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The Empathy Quotient: An Investigation of Adults with Asperger Syndrome or High Functioning Autism, and Normal Sex Differences

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Empathy is an essential part of normal social functioning, yet there are precious few instruments for measuring individual differences in this domain. In this article we review psychological theories of empathy and its measurement. Previous instruments that purport to measure this have not always focused purely on empathy. We report a new self-report questionnaire, the Empathy Quotient (EQ), for use with adults of normal intelligence. It contains 40 empathy items and 20 filler/control items. On each empathy item a person can score 2, 1, or 0, so the EQ has a maximum score of 80 and a minimum of zero. In Study 1 we employed the EQ with n = 90 adults (65 males, 25 females) with Asperger Syndrome (AS) or high-functioning autism (HFA), who are reported clinically to have difficulties in empathy. The adults with AS/HFA scored significantly lower on the EQ than n = 90 (65 males, 25 females) age-matched controls. Of the adults with AS/HFA, 81% scored equal to or fewer than 30 points out of 80, compared with only 12% of controls. In Study 2 we carried out a study of n = 197 adults from a general population, to test for previously reported sex differences (female superiority) in empathy. This confirmed that women scored significantly higher than men. The EQ reveals both a sex difference in empathy in the general population and an empathy deficit in AS/HFA.

KEY WORDS: Empathy; sex differences; Asperger syndrome; social difficulties.

Empathy is without question an important ability. It allows us to tune into how someone else is feeling, or what they might be thinking. Empathy allows us to understand the intentions of others, predict their behavior, and experience an emotion triggered by their emotion. In short, empathy allows us to interact effectively in the social world. It is also the "glue" of the social world, drawing us to help others and stopping us from hurting others.

Whereas the term "sympathy" has a long tradition, the term "empathy" astonishingly only came into being at the turn of the last century. Astonishingly, because we believe that this ability is as old as *Homo sapiens* itself. No doubt empathy itself has this long an evolutionary history, but the word "empathy" was invented by Titchener as a translation of the German word "Einfuhlung," itself a term from aesthetics meaning "to project yourself into what you observe" (Titchener, 1909).

Despite the obvious importance of empathy, it is a difficult concept to define. Researchers in this area have traditionally fallen into one of two camps: theorists who have viewed empathy in terms of affect, and those who have taken a more cognitive approach. We argue that both approaches are essential to defining empathy, and that in most instances, the cognitive and affective cannot be easily separated. Nevertheless, for historical reasons, we begin by examining each in turn.

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THE AFFECTIVE APPROACH

The affective approach defines empathy as an observer's emotional response to the affective state of another. This view of empathy arose from writings on sympathy. Within the affective approach, different definitions of empathy vary in how broad or narrow the observer's emotional response to another's emotion has to be.

As far as we can see, there are four varieties of empathy: 1) the feeling in the observer must match that of the person observed (e.g., you feel fright when you see someone else's fear; Eisenberg & Miller, 1987; Hoffman, 1984); 2) The feeling in the observer is simply appropriate to the other person's emotional state in some other way, even though it doesn't exactly match it (e.g., you may feel pity at someone else's sadness; Stotland, 1969); 3) The feeling in the observer may be any emotional response to another's emotion (e.g., an observer feeling pleasure at another's pain). This is referred to as "contrast empathy" (Stotland, Sherman, & Shaver, 1971). 4) The feeling in the observer must be one of concern or compassion to another's distress (Batson, 1991).

Options 1, 2, and 4 all seem important to include, but need not be mutually exclusive. One can include all of these in a useful definition of empathy. However, option 3 seems questionable. We argue that empathy should exclude inappropriate emotions triggered by someone else's emotional state (e.g., feeling pleasure at another's pain). Rather, the affective definition of empathy emphasises the appropriateness of the viewer's emotional response. Of course, defining what is an appropriate emotional response is not straightforward. For example, hearing of the death of a young friend who had been suffering from a painful, terminal illness might produce in you both relief (that their pain is over) and sadness (that their life has been cut short). Both emotions are appropriate emotional responses and can therefore be classified as empathic. (Note that if you feel sadness at the loss of this friend, this may be unrelated to empathy, as it may be purely self-centred, albeit still appropriate. To count as empathy, your emotion needs to be a consequence of their emotion.)

THE COGNITIVE APPROACH

Cognitive theories emphasize that empathy involves understanding the other's feelings (Kohler, 1929). These theories also refer to cognitive processes such as role-taking, switching attention to take another's perspective (Mead, 1934), or "decentering"; that is, responding nonegocentrically (Piaget, 1932). During the 1940s and 1950s the term "social acuity" was also used to refer to empathy (Chapin, 1942; Dymond, 1950; Kerr & Speroff, 1954). In recent terminology, the cognitive component is referred to as using a "theory of mind" (Astington, Harris, & Olson, 1988; Wellman, 1990) or "mindreading" (Baron-Cohen, 1995; Whiten, 1991). Essentially, this involves setting aside one's own current perspective, attributing a mental state (or "attitude") to the other person (Leslie, 1987), and then inferring the likely content of their mental state, given the experience of that person.[2] In some accounts these processes appear purely cognitive in that there is no reference to any affective state. For example, a person might infer that because John was absent during a key event, he will not know about it. In addition to this comprehension and inferential process, the cognitive element also entails the ability to predict another's behavior or mental state (Dennett, 1987). Thus, taking into account John's ignorance about a plan being changed can lead to the prediction that he will go to the wrong place.

It is clear from the above discussion that empathy consists of both the affective and cognitive components (Davis, 1994). A pictorial representation of the two-component model of empathy is presented in Figure 1.

EMPATHY AND SYMPATHY: WHAT IS THE RELATIONSHIP?

In moral philosophy, Adam Smith described sympathy as the experience of "fellow-feeling" we have when we observe someone else's powerful emotional state (Smith, 1759). Sympathy is therefore a clear instance of the affective component of empathy. Sympathy is said to occur when the observer's emotional response to the distress of another leads the observer to feel a desire to take action to alleviate the other person's suffering (Davis, 1994). The observer may not actually act on this desire, but at the very least the observer has the emotion of wanting to take appropriate action to reduce the other's distress. Thus, in Figure 1, sympathy is shown as a special subset of empathy. (We assume sympathy can entail both the cognitive and affective elements of empathy.)

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[2] A useful analogy here is to think of computers, where the user can switch from the current "window" (their representation of the world) to another window (someone else's different representation of the world). Taking this analogy further, some individuals will be more empathic than others because they switch between windows more frequently, or more easily, or because the content of the other window (their representation of the other's mind) is more detailed.

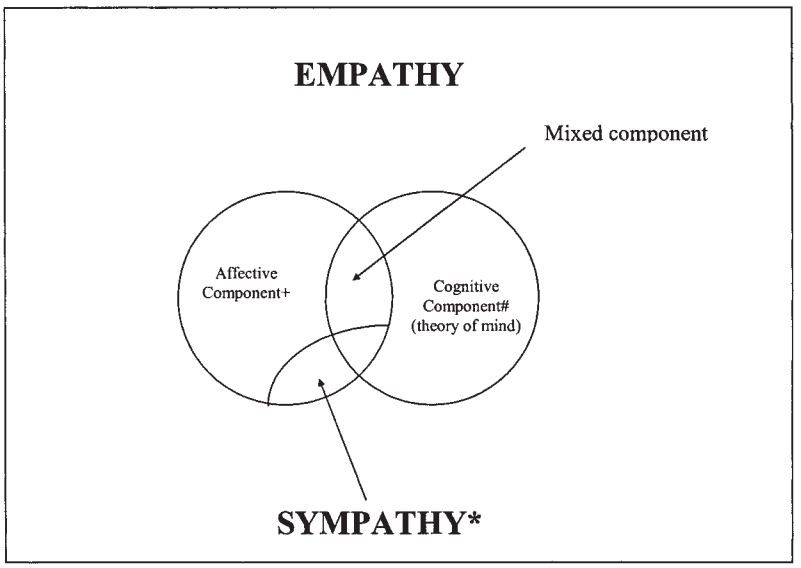

Fig. 1. A simple model showing the two overlapping components of empathy and how sympathy is a special case of the affective component of empathy.

+ Feeling an appropriate emotion triggered by seeing/learning of another's emotion.
# Understanding and/or predicting what someone else might think, feel, or do.
* Feeling an emotion triggered by seeing/learning of someone else's distress which moves you to want to alleviate their suffering.

To give an example, if you walk past a homeless person in winter and you are "moved" or "touched" (both interesting metaphors) to want to help them, this would count as sympathy. You may do nothing more. For example, you may feel that your action would be futile given the many other homeless people in the same neighborhood and the near impossibility of helping them all. So you might walk past and do nothing. Your reaction would still count as sympathy because you felt the desire to alleviate another's suffering. This same term would also apply even if you did indeed take action, and gave the homeless person your gloves. If, however, you experienced an appropriate emotion (e.g., pity) to the homeless person's emotion (e.g., hopelessness), but you did not experience any desire to take action to alleviate his or her suffering, then this would count as empathy, but not sympathy. As a final note of clarification, if you felt an inappropriate emotion to the homeless person's emotional state (e.g., feeling glad that you had a warm home with a well-stocked refrigerator), this would count as neither empathy nor sympathy.

MEASURING EMPATHY IN ADULTS

There are several instruments that purport to measure empathy, but as we will argue, many of these may not do so. For example, in the Chapin Social Insight Test (Chapin, 1942), subjects are presented with hypothetical scenarios (e.g., being disturbed by noisy neighbors) and have to choose the most effective course of action from four options. This is held to be a measure of empathy, though clearly it involves more than this because choosing an effective course of action might be based on knowledge of social rules, cultural convention, and so forth.

A second measure of empathy used a rating scale (Dymond, 1949, 1950). A group of subjects was left to interact with each other. Each then estimated how each of the others in the group rated the subject. This was intended to measure how accurately one can predict another's view of oneself. However, it has been pointed out that it is possible to achieve high levels of accuracy on this test without it reflecting empathy (Davis, 1994). For example, if all individuals tended to use the midpoints on the scale, this would lead to apparent accuracy (Cronbach, 1955).

A more widely used test is the Empathy (EM) Scale (Hogan, 1969). The EM has 64 items and has been found to have four relatively uncorrelated factors: social self-confidence, even-temperedness, sensitivity, and nonconformity (Johnson, Cheek, & Smither, 1983). As can be seen from these factors alone, it is clear that this scale is also not a pure measure of empathy. In fact, only one of these factors is directly relevant to empathy (sensitivity). The scale may be better thought of as a measure of social skill (Davis, 1994).

The Questionnaire Measure of Emotional Empathy (QMEE) was designed with the explicit aim of assessing an individual's tendency to react strongly to another's experience (Mehrabian & Epstein, 1972). It contains seven subscales. The authors suggest that, as the split-half reliability is high (0.84), the items are likely to tap a single construct. The authors also suggest that this single construct may be emotional arousability to the environment in general, rather than to people's emotions in particular (Mehrabian, Young, & Sato, 1988). Thus, although some items in the QMEE may measure affective empathy, the scale as a whole may be confounded.

A final questionnaire, the Interpersonal Reactivity Index (IRI) (Davis, 1980) has four seven-item subscales, tapping "perspective-taking," "empathic concern," "personal distress," and "fantasy." In our view, the IRI is the best measure of empathy developed to date, because three of the four factors are directly relevant to empathy. However, we suspect the IRI may measure processes broader than empathy, as included in the fantasy subscale are items such as "I daydream and fantasize, with some regularity, about things that might happen to me," and included in the personal distress subscale are items such as "In emergency situations, I feel apprehensive and ill at ease." These subscales may assess imagination or emotional self-control, and although these factors may be correlated with empathy, it is clear that they are not empathy itself.

The above review highlights the need for a new measure of empathy. We report one here, which we call the Empathy Quotient (EQ).[3]

THE EQ

The EQ was designed to be short, easy to use, and easy to score. It is shown in the Appendix. The EQ comprises 60 questions, broken down into two types: 40 questions tapping empathy (items 1, 4, 6, 8, 10, 11, 12, 14, 15, 18, 19, 21, 22, 25, 26, 27, 28, 29, 32, 34, 35, 36, 37, 38, 39, 41, 42, 43, 44, 46, 48, 49, 50, 52, 54, 55, 57, 58, 59, and 60), and 20 filler items (items 2, 3, 5, 7, 9, 13, 16, 17, 20, 23, 24, 30, 31, 33, 40, 45, 47, 51, 53, and 56).

The 20 filler items were included to distract the participant from a relentless focus on empathy. An initial attempt to separate items into purely affective and cognitive categories was abandoned because in most instances of empathy, the affective and cognitive components co-occur and cannot be easily disentangled.

Each of the items listed above scores 1 point if the respondent records the empathic behavior mildly, or 2 points if the respondent records the behavior strongly (see below for scoring of each item). Approximately half the items were worded to produce a "disagree" response and half to produce an "agree" response for the empathic response. This was to avoid a response bias either way. Following this, items were randomized. The EQ has a forced choice format, can be self-administered, and is straightforward to score because it does not depend on any interpretation.

AIMS

In the studies reported below, we had four aims: to test whether adults with high-functioning autism (HFA) or Asperger Syndrome (AS) score lower on the EQ (study 1); to test whether the EQ is inversely correlated with the AQ (Autism Spectrum Quotient) (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001b), as would be predicted if autism/AS is an empathy disorder (study 1)—the AQ is a 50-point self-report scale for use by adults with HFA or AS; to test whether the EQ inversely correlates with the FQ (Friendship Questionnaire; Baron-Cohen & Wheelwright, 2003) as an index of the validity of the EQ (study 1)—The FQ is a 25-point self-report scale assessing reciprocity and intimacy in relationships, with a scale range of 0–135; and to test for sex differences in empathy, given earlier reports of a female superiority (Davis, 1980; Davis & Franzoi, 1991; Hall, 1978; Hoffman, 1977; study 2).

AUTISM

Autism is diagnosed when an individual shows abnormalities in social and communication development in the presence of marked repetitive behavior and limited imagination (American Psychiatric Association, 1994). The term HFA is given when an individual meets the criteria for autism in the presence of normal IQ. AS is defined in terms of the individual meeting the same criteria for autism but with no history of cognitive or language delay (World Health Organization, 1994). Language delay itself is defined as not using single words by 2 years of age or not using phrase speech by 3 years of age.

[3] The term "quotient" is used not in the statistical sense (the result of dividing one quantity by another) but used on the basis of the Latin root "quotiens" (meaning "how much" or "how many").

There is growing evidence that autism and AS are of genetic origin. The evidence is strongest for autism and comes from twin and behavioral genetic family studies (Bailey *et al.,* 1995; Bolton & Rutter, 1990; Folstein & Rutter, 1977, 1988). Family pedigrees of AS also implicate heritability (Gillberg, 1991). There is also an assumption that autism and AS lie on a continuum (Baron-Cohen, 1995; Frith, 1991; Wing, 1981, 1988). One reason for testing adults with HFA or AS on the EQ (study 1, below) was to explore the notion that autism is an empathy disorder, given their mindreading deficits (Baron-Cohen, 1995; Gillberg, 1992; Yirmiya, Sigman, Kasari, & Mundy, 1992).

STUDY 1

Piloting

Pilot testing of the EQ was conducted before the cross-validation study, using a separate sample of controls (n = 20). This was to check that questions were comprehensible, that the instrument was producing a good spread of scores, and that both floor and ceiling effects were not evident. Data from this pilot study were not analyzed statistically, because of the small sample size, but all of these instrument properties were confirmed.

Subjects

Two groups of subjects were tested. Group 1 comprised 90 adults with AS/HFA (65 males, 25 females). This sex ratio of 2.6:1 (m:f) is similar to that found in other samples (Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995). All subjects in this group had been diagnosed by psychiatrists using established criteria for autism or AS (American Psychiatric Association, 1994). They were recruited via several sources, including the National Autistic Society (UK), specialist clinics carrying out diagnostic assessments, and advertisements in newsletters and Webpages for adults with AS/HFA. Their mean age was 34.2 years (SD = 12.5, range 15.4–59.9). They had all attended mainstream schooling and were reported to have an IQ in the normal range. (See below for a confirmation of this.) Their occupations reflected their mixed socioeconomic status (SES). Because we could not confirm age of onset of language with any precision (because of the considerable passage of time), these individuals are grouped together, rather than attempting to separate them into AS versus HFA.

Group 2 comprised 90 adults selected from a pool of 197 volunteers on the basis of being age- and sex-matched with group 1. The 197 volunteers are described in study 2. The 90 comparison subjects, similar to group 1, consisted of 65 males and 25 females. Their mean age was 34.2 years (SD = 11.8, range 17.4–56.4). Their SES profile was similar to that of group 1.

Method

Subjects were sent the EQ by post and were instructed to complete it on their own, as quickly as possible, and to avoid thinking about responses too long. Subjects in group 2 had the option to remain anonymous. To confirm the diagnosis of adults in group 1 being high-functioning, 15 subjects in each group were randomly selected and invited into the lab for intellectual assessment using four subtests of the WAIS-R (Wechsler, 1958). The four subtests of the WAIS-R were Vocabulary, Similarities, Block Design, and Picture Completion. On this basis, all of the subjects had a prorated IQ of at least 85, that is, in the normal range (group 1, $x = 106.5$, SD = 8.0; group 2, $x = 105.8$, SD = 6.3), and they did not differ from each other statistically (t-test, $p > .05$). These subjects were asked to fill in the EQ for a second time 12 months later as a test of its retest reliability.

Subjects in group 1 were also sent the AQ (Baron-Cohen *et al.,* 2001), and 45 of them were also sent the FQ (Baron-Cohen & Wheelwright, 2003) by post. Their mean AQ score was 35.7 (SD = 6.7). This is in the clinical range on this measure, as our previous study using the AQ shows that more than 80% of people with a diagnosis of AS or HFA score equal to or above 32 (maximum = 50). Their mean FQ score was 54.8 (SD = 19.8), which is significantly lower than the controls ($x = 83.0$, SD = 18.5, $t = -7.9$, $p < .0001$).

Scoring the EQ

"Definitely agree" responses scored 2 points and "slightly agree" responses scored 1 point on the following items: 1, 6, 19, 22, 25, 26, 35, 36, 37, 38, 41, 42, 43, 44, 52, 54, 55, 57, 58, 59, 60.

"Definitely disagree" responses scored 2 points and "slightly disagree" responses scored 1 point on the following items: 4, 8, 10, 11, 12, 14, 15, 18, 21, 27, 28, 29, 32, 34, 39, 46, 48, 49, 50.

For filler items, the total number of each possible response was computed to check for systematic bias in responding by each group. We predicted that the HFA/AS group should not differ on how they responded

on these control items, compared with individuals in the general population.

Definition of Empathy and Corroboration with Other Experts

To go beyond the authors' subjective assessment of whether the chosen items in the EQ were good tests of empathy, we provided a definition of empathy (see below) to a panel of six judges (all experimental psychologists working in this field) and asked them to rate on a 2-point scale (yes or no) whether each of the key items in the EQ related to the overarching definition of empathy. The definition given was as follows: "Empathy is the drive or ability to attribute mental states to another person/animal, and entails an appropriate affective response in the observer to the other person's mental state." Results showed that all 40 empathy items were rated as being related to empathy and all 20 filler items were correctly identified as being unrelated to empathy by at least five out of six judges. The probability of obtaining such agreement on each item by chance is $p < .003$.

Results

Mean EQ scores are shown in Table I, and Figure 2 displays the distribution of EQ scores in the two groups. A *t*-test was used to compare groups 1 and 2 on total EQ score. As predicted, the AS/HFA group scored significantly lower than the controls ($t = -13.07$, df = 178, $p < .0001$). As predicted, in group 1, EQ scores were inversely correlated with the AQ ($r = -0.56$, $p < .0001$) and directly correlated with the FQ ($r = 0.59$, $p < .001$).

Table I. Means and SDs of Total Empathy Quotient Score in Study 1

Group	Total (max = 80)
AS/HFA (n = 90)	
Mean	20.4
SD	11.6
Controls (n = 90)	
Mean	42.1
SD	10.6

Note: AS, Asperger syndrome; HFA, high functioning autism.

When the percentage of subjects in each group scoring at or above each EQ score was calculated out, this revealed that a useful cut-off with which to separate the groups is equal to or fewer than 30 points. Of adults with AS/HFA, 81.1% score at or below this cut-off, versus only 12.2% of the comparison group. This cut-off is the most useful one because it generates the largest difference between the two groups. An analysis of the percentage of subjects attaining each possible score on each empathy item within the EQ showed that

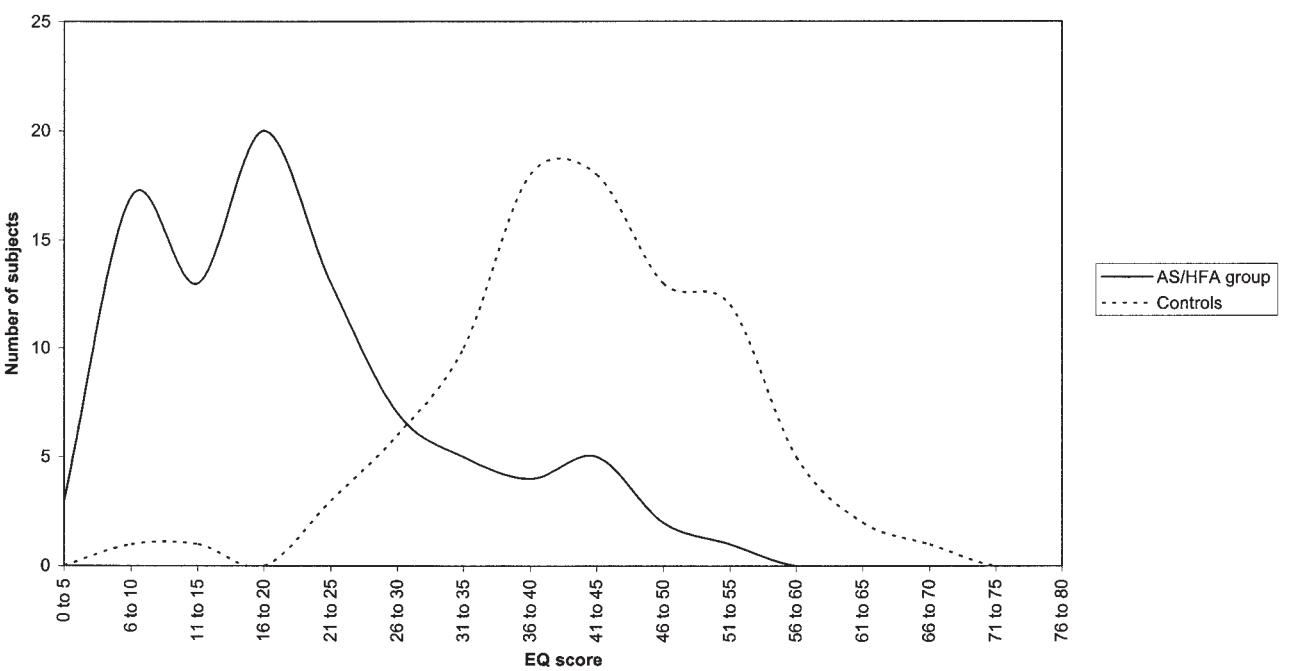

Fig. 2. Empathy Quotient scores in Asperger syndrome/high-functioning autism group and controls.

the AS/HFA group scored more frequently than the comparison group on only two items, numbers 11 and 39. An analysis was carried out of the mean percentage of subjects in each group giving each of the four possible responses for the filler items. This showed that the AS/HFA group and the comparison groups did not differ in the use of the response scale by the two groups. Finally test-retest reliability for the EQ was $r = 0.97$, which is also highly significant ($p < .001$).

Discussion

The results of study 1 show that as a group, the patients with HFA/AS scored significantly lower on the EQ than controls matched for age and gender who were drawn from a general population. This provides some support for the view of HFA/AS as an empathy disorder (Gillberg, 1992). Many of the EQ items tap what could also be described as a need for a "theory of mind," which previous studies have found to be impaired in autism (Baron-Cohen, 1995; Baron-Cohen, Leslie, & Frith, 1985; Perner, Frith, Leslie, & Leekam, 1989). The EQ thus confirms an empathizing deficit in HFA/AS, as measured by self-report and using items referring to everyday understanding of minds (Baron-Cohen, 2002).

Our clinical interviews with a series of adults with AS (n = 50) provided an opportunity to probe the reasons for their lower score on the EQ. They reported that even though they have difficulty judging/explaining/anticipating or interpreting another's behavior, it is not the case that they want to hurt another person. When it is pointed out to them that their behavior was hurtful (e.g., because they failed to pick up when someone around them needed comforting, or because they had said something that caused offense), they typically feel bad about the hurt they caused. Often they cannot recognize that the cause of the other person's hurt was their responsibility, or they cannot see how they could have acted differently to avoid such hurt, but nevertheless wish that such hurt could have been avoided. From this we can conclude that people with AS/HFA are not like unfeeling psychopaths. Rather, psychopaths might be expected to show the opposite profile—being able to judge and predict how another person might feel, even if they have little concern about that person's emotion (Blair, 1995; Blair, Jones, Clark, & Smith, 1997). We have not tested psychopaths directly on the EQ, as a self-report scale might not be the best way to assess individuals who have an acknowledged tendency to deceive.

A concern might be raised as to whether conditions like AS or HFA might have impaired the subject's ability to judge their own social or communicative behaviour, because of subtle mind-reading problems that are found even in adult patients (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997; Baron-Cohen, Wheelwright, & Jolliffe, 1997; Happe, 1994). However, if this impairment had occurred, it would have led the person to score higher on the EQ, rating their own behavior as more empathic than it might really be. Therefore, any inaccuracies of this kind would cause an elevated estimate of the person's true EQ score. This concern is thus not relevant, as if anything, any such overrating would have reduced the likelihood of finding a group difference.

The finding that the EQ is inversely correlated with the AQ is one indicator of the validity of the EQ, in that two of the domains of the AQ measure social sensitivity and sensitive communication, both of which require empathy. The fact that more than 80% of adults who have a diagnosis of AS or HFA score above 32 on the AQ and below 30 on the EQ may indicate their potential for use as screening instruments within clinic settings. We would not recommend these instruments for use in screening the general population, as the rate of individuals in the general population scoring in these ranges is at least 2%. (What proportion of these high scorers are true or false positives is not yet known.) Finally, the strong positive correlation between the EQ and the FQ provides further validation that the EQ is measuring empathy, as the FQ assesses empathy in the context of close relationships. In study 2, reported next, we tested the last of our aims; namely, testing whether there is a sex difference on the EQ in the general population.

STUDY 2

Subjects

Group 1 comprised 71 males with a mean age of 38.8 years (SD = 13.7, range 17.4–69.6). Group 2 comprised 126 females with a mean age of 39.5 (SD = 12.8, range 17.7–73.0). Both groups were recruited from two main sources: volunteers from staff at two large supermarkets in Cambridge (Sainsbury's and Marks and Spencer's) and volunteers from a village in Gloucestershire. These people were recruited in an effort to test a sample that was mixed in terms of social class. There were no differences in the SES of groups 1 and 2. The method was the same as that used in Study 1.

Results

Mean EQ scores are shown in Table II. A *t*-test was used to compare groups 1 and 2 on total EQ score.

Table II. Means and SDs of Total Empathy Quotient Score in Study 2

Group	Total (max = 80)
Males (n = 71)	
Mean	41.8
SD	11.2
Females (n = 126)	
Mean	47.2
SD	10.2

As predicted, males scored significantly lower than females ($t = 3.4$, df = 196, $p < .0001$). Using the cut-off established from study 1, only 4% of females scored equal to or fewer than 30 points, versus 14% of males. Twice as many women as men scored equal to or more than 54 points, and more than three times as many women as men scored equal to or more than 62 points. An item analysis showed that males scored more frequently than females on only three items, numbers 4, 14, and 41. An analysis was carried out of the mean percentage of subjects giving each of the four possible responses for the filler items. Males and females did not differ in the use of the response scale. Finally, Cronbach's alpha was calculated for the EQ as a whole, using all subjects from studies 1 and 2. Alpha was 0.92, which is high.

Discussion

As predicted, study 2 showed that women score slightly but significantly higher on the EQ than men. This replicates a series of earlier studies reporting sex differences (female superiority) on questionnaire measures of empathy (Davis, 1980; Davis & Franzoi, 1991; Hall, 1978; Hoffman, 1977). Specifically, more than three times as many men (14%) as women (4%) scored in the "AS/HFA range" (i.e., equal to or fewer than 30 points), whereas more than three times as many women (9.5%) as men (2.8%) scored in the "super-empathic range" (i.e., equal to or more than 62 points). Whether this reflects women's greater willingness to report empathic behavior or their higher levels of underlying empathy cannot be determined from this study. As in study 1, there do not appear to be any response biases in one sex (or in one clinical group), as measured by response patterns across the control items.

SUMMARY

In this article we have reviewed the definition of empathy at a psychological level and described a new self-assessment instrument, the EQ, for measuring empathy in adults of normal intelligence. As predicted, adults with AS/HFA scored significantly lower on the EQ than matched controls (study 1). Again, as predicted, the EQ was inversely correlated with the AQ (Baron-Cohen *et al.,* 2001), and positively correlated with the FQ (Baron-Cohen & Wheelwright, 2003). Finally, in the normal control group, as predicted, women scored slightly but significantly higher than men (study 2).

The results from both studies are consistent with the extreme male brain (EMB) theory of autism (Asperger, 1944; Baron-Cohen, 2002, 2003; Baron-Cohen & Hammer, 1997). The EMB theory recognises two psychological dimensions: "empathizing" (E) and "systemizing" (S). Empathizing is the drive to identify another's mental state and to respond with an appropriate emotion to this. Systemizing is the drive to analyze a system in terms of its underlying lawful regularities and to construct systems using such lawful regularities. The male brain is defined as individuals in whom $S > E$, and the female brain is defined by the converse psychometric profile ($E > S$). The EMB theory predicts that individuals on the autistic spectrum will show an exaggerated male profile ($S \gg E$). The results of the EQ study above are consistent with this theory, as are a series of other studies (Baron-Cohen *et al.,* 1997; Baron-Cohen, O'Riordan, Jones, Stone, & Plaisted, 1999; Baron-Cohen, Wheelwright, Scahill, Lawson, & Spong, 2001a). This theory may have implications for the marked sex ratio in AS (8m:1f) (Wing, 1981).

The approach to studying empathy using self-report methods has a number of inevitable limitations. First, empathy may comprise both state and trait components. Some individuals will be higher in empathy than others for trait reasons, which could reflect both genetic or early experiential factors (Fonagy, Steele, Steele, & Holder, 1997). We expect that empathy traits are being assessed by the EQ, albeit in terms of the individual's belief about their own empathic traits. However, empathy can also vary as a function of a person's current state. Thus, if you are drunk, you might continue to drive your point home in a discussion for far longer than is sensitive to your listener, and in this sense act unempathically. If you are angry or depressed, your own current emotional state might cloud your ability to see the other person's perspective in an argument, so that you are temporarily only able to see your own. That is, your ability to switch perspectives may be reduced by your current state. It is unlikely that self-report instruments assessing empathy are sensitive to such changes in state. Second, we recognize that the EQ only assesses the

individual's beliefs about their own empathy, or how they might like to be seen or think about themselves, and that this may be different to how empathic they are in reality. Future work might usefully compare an individual's own self-assessed EQ score with that based on the ratings by a partner or parent of that same individual.

Despite these limitations, the EQ appears to be picking up considerable individual, sex, and group differences, in both a general population sample and a clinical sample. Thinking about autism spectrum conditions as empathy disorders may be a useful framework and may teach us something about the neuro-developmental and genetic basis of empathy. Future work using the EQ needs to include psychiatric samples other than autism so that we can learn about the sensitivity and specificity of this instrument. It is clear that autism is not the only psychiatric condition in which empathy is compromised, and for this reason the EQ is unlikely to be useful as a diagnostic. For this reason, too, even in clinical screening, we advise that the EQ be accompanied by other instruments, such as the AQ, high scores on which may be specific to autism. Such specificity tests need to be carried out in the future. Nevertheless, the EQ can be said to have reasonable construct and external validity in having a high alpha coefficient and in being correlated with independent measures. Future work needs to further test the validity of the EQ, perhaps using "live" measures of empathy. Current evidence for the convergent and divergent validity of the EQ is limited to the AQ and FQ. More recently, an inverse correlation between the Systemizing Quotient (SQ) and the EQ (Baron-Cohen, Richler, Bisarya, Gurunathan, & Wheelwright, 2003) has also been found, and the sex difference on the EQ has been replicated. An important next step will be to test the validity of the EQ against existing empathy questionnaires such as the IRI (Davis, 1994). Even on the strength of the present data, however, we have suggestive evidence for autism spectrum conditions entailing an impairment in empathy.

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APPENDIX: THE EQ

How to Fill Out the Questionnaire

Below is a list of statements. Please read each statement *carefully* and rate how strongly you agree or disagree with it by circling your answer. There are no right or wrong answers, or trick questions.

IN ORDER FOR THE SCALE TO BE VALID, YOU MUST ANSWER EVERY QUESTION.

Examples				
E1. I would be very upset if I couldn't listen to music every day.	strongly agree	(slightly agree)	slightly disagree	strongly disagree
E2. I prefer to speak to my friends on the phone rather than write letters to them.	strongly agree	slightly agree	slightly disagree	(strongly disagree)
E3. I have no desire to travel to different parts of the world.	(strongly agree)	slightly agree	slightly disagree	strongly disagree
E4. I prefer to read than to dance.	strongly agree	slightly agree	(slightly disagree)	strongly disagree
1. I can easily tell if someone else wants to enter a conversation.	strongly agree	slightly agree	slightly disagree	strongly disagree
2. I prefer animals to humans.	strongly agree	slightly agree	slightly disagree	strongly disagree
3. I try to keep up with the current trends and fashions.	strongly agree	slightly agree	slightly disagree	strongly disagree

(*continued*)

APPENDIX (*Continued*)

4. I find it difficult to explain to others things that I understand easily, when they don't understand it first time.	strongly agree	slightly agree	slightly disagree	strongly disagree
5. I dream most nights.	strongly agree	slightly agree	slightly disagree	strongly disagree
6. I really enjoy caring for other people.	strongly agree	slightly agree	slightly disagree	strongly disagree
7. I try to solve my own problems rather than discussing them with others.	strongly agree	slightly agree	slightly disagree	strongly disagree
8. I find it hard to know what to do in a social situation.	strongly agree	slightly agree	slightly disagree	strongly disagree
9. I am at my best first thing in the morning.	strongly agree	slightly agree	slightly disagree	strongly disagree
10. People often tell me that I went too far in driving my point home in a discussion.	strongly agree	slightly agree	slightly disagree	strongly disagree
11. It doesn't bother me too much if I am late meeting a friend.	strongly agree	slightly agree	slightly disagree	strongly disagree
12. Friendships and relationships are just too difficult, so I tend not to bother with them.	strongly agree	slightly agree	slightly disagree	strongly disagree
13. I would never break a law, no matter how minor.	strongly agree	slightly agree	slightly disagree	strongly disagree
14. I often find it difficult to judge if something is rude or polite.	strongly agree	slightly agree	slightly disagree	strongly disagree
15. In a conversation, I tend to focus on my own thoughts rather than on what my listener might be thinking.	strongly agree	slightly agree	slightly disagree	strongly disagree
16. I prefer practical jokes to verbal humor.	strongly agree	slightly agree	slightly disagree	strongly disagree
17. I live life for today rather than the future.	strongly agree	slightly agree	slightly disagree	strongly disagree
18. When I was a child, I enjoyed cutting up worms to see what would happen.	strongly agree	slightly agree	slightly disagree	strongly disagree
19. I can pick up quickly if someone says one thing but means another.	strongly agree	slightly agree	slightly disagree	strongly disagree
20. I tend to have very strong opinions about morality.	strongly agree	slightly agree	slightly disagree	strongly disagree
21. It is hard for me to see why some things upset people so much.	strongly agree	slightly agree	slightly disagree	strongly disagree
22. I find it easy to put myself in somebody else's shoes.	strongly agree	slightly agree	slightly disagree	strongly disagree
23. I think that good manners are the most important thing a parent can teach their child.	strongly agree	slightly agree	slightly disagree	strongly disagree
24. I like to do things on the spur of the moment.	strongly agree	slightly agree	slightly disagree	strongly disagree
25. I am good at predicting how someone will feel.	strongly agree	slightly agree	slightly disagree	strongly disagree
26. I am quick to spot when someone in a group is feeling awkward or uncomfortable.	strongly agree	slightly agree	slightly disagree	strongly disagree
27. If I say something that someone else is offended by, I think that that's their problem, not mine.	strongly agree	slightly agree	slightly disagree	strongly disagree
28. If anyone asked me if I liked their haircut, I would reply truthfully, even if I didn't like it.	strongly agree	slightly agree	slightly disagree	strongly disagree
29. I can't always see why someone should have felt offended by a remark.	strongly agree	slightly agree	slightly disagree	strongly disagree
30. People often tell me that I am very unpredictable.	strongly agree	slightly agree	slightly disagree	strongly disagree
31. I enjoy being the center of attention at any social gathering.	strongly agree	slightly agree	slightly disagree	strongly disagree
32. Seeing people cry doesn't really upset me.	strongly agree	slightly agree	slightly disagree	strongly disagree

33. I enjoy having discussions about politics.	strongly agree	slightly agree	slightly disagree	strongly disagree
34. I am very blunt, which some people take to be rudeness, even though this is unintentional.	strongly agree	slightly agree	slightly disagree	strongly disagree
35. I don't tend to find social situations confusing.	strongly agree	slightly agree	slightly disagree	strongly disagree
36. Other people tell me I am good at understanding how they are feeling and what they are thinking.	strongly agree	slightly agree	slightly disagree	strongly disagree
37. When I talk to people, I tend to talk about their experiences rather than my own.	strongly agree	slightly agree	slightly disagree	strongly disagree
38. It upsets me to see an animal in pain.	strongly agree	slightly agree	slightly disagree	strongly disagree
39. I am able to make decisions without being influenced by people's feelings.	strongly agree	slightly agree	slightly disagree	strongly disagree
40. I can't relax until I have done everything I had planned to do that day.	strongly agree	slightly agree	slightly disagree	strongly disagree
41. I can easily tell if someone else is interested or bored with what I am saying.	strongly agree	slightly agree	slightly disagree	strongly disagree
42. I get upset if I see people suffering on news programmes.	strongly agree	slightly agree	slightly disagree	strongly disagree
43. Friends usually talk to me about their problems as they say that I am very understanding.	strongly agree	slightly agree	slightly disagree	strongly disagree
44. I can sense if I am intruding, even if the other person doesn't tell me.	strongly agree	slightly agree	slightly disagree	strongly disagree
45. I often start new hobbies but quickly become bored with them and move on to something else.	strongly agree	slightly agree	slightly disagree	strongly disagree
46. People sometimes tell me that I have gone too far with teasing.	strongly agree	slightly agree	slightly disagree	strongly disagree
47. I would be too nervous to go on a big rollercoaster.	strongly agree	slightly agree	slightly disagree	strongly disagree
48. Other people, often say that I am insensitive, though I don't always see why.	strongly agree	slightly agree	slightly disagree	strongly disagree
49. If I see a stranger in a group, I think that it is up to them to make an effort to join in.	strongly agree	slightly agree	slightly disagree	strongly disagree
50. I usually stay emotionally detached when watching a film.	strongly agree	slightly agree	slightly disagree	strongly disagree
51. I like to be very organized in day-to-day life and often make lists of the chores I have to do.	strongly agree	slightly agree	slightly disagree	strongly disagree
52. I can tune into how someone else feels rapidly and intuitively.	strongly agree	slightly agree	slightly disagree	strongly disagree
53. I don't like to take risks.	strongly agree	slightly agree	slightly disagree	strongly disagree
54. I can easily work out what another person might want to talk about.	strongly agree	slightly agree	slightly disagree	strongly disagree
55. I can tell if someone is masking their true emotion.	strongly agree	slightly agree	slightly disagree	strongly disagree
56. Before making a decision I always weigh up the pros and cons.	strongly agree	slightly agree	slightly disagree	strongly disagree
57. I don't consciously work out the rules of social situations.	strongly agree	slightly agree	slightly disagree	strongly disagree
58. I am good at predicting what someone will do.	strongly agree	slightly agree	slightly disagree	strongly disagree
59. I tend to get emotionally involved with a friend's problems.	strongly agree	slightly agree	slightly disagree	strongly disagree
60. I can usually appreciate the other person's viewpoint, even if I don't agree with it.	strongly agree	slightly agree	slightly disagree	strongly disagree

Thank you for filling this questionnaire in.

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