RESEARCH ARTICLE

Measuring quality of life in autistic adults: the reliability and validity of the Brief Version of the World Health Organization Quality of Life scale [version 1; peer review: 1 approved with reservations]

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Abstract

Background: Measurement of the Quality of Life (QoL) of autistic adults is receiving increasing empirical attention. The World Health Organisation (WHO) QoL measure (WHOQoL-BREF) has been utilised in several studies. Autistic adults report significantly lower QoL compared to neurotypical adults across several domains. However, no studies have investigated the suitability of WHOQoL-BREF as a tool to measure the QoL of autistic adults.

Methods: This study explored the validity and reliability of WHOQoL-BREF with a mixed methods approach. Quantitatively, structural validity was explored by an exploratory factor analysis of WHOQoL-BREF data from 352 autistic adults aged 18-80 years. Qualitatively, four discussion groups (n=20 autistic people) were conducted to explore the face validity of the items of WHOQoL-BREF.

Results: The five factor structure was conceptually similar to the WHO formulation of QoL, with adequate to good internal consistency of domains; however, some items loaded in an unexpected way. The reasons for these unexpected loadings were explored in the transcripts from the discussion groups.

Conclusions: The findings suggest that the WHOQoL-BREF has acceptable validity and reliability for use with autistic adults; however caution is needed when interpreting data from the social domain and some other items

Keywords

Adults, mental health, measurement, structural validity, community-based consultation, quality of life

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Plain language summary

The World Health Organisation (WHO) developed an international quality of life measure (the WHOQoL-BREF), and this questionnaire has been used in several studies with autistic people. The WHOQoL-BREF has four factors (in the neurotypical population) with questions about one's physical, psychological, social, and environment quality of life. Often, autistic people report lower quality of life compared to neurotypical people. However, no studies have looked at how valid the WHOQoL-BREF is at measuring quality of life for autistic people. We used both quantitative (numerical) and qualitative (talking with autistic people) data collection methods. Our analysis looked at the factor structure of the WHOQoL-BREF to identify if the factor structure is the same for autistic people as it is in the neurotypical population. We collected numerical data from 352 autistic people (aged 18–80). We also held four discussion groups with 20 autistic people. We found a five-factor structure from our quantitative analysis and this structure was similar to the WHO structure. We used the transcripts of the discussion groups to identify why some of the questions grouped together with different factors (compared to the WHO structure). The findings suggest that the WHOQoL-BREF provides a reasonably accurate picture for use with groups of autistic people. However, caution is needed when interpreting the social factor and some other questions.

Introduction

Autism is a life-long neurodevelopmental condition; autistic individuals have difficulties with social interaction and communication, and repetitive behaviours and/or interests along with sensory sensitivities. Understanding and measuring the quality of life (QoL) of autistic people has become a focus of research during the last decade (Ayres *et al.*, 2018; Burgess & Gutstein, 2007). However, there has been little research into the validity and reliability of outcome measures in use with autistic adults; one consequence of this is that accurate evaluation of services and interventions may be compromised (Brugha *et al.*, 2015; Lorenc *et al.*, 2018).

Subjective QoL for autistic adults is reported to be significantly lower than in the general population, a trend that is evidenced worldwide (Jennes-Coussens *et al.*, 2006; Kamio *et al.*, 2013; Kamp-Becker *et al.*, 2010; Lawson *et al.*, 2020; Lin, 2014; Lin & Huang, 2019; Mason *et al.*, 2018; McConachie *et al.*, 2018; Oakley *et al.*, 2021; van Heijst & Geurts, 2015). However, some studies report QoL scores that are comparable between autistic and comparison samples (Hong *et al.*, 2016; Moss *et al.*, 2017). Moreover, variability *within* groups is notable, such that only considering mean differences obscures reports of good QoL from autistic adults (Oakley *et al.*, 2021). Several factors may contribute to the QoL of autistic adults; a range of studies have suggested, for example, that receiving support predicts better subjective QoL (Renty & Roeyers, 2006) whilst being female tends to predict lower QoL (Kamio *et al.*, 2013; Mason *et al.*, 2018), as does having a mental health diagnosis (Deserno *et al.*, 2019; Helles *et al.*, 2017; Hong *et al.*, 2016; Mason *et al.*, 2018; Mason *et al.*, 2019), or sleep problems (Deserno *et al.*, 2019).

A consistent finding is that social QoL is rated lowest in autistic adults compared to other aspects of QoL (Kamp-Becker *et al.*, 2010; Lin, 2014). Challenges with social communication and reciprocity may result in greater loneliness and limited social participation (Mazurek, 2014; Orsmond *et al.*, 2004; Orsmond *et al.*, 2013)¹. Indeed, a recent network analysis identified the negative impact lower social contact had on QoL (Deserno *et al.*, 2017). However, some aspects of QoL may be conceptualised differently by autistic people compared to the general population; for example, QoL research with autistic children/adolescents has highlighted that 'friendships' may have particular meanings for autistic children which are different from their meaning in other groups, and may consequently not be captured by usual questions (Tavernor *et al.*, 2013). Other aspects of daily life may differ between the general population and autistic individuals, for example, autistic adults are much less likely to be in employment (Shattuck *et al.*, 2012), and more likely to have a history of being bullied (Van Roekel *et al.*, 2010), both of which may impact on QoL. Thus, there are factors specific both to autism characteristics and to experiences that require consideration for valid measurement of QoL of autistic people.

The WHOQoL-BREF (Skevington *et al.*, 2004) has been the tool most frequently used in QoL studies with autistic adults (Ayres *et al.*, 2018). Whilst a good level of agreement has been reported in one study between maternal proxy-report and autistic adult self-report (Hong *et al.*, 2016), there is a need for further investigation of the measurement properties of the tool when used specifically with autistic adults. In the present study, we used exploratory factor analysis to investigate the structural validity of the WHOQoL-BREF with a large sample of autistic adults from the UK. We also undertook consultation with autistic adults concerning the meaning of the questionnaire items.

Methods

Phase 1 – Quantitative analysis of WHOQoL-BREF data

Participants. All participants had joined the Adult Autism Spectrum Cohort study (ASC-UK; <http://research.ncl.ac.uk/adultaautismspectrum/>). Members of the ASC-UK, upon consenting to take part, are asked to complete a demographic questionnaire (which asks about domains such as autism diagnosis, employment status, living status, interests etc.), the WHOQoL-BREF, and the Social Responsiveness Scale. Participants are also asked to indicate their preferred contact method (postal, e-mail, telephone). Measures were sent to participants by their preferred contact method (in the case of those who listed only telephone contact, measures were sent via either post or email). The sample was 352 autistic adults (mean=42.3 years, SD=14.2) with 189 males (mean=43.9

¹ It is important to note that social communication and reciprocity both require the interaction between agents. In the case of autism, the "double empathy problem" may be relevant here, whereby autistic and non-autistic people, as agents in conversation, may well misunderstand one another (Milton, 2012). By implication, social communication challenges are not solely located within the autistic individual.

years, $sd=15.3$), 150 females (mean=41.2 years, $sd=12.6$), and 13 other/rather not say (mean=30.6, $sd=7.8$) (see Table 1).

Measures. The ASC-UK registration questionnaire comprises 78 items, including demographic information (reported in Table 1) and the participants' health, mental health and life situation.

The WHOQoL-BREF (Whoqol Group, 1998) is a 26 item measure with four domains: Physical (e.g. 'How much do you need any medical treatment to function in your daily life?'), Psychological (e.g. 'To what extent do you feel your life to be meaningful?'), Social (e.g. 'How satisfied are you with the support you get from your friends?'), and Environment (e.g. 'How satisfied are you with your transport?'). There are two global

QoL questions (e.g. 'How would you rate your quality of life?'). In a general population sample, internal consistency (Cronbach's α) was acceptable to good for each domain: Physical (0.82), Psychological (0.81), Social (0.68), and Environment (0.80) (Skevington *et al.*, 2004), and comparable in a study of autistic people: Physical (0.71), Psychological (0.82), Social (0.78), and Environment (0.79) (Hong *et al.*, 2016). Transformed domain scores (range: 0 to 100) were used in analyses.

Procedure. Participants completed the WHOQoL-BREF approximately eight weeks after they joined ASC-UK. A paper version or electronic version of the measure was sent, depending on the participant's preference. Two reminders (at three-week intervals) were sent. Participants could ask a friend, professional, or support worker with help in completing the measure if necessary. Of the 352 participants, 276 (74.6%) had reported not requiring help with completing the ASC-UK registration questionnaire, and 69 (18.6%) reported having had help (7 did not answer).

Analysis. The WHOQoL-BREF data showed good completeness. Item percentage missing was 0–4.3%; the WHOQoL cut-off for inclusion of an item is 20%. Missing data were examined for patterns as this may lead to bias in statistical analysis when imputation techniques are used (Dong & Peng, 2013). Little's MCAR test showed that none of the subscales of the WHOQoL-BREF had data missing at random: Physical (Chi-Square=25.503, $df=18$, $p=.112$); Psychological (Chi-Square=8.229, $df=10$, $p=.607$); Social (Chi-Square=5.595, $df=6$, $p=.470$); and Environment (Chi-Square=59.011, $df=46$, $p=.094$). Expectation maximisation was used to impute missing values because listwise deletion (the default in FACTOR, see below) can lead to biased analyses and expectation maximisation is a valid missing-data replacement method (Myers, 2011).

Minimum Rank Factor Analysis (MRFA; Lorenzo-Seva & Ferrando, 2006a) was used to explore the underlying factor structure of the WHOQoL-BREF in this sample. The software FACTOR (Lorenzo-Seva & Ferrando, 2006b) was used to conduct the analysis as it can run both MRFA and polychoric correlations. Polychoric correlations were used in the analysis of the WHOQoL-BREF data because Pearson's correlations can fail to detect a significant relationship with ordinal data. Simulation studies (with a pre-set 'true' population value) have shown that using Pearson's correlations with ordinal data misses the true population estimate by a large degree compared to polychoric correlations (Baglin, 2014). Minimum Average Partial (MAP) test was used to retain the number of factors as it has been shown to be effective at recovering the 'true' number of factors from known data in simulations (Ruscio & Roche, 2012).

Ethics. A favourable ethical opinion for the ASC-UK study was granted by the Wales Research Ethics Committee 5 (reference=14/WA/1066).

Table 1. Participants' demographic information.

Characteristic	Range	Mean	SD
Age in years	18–80	42.29	± 14.22
Male	18–74	43.87	± 15.31
Female	18–80	41.15	± 12.63
Age at diagnosis in years	2–74	37.82	± 16.30
Male	2–74	38.33	± 17.95
Female	4–69	38.21	± 13.39
SRS total score	18–178	111.65	± 28.66
		N	%
Gender			
Male		189	53.7
Female		150	42.6
Other / Rather not say / Not reported		13	3.7
Current employment status			
Employed (inc. self-employed)		141	40.1
Other ^a / Not reported		211	59.9
Educational qualifications			
Higher ^b education qualifications		129	36.6
Other / Not reported		223	63.4
Current mental health condition diagnosis			
Yes		262	70.8%
No		81	21.9%
Not reported		27	7.3%

^a 'other' includes being a carer for a relative, long term illness, being a full time student, or unable to work; ^b 'higher education' is first degree level qualification or above

SRS: Social Responsiveness Scale (Constantino & Gruber, 2012)

Consent statement. Written informed consent for publication of group data and participants' anonymous responses was gathered from each participant when they joined the ASC-UK.

Phase 2 – Discussion groups

Community-based consultation. Twenty adults were contacted through the National Autistic Society in North East England, and through a drama group for people with intellectual disability (males 13, females 7; mean age 28 years, range 19–45 years). They attended one of four discussion groups between June and August 2016. Each person acted as a consultee, providing advice regarding measurement of QoL through WHO items; they were thanked for their time and expertise with a shopping voucher.

Measures presented to discuss content with the consultees. The WHOQoL-BREF (see above).

The WHOQoL-Disabilities module (Power & Green, 2010) was developed to measure QoL of people with intellectual or physical disability, as an additional 13 items to be administered alongside the WHOQoL-BREF. It has one global question about the impact of the person's disability ('Does your disability have a negative (bad) effect on your day-to-day life?'). The other 12 items can be summed as a single score or in three separate domains: discrimination (e.g. 'Do you feel that some people treat you unfairly?'), autonomy (e.g. 'Do you get to make the big decisions in your life?'), and inclusion (e.g. 'Are you satisfied with your ability to communicate with other people?'). Internal consistency for the full scale is good (Cronbach's $\alpha=0.85$ for the physical disability version of the measure, and 0.81 for the intellectual disability version) (Power & Green, 2010).

Procedure. Each discussion group lasted for two hours, led by a relative of an autistic person, an autism advocate and a researcher. The aim was to elicit discussion about the clarity and suitability of the items from the WHOQoL-BREF and Disabilities module. The discussion was semi-structured to facilitate involvement, given that the individuals contributing to the consultation did not know each other (in three of the groups). First, consultees together completed a systematic sorting task based on Q-sort methodology [30] for 36 items (i.e. excluding the three global questions). Second, consultees were asked to write down areas of QoL that they thought were not covered by the WHOQoL-BREF or Disabilities items. Finally, consultees were shown the full questionnaire on paper, and discussed their positive and negative views. With permission, each discussion group was audio recorded and transcribed verbatim. Participants consented to publication of anonymous quotations from the advice they gave the research team.

Analysis. A deductive approach was taken when analysing the discussion group transcripts, with two areas of focus. The first was on nuances in the discussion, either around items that autistic people found difficult to interpret, or experiences that seemed to differ from what might be reported in the

general population. The second focus was on any QoL topic areas that were missing from the measure (stated either directly or indirectly). The transcripts were read through repeatedly and coded by DM and HM, identifying recurrent themes or areas which were emphasised as important by the interviewees. The themes were discussed and refined by all the group leaders (CW and DG were included to reflect the viewpoint of the autism community). Note that in this paper we present only illustrative quotes from discussion of items that did not load in expected ways during the factor analysis, based on general population factor loadings. (The full qualitative data analysis is presented in a further paper, McConachie *et al.*, 2018.)

Results

Items one and two were excluded from the WHOQoL-BREF EFA because they are global QoL items (Whoqol Group, 1998); thus only items three to 26 were included in the EFA. There were four steps in the process of factor analysis.

Step 1: The suitability of the data for a factor analysis was supported by a significant Bartlett's statistic ($p<0.001$), and a good sampling adequacy (KMO 0.897). A minimum factor loading cut-off of 0.40 was selected for inclusion of an item (a sample size of 300 with loadings of 0.32 is likely to be significant with an alpha level of 0.001 (Yong & Pierce, 2013). Initial results of the MRFA suggested a one factor model which explained 42.58% of the common variance. In the one factor solution, four items did not reach the selected cut-off loading.

Step 2: Given the exploratory nature of the analysis, the four factor model of the WHO QoL measure was tested. In line with the recommendations for good exploratory factor analysis practice, a three and a five factor model were also tested (Osborne & Costello, 2009; Rodgers *et al.*, 2016). The five factor model was selected as the best fit because it separated into factors that best matched the WHO QoL conceptualisation (see Table 2 for final loadings).

Step 3: For the selected five factor model, three item loadings - one social domain item, 22 ('How satisfied are you with the support you get from your friends?') and two psychological domain items, 11 ('Are you able to accept your bodily appearance?') and 26 ('How often do you have negative feelings such as blue mood, despair, anxiety, depression?') did not reach the cut-off of 0.40. Item 22 did load onto the 1 factor model (0.50) but not the other models (loadings from 0.04 to 0.34). Item 11 did load onto some models (for 1, 3, and 4 factors: loadings from 0.41 to 0.56). Item 26 did not reach the cut-off in any of the models (1, 3, 4, or 5 factors: loadings from 0.02 to 0.18). These items were retained in the five factor model as they form part of the WHOQoL structure. Item 15 ('How well are you able to get around?') loaded above 0.40 onto both the physical (0.49) and environment (0.46) domains. Item 7 ('How well are you able to concentrate?') loaded on the physical domain (0.59) rather than typically on the psychological domain.

Step 4: Internal consistency of the WHOQoL-BREF five factor model was acceptable to good across domains. The internal consistency was explored in two ways. First, only the items loading above 0.40 in each factor were included (item 15 was included in both the physical and environmental factors.) Second, items that did not load above 0.40 were included in the factor they belong to in the WHO model. Internal consistencies were: medical QoL (0.73), physical QoL (0.83;

and 0.84 when item 15 was included), psychological QoL (0.80; and 0.63 when items 11 and 26 were included), social QoL (0.72; and 0.63 when item 22 was included); and environment QoL (0.85; and 0.86 when item 15 was included).

Factor analysis - rotation

For each factor model, oblique rotation was chosen given the relationships that would be expected between the QoL

Table 2. Factor loadings for 24 items of the WHOQoL-BREF for the five factor model. (Env – environment QoL, Psych – psychological QoL, Soc – social QoL, Med – medical QoL, Phys – physical QoL)

		Phys	Med	Env	Soc	Psych
3	To what extent do you feel that (physical) pain prevents you from doing what you need to do?	-0.07	0.73	0.16	-0.02	-0.03
4	How much do you need any medical treatment to function in your daily life?	0.06	0.97	-0.08	0.01	-0.01
5	How much do you enjoy life?	-0.02	0.01	0.19	0.06	0.81
6	To what extent do you feel your life to be meaningful?	0.012	-0.06	0.10	0.14	0.62
7	<i>How well are you able to concentrate?</i>	0.59	-0.06	-0.02	0.06	0.04
8	How safe do you feel in your daily life?	0.28	0.01	0.50	0.07	-0.01
9	How healthy is your physical environment?	0.28	0.05	0.48	0.12	-0.00
10	Do you have enough energy for everyday life?	0.74	0.08	0.04	0.00	0.14
11	<i>Are you able to accept your bodily appearance?</i>	0.31	-0.06	0.09	0.11	0.26
12	Have you enough money to meet your needs?	0.17	-0.10	0.61	0.09	-0.09
13	How available to you is the information that you need in your day-to-day life?	0.30	-0.09	0.54	0.08	-0.03
14	To what extent do you have the opportunity for leisure activities?	0.33	0.10	0.41	0.09	-0.04
15	<i>How well are you able to get around?</i>	0.49	-0.09	0.46	-0.07	-0.09
16	How satisfied are you with your sleep?	0.54	0.08	0.10	-0.11	0.15
17	How satisfied are you with your ability to perform your daily living activities?	0.79	0.06	0.09	0.02	0.06
18	How satisfied are you with your capacity for work?	0.67	-0.09	0.02	0.06	0.16
19	How satisfied are you with yourself?	0.29	-0.02	-0.15	0.02	0.79
20	How satisfied are you with your personal relationships?	-0.07	0.06	0.13	0.77	0.18
21	How satisfied are you with your sex life?	0.03	-0.03	-0.10	0.87	-0.08
22	<i>How satisfied are you with the support you get from your friends?</i>	-0.05	0.06	0.34	0.31	0.18
23	How satisfied are you with the conditions of your living place?	-0.07	0.04	0.73	-0.13	0.22
24	How satisfied are you with your access to health services?	-0.05	0.09	0.68	0.07	0.17
25	How satisfied are you with your transport?	0.09	-0.05	0.65	0.03	-0.02
26	<i>How often do you have negative feelings such as blue mood, despair, anxiety, depression?</i>	0.09	0.08	-0.18	0.16	-0.17

NB Items in italics do not load as expected from WHOQoL-BREF structure. Bold numbers indicate strongest factor loading per item (all above 0.40, except for items 11, 22 and 26). Items 1 and 2 are not included in the EFA as they are global QoL items and so do not load onto facets of QoL.

domains. Pearson's correlations were used to detect this inter-relationship. Each factor, apart from the medical factor, significantly correlated with every other factor (Table 3).

Five items from the WHOQoL-BREF data did not load in the same way as in the WHO structure ('How well are you able to concentrate?', 'Are you able to accept your bodily appearance?', 'How well are you able to get around?', 'How satisfied are you with the support you get from your friends?' and 'How often do you have negative feelings such as blue mood, despair, anxiety, depression?') (Whoqol Group, 1998; Skevington *et al.*, 2004). The reasons for these different loadings were further investigated by inspecting the discussion group transcripts.

Discussion group illustrative quotes

Participants from the discussion groups were not informed about the findings of the WHOQoL-BREF items from the quantitative analysis (the factor loadings were not presented). The discussions indicated why they load in a different way:

Item 7: 'How well are you able to concentrate?' This item is in the WHOQoL-BREF psychological domain; however, in this EFA it loaded onto a physical factor. Consultees reported that noises and other sensory issues that negatively impact on autistic people frequently contributed to their inability to concentrate:

"I can't multi-task like certain women can. And loud noises and stuff put me off, if I'm doing a task I need to concentrate. So the kids put me off..." (Male, 25–40)

Consultees identified that both conversation and background noises, innocuous to others, were a big problem for their concentration:

"... for example in college I'm alright concentrating on work but if someone starts talking to me I can like, get off the subject..." (Female, 18–25)

Table 3. Correlations between each of the five factors identified in the exploratory factor analysis.

	Phys	Psych	Soc	Env	Med
Phys	-				
Psych	.588***	-			
Soc	.225***	.396***	-		
Env	.697***	.529***	.267***	-	
Med	.004	.019	.016	.057	-

***<.001 Pearson's correlation co-efficient
(Phys – physical, Psych – psychological, Soc – social,
Env – environment)

"[I] can't use strip lights, can't be in places with strip lights because the buzzing is constant. Little things really, they're not major; they're not the sort of things that people would notice in general. But I notice them all the time." (Male, 41–60)

Item 11: 'Are you able to accept your bodily appearance?' Again, this item forms part of the WHOQoL-BREF psychological domain; in our sample the highest loading was only 0.31 (on the physical domain). There was a common reference in discussion to bodily appearance being something that was focused on in youth but is no longer important. This view was not restricted to older people.

"I used to get quite upset by what people thought of me, whereas now I've learned to just accept it and I'm not really bothered by what people think." (Male, 18–25)

Another comment about the item was that a person's body is a physical 'given', and cannot be meaningfully changed, indicating a literal interpretation of the item:

"Am I able to accept it? Well I can't do anything else with it can I? I haven't got a say in the matter, I've got to. I do so because I have to..." (Female, 26–40)

Item 15: 'How well are you able to get around?' This item forms part of the physical domain of the WHOQoL-BREF and refers to physical mobility/disability; however in the factor analysis it loaded also onto the environment domain. When discussing this item, consultees took a literal interpretation or commented that the phrasing was ambiguous:

"I hate that question because it's vague, 'get around' what? Get around... I just don't like the way it's worded." (Female, 26–40)

"... when it says able 'to get around' does that mean like physical disabilities..." (Female, 26–40)

None of the consultees had a physical disability, and a common interpretation was to consider the item to be about access to transportation, and how that may be a barrier to getting around:

"... how able you are to get around. With good transport, quite well; with rubbish transport, not so good." (Male, 18–25)

"I would say that one, I interpreted that one... as more a physical thing about walking. So... or does it mean transport? I don't know." (Male, 26–40)

Item 22: 'How satisfied are you with the support you get from your friends?' This item forms part of the social domain of the WHOQoL-BREF but did not load above cut-off. Some consultees had few or no friends which made the item difficult to answer.

"Well, I don't know about anyone else but has anyone else got lots of friends?" (Male, 26–40)

"Not really, no." (Female, 26–40).

Others reflected on how they choose to interact with friends.

"Sometimes people just want their friends there for fun and don't really want them for support as well." (Male, 41–60)

"I don't really get any support from my friends, I don't really have many friends anyway and then... I wouldn't really ask them for any support or let them know that I needed it." (Female, 26–40)

Item 26: 'How often do you have negative feelings such as blue mood, despair, anxiety, depression?' This item forms part of the psychological domain of the WHOQoL-BREF. When discussing this question, consultees often mentioned that combining different types of mental health difficulty in one question was a problem.

"It's just too broad though isn't it? Going from blue mood to despair is... they're so different to be on the same piece of paper is like... I wouldn't really agree with having them together." (Female, 26–40)

"I've never counted it. You're asking me how often, so you need a number. So I don't know." (Female, 26–40)

Mental health was endorsed in discussion as an important topic to be addressed. In the quantitative study, 70.8% of the respondents reported having a current mental health diagnosis. Of these 50.6% had an anxiety condition, 52.6% a diagnosis of depression, and 40.6% reported both.

Discussion

This is the first mixed-methods investigation of the measurement properties of the WHOQOL-BREF with autistic adults. The quantitative analyses indicated that, overall, the factor structure and internal consistency of the measure is acceptable. However, some problematic items (for example, about bodily appearance, or mental health) were further examined based on discussion groups with autistic adults. We found that these items may well be interpreted differently by autistic people, as compared to neurotypical people. For example, the bodily appearance item (a psychological domain item in the WHO conceptualisation; [Whoqol Group, 1998](#)) loaded most strongly onto the physical domain in this analysis, and comments in discussion groups suggested this item is interpreted differently by autistic adults. Thus, at the group level, the WHOQOL-BREF is an acceptable measure of QoL with this population; however, interpretation at the individual item level needs careful interpretation.

We found that the original four-factor structure tended to combine the physical and psychological domains when used with autistic adults. However, a five-factor model had the best fit overall when considering the conceptual clarity of factors and the reliability coefficients for each factor. Two of the five factors in the model contained only two items, which does not make an acceptable factor. For one of these, the items formed a highly reliable factor that makes conceptual sense (concerning pain and medication) as a 'subset' of the physical

factor. The other was also highly reliable, containing two of the three items of the social domain, with the third item, 'how satisfied are you with the support you get from your friends?' being interpreted in various ways by respondents. Overall, this suggests the WHOQoL-BREF factor structure is reasonably well aligned structurally for measurement of QoL of autistic adults, but the social factor requires cautious interpretation.

However, three items loaded onto factors that are different from the original WHOQoL-BREF. The question about support from friends did not load above cut-off on any factor. Consultees made clear that friends may have different functions for them, and that 'support' is not necessarily one of them as it would imply revealing the difficulties they experience. In addition, many autistic people are socially isolated, perhaps partly because of social difficulties, and may not have or choose to have friends ([Mazurek, 2014](#)). These nuances seem to require additional or different autism-specific questions in order to capture the role that friends play in the life of autistic people. The question about physical mobility loaded on both the environment and physical factors; the autistic adults in the study appeared to interpret the question as pertaining to mobility within one's environment. Environmental factors do seem to be connected with physical factors as an individual of any mobility can be helped or hindered by the environment ([Whiteneck & Dijkers, 2009](#)). Similarly, the psychological item about concentration loaded onto the physical domain. This suggests that concentration may be conceptualised as a 'resource' that is spent, much like 'energy' is conceptualised as being a characteristic of physical QoL in the WHOQoL-BREF. Consultees in the discussion groups noted issues with loud noises and talking as affecting their concentration. Whilst this is an issue that may apply to the general population, there are common sensory sensitivity issues for individuals on the autism spectrum ([Glod et al., 2015](#)) across various domains (i.e. taste, sound, and smell) ([Leekam et al., 2007](#)). Focusing concentration and ignoring sensory issues may be physically draining, akin to depletion after exertion.

The bodily appearance question loaded only weakly onto the psychological factor, and some respondents seemed to have interpreted it as a physical item. This suggests that bodily appearance may not be clearly part of psychological identity for autistic adults, and that bodily appearance is not important relative to other physical QoL questions (for example, having enough energy, 0.74). Introspection and self-concept can be impaired in autism ([Hill et al., 2004](#); [Lind, 2010](#)) and the weak loading suggests autistic adults may relate to their appearance in a more concrete fashion rather than thinking about others' perceptions. The difficulties in identifying emotions and bodily sensations could lead to a sense of self in which the physical body is not integrated ([Seth, 2013](#)).

Finally, the mental health item loaded very poorly onto all factors, suggesting a significant weakness of this item when administered to autistic adults. Asking about multiple mental

health issues in one question may be difficult to answer for anyone, as double-barrelled questions are open to biased answers or misinterpretation (Rattray & Jones, 2007). However, as depression and anxiety are common co-morbidities in autism (Ghaziuddin *et al.*, 2002), appropriate and more detailed measurement of mental health difficulties is vital in considering factors affecting the QoL of this population. In a recent international qualitative study of QoL (including the data from the present sample, and participants in Australia, Singapore, and Argentina; McConachie *et al.*, 2020) this issue was commented on by autistic people from each country; emphasising that “*there is autism, that there is depression... it definitely shapes you a lot 'cos you feel alone, you feel not accepted*” (McConachie *et al.*, 2020, p6).

Strengths and limitations

This study preceded the confirmatory factor analysis of this measure reported in McConachie *et al.* (2018) and demonstrates the added value of utilising a qualitative approach to uncovering the meaning of items used in quantitative scales, and demonstrates that “problematic” items can be meaningfully examined and their interpretation understood by talking to those who complete the questionnaire. This enables analysis to go beyond simply commenting on poor model or item fit across factors and provides an explanation of the potential reason for these statistical findings through examination of quotes from consultation groups, something that would not be possible without a community participatory approach.

There are also some limitations. The sample is not representative of the full autism spectrum; all participants had the capacity to consent for themselves, although 19% had previously reported requiring help with questionnaire completion. The sampling methodology included participants already taking part in a longitudinal cohort study. Thus, the members of this cohort may differ from other autistic people; however, there are few samples of this size for comparison. The sample was varied: a wide age range (18–80 years); an approximately equal gender balance, important because autistic females are often underrepresented in research (Van Wijngaarden-Cremers *et al.*, 2014); and a range of educational attainment and employment situations, characteristics which somewhat mitigate the limitations. Self-report data can be prone to potential biases, such as socially desirable responding (Van de Mortel, 2008). This may be an issue with some of the items in this measure (e.g., ‘have you enough money to meet your needs?’ or ‘how satisfied are you with your sex life?’). However, some autistic people may be

relatively unconcerned about possible judgements of others. The participants in ASC-UK report their autism diagnosis and where their diagnosis took place; although on average the sample scored above a screening cut-off for autism, diagnoses were not verified with clinicians.

Conclusions

We conclude that the WHOQoL-BREF is generally adequate and reliable for measurement of QoL with autistic adults, and thus that the findings of existing QoL studies using this questionnaire can reasonably be accepted. However, the social domain and five items require care in interpretation; it may be advisable to add some explanation of these items when presenting the questionnaire to autistic adults in future. Most importantly, the measure currently cannot represent the impact which mental health difficulties have on the quality of life of autistic people; we suggest that researchers and clinicians use a separate scale validated for autistic people to capture mental health difficulties and understand their relationship with quality of life.

Data availability

Underlying data

Newcastle University: Measuring quality of life in autistic adults: The reliability and validity of the Brief Version of the World Health Organization Quality of Life scale, <https://doi.org/10.25405/data.ncl.14725287> (Mason *et al.*, 2021)

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

Consent

Written informed consent for publication of the participants’ data was obtained from each participant. Permission to share anonymised WHOQOL-BREF data (and no other participant data) was approved by the Autism adulthood and ageing programme Independent Steering Committee.

Acknowledgements

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References

- Ayres M, Parr JR, Rodgers J, *et al.*: **A systematic review of quality of life of adults on the autism spectrum.** *Autism*. 2018; **22**(7): 774–783.
[PubMed Abstract](#) | [Publisher Full Text](#)
 Baglin J: **Improving your exploratory factor analysis for ordinal data: a**

- demonstration using FACTOR.** *Practical Assessment, Research & Evaluation*. 2014; **19**(5): 1–15.
[Publisher Full Text](#)
 Brughha TS, Doos L, Tempier A, *et al.*: **Outcome measures in intervention**

trials for adults with autism spectrum disorders: a systematic review of assessments of core autism features and associated emotional and behavioural problems. *Int J Methods Psychiatr Res.* 2015; 24(2): 99–115.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Burgess AF, Gutstein SE: **Quality of life for people with autism: Raising the standard for evaluating successful outcomes.** *Child Adolesc Ment Health.* 2007; 12(2): 80–86.

[PubMed Abstract](#) | [Publisher Full Text](#)

Constantino JN, Gruber CP: **Social responsiveness scale (2nd ed.) (SRS-2).** [Manual] (Vol. Pearson). Torrance, CA: Western Psychological Services. 2012.

[Reference Source](#)

Deserno MK, Borsboom D, Begeer S, *et al.*: **Multicausal systems ask for multicausal approaches: A network perspective on subjective well-being in individuals with autism spectrum disorder.** *Autism.* 2017; 21(8): 960–971.

[PubMed Abstract](#) | [Publisher Full Text](#)

Deserno MK, Borsboom D, Begeer S, *et al.*: **Sleep determines quality of life in autistic adults: A longitudinal study.** *Autism Res.* 2019; 12(5): 794–801.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Dong Y, Peng CY: **Principled missing data methods for researchers.** *Springerplus.* 2013; 2(1): 222.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Ghaziuddin M, Ghaziuddin N, Greden J: **Depression in persons with autism: Implications for research and clinical care.** *J Autism Dev Disord.* 2002; 32(4): 299–306.

[PubMed Abstract](#) | [Publisher Full Text](#)

Glod M, Riby DM, Honey E, *et al.*: **Psychological correlates of sensory processing patterns in individuals with autism spectrum disorder: A systematic review.** *Rev J Autism Dev Disord.* 2015; 2(2): 199–221.

[Publisher Full Text](#)

Helles A, Gillberg IC, Gillberg C, *et al.*: **Asperger syndrome in males over two decades: Quality of life in relation to diagnostic stability and psychiatric comorbidity.** *Autism.* 2017; 21(4): 458–469.

[PubMed Abstract](#) | [Publisher Full Text](#)

Hill E, Berthoz S, Frith U: **Brief report: Cognitive processing of own emotions in individuals with autistic spectrum disorder and in their relatives.** *J Autism Dev Disord.* 2004; 34(2): 229–235.

[PubMed Abstract](#) | [Publisher Full Text](#)

Hong J, Bishop-Fitzpatrick L, Smith LE, *et al.*: **Factors associated with subjective quality of life of adults with autism spectrum disorder: Self-report versus maternal reports.** *J Autism Dev Disord.* 2016; 46(4): 1368–1378.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Jennes-Coussens M, Magill-Evans J, Koning C: **The quality of life of young men with Asperger syndrome: a brief report.** *Autism.* 2006; 10(4): 403–414.

[PubMed Abstract](#) | [Publisher Full Text](#)

Kamio Y, Inada N, Koyama T: **A nationwide survey on quality of life and associated factors of adults with high-functioning autism spectrum disorders.** *Autism.* 2013; 17(1): 15–26.

[PubMed Abstract](#) | [Publisher Full Text](#)

Kamp-Becker I, Schröder J, Remschmidt H, *et al.*: **Health-related quality of life in adolescents and young adults with high functioning autism-spectrum disorder.** *Psychosoc Med.* 2010; 7: Doc03.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Lawson LP, Richdale AL, Haschek A, *et al.*: **Cross-sectional and longitudinal predictors of quality of life in autistic individuals from adolescence to adulthood: The role of mental health and sleep quality.** *Autism.* 2020; 24(4): 954–967.

[PubMed Abstract](#) | [Publisher Full Text](#)

Leekam SR, Nieto C, Libby SJ, *et al.*: **Describing the sensory abnormalities of children and adults with autism.** *J Autism Dev Disord.* 2007; 37(5): 894–910.

[PubMed Abstract](#) | [Publisher Full Text](#)

Lin LY: **Quality of life of Taiwanese adults with autism spectrum disorder.** *PLoS One.* 2014; 9(10): e109567.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Lin LY, Huang PC: **Quality of life and its related factors for adults with autism spectrum disorder.** *Disabil Rehabil.* 2019; 41(8): 896–903.

[PubMed Abstract](#) | [Publisher Full Text](#)

Lind SE: **Memory and the self in autism: A review and theoretical framework.** *Autism.* 2010; 14(5): 430–456.

[PubMed Abstract](#) | [Publisher Full Text](#)

Lorenc T, Rodgers M, Marshall D, *et al.*: **Support for adults with autism spectrum disorder without intellectual impairment: systematic review.** *Autism.* 2018; 22(6): 654–668.

[PubMed Abstract](#) | [Publisher Full Text](#)

Lorenzo-Seva U, Ferrando PJ: **FACTOR: A computer program to fit the exploratory factor analysis model.** *Behav Res Methods.* 2006a; 38(1): 88–91.

[PubMed Abstract](#) | [Publisher Full Text](#)

Lorenzo-Seva U, Ferrando PJ: **FACTOR.** 2006b; Accessed 30th August 2017.

[Reference Source](#)

Mason D, Mackintosh J, McConachie H, *et al.*: **Quality of life for older autistic people: The impact of mental health difficulties.** *Res Autism Spectr Disord.* 2019; 63: 13–22.

[Publisher Full Text](#)

Mason D, McConachie H, Garland D, *et al.*: **Predictors of quality of life for**

autistic adults. *Autism Res.* 2018; 11(8): 1138–1147.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Mason D, Rodgers J, Parr J: **Measuring quality of life in autistic adults: The reliability and validity of the Brief Version of the World Health Organization Quality of Life scale.** Newcastle University. Dataset, 2021. <http://www.doi.org/10.25405/data.nci.14725287>

Mazurek MO: **Loneliness, friendship, and well-being in adults with autism spectrum disorders.** *Autism.* 2014; 18(3): 223–232.

[PubMed Abstract](#) | [Publisher Full Text](#)

McConachie H, Mason D, Parr JR, *et al.*: **Enhancing the validity of a quality of life measure for autistic people.** *J Autism Dev Disord.* 2018; 48(5): 1596–1611.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

McConachie H, Wilson C, Mason D, *et al.*: **What is important in measuring quality of life? Reflections by autistic adults in four countries.** *Autism in Adulthood.* 2020; 2(1): 4–12.

[Publisher Full Text](#)

Milton DE: **On the ontological status of autism: the 'double empathy problem'.** *Disability & Society.* 2012; 27(6): 883–887.

[Publisher Full Text](#)

Moss P, Mandy W, Howlin P: **Child and adult factors related to quality of life in adults with autism.** *J Autism Dev Disord.* 2017; 47(6): 1830–1837.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Myers TA: **Goodbye, listwise deletion: Presenting hot deck imputation as an easy and effective tool for handling missing data.** *Commun Methods Meas.* 2011; 5(4): 297–310.

[Publisher Full Text](#)

Oakley BF, Tillmann J, Ahmad J, *et al.*: **How do core autism traits and associated symptoms relate to quality of life? Findings from the Longitudinal European Autism Project.** *Autism.* 2021; 25(2): 389–404.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Orsmond GI, Krauss MW, Seltzer MM: **Peer relationships and social and recreational activities among adolescents and adults with autism.** *J Autism Dev Disord.* 2004; 34(3): 245–256.

[PubMed Abstract](#) | [Publisher Full Text](#)

Orsmond GI, Shattuck PT, Cooper BP, *et al.*: **Social participation among young adults with an autism spectrum disorder.** *J Autism Dev Disord.* 2013; 43(11): 2710–2719.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Osborne J, Costello AB: **Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis.** *Pan-Pacific Management Review.* 2009; 12(2): 131–146.

Power MJ, Green AM, WHOQOL-Dis Group: **Development of the WHOQOL disabilities module.** *Qual Life Res.* 2010; 19(4): 571–584.

[PubMed Abstract](#) | [Publisher Full Text](#)

Rattray J, Jones MC: **Essential elements of questionnaire design and development.** *J Clin Nurs.* 2007; 16(2): 234–243.

[PubMed Abstract](#) | [Publisher Full Text](#)

Renty JO, Roeyers H: **Quality of life in high-functioning adults with autism spectrum disorder: The predictive value of disability and support characteristics.** *Autism.* 2006; 10(5): 511–524.

[PubMed Abstract](#) | [Publisher Full Text](#)

Rodgers J, Wigham S, McConachie H, *et al.*: **Development of the anxiety scale for children with autism spectrum disorder (ASC-ASD).** *Autism Res.* 2016; 9(11): 1205–1215.

[PubMed Abstract](#) | [Publisher Full Text](#)

Ruscio J, Roche B: **Determining the number of factors to retain in an exploratory factor analysis using comparison data of known factorial structure.** *Psychol Assess.* 2012; 24(2): 282–292.

[PubMed Abstract](#) | [Publisher Full Text](#)

Seth AK: **Interoceptive inference, emotion, and the embodied self.** *Trends Cogn Sci.* 2013; 17(11): 565–573.

[PubMed Abstract](#) | [Publisher Full Text](#)

Shattuck PT, Narendorf SC, Cooper B, *et al.*: **Postsecondary education and employment among youth with an autism spectrum disorder.** *Pediatrics.* 2012; 129(6): 1042–1049.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

Skevington SM, Lotfy M, O'Connell KA, *et al.*: **The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group.** *Qual Life Res.* 2004; 13(2): 299–310.

[PubMed Abstract](#) | [Publisher Full Text](#)

Tavernor L, Barron E, Rodgers J, *et al.*: **Finding out what matters: validity of quality of life measurement in young people with ASD.** *Child Care Health Dev.* 2013; 39(4): 592–601.

[PubMed Abstract](#) | [Publisher Full Text](#)

van de Mortel TF: **Faking it: social desirability response bias in self-report research.** *Aust J Adv Nurs.* 2008; 25(4): 40–48.

[Reference Source](#)

van Heijst BF, Geurts HM: **Quality of life in autism across the lifespan: A meta-analysis.** *Autism.* 2015; 19(2): 158–167.

[PubMed Abstract](#) | [Publisher Full Text](#)

van Roekel E, Scholte RHJ, Didden R: **Bullying among adolescents with autism spectrum disorders: Prevalence and perception.** *J Autism Dev Disord.*

2010; **40**(1): 63–73.

[PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

van Wijngaarden-Cremers PJM, van Eeten E, Groen WB, *et al.*: **Gender and age differences in the core triad of impairments in autism spectrum disorders: a systematic review and meta-analysis.** *J Autism Dev Disord.* 2014; **44**(3): 627–635.
[PubMed Abstract](#) | [Publisher Full Text](#)

Whiteneck G, Dijkers MP: **Difficult to measure constructs: conceptual and methodological issues concerning participation and environmental**

factors. *Arch Phys Med Rehabil.* 2009; **90**(11 Suppl): S22–S35.

[PubMed Abstract](#) | [Publisher Full Text](#)

Whoqol Group: **Development of the World Health Organization WHOQOL-BREF quality of life assessment.** *Psychol Med.* 1998; **28**(3): 551–558.

[PubMed Abstract](#) | [Publisher Full Text](#)

Yong AG, Pearce S: **A beginner's guide to factor analysis: Focusing on exploratory factor analysis.** *Tutor Quant Methods Psychol.* 2013; **9**(2): 79–94.
[Publisher Full Text](#)

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I appreciated the opportunity to review the manuscript titled, Measuring quality of life in autistic adults: the reliability and validity of the Brief Version of the World Health Organization Quality of Life scale. In general, the research question addressed in this manuscript is relevant to the field of ASD. The process is written in an excellent way. However, I do think there are some concerns and the most important ones are detailed below.

1. Information about symptom severity classification and IQ levels should be provided. The authors should clarify the sample features. Are they ASD with mild ID or without an ID? Please clarify.
2. Please provide the Cronbach Alpha values of the WHOQoL-BREF for the participants in this study.
3. How did the sample respond to the WHOQoL-BREF? How do you ensure that the participants understand the wording and meaning of the measurement tools?
4. Why did the authors use the Social Responsiveness Scale? There was no further analysis and discussion in the text. Please clarify.
5. How many online questionnaires had been sent out? What was the response rate?
6. Recruitment methods could be expanded in Phase 2. The authors state they recruited through the National Autistic Society in North East England, and through a drama group for people with intellectual disabilities - were these participants with mild ID or without an ID? Please clarify.
7. Please provide information on the mean scores and SD of the WHOQoL-BREF.
8. The authors are encouraged to provide a more detailed discussion about the medical QoL.

9. What is the clinical implication regarding the main findings of this study? The implications of the findings should be explored with more depth, especially in practices and research.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Functions and occupational performance of individuals with autism spectrum disorder

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.