Examination of the reliability and factor structure of the Autism Spectrum Quotient (AQ) in a non-clinical sample

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Abstract:

A self-report screening measure for high functioning autism spectrum disorders is needed for diagnostic screening and research purposes. The Autism Spectrum Quotient (AQ) has been developed for these reasons, although a comprehensive assessment of the psychometric properties of the AQ has not been completed. The purpose of the current study was to assess the distribution, internal consistency, and factor structure of the AQ in a non-clinical sample (n = 1005). The current findings demonstrate the normal distribution of autistic traits and support a three-factor structure of the AQ. Additionally, a three-factor version of the AQ yielded somewhat improved internal consistency. Implications of these findings and suggestions for further development of the AQ as a measure of the autism spectrum are offered.

Keywords: autism spectrum quotient | spectrum disorders | AD | high functioning autism | autism | factor analysis

Article:

1. Introduction

Autism spectrum disorders are estimated to affect 60 out of every 10,000 live births. Between 29% and 60% of those affected have normal intelligence (Tidmarsh & Volkmar, 2003). Those with normal intelligence and significant autism traits are diagnosed with Asperger's disorder (AD) or autistic disorder (usually referred to as high functioning autism (HFA) when there is normal intelligence; *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (*DSM-IV-*

TR); American Psychiatric Association (APA), 2000). The symptom domains of HFA are impairments in the autism triad: (a) social interaction, (b) communication, and (c) restricted interests, repetitive behaviors (APA, 2000). The symptom domains of AD involve only two domains of the autism triad – impairment in social interaction and restricted interests, repetitive behaviors. Research is needed to improve our understanding of the diagnostic boundaries and stability of HFA and AD during adulthood. Further, there is a need to know more about factors that produce and maintain optimal functioning, and about the co-occurrence of psychopathology with the disorders.

The Autism Spectrum Quotient (AQ) was developed by [Baron-Cohen et al., 2001a] and [Baron-Cohen et al., 2001b] to address this need. The AQ is a 50-item self-report questionnaire that measures autism traits in intellectually normal adults (Baron-Cohen et al., 2001a). It is composed of five domains corresponding to the autism triad and cognitive deficits of autism: (a) social skill, (b) attention switching, (c) attention to detail, (d) communication, and (e) imagination (Baron-Cohen et al., 2001a). The AQ has a Likert scale scoring system ("definitely agree," "slightly agree," "slightly disagree," "definitely disagree"); however, the Likert scale values are typically collapsed into two categories ("agree" and "disagree"). The latter is the recommended scoring procedure.

Use of the AQ in autism research has produced several potentially important findings. First, AQ scores have been shown to be stable cross-culturally with Japanese (Wakabayashi, Baron-Cohen, Wheelwright, & Tojo, 2006) and Austrian samples (Voracek & Dressler, 2006). Second, AQ scores have been associated with scientific ability (Baron-Cohen et al., 2001a), social cognition (Bayliss & Tipper, 2005), and schizotypal personality (Hurst, Nelson-Gray, Mitchell, & Kwapil, in press). Third, the AQ demonstrated good diagnostic validity (sensitivity = 0.95, specificity = 0.52, positive predictive value = 0.84, negative predictive value = 0.78) and was found suitable for screening purposes by Woodbury-Smith, Robinson, Wheelwright, and Baron-Cohen (2005). Fourth, Baron-Cohen et al. (2001a) found that males scored significantly higher than females when the AQ was administered to a combined large sample of randomly recruited control participants and college students. However, Hurst et al. (in press) found no differences between males and females in a large sample of college students. Fifth, and finally, a high heritability for autistic traits in later adolescence has been found in a study conducted in the Netherlands using the AQ (Hoekstra, Bartels, Verweij, & Boomsma, 2007). Taken together, these results are impressive and suggest the AQ is serving an important role in developing our understanding of autistic traits. Given the AQ's importance and potential utility in future research in a variety of domains (e.g., cross-cultural expression of the autism spectrum and behavior genetics), it is crucial that the basic assumptions and psychometrics of this measure be empirically demonstrated. We review the current empirical findings below and the rationale for the current study.

1.1. Distribution and internal consistency of AQ scores

The AQ is purported to measure traits that are on a continuum and normally distributed in the general population (Baron-Cohen et al., 2001a). Thus, the distribution of scores obtained from population samples should be normally distributed. As expected, AQ scores reported by Baron-

Cohen et al. (2001a) and Hurst et al. (in press) were normally distributed. Examination of these distributional properties should continue.

The internal consistency for a questionnaire, determined by coefficient alpha (Cronbach's alpha), provides a measure of the extent to which the items contained in the questionnaire consistently measure the same construct. High internal consistency suggests one can have confidence that a questionnaire is measuring a single construct, although it does not indicate what construct is being measured. A coefficient alpha of 1 indicates the highest/strongest possible relationship among test items while a coefficient alpha of 0 indicates no relationship among items. A minimum coefficient alpha of 0.70 for an item set is typically considered an acceptable or "adequate" level in the social sciences (Kline, 2005). Internal consistencies of the five AQ domains, however, are generally lower. For example, Baron-Cohen et al. (2001a) reported Cronbach's alphas as follows: social skill = 0.77, attention switching = 0.67, attention to detail = 0.63, communication = 0.65, imagination = 0.65. Austin (2005) reported similar findings: social skill = 0.75, attention switching = 0.58, attention to detail = 0.66, communication = 0.61, imagination = 0.65. However, Austin reported a coefficient alpha for the total AQ of 0.82, indicating good internal consistency. In a second independent analysis, Hurst et al. (in press) reported coefficient alphas from a sample of 607 undergraduate students. Coefficient alphas for the total AQ were 0.67 for both genders. Domain coefficient alphas for the females were: social skill = 0.64, attention switching = 0.42, attention to detail = 0.61, communication = 0.49, imagination = 0.34. Male coefficient alphas were consistent with the females'. Here, the total AQ reached only marginally acceptable internal consistency as did the social and attention to detail domains; however, the coefficient alphas for the other domains were considerably lower, indicating that the attention switching, communication, and imagination domains did not reliably measure single constructs.

1.2. Factor structure of the AQ

Austin (2005) used factor analysis to assess the five domain structure of the AQ, finding a three-factor rather than a five-factor solution. These three factors were called social skills, detail/patterns, and poor communication. The three factors and the items that loaded on them did not clearly align with any one of the established five AQ domains. For instance, the communication/mindreading scale from Austin was composed of items from the communication, social skill, and imagination domains from the original AQ. Overall, Austin (2005) is the only study to assess the factor structure of the AQ and did not find support for a five domain version of the AQ. Accordingly, additional studies are needed to explore the factor structure of the AQ.

1.3. Purpose of the current study

Although an instrument such as the AQ could be useful in research and clinical settings, its reliability and factor structure have not been well established. The purpose of the current study was to further assess the distribution, internal consistency, and factor structure of the AQ. Given that the domains of the AQ have generally demonstrated only low to marginal internal consistency ([Austin, 2005], [Baron-Cohen et al., 2001a] and [Hurst et al., in press]), and given that the only factor analysis conducted on the AQ to date (Austin, 2005) supported a three-factor

solution instead of a five-factor solution, we expected similar findings in the current study. We also expected to replicate the previously reported normal distribution of scores.

2. Method

2.1. Participants, measures, and procedures

A total of 1005 introductory psychology students (M = 19.36 years, SD = 3.89, age range = 17–55) from an American university participated in the study. The sample was predominantly Caucasian (66%) and African American (20%), and was primarily composed of females (78%), which was consistent with the university demographics. The AQ ([Baron-Cohen et al., 2001a] and [Baron-Cohen et al., 2001b]) was included with other measures that were randomly placed in a packet that was distributed and completed during group administrations. Participants received course credit for involvement. The AQ was scored using the collapsed scoring system recommended by [Baron-Cohen et al., 2001a] and [Baron-Cohen et al., 2001b].

3. Results

3.1. Distribution of AQ scores and internal consistency

Due to the sample size and the large number of analyses computed, the alpha level was set conservatively at 0.001 for all analyses in order to minimize Type I error and reduce the likelihood of reporting statistically significant, but inconsequential findings. Table 1 lists descriptive statistics and Cronbach's coefficient alphas for the AQ and its five domains. Cronbach's coefficient alpha estimates indicate that the internal consistency of the domain scales ranged from marginal (social skill α = 0.66) to low (imagination α = 0.40). Internal consistency for the total score was marginal (α = 0.67).

Table 1. Autism Spectrum Quotient characteristics

Scale	Total sample				
	Mean	SD	α	Skewness	Kurtosis
AQ total	16.72	5.22	0.67	0.45	0.05
Social skill	2.14	1.99	0.66	1.18	1.03
Attention switching	4.72	1.83	0.41	0.02	−0.22
Attention to detail	5.27	2.18	0.60	−0.02	−0.51
Communication	2.26	1.71	0.47	0.76	0.20
Imagination	2.34	1.63	0.40	0.64	0.21

Note. AQ = Autism Spectrum Quotient.

Table 1 also indicates that total or domain skewness (standard error = 0.08) or kurtosis (standard error = 0.15) values did not depart from normality (Kline, 2005), indicating that AQ scores were normally distributed in our sample. Table 2 lists total and domain scores along with Cronbach's coefficient alphas for the AQ by gender. No significant sex differences were found for total or domain scores.

Table 2. Autism Spectrum Quotient characteristics by gender

Scale	Males (n = 226)			Females (n = 779)			t
	Mean	SD	α	Mean	SD	α	
AQ total	16.60	5.24	0.67	16.76	5.22	0.68	0.41
Social skill	2.04	2.02	0.68	2.16	1.98	0.65	0.80
Attention switching	4.56	1.81	0.41	4.77	1.84	0.41	1.56
Attention to detail	5.17	2.18	0.59	5.29	2.18	0.60	0.74
Communication	2.21	1.71	0.48	2.27	1.71	0.47	0.43
Imagination	2.61	1.76	0.46	2.26	1.58	0.39	−2.85

Note. AQ = Autism Spectrum Quotient. All comparisons listed are non-significant.

3.2. Factor structure of the AQ

A principal component analysis with a promax rotation was conducted as a data reduction technique to explain the pattern of correlations within our data set with the fewest number of factors possible and to assess the fit of the five-factor solution of the AQ. This oblique rotation was applied to allow AQ domains to remain correlated, which is consistent with previous AQ analyses (e.g., Austin, 2005). The first five factors accounted for 27% of the variance with eigenvalues that ranged from 4.40 to 1.61. Item loadings were not consistent with the original five-factor model of the AQ (Table 3). Loadings for all five domains are listed to be consistent with the proposed five-factor structure (Table 3), although a scree plot (Fig. 1) supported a three-factor solution.

Table 3. Item loadings of Autism Spectrum Quotient five-factor solution with promax rotation

Autism Spectrum Quotient items	Factor				
	1	2	3	4	5
Social skill scale					
I prefer to do things with others rather than on my own*	***0.48***	0.02	−0.08	−0.02	−0.05
I find social situations easy*	***0.64***	−0.09	0.11	***0.35***	−0.01

Autism Spectrum Quotient items	Factor				
	1	2	3	4	5
I would rather go to a library than a party	***0.40***	0.08	0.10	0.13	0.10
I find myself drawn more strongly to people than to things*	***0.57***	0.02	0.07	0.03	−0.06
I find it hard to make new friends	***0.62***	0.04	0.16	0.23	0.06
I find it easy to work out what someone is thinking or feeling just by looking at their face*	0.04	−0.15	0.08	***0.53***	−0.10
I enjoy social occasions*	***0.70***	−0.02	0.02	0.07	0.04
I find it difficult to work out people's intentions	0.11	0.06	***0.41***	***0.30***	0.19
I enjoy meeting new people*	***0.65***	−0.02	0.02	0.17	0.01
I am a good diplomat*	0.27	−0.07	0.01	***0.40***	0.01
Attention switching scale					
I prefer to do things the same way over and over again	0.03	0.04	0.18	0.24	0.05
I frequently get so strongly absorbed in one thing that I lose sight of other things	0.10	0.07	0.14	0.06	***0.50***
In a social group, I can easily keep track of several different people's conversations*	0.21	−0.28	0.16	***0.41***	−0.13
I tend to have very strong interests, which I get upset about if I can't pursue	−0.02	0.24	0.12	−0.13	***0.33***
It does not upset me if my daily routine is disturbed*	0.12	0.05	0.02	0.17	0.03
I find it easy to do more than one thing at once*	0.13	−0.23	0.10	***0.41***	−0.09
I enjoy doing things spontaneously*	0.25	−0.01	0.02	0.23	−0.18
If there is an interruption, I can switch back to what I was doing very quickly*	0.14	−0.04	0.10	***0.49***	0.04
I like to plan any activities I participate in carefully	−0.09	0.18	0.22	−0.03	0.02
New situations make me anxious	0.23	0.05	0.27	0.29	0.14
Imagination scale					
If I try to imagine something, I find it very easy to create a picture in my mind*	0.11	−0.12	0.23	0.23	−0.26
When I'm reading a story, I can easily imagine what the characters might look like*	0.07	−0.17	***0.39***	0.08	−***0.31***
I find making up stories easy*	0.02	−0.17	0.14	0.25	−***0.41***
When I'm reading a story, I find it difficult to work out the character's intentions	−0.01	0.04	***0.62***	0.10	0.06
I don't particularly enjoy reading fiction	−0.06	0.03	***0.47***	−0.02	−0.02

Autism Spectrum Quotient items	Factor				
	1	2	3	4	5
I would rather go to the theatre than a museum*	0.18	0.07	−0.07	0.07	−0.03
When I was young, I used to enjoy playing games involving pretending with other children*	0.13	0.03	0.18	0.01	−***0.42***
I like to collect information about categories of things (e.g., types of car, types of bird, types of train, types of plant, etc.)	0.08	0.28	0.16	−0.08	0.27
I find it difficult to imagine what it would be like to be someone else	0.02	−0.04	***0.32***	0.09	−0.06
I find it very easy to play games with children that involve pretending*	0.10	−0.01	0.18	0.12	−***0.47***
Attention to detail scale					
I often notice small sounds when others do not	0.12	***0.37***	0.03	−0.11	0.26
I usually notice car number plates or similar strings of information	−0.02	***0.62***	−0.03	−0.16	0.17
I am fascinated by dates	0.00	***0.50***	0.18	0.04	0.17
I tend to notice details that others do not	−0.01	***0.45***	−0.15	−0.21	0.21
I am fascinated by numbers	0.04	***0.58***	0.15	0.01	0.04
I notice patterns in things all the time	0.10	***0.56***	0.00	−0.22	***0.33***
I usually concentrate more on the whole picture rather than the small details*	0.15	0.15	−0.17	0.27	−0.03
I am not very good at remembering phone numbers*	−0.11	***0.47***	−0.26	0.08	−0.17
I don’t usually notice small changes in a situation or a person’s appearance*	−0.06	0.28	−***0.46***	−0.04	−0.09
I am not very good at remembering people’s date of birth*	−0.13	***0.43***	−0.25	0.08	−0.27
Communication scale					
Other people frequently tell me that what I’ve said is impolite, even though I think it is polite	0.13	0.13	0.28	−0.10	***0.35***
I enjoy social chit-chat*	***0.70***	−0.04	−0.01	0.08	−0.04
When I talk, it isn’t always easy for others to get a word in edgewise	−0.16	0.14	0.27	0.05	***0.39***
I frequently find that I don’t know how to keep a conversation going	***0.47***	−0.07	***0.31***	0.19	0.10
I find it easy to “read between the lines” when someone is talking to me*	0.05	−0.04	0.14	***0.57***	−0.17
I know how to tell if someone listening to me is	0.08	−0.04	0.02	***0.37***	−0.01

Autism Spectrum Quotient items	Factor				
	1	2	3	4	5
getting bored*					
When I talk on the phone, I'm not sure when it's my turn to speak	0.27	0.06	***0.41***	0.07	0.24
I am often the last to understand the point of a joke	0.05	0.01	***0.38***	0.24	0.08
I am good at social chit-chat*	***0.71***	−0.11	0.10	0.29	−0.03
People often tell me that I keep going on and on about the same thing	0.04	0.12	0.27	0.17	***0.46***
Proportion of variance by factor (%)	8.98	6.03	5.06	3.47	3.23

Note. AQ = Autism Spectrum Quotient; * = reverse-keyed item; all items with loadings ⩾ 0.30 are bolded and italicized. Although a three-factor solution is supported by this analysis, loadings for all five scales on five separate factors are listed to assess the original five AQ domains.

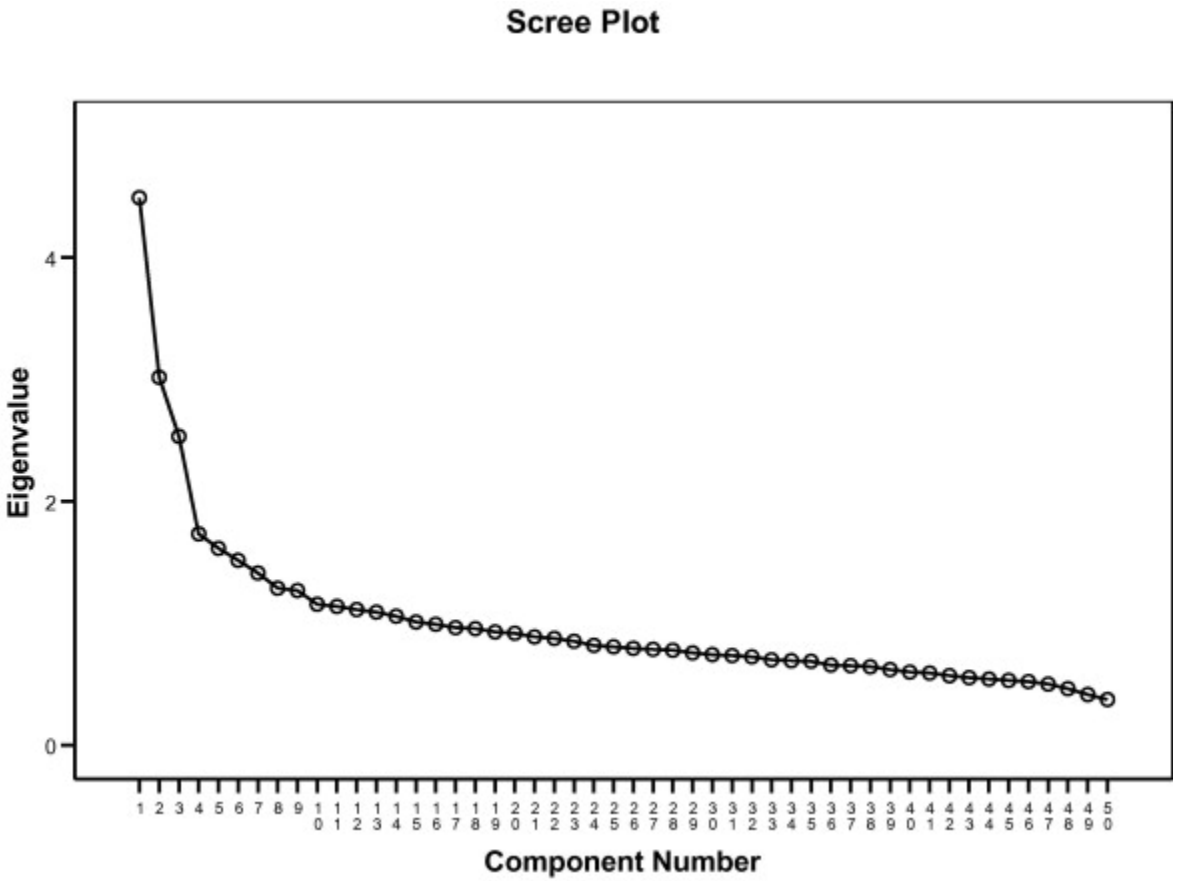

Fig. 1. Scree plot of the Autism Spectrum Quotient.

3.3. Distribution of scores and internal consistency for three-factor version of the AQ

Since Austin (2005) reported a three-factor solution to the AQ, a separate set of analyses were conducted using the 26-items from Austin's three-factor version to determine if this version of the AQ would exhibit improved psychometric properties. Table 4 lists descriptive statistics and Cronbach's coefficient alphas for the three-factor version suggested by Austin (2005). Austin termed the three domains as follows: social skills, details/patterns, and communication/mindreading. Internal consistency for Austin's 26-item version of the AQ was slightly lower ($\alpha = 0.65$) than the original 50-item version of the AQ ($\alpha = 0.67$). In addition, Cronbach coefficient alpha estimates indicated that the internal consistency of the domains of the Austin version of the AQ also ranged from acceptable (social skills $\alpha = 0.75$) to low (communication/mindreading$\alpha = 0.42$). Table 4 shows that total and domain skewness (standard error = 0.08) or kurtosis (standard error = 0.15) values did not depart from normality (Kline, 2005). Total and domain scores along with Cronbach's coefficient alphas for the analysis of our data using the Austin three-factor version of the AQ are listed in Table 5 by gender. No significant sex differences were found for the total score, but females scored higher than males on the communication/mindreading domain ($p = 0.001$).

Table 4. Autism Spectrum Quotient characteristics (three-factor revision)

Scale	Total sample				
	Mean	SD	α	Skewness	Kurtosis
Three-factor AQ total	8.10	3.59	0.65	0.57	0.06
Social skills	2.32	2.42	0.75	1.31	1.36
Details/patterns	4.05	1.83	0.54	−0.03	−0.61
Communication/mindreading	1.72	1.36	0.42	0.56	−0.35

Note. AQ = Autism Spectrum Quotient.

Table 5. Autism Spectrum Quotient characteristics by gender (three-factor revision)

Scale	Males (n = 226)			Females (n= 779)			t
	Mean	SD	α	Mean	SD	α	
Three-factor AQ total	8.11	3.46	0.63	8.09	3.63	0.66	−0.06
Social skills	2.50	2.48	0.75	2.27	2.40	0.75	−1.26
Details/patterns	4.16	1.77	0.49	4.02	1.84	0.55	−1.01
Communication/mindreading	1.46	1.37	0.51	1.80	1.35	0.40	3.39

Note. AQ = Autism Spectrum Quotient.

Correlation is significant at <0.001 level (2-tailed).

3.4. Factor structure of the three-factor version of the AQ

A principal component analysis with a promax rotation was conducted to assess the fit of the three-factor solution using only the 26-items that made up the three-factor solution of the AQ proposed by Austin (2005). The first three factors accounted for 29% of the variance with eigenvalues that ranged from 3.75 to 1.62. Item loadings were somewhat consistent with the proposed three-factor model of the AQ proposed by Austin (seeTable 6). In addition, a scree plot (Fig. 2) supported a two- or three-factor solution.

Table 6. Item loadings of Austin's (2005) three-factor solution of the Autism Spectrum Quotient with promax rotation

Revised Autism Spectrum Quotient items based on Austin (2005)	Factor		
	1	2	3
Factor 1. Social skills			
I am good at social chit-chat*	***0.73***	−0.10	0.12
I find social situations easy*	***0.68***	−0.10	0.14
I enjoy social occasions*	***0.71***	0.06	−0.07
I enjoy social chit-chat*	***0.70***	0.03	−0.08
I frequently find that I don't know how to keep a conversation going	***0.49***	−0.06	***0.37***
I enjoy meeting new people*	***0.67***	0.01	−0.02
I find it hard to make new friends	***0.63***	0.05	0.21
When I was young, I used to enjoy playing games involving pretending with other children*	0.13	−0.16	0.12
I find myself drawn more strongly to people than to things*	***0.56***	0.06	−0.01
I enjoy doing things spontaneously*	0.29	−0.12	0.06
I find it very easy to play games with children that involve pretending*	0.13	−0.23	0.11
I would rather go to a library than a party	***0.40***	0.13	0.08
Factor 2. Details/patterns			
I notice patterns in things all the time	0.06	***0.68***	0.02
I usually notice car number plates or similar strings of information	−0.04	***0.66***	0.05
I am fascinated by numbers	0.02	***0.53***	0.20
I am fascinated by dates	−0.02	***0.47***	***0.33***
I tend to notice details that others do not	−0.03	***0.52***	−0.15
I like to plan any activities I participate in carefully	−0.10	0.11	***0.31***

Revised Autism Spectrum Quotient items based on Austin (2005)	Factor		
	1	2	3
I often notice small sounds when others do not	0.09	***0.49***	0.02
It does not upset me if my daily routine is disturbed*	0.12	−0.01	0.11
Factor 3. Communication/mindreading			
People often tell me that I keep going on and on about the same thing	0.03	0.22	***0.33***
When I'm reading a story, I find it difficult to work out the character's intentions	−0.02	−0.01	***0.61***
I find it difficult to work out people's intentions	0.12	0.05	***0.58***
I am often the last to understand the point of a joke	0.06	−0.03	***0.53***
Other people frequently tell me that what I've said is impolite, even though I think it is polite	0.08	0.29	0.23
If there is an interruption, I can switch back to what I was doing very quickly*	0.19	−0.11	0.29
Proportion of variance by factor (%)	8.98	6.03	5.06

Note. AQ = Autism Spectrum Quotient; * = reverse-keyed item; all items with loadings ⩾.30 are bolded and italicized.

Fig. 2. Scree plot of the three-factor Autism Spectrum Quotient.

4. Discussion

The AQ is a promising measure designed to screen for HFA and AD, and is the first of its kind. The purpose of the current study was to assess the distribution, internal consistency, and factor structure of the AQ. As expected, we replicated previous findings: scores were normally distributed and the original scales of the AQ yielded low to marginal internal consistency. Additionally, our factor analysis results closely resemble those of Austin (2005) and support a three-factor solution. Although the internal consistency of Austin's revised scales was somewhat improved (i.e., the social skills scale demonstrated acceptable internal consistency), other scales demonstrated marginal to low levels of internal consistency. Scores on both versions of the AQ were normally distributed, which suggests that it is theoretically possible to design a screening device for HFA and AD for use in the general population. Accordingly, the following recommendations are provided for further development of the AQ or an autism screening tool.

First, since the available evidence suggests that a three-factor solution may best fit the data, it may be prudent for future researchers to establish these factors rather than retaining the original five of the AQ. Second, researchers should to try to link the three identified factors to the autism triad, consistent with the current diagnostic criteria. Accordingly, deleting items from the current AQ that do not conform to the three symptom domains and adding new domain-relevant items could result in more reliable factors and a stronger theoretical link between the AQ and the current *DSM* criteria.

Test construction should also proceed with an effort to discriminate the three identified factors from other theoretically distinct personality factors such as anxious, schizoid, or schizotypal. Indeed, analysis of many AQ items (e.g., “I find social situations easy” (reverse scored) or “I find it easy to make new friends” (reverse scored)) suggests that there could be multiple motives behind endorsement of the items (e.g., social anxiety or social anhedonia). Accordingly, test construction efforts for the AQ should attempt to ensure that the social functioning scales of the AQ do not also load highly on social anxiety or social anhedonia scales so that poor social functioning associated with the autism spectrum (e.g., failure to pick up on social cues) can be effectively discriminated from poor social functioning that is the result of other related conditions. In addition, in some cases, it might be useful to administer additional measures (e.g., social anxiety and social anhedonia measures) along with the AQ in order to gather additional information that might be useful in distinguishing autism spectrum traits from other related conditions.

Furthermore, if cultural variables affect item interpretation, culturally sensitive versions of the measure could be developed as well (e.g., see Wakabayashi, Tojo, Baron-Cohen, & Wheelwright, 2004). Indeed, it is possible that cultural differences may account for some of the psychometric differences reported for the AQ. Specifically, the [Austin, 2005] and [Baron-Cohen et al., 2001a] samples were both from the UK, whereas the current study and Hurst et al. (in press) were both conducted in the US. In the US studies, the reported coefficient alphas were lower than those reported in the UK samples, suggesting possible cultural differences in how test takers responded to items. Consistent with this hypothesis, one recent study administered the AQ to a US sample and reported internal consistencies that were as low as 0.40 for the original AQ and 0.46 for Austin’s three-factor AQ (Jobe & Williams White, 2007). It does not, however, appear to be the case that the psychometric problems associated with the AQ are due only to cultural differences in item interpretation. Austin (2005), which was also conducted in the UK, did not support a five-factor structure of the AQ. Similarly, many of the alpha coefficients reported by [Austin, 2005] and [Baron-Cohen et al., 2001a] also fell into the marginally acceptable range.

In addition, while strong factor structure, positive predictive power for diagnosis, and internal consistency are very important for any test of character traits, it is also important that the fundamental constructs that a test purports to measure actually measure them. Since no other psychometrically well established tests for assessing HFA or AD in adults exist, other established measures that have been used to assess the component constructs (e.g., social and communication skills) such as the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984), could be used to determine the validity of the factor constructs.

In conclusion, the AQ is an innovative and important first step in trying to identify adults with AD and HFA. The utility of such a measure is unquestioned; however, our results suggest that the psychometric properties of the AQ need improvement. Consequently, researchers and clinicians using the AQ should recognize the limitations of the current measure, and consider improving it.

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