

Agent familiarity and emotional context influence the everyday empathic responding of
young children with autism

Kristelle Hudry

School of Psychology

University of Queensland

&

Virginia Slaughter

School of Psychology

University of Queensland

Running title: Moderators of empathy in ASD

Author Note/Acknowledgements

Kristelle Hudry is now at the UCL Institute of Child Health, London.

We would like to thank the parents for their participation in completion of the questionnaires for this study, and Emma Fitton for her assistance with coding. This study formed part of the doctoral dissertation of Kristelle Hudry.

Correspondence concerning this article should be addressed to Kristelle Hudry at BBSU, UCL Institute of Child Health, 30 Guilford Street, London WC1N 1EH, United Kingdom. Ph: +44 (020)7 905 2164; Fax: +44 (020)7 831 7050; k.hudry@ich.ucl.ac.uk

Abstract

Whereas research addressing empathy in ASD tends to employ pencil-and-paper and lab-based behavioural methods, the current study is novel in eliciting parent-report data regarding everyday empathy, sampling various emotional situations regularly encountered by children. Parents of typically-developing children and children diagnosed with ASD and DS completed the newly-developed Day-to-Day Child Empathy Questionnaire. Analysis of descriptions of their children's responses to the various empathy-inducing situations supports the notion of an empathy deficit in ASD, confirming previous laboratory-based findings. However, important moderation effects were also demonstrated, for both control and clinical groups. In particular, parents reported children in all groups to be more likely to respond empathically to a familiar agent. The nature of children's responses also according to the specific emotional context.

Key Words: autism, children, empathy, emotion, parent-report, moderators, familiarity

Agent familiarity and emotional context influence the everyday empathic responding of
young children with autism

In his earliest report, Kanner (1943) considered that individuals with autism were unable to experience normal emotional contact with others, deeming this be the core feature of the condition. Researchers have since sought to understand the nature of emotion in autism spectrum disorders (ASD) with a growing body of research revealing areas of deficit alongside other spared aspects of emotion (e.g., Ozonoff, Pennington, & Rogers, 1990; Prior, Dahlstrom, & Squires, 1990), and Frith (2003) explains that it is the *social* emotions (i.e., those necessitating an appreciation of other people) which are fundamentally impaired.

One such social emotion, empathy, has long been of research and philosophical interest, and is multifaceted, involving perceptual, affective, cognitive, and behavioural components (Eisenberg et al. 1989; Feshbach, 1982; Hoffman, 1984). Originally considered a uniquely human capacity, Preston & de Waal (2002a) have argued that empathy actually exists on a spectrum of sophistication, with simpler forms present in other animal species and higher-level forms present in humans as well as the great apes. Similarly, in individual humans, empathy is likely to arise from a basic biological preparedness to attend toward others' emotions (Hoffman, 1975). From these early beginning, it is then able to develop in its sophistication and complexity, acting to regulate the individual's behaviour with respect to social others, and promoting his or her interpersonal relationships with these others (Preston & de Waal, 2002a).

While stability of individual differences in empathic responsiveness has been demonstrated across the first decades of life (Cummings, Hollenbeck, Iannotti, Radke-Yarrow, & Zahn-Waxler, 1986; Eisenberg et al., 1987), a number of robust moderating effects have also been demonstrated. Gender is perhaps the most reliable of these, with girls shown to be more empathic than boys from 14 months of age through to

adolescence (Eisenberg & Fabes, 1998; Grusec, Goodnow, & Cohen, 1996; Zahn-Waxler et al., 1992). Even within individuals empathy is not static but subject to several robust moderators; familiarity, similarity, learning, past experience, and salience (Preston and de Waal, 2002b). The familiarity effect is evident even early on, as infants become first attuned to emotions of the primary caregiver (Montague & Walker-Andrews, 2002) and are only later sensitive to those of others (Soken & Pick, 1992, 1999; Walker, 1982). Similarly, although not unempathic toward strangers, children do direct more prosocial behaviours toward their own caregivers (Zahn-Waxler et al., 1992). The similarity effect describes the greater empathy shown toward others who are more similar (e.g., in terms of age, gender, species, etc.). Effects of learning and past experience are evident as individuals show more empathy regarding distressing situations with which they have had past or personal experience, and cue salience explains that empathy becomes more likely with greater clarity of emotional cues¹ (Preston & de Waal, 2002b).

Empathy deficits in ASD have been demonstrated across the spectrum. Young (often non-verbal) children with autism, assessed using play-based scenarios of enacted adult distress, fail to react appropriately showing lower levels of concern and reduced prosocial responding compared to matched controls (Bacon, Fein, Morris, Waterhouse, & Allen, 1998; Charman, Swettenham, Baron-Cohen, Cox, Baird, & Drew, 1997; Dawson et al., 2004; Sigman, Kasari, Kwon, & Yirmiya, 1992). Empathy has also been assessed in older children, adolescents and adults with ASD, via the presentation of controlled stimuli (e.g., static images, audio clips, video footage, etc.) and test questions, exploiting the better-developed verbal abilities of these individuals in order to gain insight into their understanding of and reactions toward emotion (e.g., Buitelaar & van der Wees, 1997; Dennis, Lockyer, & Lazenby, 2000; Hobson, 1986a, 1986b, 1993; Hobson, Ouston, & Less, 1989; Moore, Hobson, & Lee, 1997). Empathy deficits

remain, however, despite the intact intellectual abilities of many of these individuals (Sigman et al., 1992; Yirmiya, Sigman, Kasari, & Mundy, 1992), evidencing these as distinct from cognitive ability. Despite showing reduced empathy at a group level, compared to controls, individual variation is seen among individuals with ASD, and as is the case for typical controls, stability over time has also been shown the empathic abilities of individuals with ASD (McGovern & Sigman, 2005).

Empathy deficits in ASD exist alongside cognitive impairments which may contribute to or interact together with these. Such impairments include deficits in perspective taking (e.g., Baron-Cohen, Leslie, & Frith, 1985), a tendency for weak central coherence (WCC) in processing style (e.g., Happe, 1999), and impaired aspects of executive function (e.g., Hill, 2004). Another noteworthy cognitive feature is a relative failure to generalize over complex and abstract categories (Klinger & Dawson, 2001; Minshew, Meyer & Goldstein, 2002). This has the potential to hinder the development of empathy in individuals with ASD by preventing them from recognising similarities in others' emotional responses, or the consistency of individuals' reactions across different emotional situations.

Aside from the global notion that empathy deficits exist to varying degrees for individuals along the autism spectrum, little is yet known about the full extent of such deficits in this condition. The current study addresses this question using reports of real-life empathy in young children with autism across a variety of different emotional contexts. While past research has regularly investigated empathy in the clinic, it is with real-life social situations that all individuals with ASD struggle (Yirmiya et al., 1992), and given that situations of real-life distress arise relatively infrequently and unpredictably, caregivers are the best-placed witnesses and respondents regarding their children's behaviour. While parents have not yet been used in this way to report on the empathy of their children with autism, studies of empathy in typical children have

successfully employed parents as the reporters of real-life events and child behaviour (Zahn-Waxler et al., 1992).

In the current study, we therefore sought to collect parent reports of the usual responses of children toward others' negative emotions, using the purpose-built Day-To-Day Child Empathy Questionnaire (DCEQ). By comparing the responses of parents of children with autism and controls, we sought a better understanding of real-life empathy across a variety of emotional contexts with which children should be familiar but which would not readily be assessable in the clinic. We predicted that parents of children with ASD would report their children to show global deficits in real-life empathy compared to controls. Familiarity with the emotional individual was predicted to moderate the responsiveness of controls and, given the robustness of such a moderator (Preston & de Waal, 2002a), this was also expected to apply to the children with autism. A second type of possible moderator, the specific emotion shown, was also included (with five exemplars: pain, fear, illness, anger, frustration). Given the likely regularity of past experience with such affective situations, controls were not expected to differentiate their behaviour across these emotional contexts. However, given the generalisation difficulties reported in individuals with ASD, such consistency of responsiveness was not necessarily expected to hold for this group.

Methods

Participants

Participants were 95 primary caregivers (largely mothers) of young children with ASD, Down Syndrome (DS), and typical development. Respondents for the two clinical groups were recruited via questionnaire mail-out to public special education services/support groups. As children were not seen in the clinic for this study, along with DCEQ completion, parents also provided diagnostic and educational history details for their child. Given that recruitment was conducted via specialist services with no

incentive offered for participation, it was felt that reasonable confidence could be asserted in the parent-reported diagnoses.

In total, 56 questionnaires were returned by parents of children with ASD and DS, with 15 discarded so as to achieve best possible group matching. Eight questionnaires were omitted for children aged over 8 years (so as to retain a relatively young sample), and five questionnaires pertaining to children diagnosed with ASD at/after 4 years of age were also discarded (so as to assert further confidence in this as a sample of children with clear features of childhood autism). Further, two questionnaires pertaining to children with DS were excluded due to parent reports of the presence of autistic features. Final samples of 26 questionnaires for children with ASD² and 15 for children with DS/Trisomy 21 were therefore retained for analysis.

Primary caregivers of typically developing children (aged 24 months to 6 years) were also recruited with a total of 67 questionnaires returned. Three of these were discarded due to parent reports of child developmental delay and those remaining were then rank ordered by child chronological age (CA) and approximately median-split (at CA = 38 months), such that one group (hereafter referred to as the *old* typical group; N = 25) was well matched on CA to the two clinical groups. Of the remainder, a further 10 questionnaires were discarded so as to reduce positive skew of CA³ and to balance the sample size. The final sample thereby comprised a non-matched group (hereafter referred to as the *young* typical group; N = 29) of typical children at the developmental stage at which coordinated empathic behaviours *first* begin to appear (Zahn-Waxler et al., 1992). They would thereby serve *base-level* comparative purposes.

As seen in Table 1, the typically uneven ratio of boys to girls with ASD is reflected in this sample, with all groups similar in gender composition, $\chi^2(3) = 5.01, ns$. Intended matching of three groups on child CA was successful, $F(3, 96) = 28.35, p < .$

001, with only the young typical group significantly different in age from all other groups, $t(28.42) = 11.74, p < .001$, who were well matched, $t(44.97) = 1.54, ns$.

[Place Table 1 about here]

Day-to-Day Child Empathy Questionnaire (DECQ)

Parents completed the DCEQ⁴ containing questions about children's spontaneous empathic behaviours as observed in everyday settings and returned these using supplied pre-paid envelopes. The DECQ contained a 3 x 5 Empathy Scenario Matrix (represented in Figure 1). Columns pertained to three specific individuals (hereafter referred to as *agents*; caregiver/respondent, unknown adult, and child), and rows to five specific emotional contexts (surrounding scenarios of pain, fear, illness, anger in conversation, and frustration at spillage), selected on the basis of inclusion in previous studies (e.g., Sigman et al., 1992), and the likelihood of such situations having been encountered by children in their everyday lives. Parents briefly described, in each matrix cell, the current usual or likely behaviour of their child in witnessing each event, and were prompted to consider their child's direction of gaze, and any actions or vocalizations made.

[Place Figure 1 about here]

Response Coding

A structure for quantifying the descriptions was derived on the basis of coding categories applied by Sigman et al. (1992) in their original observations of empathy in children with autism, with modifications made given that the current data were written descriptions of behaviour rather than videotaped observations. Analyses were therefore 3-way mixed factorial, with diagnostic group as the between-subjects factor (4 levels; ASD, DS, young typical, and old typical), and with two within-subjects factors; emotional agent (3 levels; caregiver, unknown adult, and child) and emotional context (5 levels; pain, fear, illness, anger, and frustration). Following Sigman et al. (1992), a

global code was first applied to each cell description, rating the level of described interest/concern of the child on a scale of 0 to 4 (where 0 = no interest/concern, 1 = some interest/no concern, 2 = clear interest/no concern, 3 = clear interest/some concern, 4 = clear interest/clear concern).

It was not possible to parallel Sigman et al.'s (1992) coding with respect to direction of child attention (e.g., duration of gaze toward a given location) as such detail was not provided in the behavioural descriptions. It was, however, possible to record the mentions of occurrence of other specified child behaviours, including displayed facial affect, prosocial behaviours, and self-serving behaviours. Such data coded by Sigman et al. from videotaped observations comprised a combination of duration and proportion measures, while here, the available data were all proportion measures (i.e., numbers of children in each group noted to display a specific behaviour). For each cell description, therefore, a record was made regarding the presence or absence of each of the following; (a) facial affect – positive (i.e., antagonizing, laughing, teasing) and negative (i.e., emotion contagion), (b) prosocial behaviours – vocalization, comforting (i.e., approaching, offering help, offering affection, seeking out help), imitation (i.e., of the incident), and (c) self-serving behaviours – withdrawal (i.e., avoiding the person), seeking comfort for self, self-stimulation, active play. Preliminary checks indicated many of the specific coded behaviours to be infrequently reported by parents (i.e., positive affect in 3%, imitation in 6%, withdrawal in 6%, seeking comfort for self in 3%, and self-stimulation in <1% of all cells). These were therefore excluded from any further analyses.

All coding was conducted by the principal researcher. A second rater, blind to both child group and the aims of the study, coded a random sample of one third of all cell descriptions (stratified by agent and scenario type) for 10% of all matrices (stratified by child group). Inter-rater reliability was excellent for the interest/concern

scores, $r = .90$ (76% raw agreement [RA]), and good for the retained specific other behaviours; negative facial affect $\kappa = .62$ (91% RA), vocalization $\kappa = .83$ (92% RA), comforting $\kappa = .81$ (92% RA), and active play $\kappa = .77$ (94% RA).

Results

Preliminary Data Checking

Across all 1425 possible cell descriptions (95 questionnaires x 3 agents x 5 emotional scenarios), 74 contained missing data (5%), due in 32 cases to incomplete/incorrectly completed cells and in 42 cases to the respondent indicating he/she did not know the child's response. As treatment of this missing data differed for the interest/concern and specific response codes, this information is presented below as relevant.

Interest/Concern Ratings

Analysis of the primary coder's interest/concern ratings was conducted on the 1351 valid cell descriptions with values imputed for the 74 missing cells using the expected maximization method⁵. This was via mixed-factorial ANOVA, with group as the between-subjects factor, and emotional agent and context as within-subjects factors. The results are depicted in Figure 2. As predicted, there was a significant main effect of group, $F(3, 91) = 7.85, p < .001$, with children with ASD rated as least interested/concerned ($M = 2.30, SD = 1.06$); significantly less so than the typical controls, ($t(91) = -4.40, p < .001, M = 3.24, SD = .81$), and with ratings for the children with DS falling intermediate ($t(91) = 2.19, p < .034, M = 3.02, SD = .93$).

[Place Figure 2 about here]

The main effect of agent was also significant, $F(1.80, 163.72) = 36.61, p < .001$, as predicted. For children in all groups, interest/concern ratings were highest for the most familiar agent (i.e., the caregiver, $M = 3.28, SD = .91$), and lowest for the most unfamiliar agent (i.e., the unknown adult, $M = 2.55, SD = 1.22$), with moderate ratings

for the moderately familiar agent (i.e., another child, $M = 2.72$, $SD = .94$). Given the lack of significant group \times agent interaction, $F(5.40, 163.72) = .67$, ns , this familiarity effect held true for the children with ASD just as for the controls.

The main effect of emotional context was also significant, $F(3.41, 310.06) = 3.82$, $p = .007$, as was the group \times emotional context interaction, $F(10.22, 310.06) = 2.33$, $p = .011$. As predicted, no differences in interest/concern were apparent across the emotional contexts for the old typical controls who were rated highly across all ($M = 2.97$, $SD = .78$). Somewhat greater variation was present, however, for the children with DS and the young controls. Interest/concern ratings were lower for the former group toward the context of fear ($M = 2.15$, $SD = 1.40$) compared to that of pain ($M = 3.32$, $SD = 1.01$, $t(14) = 4.02$, $p = .001$); with all other scenarios intermediate, $M = 2.50$, $SD = .95$). For the latter group, it was the context of illness ($M = 2.27$, $SD = 1.05$) which received lower ratings of interest/concern than that of pain ($M = 3.24$, $SD = .84$; $t(28) = 5.80$, $p < .001$); with all other scenarios intermediate, $M = 2.45$, $SD = 1.05$).

Greatest variability across emotional contexts, however, was seen in the interest/concern ratings for the children with ASD. Highest ratings were apparent for pain, anger and frustration ($M = 2.23$, $SD = 1.16$), with lower ratings given for fear ($M = 1.67$, $SD = 1.11$), and lower ratings still for the context of illness ($M = 1.23$, $SD = 1.22$), thereby demonstrating lesser consistency of empathic responsiveness across emotional contexts for the children with ASD, compared to controls. However, the pattern of emotional context effects observed for the group with ASD (i.e., lower ratings for fear and illness than pain, anger, or frustration) is noted to be an exaggeration of the trends also apparent in the controls, and not a novel effect.

Specific Behavioural Responses

Other specific behaviours commonly reported for children's responses to emotional situations were tallied with analyses conducted on binary data indicating

whether each child was or was not (scores of 1 and 0, respectively) described to engage in these for each matrix cell. By contrast to the ratings of interest/concern, it was not considered appropriate here to impute values for missing cells given the spontaneous nature of such behaviours⁶. The repeated-measures design therefore resulted in list-wise deletion of cases containing any missing data, reducing the sample to 71 children; 15 ASD, 11 DS, 22 Young Typical and 23 Old Typical. As shown in Table 2, verification of group descriptive characteristics for this sub-sample indicated that suitable matching was maintained; CA, $F(3, 67) = 17.48, p < .001$, gender, $\chi^2(3) = 3.59, ns$. These data were analysed by mixed factorial ANOVA⁷, with Bonferroni adjustments applied to the *df* of all post-hoc simple effects tests.

[Place Table 2 about here]

Negative facial affect. Mention of a negative affective response was made in 14.6% of cells (e.g., ‘Look at me and start crying’), with no differences apparent across diagnostic groups, $F(3, 67) = 1.70, ns$. Significant effects were present however for agent, $F(2, 134) = 20.91, p < .001$, and emotional context, $F(3.00, 200.80) = 27.43, p < .001$, as well as the agent x emotional context interaction, $F(4.75, 317.96) = 7.79, p < .001$. While most children (83%) were noted to show some negativity, this was more often during displays of caregiver fear and anger ($M = .48, SD = .50$) than during displays of the unknown adult or child ($M = .17, SD = .38$), $t(70) = 7.38, p < .001$, or during situations of pain, illness, or frustration ($M = .06, SD = .15$), $t(70) = 9.76, p < .001$.

Vocalization. Children were reported to vocalize (toward the emotional agent or another onlooker) in 40% of cells (e.g., ‘Will state “What a mess” but no interaction with person’), with significant effects present for group, $F(3, 67) = 4.98, p = .004$, agent, $F(2, 134) = 10.38, p < .001$, and emotional context, $F(4, 268) = 6.30, p < .001$, but no interactive effects. (Means are presented in Table 3.) The effect of group was

driven by more old typical children vocalizing than children with ASD, $t(67) = 2.92, p = .005$, or DS, $t(67) = 3.40, p = .001$ (and with young typical children falling intermediate, $t(67) = -1.79, ns$). All children vocalized more during emotional scenarios of the caregiver than during those of the unknown adult or child, $t(70) = 4.62, p < .001$, and more vocalization was also reported for scenarios of pain and frustration than for those of fear and anger, $t(70) = 4.61, p < .001$ (with that of illness falling intermediate, $t(70) = 2.03, p = .047$).

[Place Table 3 about here]

Comforting. Reports of comforting acts (i.e., approaching, offering/seeking help and offering affection) occurred in 35.2% of cells (e.g., ‘Would state verbally “It’s okay mummy”, while rubbing back with hand’), with significant effects present for group, $F(3, 67) = 5.12, p = .003$, agent, $F(2, 134) = 74.65, p < .001$, and emotional context, $F(3.35, 224.69) = 20.86, p < .001$, along with significant two-way interactions of group x agent, $F(6, 134) = 4.69, p < .001$, group x emotional context, $F(10.06, 224.69) = 1.92, p = .044$, and agent x emotional context, $F(6.31, 422.41) = 6.81, p < .001$. (Means are presented in Table 4.) The effect of group was due to more old typical children offering comfort than children with ASD, $t(67) = 3.87, p < .001$ (with young typical children and children with DS falling intermediate, $t(67) = -1.41, ns$). Children in all groups were noted to differentiate comforting according to identity of the emotional agent, with controls showing greater comforting toward caregivers and other children than toward unknown adults, $t(55) = 13.13, p < .001$. Such a familiarity effect was present, but more stringent, in children with ASD, who showed greater comforting toward their caregivers alone, $t(14) = 3.14, p = .004$. Control children also differentiated their comforting according to the emotional context, comforting more during caregiver and child scenarios of pain, frustration and illness, than during scenarios of fear and anger, t

(55) = 7.42, $p < .001$. Children with ASD, by contrast, were not reported to differentiate their comforting at all across situations $F(4, 56) = 1.83$, *ns*.

[Place Table 4 about here]

Active play. Children were reported to carry on with their own play activities in 17.5% of cells (e.g., ‘Acknowledge child is unwell but do his own thing’), with significant effects of group, $F(3, 67) = 5.28$, $p = .002$, agent, $F(2, 134) = 11.15$, $p < .001$, and emotional context, $F(3.00, 200.69) = 8.15$, $p < .001$, and a marginally significant agent x emotional context interaction, $F(6.59, 441.72) = 2.09$, $p = .047$, apparent. As shown in Table 5, significantly more children with ASD than old typical children carried on playing, $t(67) = -3.94$, $p < .001$ (with young typical children and children with DS falling intermediate, $t(67) = -2.83$, $p = .006$). Children continued more often with their play during scenarios of agent illness and fear than during those of pain and anger, $t(70) = 5.19$, $p < .001$ (with frustration falling intermediate, $t(70) = 1.47$, *ns*), and play more often occurred during the emotional events of unknown adults and other children, than during those of the caregiver, $t(70) = 4.63$, $p < .001$ (although this was with the exception that children continued to play equally during scenarios of the frustration of any agent, $t(70) = -1.53$, *ns*).

[Place Table 5 about here]

Discussion

Use of the parent-report Day-To-Day Child Empathy Questionnaire permitted investigation of the everyday empathy of young children with autism and comparison groups across emotional situations familiar to most children but occurring insufficiently regularly to permit controlled experimenter observation. With a foundation in the methodology and coding systems of past experimental studies (e.g., Sigman et al., 1992), the present results were expected to parallel those previously shown in the lab, whilst addressing novel predictions regarding potential moderators of empathy in

autism. As expected, parents reported their children with ASD to show global deficits in real-life empathy, describing them as less interested in/concerned about various emotional situations than both age-matched and 'base-level' typical controls. They were also reported to be less responsive in terms of a range of overt response behaviours, less often described to vocalize or engage in comforting acts and more often described to continue with their own play activities.

It cannot, however, be claimed that children with ASD are categorically hypo-responsive as their behaviours were often described in line with those of children with DS and younger typical children. Furthermore, parent reports suggested moderating effects of familiarity and emotional context to apply equally to the children with ASD as for controls. The agent familiarity effect was pronounced across all groups and measures, with greatest empathy reported toward the most familiar agent (i.e., caregiver) and least empathy toward the least familiar agent (i.e., the unknown adult).

No strong predictions were made regarding moderating effects of emotional context across the different groups, although typical controls were considered likely to show empathy across a range of negative scenarios. This prediction held for the interest/concern ratings made regarding descriptions of the older typical controls (i.e., ratings were high and stable across all situations). Somewhat greater variability was present in the ratings for the younger controls and children with DS. Greatest variability, however, was apparent in the ratings made regarding descriptions of the behaviour of children with ASD, with a tendency here for exaggerations of the trends seen in controls (i.e., marginal effects in the descriptions of behaviour for controls were statistically significant for the children with ASD). In particular, there was robust differentiation in child reactions toward fear and anger, compared to pain, illness and frustration, with the former eliciting response behaviours indicative of more personal distress responses (i.e., negative affect) and the latter eliciting behaviours more

indicative of sympathetic distress responses (i.e., purer empathy; vocalizing and offering comfort).

The current results suggest that just as a global empathy deficit is important and reliably demonstrable in individuals with ASD, moderating effects are also influential for this group just as in typical empathic responding. Furthermore, reported moderator effects for children with ASD do not appear to be categorically different from those seen in typical empathy.

The current study is unique in documenting detailed parent reports of empathy in children with atypical development, with a major strength lying in the use of data on everyday empathy, avoiding the possible impacts of an artificial testing situation on child responses or reliance on academic-style assessment. However, concerns regarding the reliability and validity of parent-report information as the sole source of research data apply here, as parents may have misreported or misremembered their children's behaviour, or may have failed to generate thorough descriptions of typical responses. Additional limitations to the present methodology include the lack of more detailed information on the symptom severity of the children with ASD as well as lack of information and group matching on cognitive ability level. As already mentioned, researchers have shown empathy to be independent of aspects of cognitive function (Sigman et al., 1992; Yirmiya, Sigman, Kasari, & Mundy, 1992). However, it is possible that the two facets would interact in some way, so it will be important to replicate the current results with more carefully described and more thoroughly matched samples.

Given these limitations, two potential avenues exist for the continuation of this line of research. First, a return to the lab would permit more careful experimental control in testing out the proposed moderating effects presented here, and converging results would serve to validate the current parent reports. Second, a longitudinal study of empathy in ASD, following the methodology of Zahn-Waxler et al. (1992) with

typical children, would permit the collection of prospective data. Training parents as observers would yield greater confidence in the real-life data provided. Additionally, the use of an increased sample within a more large-scale study would permit the assessment of and group matching on verbal/cognitive ability levels thereby permitting evaluation of the ways in which moderator effects might interact with other individual difference variables (e.g., level of symptom severity, IQ, age, gender, and past experience). Finally, the increased sampling of behaviour available in a longer-term study would lessen the need to omit low frequency behaviours from analysis (e.g., displays of positive affect, imitation, avoidance, seeking self-comfort, and self-stimulation behaviours) as was necessary here.

Just as autism is complex and exists along a spectrum of level of ability/impairment, so too is empathy complex and multifaceted (Eisenberg et al., 1989; Feshbach, 1982; Hoffman, 1984), presenting along a spectrum of level of sophistication (Preston & de Waal, 2002a). Despite its limitations, the current study presents the DCEQ as a promising tool for gaining insight into young children's emotional responsiveness. Drawing on parents' intimate knowledge of their children's typical responses across a variety of emotional contexts, such a questionnaire thereby permits both a broader and more detailed evaluation of child empathy than is possible through the use of clinic-based assessments, given ensuing practical constraints. Including detailed parent-reports, such as those used here, with very young children with ASD will permit researchers to more thoroughly address the core nature of empathic and emotional deficits in this condition. Longitudinal studies of infants at high risk for autism (potentially seen from birth) would permit the tracking of individual progress in empathic development, from the proposed bases in contagious crying (Sagi & Hoffman, 1976) through personal distress reactions (Hoffman, 1990; Zahn-Waxler et al., 1992) and on to empathic distress and coordinated behavioural responses in older children

(Zahn-Waxler et al., 1992). By carefully following the development of infants, including those at high risk of autism, it should be possible to confirm notions about the typical developmental trajectory of empathy whilst also addressing questions regarding the point at which the deviation in autism occurs.

References

- Bacon, A., Fein, D., Morris, R., Waterhouse, L., & Allen, D. (1998). The responses of autistic children to the distress of others. *Journal of Autism and Developmental Disorders*, 28(2), 129-142.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a 'theory of mind'? *Cognition*, 21, 37-46.
- Buitelaar, J. K., & van der Wees, M. (1997). Are deficits in the decoding of affective cues and in mentalising abilities independent? *Journal of Autism and Developmental Disorders*, 27(5), 539-556.
- Charman, T., Swettenham, J., Baron-Cohen, S., Cox, A., Baird, G., & Drew, A. (1997). Infants with autism: An investigation of empathy, pretend play, joint attention and imitation. *Developmental Psychology*, 33, 781-789.
- Cummings, E. M., Hollenbeck, B., Iannotti, R., Radke-Yarrow, M., & Zahn-Waxler, C. (1986). Early organization of altruism and aggression: Developmental patterns and individual differences. In C. Zahn-Waxler, M. Cummings & R. Iannotti (Eds.), *Altruism and aggression* (pp. 165-188). New York: Cambridge University Press.
- Dawson, G., Toth, K., Abbott, R., Osterling, J., Munson, J., Estes, A., et al. (2004). Early social attention impairments in autism: Social orienting, joint attention, and attention to distress. *Developmental Psychology*, 40(2), 271-283.
- Dennis, M., Lockyer, L., & Lazenby, A. L. (2000). How high-functioning children with autism understand real and deceptive emotion. *Autism*, 4(4), 370-381.
- Eisenberg, N., & Fabes, R. A. (1998). Prosocial development. In N. Eisenberg (Ed.), *Handbook of child psychology: Vol 3. Social, emotional, and personality development* (Vol. 3, pp. 701-778). New York: Wiley.

- Eisenberg, N., Fabes, R. A., Miller, P. A., Fultz, J., Shell, R., Mathy, R. M., et al. (1989). Relation of sympathy and personal distress to prosocial behaviour: A multitmethod study. *Journal of Personality and Social Psychology*, 57(1), 55-66.
- Eisenberg, N., Shell, R., Pasternack, J., Lennon, R., Beller, R., & Mathy, R. M. (1987). Prosocial development in middle childhood: A longitudinal study. *Developmental Psychology*, 23, 712-718.
- Feshbach, N. D. (1982). Sex differences in empathy and social behaviour in children. In N. Eisenberg (Ed.), *The development of prosocial behaviour* (pp. 315-338). New York: Academic Press.
- Frith, U. (2003). *Autism: Explaining the enigma* (2nd ed.). Oxford, UK: Blackwell.
- Grusec, J. E., Goodnow, J. J., & Cohen, L. (1996). Household work and the development of concern for others. *Developmental Psychology*, 32, 999-1007.
- Happe, F. (1999). Autism: Cognitive deficit or cognitive style? *Trends in Cognitive Science*, 3, 216-222.
- Hill, E. (2004). Executive dysfunction in autism. *Trends in Cognitive Science*, 8, 26-32.
- Hobson, P. (1986a). The autistic child's appraisal of expressions of emotion. *Journal of Child Psychology and Psychiatry*, 27(3), 321-342.
- Hobson, P. (1986b). The autistic child's appraisal of expressions of emotion: A further study. *Journal of Child Psychology and Psychiatry*, 27(5), 671-680.
- Hobson, P. (1993). Understanding persons: The role of affect. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds* (pp. 204-227). Oxford: Oxford University Press.
- Hobson, P., Ouston, J., & Lee, A. (1989). Naming emotion in faces and voices: Abilities and disabilities in autism and mental retardation. *British Journal of Developmental Psychology*, 7, 237-250.

- Hoffman, M. L. (1975). Developmental synthesis of affect and cognition and its interplay for altruistic motivation. *Developmental Psychology, 11*, 607-622.
- Hoffman, M. L. (1984). Interaction of affect and cognition in empathy. In C. E. Izard, J. Kagan & R. B. Zajonc (Eds.), *Emotions, cognition, and behaviour* (pp. 103-131). Cambridge: Cambridge University Press.
- Hoffman, M. L. (1990). Empathy and justice motivation. *Motivation and Emotion, 14*, 151-171.
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2*, 217-250.
- Klinger, L. & Dawson, G. (2001). Prototype formation in autism. *Development and Psychopathology, 13*, 111-124.
- McGovern, C. W., & Sigman, M. (2005). Continuity and change from early childhood to adolescence in autism. *Journal of Child Psychology and Psychiatry, 46*(4), 401-408.
- Minshew, N. J., Meyer, J., & Goldstein, G. (2002). Abstract reasoning in autism: A dissociation between concept formation and concept identification. *Neuropsychology, 16*, 327-334.
- Montague, D. P. F., & Walker-Andrews, A. S. (2002). Mothers, fathers, and infants: The role of person familiarity and parental involvement in infants' perception of emotional expressions. *Child Development, 73*, 1339-1352.
- Moore, D. G., Hobson, P., & Lee, A. (1997). Components of person perception: An investigation with autistic, non-autistic retarded and typically developing children and adolescents. *British Journal of Developmental Psychology, 15*(4), 401-423.

- Ozonoff, S., Pennington, B., & Rogers, S. (1990). Are there specific emotion perception deficits in young autistic children? *Journal of Child Psychology and Psychiatry*, *31*, 343-361.
- Preston, S. D., & de Waal, F. B. M. (2002a). The communication of emotions and the possibility of empathy in animals. In S. G. Post, L. G. Underwood, J. P. Schloss & W. B. Hurlburt (Eds.), *Altruism and altruistic love: Science, philosophy, and religion in dialogue* (pp. 284-308). New York NY: Oxford University Press.
- Preston, S. D., & de Waal, F. B. M. (2002b). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*, *25*, 1-72.
- Prior, M., Dahlstrom, B., & Squires, T. (1990). Autistic children's knowledge of thinking and feeling states in other people. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *31*, 587-601.
- Sagi, A., & Hoffman, M. L. (1976). Empathetic distress in the newborn. *Developmental Psychology*, *12*, 175-176.
- Sigman, M., Kasari, C., Kwon, J. H., & Yirmiya, N. (1992). Responses to the negative emotions of others by autistic, mentally retarded, and normal children. *Child Development*, *63*, 796-807.
- Sigman, M., Yirmiya, N., & Capps, L. (1995). Social and cognitive understanding in high-functioning children with autism. In E. Schopler & G. Mesibov (Eds.), *Learning and cognition in autism* (pp. 159-176). New York: Plenum Press.
- Soken, N. H., & Pick, A. D. (1992). Intermodal perception of happy and angry expressive behaviours by seven-month old infants. *Child Development*, *63*, 787-795.
- Soken, N. H., & Pick, A. D. (1999). Infants' perception of dynamic affective expressions: Do infants distinguish specific expressions? *Child Development*, *70*, 1275-1282.

Walker, A. S. (1982). Intermodal perception of expressive behaviours by human infants.

Journal of Experimental Child Psychology, 33, 514-535.

Yirmiya, N., Sigman, M. D., Kasari, C., & Mundy, P. (1992). Empathy and cognition in

high-functioning children with autism. *Child Development*, 63, 150-160.

Zahn-Waxler, C., Radke-Yarrow, M., Wagner, E., & Chapman, M. (1992).

Development of concern for others. *Developmental Psychology*, 28, 126-136.

Footnotes

1. Although if overly salient, the result in the observer may be one of personal distress rather than of empathy (Preston & de Waal, 2002a).
2. Twelve children had non-specified diagnoses of ASD, 11 were diagnosed with Autistic Disorder, two with PDD-NOS, and one child with autism secondary to Lennox-Gastault Syndrome.
3. CA of the children described in the remaining questionnaires was significantly positively skewed. Those discarded were therefore selected at random from the youngest 50% remaining, so as to reduce this skew.
4. A copy of the DECQ can be obtained by contacting the corresponding author.
5. Little's MCAR test indicated these cells to occur at random across the data set; $\chi^2(242) = 256.23, ns$.
6. Indeed, when tests were run with and without missing data imputed, the obtained results differed substantially, with the latter method proving more conservative and parsimonious.
7. While, the categorical nature of this categorical data would point to non-parametric analysis as most appropriate, such testing would not allow for a mixed-factorial design. Given the robustness of ANOVA, along with conceptualization of the data as ordinal (rather than simply nominal), use of this parametric procedure was considered acceptable so as to permit the evaluation of interactive effects. Tests of all main effects were verified non-parametrically using a series of chi-square contingency tests with no differences observed in the findings. As such, the parametric results are reported.

Scenario	Person in the Scenario		
	If the caregiver (i.e., you)	If an unknown adult	If another child
... accidentally hit themselves and were in pain.			
... was worried/afraid of something (e.g., object or animal).			
... was lying down feeling a bit sick.			
... was having an angry conversation.			
... accidentally knocked over and spilled a drink and was upset.			

Figure 1. The Empathy Scenario Matrix. Parents provided brief descriptions of their children's likely response behaviours in each cell.

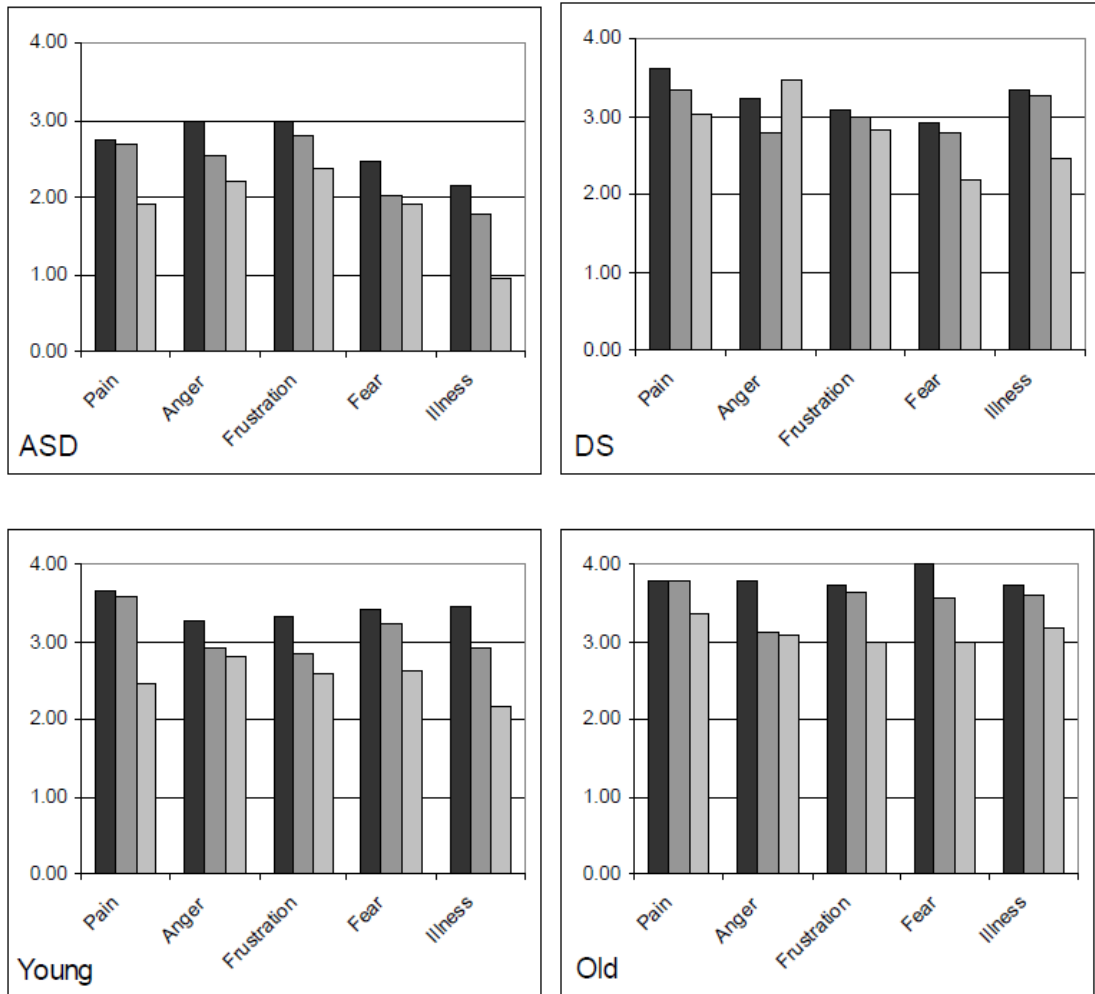


Figure 2. Apparent interest/concern ratings for children with ASD, DS, and young and old controls when observing naturally-occurring scenarios of others' negative emotion. Caregiver (black), another child (dark grey), unknown adult (light grey).

Table 1

Sample descriptive characteristics and group matching.

	ASD	DS	Young	Old
	N = 26	N = 15	N = 29	N = 25
Child Measures				
Gender (% male)	88%	53%	69%	64%
Mean (<i>SD</i>) chronological age	58m (20m)	64m (21m)	28m (4m) *	55m (11m)
Familial Measures				
Respondent gender (% female)	93%	100%	97%	80%
Proportion dual-parent families	79%	100%	93%	96%
Mean number of offspring	2.1	2.2	1.8	2.4

* Significantly different from all other groups, which do not differ.

Table 2

Sample descriptive characteristics and group matching for N = 71 children retained for detailed coding of specific response behaviours.

	ASD	DS	Young	Old
	N = 15	N = 11	N = 22	N = 23
Child Measures				
Gender (% male)	82%	50%	67%	63%
Mean (SD) CA	56m (22m)	62m (24m)	29m (5m) *	54m (11m)

* Significantly different from all other groups, $t(26.63) = 8.67, p < .001$, which do not differ, $t(29.75) = 1.03, ns$.

Table 3

Means (and standard deviations) for significant main effects on child vocalization.

Means represent the proportion of cells in which parents reported child to vocalize (1 = behaviour present, 0 = behaviour absent).

Main Effects	Group/Condition Means (SDs)				
Group	ASD	DS	YOUNG	OLD	
	.29 (.43) ^b	.21 (.40) ^b	.41 (.49)	.56 (.50) ^a	
Agent	Caregiver	Unknown Adult		Child	
	.44 (.47) ^a	.31 (.42) ^b		.35 (.47) ^b	
Emotional Context	Pain	Fear	Illness	Anger	Frustration
	.44 (.48) ^a	.28 (.41) ^b	.36(.45)	.29 (.43) ^b	.47 (.49) ^a

^a Significantly higher than other superscripted groups, $p < .05$

^b Significantly lower than other superscripted groups, $p < .05$

Table 4

Means (and standard deviations) for significant main and interactive effects regarding child comforting. Means represent the proportion of cells in which parents reported child to comfort the agent (1 = behaviour present, 0 = behaviour absent).

Significant Effects	Group/Condition Means (SDs)				
Group	ASD	DS	YOUNG	OLD	
	.20 (.37) ^b	.38 (.35)	.35 (.38)	.44 (.40) ^a	
Agent	Caregiver	Unknown Adult		Child	
	.50 (.44) ^a	.12 (.25) ^b		.42 (.43) ^a	
Emotional Context	Pain	Fear	Illness	Anger	Frustration
	.50 (.41) ^a	.23 (.36) ^b	.42(.36) ^a	.15 (.27) ^b	.41 (.47) ^a
Agent x Emotional Context	Pain	Fear	Illness	Anger	Frustration
Caregiver	.73 (.41) ^a	.28 (.42) ^c	.71 (.43) ^a	.25 (.42) ^c	.52 (.51) ^b
Unknown Adult	.15 (.35)	.07 (.21)	.10 (.20)	.02 (.06)	.24 (.43)
Child	.63 (.46) ^a	.33 (.44) ^c	.45 (.46) ^b	.19 (.32) ^c	.48 (.48) ^b
Group x Agent	Caregiver	Unknown Adult		Child	
ASD	.32 (.46) ^a	.09 (.26) ^b		.19 (.38) ^b	
DS	.51 (.36) ^a	.18 (.29) ^b		.46 (.39) ^a	
YOUNG	.57 (.47) ^a	.07 (.19) ^b		.40 (.48) ^a	
OLD	.58 (.46) ^a	.11 (.28) ^b		.62 (.47) ^a	
Group x Emotional Context	Pain	Fear	Illness	Anger	Frustration

ASD	.29 (.44)	.09 (.29)	.20 (.29)	.13 (.34)	.29 (.46)
DS	.61 (.45) ^a	.15 (.27) ^b	.64 (.41) ^a	.03 (.10) ^b	.49 (.51) ^a
YOUNG	.52 (.39) ^a	.26 (.40) ^b	.39 (.31)	.20 (.31) ^b	.38 (.48)
OLD	.59 (.34) ^a	.41 (.47)	.45 (.44)	.25 (.33) ^b	.49 (.44)

^a Significantly higher than other superscripted groups in row, $p < .05$

^b Significantly lower than other superscripted groups in row, $p < .05$

Table 5

Means (and standard deviations) for significant main and two-way interaction effects regarding child active play. Means represent the proportion of cells in which parents reported the child to continue playing (1 = behaviour present, 0 = behaviour absent).

Significant Effects	Group/Condition Means (SDs)				
Group	ASD	DS	YOUNG	OLD	
	.36 (.33) ^a	.14 (.18)	.18 (.19)	.07 (.16) ^b	
Agent	Caregiver	Unknown Adult		Child	
	.11 (.21) ^b	.23 (.31) ^b		.19 (.27) ^b	
Emotional Context	Pain	Fear	Illness	Anger	Frustration
	.12 (.26) ^b	.18 (.30) ^a	.29 (.38) ^a	.10 (.22) ^b	.18 (.33)
Agent x Emotional Context	Caregiver	Unknown Adult		Child	
Pain	.08 (.17) ^b	.22 (.38) ^a		.09 (.22) ^b	
Fear	.10 (.24) ^b	.26 (.43) ^a		.25 (.42) ^a	
Illness	.20 (.39) ^b	.39 (.47) ^a		.31 (.41) ^a	
Anger	.05 (.11) ^b	.13 (.27) ^a		.14 (.27) ^a	
Frustration	.17 (.32)	.21 (.40)		.20 (.38)	

^a Significantly higher than other superscripted groups in row, $p < .05$

^b Significantly lower than other superscripted groups in row, $p < .05$