Addressing quality of life of children with autism spectrum disorder and intellectual disability

Running head: QOL in ASD and ID

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ABSTRACT

Despite the advances on the assessment of quality of life, this concept is barely studied and is riddled with important limitations for those with autism spectrum disorder (ASD). This paper is aimed at validating a questionnaire to assess quality of life of children with ASD and intellectual disability. Based on the KidsLife Scale, geared toward people with intellectual disability, the most reliable items for those with ASD were selected. Study participants were 420 persons, from 4 to 21 years old. Results indicated that the KidsLife-ASD Scale measured eight intercorrelated domains had good reliability and exhibited adequate evidences of validity. KidsLife-ASD emerges as a helpful tool to guide person-centered planning addressed at improving quality of life.

KEYWORDS: autism spectrum disorder; intellectual disability; quality of life; social inclusion; rights; self-determination.

Addressing Quality of Life of Children with Autism Spectrum Disorder and Intellectual Disability

1. Introduction

The concept of quality of life (QOL) serves as a conceptual and assessment framework to develop person-centered planning, as a basic principle to guide professional practice, and as a vehicle to lead the development and implementation of public policies (Gómez et al., 2013; Mansell & Beadle-Brown, 2012; Reinders & Schalock, 2014; Schalock & Verdugo, 2012). Despite the considerable advances achieved during the last decade on the operationalization and assessment of this construct, especially in the intellectual disability (ID) field, its application for those with autism spectrum disorder (ASD) is still a pending task. This area is barely studied and is riddled with important limitations (Arias et al., 2018; Payakachat et al., 2012; Tavernor et al., 2013). The most recently published systematic review (Ayres, 2017) found only one QOL measure designed for use with the general autism spectrum population in adulthood (the QOL1 and QOL2) highlighting the pressing need to develop robust tools for this population. More recently, the WHOQOL-BREF, a health-related QOL measure for the general population, and the INICO-FEAPS scale, a QoL scale for individuals with intellectual and/or developmental disabilities, have been validated for adults with ASD (Knüppel et al., 2018; McConachie et al., 2017).

Although several instruments have been used to assess QOL in children and youth (e.g. PedsQL, Child Health Questionnaire, Kidscreen), there is no such instrument specifically designed for use with children and adolescents with ASD (Billstedt et al., 2011; Cottenceau et al., 2012; Dijkhuis et al., 2017; Tavernor et al., 2013; van Heijst & Geurts, 2015). Among basic parenting worries is this lack of tools capturing the potential particularities, special needs and supports, daily life, and contexts that children with ASD might have (Amor et al., 2018; Begara, Gómez, & Alcedo, 2019). Indeed, generic QOL instruments may not reflect crucial life aspects such as restricted interests, high anxiety levels, or resistance to change (Ikeda et al., 2016; Tavernor et al., 2013; Waters et al., 2009). We agree with Schalock and Keith (2016) when they point out that a QOL assessment must reflect the degree to which people have experiences that are valued for them; occur in domains contributing to a full and interconnected life; occur in physical, social, and cultural contexts in which people are involved and are important to them; and involve events and circumstances that are common to all human beings, as well as idiosyncratic ones.

Most of the research about QoL of children and adolescents with ASD are addressed to those with high verbal or cognitive skills (Egilson et al., 2017; Potvin et al., 2013; Shipman et al., 2011), when the assessment tools are applied to people with ASD and an accompanying diagnosis of ID (e.g. PedsQL, Kidscreen), they are reduced to those with the less significant disabilities who can complete a self-report (Payakachat et al., 2012; Sheldrick et al., 2012; Shipman et al., 2011). For those with ASD and greatest support needs, most of the publications and most of the QOL instruments are focused on other similar but different constructs such as health-related QOL (e.g. Kuhlthau et al., 2017) or family/parents' QOL (e.g. Hsiao et al., 2017). When they are focused on individual QOL (e.g. Gómez et al., 2010), research on outcomes is reduced to a few domains (e.g. friendships, education, health) or objective indicators (e.g. employment status).

However, QOL is a more comprehensive concept that includes not only objective but also subjective aspects (Burgess & Gutstein, 2007; Schalock et al., 2011; van Heijst & Geurts, 2015). A multidimensional and comprehensive QOL assessment is crucial not only when estimating the impact of ASD but also when evaluating the efficacy of interventions (Morán et al., 2015). To capture the multidimensional and comprehensive nature of the concept, several QOL conceptual models have been developed in the ID field (e.g. Cummins, 2005; Felce & Perry, 1995; Petry, Maes y Vlaskamp, 2005; Schalock & Verdugo, 2002); these are gradually being extended to other specific populations (Alborz, 2017; van Hecke et al., 2017). One of the most commonly used is the eight-domain model proposed by Schalock and Verdugo (2002), given its high quantity of evidences of validity (Gómez et al., 2011; Jenaro et al., 2005; Wang et al., 2010) and familiarity to practitioners (Arias et al., 2018, Carbó-Carreté et al., 2015; Gómez et al., 2015). According to this model, QOL is considered a desired state of personal wellbeing that has universal and cultural-bound properties, includes both objective and subjective components, and is influenced by individual and environmental factors (Schalock et al., 2011). According to this framework, QOL is composed of eight domains: emotional wellbeing, material wellbeing, physical wellbeing, personal development, rights, self-determination, social inclusion, and interpersonal relationships.

Another essential issue that might determine QOL outcomes is related to the respondents themselves. It is undeniable that each person has a unique perception of his or her QOL; this is influenced by context, previous experiences and personal values. This personal perspective can only be measured through self-reports. Nevertheless, this perspective may not be adequate when the goal is to assess

interventions and efficacy of supports, given the dependence of wellbeing scores on homeostatic processes (Cummins & Wooden, 2013): Most people without mental health problems will score over the 75th percentile when asked about their personal wellbeing. When it is desired to evaluate the effectiveness of interventions, reports of others tend to be much more sensitive to changes (Gómez & Verdugo, 2016). In fact, the relationship between different perspectives is an issue garnering interest since the concept's birth. Several authors agree on the lack of relationship between them (Koch et al., 2015; Simões & Santos, 2016; White-Koning et al., 2007; Zimmermann & Endermann, 2008), while others provide evidence of a moderate (Balboni et al., 2013; Claes et al., 2012; Egilson et al., 2017; Sheldrick et al., 2012) or high association (McVilly et al., 2000).

Thus, when selecting or developing an instrument for assessing QOL, one of the most important decisions to be taken is if we want to focus interest on the self-perception of a person, the perception of a third person who knows him or her well, or both perceptions. In this sense, it must be noted that there is no comprehensive assessment tool specifically addressed to children with ASD and ID in the international ambit that considers the eight QOL domains. Specifically, in the Spanish context there is only one available instrument for children and adolescents with ID: the KidsLife Scale (Gómez et al., 2016), a report of others who know the person well. Although the instrument presents adequate validity and reliability in its application to children and adolescents with ASD (Arias et al., 2018; Morán et al., 2015), relatives and professionals have expressed, during its application, that not all the items were suitable or sufficiently appropriate for them.

For these reasons, we consider it fundamental and imperative to count on a QOL assessment for children with not only ID but also ASD that contemplates their particularities, daily lives, contexts, and needs (Burgess & Gutstein, 2007; McConachie et al., 2015). Such an instrument must be applicable for those with greater support needs, who are not always able to communicate by themselves. Therefore, the goal of this study is to adapt the KidsLife Scale for use with children and young people with ID who have an accompanying diagnosis of ASD: the KidsLife-ASD (known in Spanish as KidsLife-TEA). To that end, we departed from the field-test version of the KidsLife Scale to select the most reliable and discriminant items for ASD. Reliability and validity evidence based on the internal structure of the new scale is provided below.

2. Methods

2.1 Participants

The assessed participants were 420 people: (a) having ASD and an ID; (b) aged from 4 to 21 years old; and (c) receiving supports and services in social and educational domains. The only exclusion criterion was if the person was outside educational settings (since the assessment tool includes items related to educational but not employment settings and circumstances). The number of boys (n=333; 79.3%) was almost four times higher than the number of girls (n=87; 20.7%). Their ages ranged from 4 to 21 years old (M=12; SD=4.7) (Figure 1). According to the official records at schools and participating centers, 12.6% of the participants had mild ID, 37.1% moderate, 44.3% severe, and 6% profound. The most prevalent associated conditions were behavioral disorders (16.2%), physical disability (8.3%), epilepsy (6.9%), mental disorders (6.7%), visual disability (3.3%) and Down syndrome (3.3%). Regarding type of schooling, 22.1% were in general education, 65.2% in special education and 12.6% in combined education (i.e., special education combined with education in ordinary schools).

<Figure 1>

The assessment was carried out by 237 respondents from 78 Spanish agencies that provide support to people with intellectual and developmental disabilities. In this case, the number of women (82.4%) was much higher in comparison to the number of male informants (17.6%). Just over half (51.5%) were professionals, the other half (48.5%) were parents of the assessed people. Among them, the majority were mothers (76.5%), only one in four (23.5%) were fathers. The respondents had known the assessed person for a mean of five years and four months (the range varied from six months up to 20 years). Almost all of them (83.6%) had contact with the assessed person several times per week.

2.2 Materials

The field-test version of the KidsLife Scale was used (Gómez et al., 2016). This instrument allows assessing QOL-related personal outcomes for children and young adults with ID, aged 4-21 years old, if they are users of social, health, and educational services. The scale is completed by a third-party respondent (e.g. staff, relative, or proxy) who has known the person at least six months and can observe him or her for significant periods of time in different contexts.

The field-test version of the scale included 156 items (i.e. 20 items per each of the eight QOL domains, except for social inclusion that comprised 16 items) (Gómez et al., 2014, 2016). All items were formulated as third-person declarative statements and divided into eight subscales which correspond to the eight QOL domains (Schalock & Verdugo, 2002): emotional wellbeing, material wellbeing, physical wellbeing, personal development, rights, self-determination, social inclusion, and interpersonal relationships. The answer format had four options: 'never', 'sometimes', 'often', and 'always', that were scored from 1 to 4 according to the valence of each item. Likewise, sociodemographic data were collected throughout an ad hoc survey about the person being evaluated, the respondent, and the service/support provider.

2.3 Procedure

Several dissemination activities about the study were carried out through courses, scientific conferences, seminars and the websites of the Institute on Community Integration (University of Salamanca) and Plena Inclusión [Full Inclusion], a Spanish confederation of organizations in favor of People with Intellectual Disabilities (brings together 891 organizations). In addition, with the aim of locating any other potential participating centers providing support and services to children and youth with ID and ASD, a thorough web search was conducted. The research team contacted each support provider identified by sending mass emails. Those centers that could not use email or needed more information were contacted by phone.

When an organization or service showed interest in participating, they were asked to complete an online questionnaire with their contact details and the person in charge of coordinating the implementation of scales. Each participant organization was provided (via email, phone, videoconference, and meetings as required) all instructions needed to complete the scales: information about the research, access to the electronic version of the scale, the instruction manual, and the informed consent to be completed by participants or their legal guardians. All along the process, the research team was available to solve issues and problems, as well as negotiate deadlines to send back the assessments.

Authorization to conduct this research was obtained from the University of Oviedo Ethics Committee. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The privacy rights of human subjects was respected: to guarantee

confidentiality of the data, each assessed person was assigned an anonymous identification code that allowed returning results (to be used at each organization or center to develop person-centered planning and guide organizational strategies of improving users' QOL).

Data were analyzed with SPSS 24.0, FACTOR 10.7, and MPlus 7.0.

3. Results

3.1 Reliability

Reliability in terms of internal consistency was the first analysis conducted for the field-test version of the KidsLife Scale. Cronbach's alpha as a measure of reliability has recently been criticized because this coefficient assumes continuity of the variables and this assumption is not met by ordinal response items. Several studies have shown that the use of Cronbach's alpha with less than five ordinal options produces a spurious decrease of its magnitude (Elosua & Zumbo, 2008). In this study it was still calculated, given it is the most widely used in social sciences. Still, as data came from an ordinal scale with four options, ordinal alpha and ordinal theta were preferred. As is shown in Table 1, all internal consistency coefficients were adequate. Ordinal alpha ranged from .83 (emotional wellbeing) to .94 (personal development).

<Table 1>

Given the excessive length of the field-test version, the aim of the next step was to reduce the final scale to a more appropriate number of items (i.e. 12 items per domain). In this phase, it was important not only to select the most reliable items but also to avoid redundancy as well as guarantee that core indicators would still be represented. For this reason, the scale was refined in four steps (Table 2).

<Table 2>

The first step consisted of calculating corrected homogeneity indexes (CHI) for the items by domains. Values ranged between −.07 (i113, rights) and .74 (i125, personal development). The domain with the highest mean *CHI* was personal development (*M*=.58), while the lowest was found in rights (*M*=.37). We established a limit of *CHI* >.30 to keep an item in the scale. Only 13 items were below the limit and eliminated for this reason. Once the less reliable items by domain had been removed, the second step was to explore the item difficulty through their mean. Aimed to avoid ceiling effects (i.e. including

items in which people generally obtained the highest score) and non-discriminant items, those items with means over 3 and closer to 4 were deleted within each domain (scores ranged from 1 to 4). A total of 32 items were deleted for this reason, most of them in self-determination (*n*=7) and material wellbeing (*n*=6). In contrast, only five items were removed in total for rights (*n*=1), social inclusion (*n*=2), and personal development (*n*=2). Next, among the remaining items, CHI values were checked again to select the most reliable ones. In this third phase, only one item was removed for self-determination because of its lower value in comparison with the others. Finally, 14 items were eliminated from the remainder pool due to content (i.e. avoiding redundant items and assuring core indicators were represented); most of them (*n*=9) were removed from personal development and interpersonal relationships.

By means of the process summarized in Table 2, the KidsLife-ASD final version was reduced to 96 items. Reliability analysis in terms of internal consistency was again calculated by domains, Cronbach's alpha, ordinal alpha, and ordinal theta. For ordinal alpha, coefficients varied between .82 (physical wellbeing) and .92 (personal development). The elimination of items did not lead to any difference in internal consistency for social inclusion and had a very slight variation for rights. Nevertheless, there was a little internal consistency loss for the other six domains, losing the greatest value in material and physical wellbeing (Table 3).

<Table 3>

3.2 Construct validity

With the aim of evaluating the fit of the eight-domain model to data, we performed a confirmatory factorial analysis (CFA). Therefore, the analysis of fit was performed on the model in which QOL is understood to comprise eight domains as intercorrelated first-order factors. Because of the high number of items which make up each domain (*n*=12), three parcels were used as indicators or observed variables of each latent variable for the fit analysis of the KidsLife-ASD Scale. Each parcel comprised four items and was made up of the sum of items with asymmetry in opposite directions (positive and negative). In this way, the item with the largest positive asymmetry was assigned to the first parcel along with the item with the largest negative asymmetry, the items with the next largest asymmetries were assigned to the second parcel and so on (Table 4).

<Table 4>

Several strategies were used to check parcels' unidimensionality: (a) analysis of optimized parallel (Timmerman & Lorenzo-Seva, 2011), based on minimum rank factor analysis (MRFA; Lorenzo-Seva & Ferrando, 2013), in which the polychoric correlations matrix between the four items composing each parcel was compared with the results of 500 random permuted correlations matrices of raw scores; and (b) two indexes of closeness to unidimensionality were estimated for each parcel (Ferrando & Lorenzo-Seva, 2017): the explained common variance (ECV) estimated the size of the dominant factor—ranging between 0 and 1, ECV values between .70 and .85 indicate a unidimensional structure of the data (Rodríguez, Reise, & Haviland (2016)—and the mean of item residual absolute loadings (MIREAL) of a potential residual second factor MRFA, orthogonal to the primary factor. MIREAL is a general estimator of the degree of deviation of unidimensionality, values under .30 are considered indicators of lack of a relevant residual factor (Ferrando & Lorenzo-Seva, 2017).

As can be seen in Table 5, where results about parcels' unidimensionality are included, on the one hand, the ECV values ranged between .71 and .85. This suggests the existence of a clearly dominant factor in all parcels. On the other hand, MIREAL values were lower or very close to the cut-off point of .30, ranging from .18 to .36, suggesting that the presence of relevant systematic variance in any case besides the principal factor was not plausible. The parallel analysis suggested the presence of a single factor in all cases, given that the variance assumed by the first variable was always greater than that derived from the simulated matrices and the variance assumed by the second factor in the real data was lower than that calculated from the random matrices. Given these results, it can be concluded that parcels were sufficiently unidimensional. We thus proceeded to the next step, which consisted of the CFA.

<Table 5>

Next, the fit of three confirmatory factorial models was compared. These models were specified based on those proposed in Gómez et al. (2011) based on the scientific literature: (a) QOL as a unidimensional construct (M1); (b) QOL as eight intercorrelated factors (M2; Schalock & Verdugo, 2002); and (c) QOL as eight first-order factors and a general second-order domain (M3; Wang et al., 2010). The three CFA models were estimated using robust maximum likelihood (MLR) as an estimation method and implemented in Mplus 7.0. In the estimation of the models, the non-independence between the observations made by the same evaluators (i.e., type=COMPLEX, with 237 clusters) was taken into account. The results are displayed in Table 6, where it is shown that the unidimensional model obtained

an unacceptable fit to the data (*RMSEA*=.127, *CFI*=.678, *TLI*=.648). Comparing the others, the eight correlated first-order factors showed a better fit in general terms than the hierarchical model (*ΔRMSEA*=-.005, *ΔCFI*=.015, *ΔTLI*=.013), being also more plausible according to absolute fit indexes such as AIC (*ΔAIC*=-76) and ABIC (*ΔABIC*=-59), but not according to BIC (*ΔBIC*=5). In any regard, considering all the obtained indices, the model consisting of eight intercorrelated factors was the best one (representing the internal structure of the data).

<Table 6>

Standardized factorial loadings, the reliability based on the model (McDonald's omega), and an estimation of convergent validation for the factors using the average variance extracted (AVE) are shown in Table 7. As it can be seen, the factorial loadings were high (ranging from .66 to .90; *M*=79; *SD*=06). Omega's indices were between .74 and .90. AVE values always greater than .50, suggesting a good convergent validity for the factors (i.e. the explained variance by the factor was greater than the residual variance in all cases).

<Table 7>

Finally, the correlations between the factors (Table 8) showed a range between .36 (SI-PW) and .78 (PD-IR). Discriminant validity was checked by comparing the highest correlation with the square of the AVE value in each factor (see diagonal of Table 7). To consider that a factor has an adequate discriminant validity, it is needed that the square of the AVE value is greater than the highest observed correlation in that factor (Forner & Larcker, 1981), a condition that was met in all cases.

<Table 8>

4. Discussion

This study helps fill the gap existing in the assessment of QOL in infancy and adolescence of people with ASD and ID. To the best of our knowledge, the KidsLife-ASD is the first QOL scale specifically adapted to these children and youngsters. Actually, the identification of a widespread use of tools lacking reliability and validity was an important finding of the recent systematic review carried out by Ayres et al. (2017), who highlighted the pressing need to develop robust measures for people with ASD. For these reasons, we examined the psychometric properties of the field-test version of the KidsLife

Scale when it is applied to those with not only ID but also an ASD, with the goal of adapting it to this population. Results supported the internal structure of the scale based on the theoretical and assessment framework in which QOL is composed of eight intercorrelated first-order domains.

Although QOL domains are identical to the original KidsLife Scale (Gómez et al., 2016), addressed to children with ID, they were operationalized through a different pool of items (since the most valid, reliable, and suitable items for people with ASD and ID were selected). The adapted KidsLife-ASD Scale is composed by the same number of items as the original (*N*=96) but 31% were different (*n*=30): two items in rights; three items in social inclusion, self-determination, and material wellbeing (*n*=9); four items in personal development and interpersonal relationships (*n*=8); five in physical wellbeing; and six in emotional wellbeing. Therefore, four of the eight subscales are substantially different and eight items were slightly reformulated to include more suitable examples for this population (i.e. the essential content of the items was the same, but clarifications were added among parentheses to better explain their content). An English version of the specific items in the ASD KidsLife can be seen in Appendix 1. The result is a helpful assessment tool that satisfies the demands of organizations for a specific QOL instrument that will allow professionals working in this field to develop evidence-based practices to enhance QOL-related personal outcomes (Claes et al., 2015; Gómez et al., 2013; van Loon et al., 2013).

The KidsLife-ASD Scale presents adequate evidence of reliability and validity based on the internal structure of the scale, as well as convergent and discriminant validity. Internal consistency of some domains (i.e.., PW, MW, SD, PD, and IR) was slightly lower (between -.02 and -.08) as a result of the removal of items. This decrease might be caused by the elimination of redundant items, given that these coefficients are a measure based on correlations between items that might be inflated by overlaps between them. Nevertheless, the eight subscales showed adequate values to guarantee the reliability of the scale. In this sense, personal development was the most consistent and reliable domain, while the three wellbeing-related domains (i.e., physical, material and emotional wellbeing) obtained the lowest values but were within a range considered appropriate.

With regard to the validity evidences based on the internal structure of the scale, the CFA showed adequate indexes of fit for the eight-domain model, better than those obtained for the fit of two alternative models. With respect of convergent and discriminant validity, the personal development domain stood out, while physical and material wellbeing were the least discriminant. Furthermore, these

results support the conclusion that the items which make up the scale constitute an appropriate operationalization of the QOL construct for children and adolescents with ASD and ID who are attending social or educational services. Thus, it seems to be an appropriate and helpful tool for guiding evidence-based practices and allocation of resources for them.

Some limitations must be noted. Despite our use of a large group of participants, they were not randomly selected. Rather, they were limited to those who agreed to participate (among those receiving support in contacted organizations who were willing to collaborate). Moreover, it must be emphasized that this is a report of a third person. Thus, a further area for future research is development of a self-report version of the KidsLife-ASD Scale, given the necessity of developing QOL self-reports with adequate evidence of reliability and validity for this population (Saldaña et al., 2009). Parents and staff have traditionally been relied on to offer proxy reports of children's QOL. Yet recent research is showing evidence of the capacity of adolescents with ASD to provide a unique perspective on their own well-being and thereby take a more active role in research (Burgess & Turkstra, 2010; Egilson et al., 2017; Ikeda et al., 2014, 2016; Shipman et al., 2011). Given the observed differences between respondents, it is essential to consider the perspectives of professionals, parents, adolescents and children when designing and planning supports and interventions (Clark et al., 2015); it is also important to obtain an overall assessment of progress and obstacles related to the child's QOL (Burgess & Gutstein, 2007). Finally, due to the large number of items per domain and the need to replicate the same structure as in the original study of the KidsLife Scale, we used parcels that may lead to some disadvantages. Future research might also be focused on analyzing QOL-related personal outcomes assessed with this scale, examining personal and contextual variables that may impact on QOL, and adapting the scale for people with ASD but no ID.

We consider the KidsLife-ASD Scale as a valuable first step forward in carrying out a comprehensive assessment of QOL. The information derived using this scale may be quite helpful to improve quality of life-related personal outcomes, develop person-centered planning, provide individualized supports, implement quality improvement strategies for organizations, and guide social and human policies to ensure human rights, empowerment, and inclusion. Although the validation presented in this study is geared toward the Spanish population, the original KidsLife Scale is being adapted for use in other countries (Belgium, Chile, Colombia, Italy, among others), and the KidsLife-ASD is also being translated into other languages with the aim of being validated in the near future.

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Table 1. Internal consistency coefficients for the field-test version of the scale.

	SI	SD	EW	PW	MW	RI	PD	IR
Cronbach's alpha	.88	.87	.85	.80	.83	.78	.91	.88
Ordinal alpha	.90	.90	.83	.88	.91	.89	.94	.92
Ordinal theta	.91	.91	.86	.89	.92	.91	.95	.93
N items	16	20	20	20	20	20	20	20

SI: social inclusion; SD: self-determination; EW: emotional wellbeing; PW: physical wellbeing; MW: material wellbeing; RI: rights; PD: personal development; IR: interpersonal relationships.

Table 2. Eliminated items in the final version of the scale.

	1st step *CHI* < 0.300	2nd step *M* > 3	3rd step smaller *CHI*	4th step Content	*N* items
SI	i03, i14	i11, i15	-	-	4
SD	-	i17, i25, i26, i28, i31, i32, i34	i29	-	8
EW	i37, i46	i38, i39, i42, i43, i45	-	i52	8
PW	i69, i76	i59, i65, i68, i70, i75	-	i61	8
MW	-	i77, i78, i84, i85, i95, i96	-	i80, i87	8
RI	i99, i100, i108, i110, i111, i113	i102	-	i101	8
PD	i131	i120, i130	-	i126, i128, i129, i132, i135	8
IR	-	i143, i144, i145, i149	-	i137, i138, i152, i156	8
N items	13	32	1	14	60

SI: social inclusion; SD: self-determination; EW: emotional wellbeing; PW: physical wellbeing; MW: material wellbeing; RI: rights; PD: personal development; IR: interpersonal relationships.

Table 3. Comparison of Cronbach's alphas for the field-test version and the final version of the scale.

		SI	SD	EW	PW	MW	RI	PD	IR
Cronbach's alpha	Field-test version	.88	.87	.85	.80	.83	.78	.91	.88
	Final version	.88	.83	.79	.74	.75	.79	.88	.84
	Difference	0	-.04	-.06	-.06	-.08	+.01	-.03	-.04
Ordinal alpha	Field-test version	.90	.90	.83	.88	.91	.89	.94	.92
	Final version	.90	.87	.85	.82	.85	.88	.92	.88
	Difference	0	-.03	+.02	-.05	-.06	-.01	-.02	-.04
Ordinal theta	Field-test version	.91	.91	.86	.89	.92	.91	.95	.93
	Final version	.91	.88	.86	.83	.86	.89	.93	.89
	Difference	0	-.03	0	-.06	-.06	-.02	-.02	-.04

SI: social inclusion; SD: self-determination; EW: emotional wellbeing; PW: physical wellbeing; MW: material wellbeing; RI: rights; PD: personal development; IR: interpersonal relationships.

Table 4. Compositions of parcels.

	Parcel 1	Parcel 2	Parcel 3
Social inclusion	i16 (1.24)	i06 (.72)	i01 (-.00)
	i02 (-.34)	i10 (-.01)	i05 (.22)
	i08 (-.40)	i13 (.32)	i12 (.42)
	i04 (-.15)	i07 (-.19)	i07 (.31)
Self-determination	i30 (1.57)	i27 (.96)	i18 (-.14)
	i23 (-.30)	i22 (-.15)	i19 (.09)
	i33 (.49)	i36 (.13)	i21 (.07)
	i20 (-.07)	i35 (-.02)	i24 (.93)
Emotional wellbeing	i55 (-.13)	i49 (-.39)	i44 (-.42)
	i47 (-1.35)	i48 (-1.10)	i51 (-.84)
	i40 (-.66)	i50 (-.67)	i53 (-.69)
	i54 (-1.03)	i41 (-.96	i56 (-1.05)
Physical wellbeing	i57 (-.95)	i71 (-.185)	i60 (-1.21)
	i64 (-.58)	i66 (-.92)	i62 (-1.15)
	i74 (-1.79)	i67 (-1.70)	i72 (-.28)
	i58 (-1.33)	i63 (-1.28)	i73 (-1.36)
Material wellbeing	i90 (.20)	i81 (-1.60)	i89 (-1.11)
	i83 (-1.01)	i88 (-.60)	i82 (-1.24)
	i79 (-1.72)	i89 (-1.11)	i94 (-1.26)
	i86 (-1.51)	i93 (-1.34)	i93 (-1.34)
Rights	i97 (-1.34)	i98 (.58)	i104 (-2.01)
	i114 (.172)	i116 (-.09)	i105 (-1.31)
	i112 (-3.11)	i106 (-2.17)	i109 (.31)
	i103 (-1.94)	i107 (-1.69)	i115 (-.74)
Personal development	i121 (-.30)	i124 (-.39)	i117 (-.80)
	i134 (-.57)	i118 (-.58)	i119 (-.64)
	i127 (-1.16)	i136 (-1.08)	i122 (-.52)
	i125 (-.75)	i123 (-.73)	i133 (-.66)
Interpersonal relationships	i141 (.26)	i140 (.25)	i139 (-.53)
	i154 (-.37)	i153 (-.44)	i142 (-.49)
	i151 (-.96)	i147 (-.89)	i146 (-.80)
	i148 (-.79)	i155 (-.58)	i150 (.13)

Asymmetry values are between parentheses.

Table 5. Parcels' unidimensionality.

Factor	Parcel	ECV	MIREAL	Real data % of variance for variable 1	Real data % of variance for variable 2	Mean of random % of variance for variable 1	Mean of random % of variance for variable 2	Advised number of dimensions
SI	si_p1	.853	.226	86,6	13,4	67,5	32,0	1
	si_p2	.858	.236	82,6	17,4	67,0	32,4	1
	si_p3	.866	.248	87,6	12,4	68,0	31,4	1
SD	sd_p1	.712	.299	71,4	28,6	66,8	32,7	1
	sd_p2	.767	.312	75,0	25,0	66,7	32,6	1
	sd_p3	.763	.278	77,3	22,7	67,3	32,1	1
EW	ew_p1	.731	.259	77,5	22,5	68,1	31,3	1
	ew_p2	.751	.280	80,1	19,9	67,3	32,0	1
	ew_p3	.846	.227	97,9	2,1	67,8	31,5	1
PW	pw_p1	.896	.188	88,6	11,4	67,4	31,9	1
	pw_p2	.776	.274	78,5	21,5	65,9	33,3	1
	pw_p3	.741	.337	76,8	23,2	66,7	32,4	1
MW	mw_p1	.814	.197	77,4	22,6	67,2	32,3	1
	mw_p2	.728	.360	67,7	25,2	66,7	32,4	1
	mw_p3	.787	.251	71,9	28,1	68,5	30,9	1
RI	ri_p1	.806	.283	85,4	14,6	66,6	32,6	1
	ri_p2	.776	.308	77,8	22,2	67,4	31,9	1
	ri_p3	.781	.302	82,3	17,7	67,7	31,7	1
PD	pd_p1	.859	.204	83,8	16,2	68,4	31,0	1
	pd_p2	.872	.244	87,5	12,5	67,6	31,8	1
	pd_p3	.801	.310	80,1	19,9	67,8	31,6	1
IR	ir_p1	.735	.348	70,0	30,0	66,3	33,1	1
	ir_p2	.871	.210	87,2	12,8	66,9	32,4	1
	ir_p3	.851	.235	88,0	12,0	67,8	31,6	1

SI: social inclusion; SD: self-determination; EW: emotional wellbeing; PW: physical wellbeing; MW: material wellbeing; RI: rights; PD: personal development; IR: interpersonal relationships; ECV: Explained Common Variance; MIREAL: Mean of Item Residual Absolute Loadings.

Table 6. Standardized factorial loadings for the eight-domain confirmatory model.

Model	FP	RMSEA (CI)	CFI	TLI	AIC	BIC	ABIC
M1 (one-dimensional)	72	.127 (.122-.132)	.678	.648	41119	41409	41181
M2 (eight correlated factors)	100	.050 (.043-.056)	.956	.946	39502	39906	39588
M3 (second order factors)	80	.055 (.049-061)	.941	.933	39578	39901	39647

FP: Free parameters from the base-line model; RMSEA: Root mean square error of approximation; CI: confidence interval; CFI: Comparative fit index; TLI: Tucker-Lewis index; AIC: Akaike information criterion; BIC: Bayesian information criterion; ABIC: Sample-size adjusted BIC.

Table 7. Standardized factorial loadings for the eight-domain confirmatory model.

	SI	SD	EW	PW	MW	RI	PD	IR
Parcel 1	.785	.834	.770	.668	.718	.838	.791	.852
Parcel 2	.874	.809	.786	.817	.755	.762	.906	.818
Parcel 3	.818	.831	.797	.615	.716	.748	.900	.816
AVE	.68	.68	.62	.50	.53	.61	.75	.69
Omega	.87	.86	.83	.74	.77	.83	.90	.87

AVE: Average Variance Extracted; SI: social inclusion; SD: self-determination; EW: emotional wellbeing; PW: physical wellbeing; MW: material wellbeing; RI: rights; PD: personal development; IR: interpersonal relationships.

Table 8. Correlations between the eight domains.

	SI	SD	EW	PW	MW	RI	PD	IR
SI	**.82**							
SD	.52	**.82**						
EW	.36	.55	**.78**					
PW	.35	.35	.56	**.70**				
MW	.38	.53	.66	.70	**.72**			
RI	.50	.53	.61	.51	.72	**.78**		
PD	.44	.52	.72	.53	.67	.68	**.86**	
IR	.55	.64	.68	.49	.68	.75	.78	**.82**

Squares of the AVE are on the diagonal (in bold), the inter-factor correlations are out of the diagonal. SI: social inclusion; SD: self-determination; EW: emotional wellbeing; PW: physical wellbeing; MW: material wellbeing; RI: rights; PD: personal development; IR: interpersonal relationships.

Figures

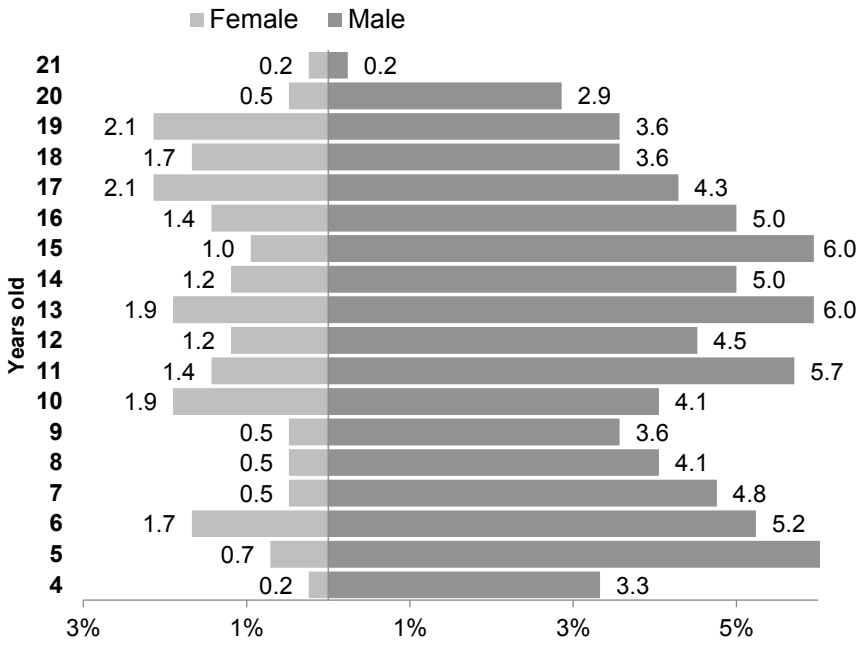

Figure 1. Distribution of participants in terms of age and gender.