant.

Mean comparisons for gender groups (Table 2) showed that in the whole questionnaire and in 9 of the 15 scales the scores of boys and girls did not differ significantly; in 6 scales there were significant differences,

though not excessively large, whereby boys scored higher than girls in 5 scales (family, school functioning, social functioning, stress and motivation) and girls scored higher only in the scale of fun.

Table 2

Number of Cases, Means, SDs and F Values for Groups Defined by Ethnicity, Geographic Location (Arabs North and Arabs South), Gender, Age Groups and Size of Residential Location

		Ethnicity		Arab group		Gender	
		Jew	Arab	North	South	Male	Female
QOL-general and scales		2,734	840	432	408	1,295	1,387
QOL general	Mean	1.853	2.029	2.458	1.576	1.857	1.833
	(SD)	(0.528)	(0.492)	(0.212)	(0.228)	(0.550)	(0.503)
	F	73.863***		3367.256***		1.371	
Family	Mean	1.933	1.982	2.474	1.462	1.947	1.903
	(SD)	(0.559)	(0.644)	(0.416)	(0.379)	(0.545)	(0.565)
	F	4.638**		1347.035***		4.285**	
Fun	Mean	1.876	2.084	2.356	1.795	1.843	1.894
	(SD)	(0.637)	(0.534)	(0.429)	(0.481)	(0.678)	(0.596)
	F	73.431***		317.588***		4.205**	
Basic needs	Mean	1.785	2.074	2.582	1.536	1.796	1.756
	(SD)	(0.708)	(0.627)	(0.326)	(0.367)	(0.719)	(0.698)
	F	113.045***		1907.423***		2.215	
Negative feelings	Mean	1.894	1.984	2.268	1.683	1.881	1.896
	(SD)	(0.464)	(0.523)	(0.356)	(0.364)	(0.559)	(0.489)
	F	19.927***		552.698***		.507	
Physical state	Mean	1.899	2.015	2.386	1.623	1.895	1.891
	(SD)	(0.474)	(0.510)	(0.315)	(0.363)	(0.510)	(0.435)
	F	37.167***		1058.797***		0.042	
Mastery	Mean	1.874	2.030	2.332	1.710	1.873	1.864
	(SD)	(0.504)	(0.473)	(0.358)	(0.355)	(0.544)	(0.465)
	F	63.109***		636.421***		0.216	
Cognitive functioning	Mean	1.837	2.057	2.617	1.465	1.849	1.806
	(SD)	(0.680)	(0.688)	(0.355)	(0.399)	(0.698)	(0.657)
	F	66.938***		1955.499***		2.628	
Worries	Mean	1.959	2.007	2.026	1.988	1.956	1.956
	(SD)	(0.433)	(0.408)	(0.386)	(0.429)	(0.451)	(0.416)
	F	8.251***		1.791		.000	
Positive feelings	Mean	1.818	2.049	2.695	1.365	1.826	1.788
	(SD)	(0.722)	(0.785)	(0.395)	(0.439)	(0.739)	(0.697)
	F	62.976***		2128.667***		1.800	

(Table 2 continued)

School functioning	Mean	1.779	2.076	2.790	1.319	1.802	1.734	
	(SD)	(0.804)	(0.800)	(0.285)	(0.346)	(0.799)	(0.802)	
	F	87.547 ^{***}		4531.461 ^{***}		4.822 ^{**}		
Body image	Mean	1.817	1.967	2.606	1.290	1.816	1.793	
	(SD)	(0.744)	(0.807)	(0.489)	(0.444)	(0.733)	(0.745)	
	F	24.860 ^{***}		1660.221 ^{***}		0.635		
Social functioning	Mean	1.808	1.999	2.517	1.451	1.855	1.751	
	(Sd)	(0.762)	(0.715)	(0.461)	(0.494)	(0.684)	(0.733)	
	F	45.872 ^{***}		1046.124 ^{***}		14.337 ^{***}		
Stress	Mean	1.833	2.056	2.338	1.758	1.860	1.794	
	(SD)	(0.669)	(0.568)	(0.476)	(0.504)	(0.693)	(0.644)	
	F	76.553 ^{***}		293.475 ^{***}		6.398 ^{**}		
Self esteem	Mean	1.744	2.031	2.686	1.337	1.754	1.712	
	(SD)	(0.842)	(0.825)	(0.432)	(0.518)	(0.860)	(0.822)	
	F	75.005 ^{***}		1683.551 ^{***}		1.678		
Motivation	Mean	1.727	2.074	2.725	1.384	1.743	1.687	
	(SD)	(0.831)	(0.794)	(0.403)	(0.447)	(0.831)	(0.824)	
	F	114.521 ^{***}		2082.265 ^{***}		3.002 [*]		
		Age group				Locality Size		
		7-9	10-12	13-14	15-18	Small	Med.	Large
QOL – general and scales		223	1008	949	539	1213	396	1122
QOL general	Mean	1.873	2.172	1.530	1.811	2.023	1.764	1.700
	(SD)	(0.497)	(0.550)	(0.284)	(0.469)	(0.551)	(0.515)	(0.447)
	F	329.931 ^{***}				125.925 ^{***}		
Family	Mean	1.870	2.138	1.753	1.891	2.118	1.830	1.770
	(SD)	(0.602)	(0.602)	(0.464)	(0.484)	(0.545)	(0.544)	(0.518)
	F	87.262 ^{***}				132.385 ^{***}		
Fun	Mean	1.831	2.141	1.600	1.872	2.058	1.826	1.695
	(SD)	(0.722)	(0.688)	(0.473)	(0.537)	(0.629)	(0.629)	(0.594)
	F	134.904 ^{***}				102.814 ^{***}		
Basic needs	Mean	1.863	2.196	1.358	1.729	1.988	1.685	1.601
	(SD)	(0.652)	(0.720)	(0.401)	(0.681)	(0.745)	(0.692)	(0.609)
	F	307.586 ^{***}				98.060 ^{***}		
Negative feelings	Mean	1.875	2.143	1.639	1.883	2.021	1.822	1.782
	(SD)	(0.505)	(0.525)	(0.410)	(0.485)	(0.546)	(0.513)	(0.470)
	F	181.167 ^{***}				68.181 ^{***}		

(Table 2 continued)

Physical state	Mean	1.917	2.146	1.643	1.875	2.012	1.817	1.806
	(SD)	(0.420)	(0.473)	(0.350)	(0.447)	(0.497)	(0.457)	(0.427)
	F	230.287 ^{***}				64.513 ^{***}		
Mastery	Mean	1.910	2.138	1.612	1.824	2.013	1.809	1.747
	(SD)	(0.518)	(0.515)	(0.338)	(0.471)	(0.524)	(0.508)	(0.440)
	F	223.552 ^{***}				90.740 ^{***}		
Cognitive functioning	Mean	1.907	2.233	1.451	1.743	2.034	1.732	1.661
	(SD)	(0.637)	(0.694)	(0.408)	(0.638)	(0.716)	(0.668)	(0.581)
	F	290.380 ^{***}				99.898 ^{***}		
Worries	Mean	1.960	2.052	1.842	1.985	1.986	1.911	1.946
	(SD)	(0.449)	(0.416)	(0.420)	(0.434)	(0.443)	(0.414)	(0.426)
	F	40.874 ^{***}				5.379 [*]		
Positive feelings	Mean	1.856	2.228	1.416	1.734	2.058	1.734	1.587
	(SD)	(0.794)	(0.759)	(0.410)	(0.621)	(0.728)	(0.697)	(0.638)
	F	271.724 ^{***}				139.874 ^{***}		
School functioning	Mean	1.849	2.268	1.279	1.711	2.039	1.686	1.531
	(SD)	(0.759)	(0.821)	(0.421)	(0.745)	(0.840)	(0.792)	(0.673)
	F	342.473 ^{***}				130.516 ^{***}		
Body image	Mean	1.789	2.228	1.415	1.761	2.037	1.662	1.635
	(SD)	(0.759)	(0.777)	(0.497)	(0.624)	(0.781)	(0.712)	(0.645)
	F	249.270 ^{***}				102.087 ^{***}		
Social functioning	Mean	1.894	2.167	1.435	1.748	2.000	1.676	1.649
	(Sd)	(0.660)	(0.691)	(0.504)	(0.735)	(0.733)	(0.697)	(0.641)
	F	216.217 ^{***}				83.638 ^{***}		
Stress	Mean	1.883	2.174	1.483	1.782	1.966	1.748	1.718
	(SD)	(0.588)	(0.672)	(0.485)	(0.648)	(0.702)	(0.679)	(0.599)
	F	217.312 ^{***}				45.015 ^{***}		
Self esteem	Mean	1.757	2.238	1.242	1.690	1.999	1.601	1.519
	(SD)	(0.778)	(0.851)	(0.479)	(0.822)	(0.877)	(0.808)	(0.734)
	F	304.513 ^{***}				109.371 ^{***}		
Motivation	Mean	1.769	2.212	1.240	1.656	1.988	1.603	1.487
	(SD)	(0.773)	(0.851)	(0.460)	(0.808)	(0.868)	(0.798)	(0.712)
	F	297.246 ^{***}				120.646 ^{***}		

Note. ^{**} $p < 0.01$, ^{***} $p < 0.001$, Small localities are defined as communities including up to 5,000 inhabitants; medium localities are defined as villages and towns including 5,000 to 49,000 inhabitants; large localities are defined as cities with 50,000 or more inhabitants.

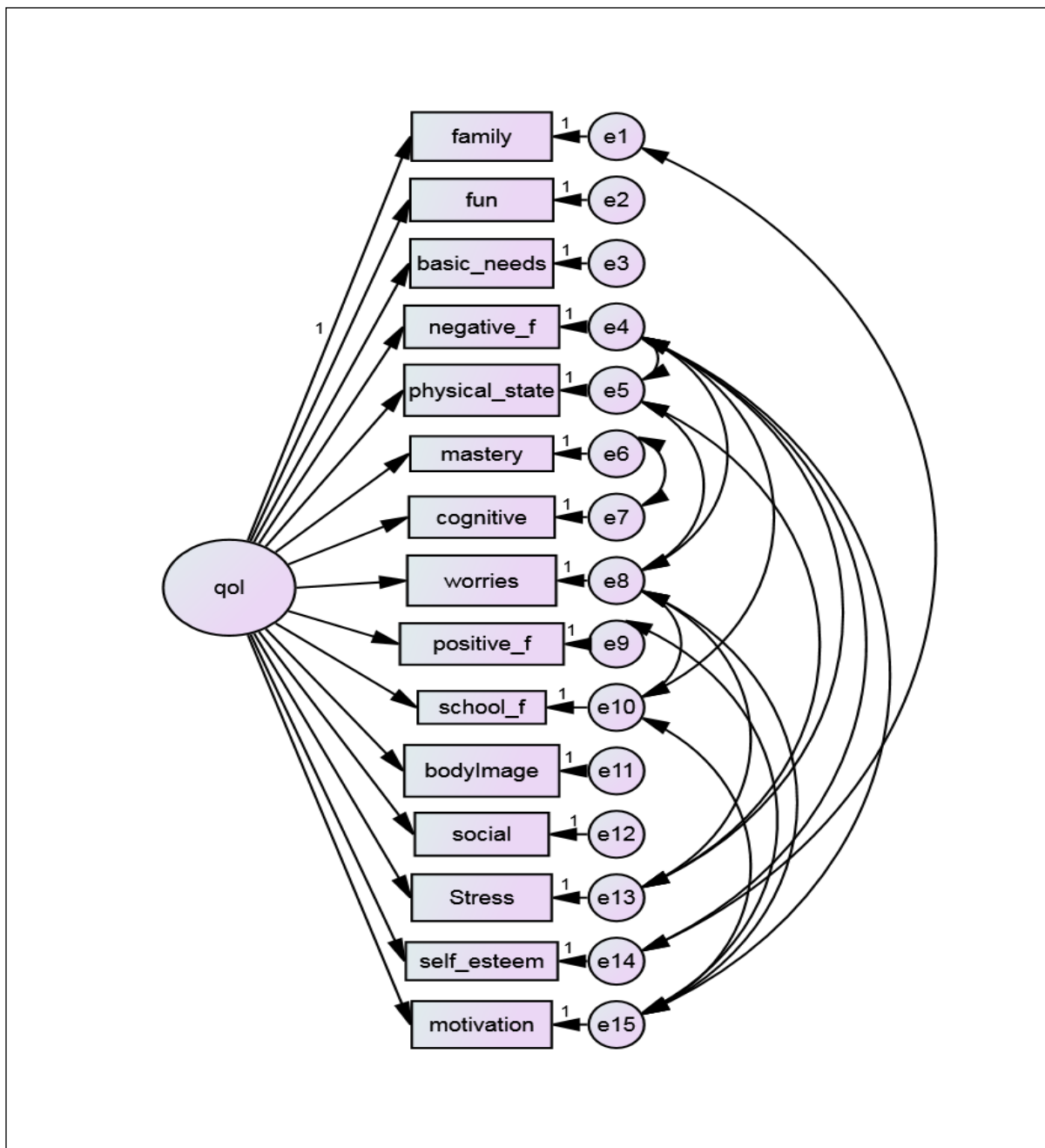


Figure 1. The measurement model of the CH-QOL based on the group of Jewish children.

$\chi^2(75) = 646.605$; $\chi^2/df = 8.621$; $p = 0.000$; CFI = 0.988; TLI = 0.983; RAMSEA = 0.053.

Figure 1 presents in graphic form the measurement model of the CH-QOL questionnaire which was constructed by confirmatory factor analysis on the basis of the data of the Jewish group ($n=2734$). The figure shows that all 15 scales are related to the latent construct of QOL. Further, the lines connecting the error terms indicate that some of the variance in each of the scales is not accounted for by the latent construct QOL but by correlations with other scales. This holds particularly for the scales of negative feelings, motivation and worries. There are four scales for which this statement does not hold: body image, fun, basic needs and social functioning.

Table 3

Model Fit Indices for the Measurement Model

Samples	N	χ^2	χ^2/df	p	CFI	TLI	RMSEA
Jews	2734	646.605	8.621	0.000	0.988	0.983	0.053
Arab	840	372.414	4.966	0.000	0.975	0.966	0.069
Arab North	432	223.996	2.987	0.000	0.902	0.863	0.068
Arab South	408	195.147	2.602	0.000	0.916	0.883	0.063
Male	1295	315.067	4.201	0.000	0.990	0.985	0.050
Female	1387	416.256	5.550	0.000	0.985	0.979	0.057
Age: 7-9	223	130.447	1.739	0.000	0.983	0.977	0.058
Age: 10-12	1008	289.365	3.858	0.000	0.989	0.984	0.053
Age: 13-14	949	283.291	3.777	0.000	0.969	0.956	0.054
Age: 15-18	539	163.866	2.185	0.000	0.989	0.984	0.047
Locality: Small	1213	350.011	4.667	0.000	0.987	0.982	0.055
Locality: Medium	396	189.913	2.532	0.000	0.983	0.976	0.062
Locality: Large	1122	276.502	3.687	0.000	0.987	0.982	0.049

Table 3 presents the model fit indices for the measurement model. The first row shows the model fit indices for the group of Jewish children on the basis of which the model was constructed. The indices fully support the adequacy of the model for representing the data. Table 3 presents in addition the model fit indices for the whole set of samples in the study: Arab sample, Arabs from the north of Israel, Arabs from the south of Israel (Bedouins), males and females, children of four different age groups (from 7 to 18 years), and children living in localities of three different sizes. In each of these samples the same model was found to be fit and appropriate. These findings support the validity of the presented measurement model.

Table 4

Standardized Regression Weights of the Measurement Models

Scales of QOL	Ethnicity		Arab		Gender	
	Jewish	Arab	North	South	Male	Female
Family	0.698	0.816	0.336	0.376	0.671	0.715
Fun	0.789	0.579	0.339	0.266	0.856	0.720
Basic needs	0.950	0.896	0.608	0.576	0.957	0.945
Negative feelings	0.794	0.770	0.686	0.620	0.831	0.755
Physical state	0.802	0.820	0.473	0.557	0.819	0.783
Mastery	0.863	0.747	0.564	0.444	0.888	0.836
Cognitive	0.913	0.899	0.587	0.582	0.920	0.904
Worries	0.381	0.163	0.371	0.313	0.468	0.287
Positive feelings	0.913	0.918	0.680	0.668	0.914	0.911
School functioning	0.936	0.923	0.523	0.446	0.938	0.934

(Table 4 continued)

Body Image	0.864	0.866	0.453	0.554	0.858	0.870
Social	0.803	0.764	0.248	0.321	0.764	0.842
Stress	0.764	0.613	0.509	0.412	0.757	0.768
Self esteem	0.919	0.902	0.645	0.720	0.924	0.913
Motivation	0.907	0.859	0.241	0.485	0.906	0.909

Scales of QOL	Age group				Locality Size		
	7-9	10-12	13-14	15-18	Small	Med.	Large
Family	0.782	0.789	0.503	0.512	0.661	0.698	0.672
Fun	0.898	0.874	0.567	0.573	0.766	0.793	0.778
Basic needs	0.935	0.957	0.843	0.934	0.955	0.941	0.937
Negative feelings	0.738	0.818	0.621	0.737	0.809	0.785	0.742
Physical state	0.688	0.809	0.592	0.776	0.817	0.807	0.748
Mastery	0.863	0.872	0.632	0.860	0.866	0.867	0.825
Cognitive	0.874	0.923	0.740	0.894	0.933	0.911	0.860
Worries	0.192	0.392	0.320	0.320	0.421	0.377	0.336
Positive feelings	0.923	0.922	0.703	0.893	0.912	0.904	0.896
School functioning	0.928	0.950	0.755	0.900	0.941	0.944	0.907
Body Image	0.865	0.890	0.657	0.786	0.883	0.859	0.804
Social	0.715	0.800	0.561	0.821	0.818	0.801	0.744
Stress	0.483	0.747	0.575	0.796	0.813	0.749	0.672
Self esteem	0.836	0.928	0.749	0.915	0.924	0.922	0.888
Motivation	0.871	0.900	0.715	0.912	0.912	0.903	0.874

Table 4 presents the standardized regression weights of the measurement model in each of the samples of the study. The estimated loadings of the scales represent the amount of variance of the scales accounted for by the latent factor which in our case is the QOL. The regression weights indicate which scales are most closely or least closely related to the QOL factor in each sample. Thus, the regression weights for the Jewish and Arab samples indicate that the scales with the three highest regression weights in the Jewish sample are basic needs, school functioning, and self esteem, and in the Arab sample – school functioning, positive feelings, and self esteem. Similarly, also the scales with the three lowest weights differ in the two samples (worries, family and negative feelings in the Jewish sample vs worries, fun and stress in the Arab sample). The Arab samples of the north and south resemble each other more in the scales with the highest regression weights (negative feelings, positive feelings and self esteem) and less in those with the lowest regression weights (motivation, social functioning and family for Arabs from the north and social functioning, worries and fun for Arabs from the south). The similarities are higher between the samples of males and females: the scales with the highest regression weights - basic needs, school functioning and self esteem – and with the lowest regression weights – worries, family, stress – are the same in the two samples. Concerning the age groups, Table 4 shows that school functioning and basic needs figure among the scales with the highest regression weights in the age groups from

7 to 14years while in the oldest group the scales with the highest regression weights are basic needs, self esteem and motivation. However, the age groups differ more in the scales with the lowest regression weights except for sharing worries as the scale with the lowest weight. In the three samples of locality sizes we find again school functioning and basic needs as the scales with the highest regression weights and worries and family as the scales with the lowest regression weights.

Table 5

Model Fit Indices for Group Comparisons

	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Ethnicity: Jews-Arabs	14	528.124	0.000	0.009	0.009	0.009	0.009
Arab (North-South)	14	33.731	0.002	0.011	0.011	-0.002	-0.002
Gender: Male-Female	14	272.031	0.000	0.006	0.006	0.006	0.006
Ages: 7-9 --- 10-12	14	77.049	0.000	0.003	0.003	0.002	0.002
Ages: 10-12---13-14	14	65.552	0.000	0.003	0.003	0.001	0.001
Ages: 13-14 --- 15-18	14	145.380	0.000	0.010	0.010	0.009	0.009
Locality: small-med.	14	17.524	0.229	0.001	0.001	-0.001	-0.001
Locality: med.-large	14	19.759	0.138	0.001	0.001	-0.001	-0.001
Locality: small-large	14	88.360	0.000	0.002	0.002	0.001	0.001

Table 5 presents the model fit indices for group comparisons. The comparisons provide information about the overall similarity between any two models that are compared. The results in Table 5 show that the overall differences between the models for each of the following pairs of samples were highly significant: Jews vs Arabs, Arabs from the north vs Arabs from the south, males vs females and the pairs of samples defined by age (7-9 vs 10-12, 10-12 vs 13-14, 13-14 vs 15-18) as well as small locality vs large locality. Only in regard to two samples the results were not significant: small locality vs medium-sized locality and medium-sized locality vs large locality.

Table 6

Group Comparisons of Standardized Regression Weights for Groups differing in Ethnicity and Gender

Model path	Ethnicity			Gender			
		B (standard.)		Z diff			
		Jew	Arab		Male	Female	Z diff
QOL scales							
Family	<-- QOL	1.000	1.000		1.000	1.000	
Fun	<-- QOL	1.290 ^{***}	0.589 ^{***}	-15.334 ^{***}	1.587 ^{***}	1.062 ^{***}	-7.63 ^{***}
Basic needs	<-- QOL	1.725 ^{***}	1.069 ^{***}	-13.534 ^{***}	1.880 ^{***}	1.632 ^{***}	-3.248 ^{***}
Negative feelings	<-- QOL	1.062 ^{***}	0.677 ^{***}	-10.402 ^{***}	1.266 ^{***}	0.907 ^{***}	-6.362 ^{***}
Physical state	<-- QOL	0.976 ^{***}	0.796 ^{***}	-4.892 ^{***}	1.144 ^{***}	0.843 ^{***}	-5.899 ^{***}
Mastery	<-- QOL	1.116 ^{***}	0.673 ^{***}	-11.957 ^{***}	1.321 ^{***}	0.963 ^{***}	-6.529 ^{***}
Cognitive	<-- QOL	1.592 ^{***}	1.177 ^{***}	-8.37 ^{***}	1.756 ^{***}	1.469 ^{***}	-3.928 ^{***}
Worries	<-- QOL	0.421 ^{***}	0.126 ^{***}	-8.552 ^{***}	0.575 ^{***}	0.294 ^{***}	-6.236 ^{***}
Positive feelings	<-- QOL	1.689 ^{***}	1.370 ^{***}	-5.893 ^{***}	1.847 ^{***}	1.572 ^{***}	-3.563 ^{***}

(Table 6 continued)

School functioning	<--	QOL	1.930 ^{***}	1.405 ^{***}	-9.109 ^{***}	2.050 ^{***}	1.854 ^{***}	-2.292 ^{**}
Body Image	<--	QOL	1.649 ^{***}	1.329 ^{***}	-5.615 ^{***}	1.720 ^{***}	1.603 ^{***}	-1.496
Social functioning	<--	QOL	1.466 ^{***}	1.039 ^{***}	-7.918 ^{***}	1.428 ^{***}	1.529 ^{***}	1.356
Stress	<--	QOL	1.310 ^{***}	0.663 ^{***}	-13.476 ^{***}	1.434 ^{***}	1.225 ^{***}	-2.955 ^{***}
Self esteem	<--	QOL	1.985 ^{***}	1.417 ^{***}	-8.836 ^{***}	2.171 ^{***}	1.857 ^{***}	-3.303 ^{***}
Motivation	<--	QOL	1.933 ^{***}	1.297 ^{***}	-10.648 ^{***}	2.057 ^{***}	1.854 ^{***}	-2.303 ^{***}

Notes. ^{***} p -value < 0.01; ^{**} p -value < 0.05; Z-score comparisons were done in terms of regression weights

Tables 6 to 9 present the results of comparisons between regression weights of the 15 scales in pairs of samples. Table 6 presents the results for comparisons in terms of ethnicity and gender. Table 6 shows that all comparisons for Jews and Arabs yield highly significant results, indicating that in the Arab sample the relation between each of the scales and QOL is significantly stronger than in the Jewish sample. For gender, the results show that in regard to 13 of the 15 scales the relation of the scales to QOL is significantly stronger than in the male sample. The only two exceptions are the scales of body image and social functioning in which the two samples do not differ significantly in the regression weights.

Table 7

Group Comparisons of Standardized Regression Weights for Arabs in the North vs Arabs in the South

Model path	Arab North-Arab South		Z diff		
	B (standard.)				
QOL scales	Arab North	Arab South			
Family	<--	QOL	1.000	1.000	
Fun	<--	QOL	1.040 ^{***}	0.897 ^{***}	-0.47
Basic needs	<--	QOL	1.417 ^{***}	1.483 ^{***}	0.201
Negative feelings	<--	QOL	1.741 ^{***}	1.586 ^{**}	-0.412
Physical state	<--	QOL	1.065 ^{***}	1.418 ^{***}	1.190
Mastery	<--	QOL	1.445 ^{***}	1.107 ^{***}	-1.082
Cognitive	<--	QOL	1.492 ^{***}	1.628 ^{**}	0.381
Worries	<--	QOL	1.023 ^{***}	0.939 ^{***}	-0.287
Positive feelings	<--	QOL	1.920 ^{***}	2.058 ^{**}	0.316
School functioning	<--	QOL	1.063 ^{***}	1.083 ^{***}	0.075
Body Image	<--	QOL	1.582 ^{***}	1.725 ^{**}	0.358
Social	<--	QOL	0.817 ^{***}	1.111 ^{***}	0.943
Stress	<--	QOL	1.728 ^{***}	1.455 ^{***}	-0.677
Self esteem	<--	QOL	1.992 ^{***}	2.614 ^{**}	1.181
Motivation	<--	QOL	0.693 ^{***}	1.521 ^{***}	2.594 ^{***}

Notes. ^{***} p -value < 0.01; ^{**} p -value < 0.05; Z-score comparisons were done in terms of regression weights.

Table 7 presents the results of the comparisons between the regressions weights of the 15 scales for Arabs in the north and Arabs in the south. The results show no significant differences in the regression weights of the

two samples except for the scale of motivation which has a significantly stronger relation to QOL in the sample of Arabs from the south.

Table 8

Group Comparisons of Standardized Regression Weights for Three Age Groups

Age group		B (standard.)					Multigroup comparisons (Z-score)		
Model path		Age	Age	Age	Age	Age 7-9	Age 10-12	Age 13-14	
QOL scales		7-9	10-12	13-14	15-18	vs	vs	vs	
						Age 10-12	Age13-14	Age 15-18	
Family	<- QOL	1.000	1.000	1.000	1.000				
Fun	<- QOL	1.379***	1.267***	1.149***	1.244***	-1.169	-1.229	0.639	
Basic needs	<- QOL	1.296***	1.451***	1.452***	2.570***	1.779	0.004	5.224***	
Negative feelings	<- QOL	0.783***	0.902***	1.085***	1.436***	1.666	2.148**	2.432**	
Physical state	<- QOL	0.614***	0.806***	0.889***	1.401***	3.109***	1.163	3.865***	
Mastery	<- QOL	0.950***	0.946***	0.916***	1.637***	-0.057	-0.414	5.015***	
Cognitive	<- QOL	1.183***	1.349***	1.293***	2.308***	1.905	-0.590	5.153***	
Worries	<- QOL	0.184***	0.343***	0.573***	0.558***	2.261**	3.184***	-0.145	
Positive feelings	<- QOL	1.558***	1.475***	1.236***	2.240***	-0.802	-2.537**	5.24***	
School functioning	<- QOL	1.498***	1.642***	1.364***	2.708***	1.419	-2.781***	5.949***	
Body Image	<- QOL	1.396***	1.457***	1.400***	1.983***	0.587	-0.526	3.086***	
Social	<- QOL	1.002***	1.165***	1.214***	2.436***	1.718	0.480	5.676***	
Stress	<- QOL	0.604***	1.056***	1.197***	2.084***	4.994***	1.410	4.638***	
Self esteem	<- QOL	1.381***	1.662***	1.541***	3.040***	2.492**	-1.011	5.731***	
Motivation	<- QOL	1.432***	1.613***	1.411***	2.976***	1.697	-1.887	6.36***	

Notes. *** p -value < 0.01; ** p -value < 0.05; Z-score comparisons were done in terms of regression weights.

Table 8 presents the results of the comparisons between the regressions weights of the 15 scales for the three pairs of samples representing the different age groups. The results show that the regression weights for the 7-9 years group and the 10-12 years group differ significantly only in the four following scales in which the relation to QOL is significantly stronger in the 10-12 aged group than in the younger group (7-9 years): physical state, worries, stress and self esteem. The comparisons for the 10-12 aged group and the 13-14 aged group show that the regression weights are significantly higher in the 13-14 aged group than in the younger group in the scales of negative feelings and worries, and significantly lower in the scales of positive feelings and school functioning. The comparisons between the oldest group (15-18 years) and the 13-14 aged group show that the regression weights of the older group are significantly higher than those of the younger group in all scales except the scale of worries.

Table 9 presents the results of the comparisons between the regressions weights of the 15 scales for children in the three samples differing in locality size. The results indicate that the regression weights for the medium-sized localities are significantly smaller than those for the small-sized localities in seven scales (basic needs, negative feelings, physical state, cognitive functioning, body image, stress and motivation); the regression weights for the

larger localities are smaller than those for the smallest localities in all scales; and there are no significant differences between the regression weights for the medium-sized and for the largest localities.

Table 9

Multigroup Comparisons of Standardized Regression Weights for the Three Groups Differing in Locality Size

Model path		Locality Size Groups						
		B (standard.)			Multigroup comparisons (Z-score)			
QOL scales		Size: small	Size: medium	Size: large	Size small vs size medium	Size small vs size large	Size medium vs size large	
Family	<-	QOL	1.000	1.000	1.000			
Fun	<-	QOL	1.338***	1.313***	1.329***	-0.245	-0.123	0.15
Basic needs	<-	QOL	1.974***	1.716***	1.641***	-2.21**	-3.738***	-0.677
Negative feelings	<-	QOL	1.220***	1.053***	0.999***	-1.976**	-3.414***	-0.657
Physical state	<-	QOL	1.127***	0.972***	0.919***	-2.038**	-3.526***	-0.713
Mastery	<-	QOL	1.261***	1.160***	1.042***	-1.206	-3.517***	-1.459
Cognitive	<-	QOL	1.854***	1.602***	1.436***	-2.252**	-4.942***	-1.558
Worries	<-	QOL	0.515***	0.410***	0.410***	-1.563	-1.989**	-0.004
Positive feelings	<-	QOL	1.841***	1.661***	1.644***	-1.560	-2.219**	-0.150
School functioning	<-	QOL	2.192***	1.969***	1.754***	-1.684	-4.42***	-1.707
Body Image	<-	QOL	1.914***	1.612***	1.490***	-2.523**	-4.609***	-1.068
Social	<-	QOL	1.663***	1.471***	1.370***	-1.674	-3.345***	-0.900
Stress	<-	QOL	1.586***	1.339***	1.159***	-2.223**	-5.169***	-1.677
Self esteem	<-	QOL	2.249***	1.965***	1.873***	-1.939	-3.394***	-0.649
Motivation	<-	QOL	2.197***	1.898***	1.788***	-2.223**	-3.968***	-0.857

Notes. *** p -value < 0.01; ** p -value < 0.05; Z-score comparisons were done in terms of regression weights.

Table 10

Results of Applying the Measurement Model of the QOL to a Sample of 123 Pediatric Cancer Patients

QOL scales		Standardized regression weights
Family	<---	QOL 0.484
Fun	<---	QOL 0.562
Basic needs	<---	QOL 0.650
Negative feelings	<---	QOL 0.523
Physical state	<---	QOL 0.607
Mastery	<---	QOL 0.599
Cognitive	<---	QOL 0.450
Worries	<---	QOL 0.542
Positive feelings	<---	QOL 0.286

(Table 10 continued)

School functioning	<---	QOL	0.503
Body Image	<---	QOL	0.418
Social	<---	QOL	0.292
Stress	<---	QOL	0.411
Self esteem	<---	QOL	0.407
Motivation	<---	QOL	0.195

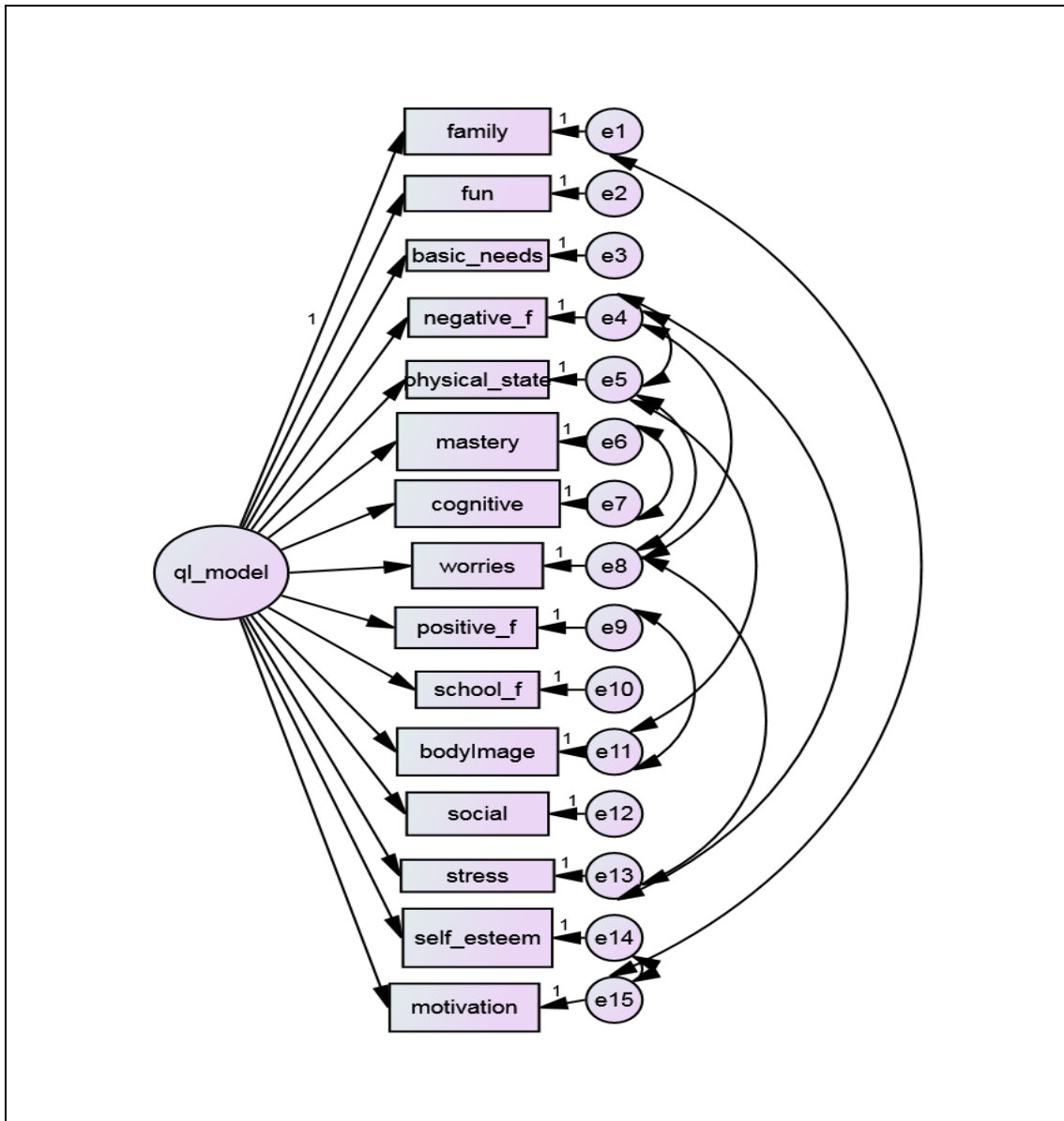


Figure 2. The measurement model of the CH-QOL based on the data of 217 pediatric cancer patients.

$\chi^2(80) = 101.739$; $\chi^2/df = 1.272$; CFI = 0.943; NFI = 0.790; TLI = 0.925; RMSEA = 0.047.

Table 10 presents the results of applying the measurement model based on healthy Jewish children to a group of children with various pediatric cancer diagnoses. The results in table 10 indicate that the measurement model fits this group of sick children but to a somewhat lower degree than it fits the different samples of healthy children. Figure 2 shows that the fit of the measurement model depends to some degree on correlations between error terms other than those in Figure 1. However, the notable findings concern the standardized regression weights. As may be expected, the lowest ones are in the scales of motivation, social functioning and mastery, namely, in the domains that are most strongly affected negatively by the state of cancer disease. The highest regression weights are in the following five scales: basic needs, physical state, mastery, fun and worries. These are the scales that may be expected to affect the QOL of sick children to a high degree. Notably, the scale of worries is included in this list, whereas in the samples of healthy children its regression weight was persistently low.

Discussion

The findings of the presented study provide information and guidelines concerning the use of the CH-QOL questionnaire. This questionnaire has been designed as a tool for the assessment of QOL in healthy children. The findings fully support its adequacy for fulfilling this objective. In terms of the questionnaire's descriptive characteristics it is important to note that it includes 15 scales representing domains of contents identified by children as most relevant for their QOL. Thus, the content is by definition variegated and relevant. Also the items and the response options have been selected by children. The reliabilities of the 15 scales are high and within the acceptable range, including the scale of worries which will be discussed later.

The two major characteristics of the CH-QOL questionnaire are first, its stability and proven adequacy for representing different samples and secondly, its sensitivity for identifying and manifesting differences between various samples. The first characteristic is manifested most clearly and convincingly in the measurement model of the CH-QOL which is supported by the set of goodness-of-fit indices and was shown to be equally adequate for 13 samples differing in major demographic variables: ethnicity, gender, age, and size of residential locality. The second characteristic is manifested in the findings which indicate differences between the samples in means (Table 2), in the relation of the different scales to the latent variable QOL (Table 4), in the overall similarity of the measurement model between pairs of samples (Table 5), and in the significance of the differences between the regression weights for the different scales across samples (Tables 6-9).

The stability of the measurement model across 13 samples provides support for the validity of the underlying theoretical approach as well as for the content domains that make up the QOL of children. Notably, the CH-QOL includes domains that are represented also in other tools assessing the QOL of children, such as physical health, social functioning and school functioning, but it includes also domains that are not represented in other tools, such as stress, worries, mastery and independence, self esteem, and motivation. Moreover, even in regard to domains that are represented in other tools, the approach of CH-QOL may be different, such as the differentiation between positive feelings (e.g., hope, joy) and negative feelings (e.g., anger, fear, sadness), or the inclusion of the item 'having a close friend' in the scale of basic needs rather than in the scale of social functioning as would be habitual. Evidence was provided also for the adequacy of the same measurement model for representing the sample of children with pediatric cancer (Table 10) although it was not the original goal of the study.

Considering the various aspects of the differences between the samples or the scales or both provides a

rich platform for getting relevant information about the children of a particular sample. For example, mean comparisons of the scales (Table 2) show that in many respects boys and girls do not differ in QOL and the observed differences indicate that girls tend to have lower QOL insofar as, for example, stress or social functioning are considered. Hence, somewhat lower QOL scores for a girl in these domains should not be interpreted as necessarily indicative of a problem. Another example along the same lines indicates that of the four assessed age groups the highest QOL scores are in the group of 10-12 year olds and the lowest in the group of 13-14 year olds. Findings of this kind indicate that special concern should be devoted to the group of 13-14 year olds for identifying and understanding issues with the potential of lowering their QOL. It is likely that the impending transfer of children in this age group to middle high school may be one of the reasons for dampening the QOL level of these children (Gillison, Standage, & Skevington, 2008). A final example based on mean scores of the scales is the finding about the relatively highest scores of QOL in the group of children from small localities, probably due to the community spirit of such residential sites (Magee & James, 2012; Marans & Stimson, 2011).

Considering the differences between the samples in terms of the regression weights provides another perspective on inter-samples similarities and differences. Comparisons of the total structure of QOL in the different samples show that any two pairs of samples, such as boys and girls, or Jewish and Arab children are significantly different, except for the QOL in localities of medium and large size, probably because they share the character of urban life (Table 5). However, inspecting the scales with the highest and lowest standardized regression weights in each sample uncovers some similarities. For example, the samples of boys and girls resemble each other in the three scales with the highest and in the three scales with the lowest standardized regression weights. This indicates that QOL tends to be defined in similar terms by boys and girls. Another finding of interest is that the major components defining QOL are similar for children in the age groups 7 to 14 years but change after that age when self esteem and motivation come into the fore. Findings of this kind indicate which domains need to be considered and enhanced in each age group so as to maintain an optimal QOL for the children.

The above presented findings suggest the importance of comparing the regression weights of specific scales in the different samples (Tables 6-9). Take for example self esteem. The findings show that it plays a significantly more important role in QOL for girls than for boys, for Arab children than for Jewish ones, for children 15-18 years old than for 13-14 years old or 7-9 years old, and for children from large cities than for those from small communities. Findings of this kind illustrate the importance of focusing on specific scales and particular regression weights in order to get a correct conception of the QOL of children of a particular age group, gender, ethnicity or residential locality.

In this context it is of particular importance to mention the scale of worries. This scale stood out in our findings as an exception in several respects. Its Cronbach's alpha coefficient of reliability was lower than that of all other scales and its standardized regression weights tended to be low in all samples, except one: that of the pediatric cancer group. It is evident that worries would not be a major component determining the QOL of healthy children who live under normal conditions. This is the reason for the low reliability coefficient and low regression weights of this scale. However, this scale may be expected to be of great importance precisely in a sample of sick children or children who live under other difficult conditions. As documented in the Introduction, there are many theoretical, psychological, sociological, therapeutic and educational

considerations to assess the QOL particularly of children whose life may be studded with hardships of various kinds. We wanted to make the CH-QOL questionnaire useful also in these contexts. This is the reason why the scale of worries was left in the CH-QOL questionnaire despite its psychometrically dubious conduct in the population of healthy normative children.

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