

Empathic Embarrassment Accuracy in Autism Spectrum Disorder

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Empathic accuracy refers to the ability of perceivers to accurately share the emotions of protagonists. Using a novel task assessing embarrassment, the current study sought to compare levels of empathic embarrassment accuracy among individuals with autism spectrum disorders (ASD) with those of matched controls. To assess empathic embarrassment accuracy, we compared the level of embarrassment experienced by protagonists to the embarrassment felt by participants while watching the protagonists. The results show that while the embarrassment ratings of participants and protagonists were highly matched among controls, individuals with ASD failed to exhibit this matching effect. Furthermore, individuals with ASD rated their embarrassment higher than controls when viewing themselves and protagonists on film, but not while performing the task itself. These findings suggest that individuals with ASD tend to have higher ratings of empathic embarrassment, perhaps due to difficulties in emotion regulation that may account for their impaired empathic accuracy and aberrant social behavior. *Autism Res* 2015, 8: 241–249. © 2015 International Society for Autism Research, Wiley Periodicals, Inc.

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Introduction

Empathy is defined as the reactions of one individual to those of another observed individual [Davis, 1983]. Human empathy relies on the ability to share emotions, as well as to understand the thoughts, desires and feelings of the other. While empathy involves emotional as well as cognitive aspects [Shamay-Tsoory, Aharon-Peretz, & Perry, 2009], it has been suggested that a core feature of empathy is empathic accuracy, which is defined as the ability to accurately infer others' thoughts or feelings [Ickes, Stinson, Bissonnette, & Garcia, 1990]. Indeed, a model of empathy recently published by Zaki, Weber, Bolger, and Ochsner [2009] suggests that the emotional and cognitive components of empathy contribute to the ability of the perceiver to accurately match her/his state with the emotions or thoughts experienced by another target.

A reliable measure of empathy that can also be used as a measure of empathic accuracy is empathic embarrassment. Empathic embarrassment, which involves an observer sharing the embarrassment of a total stranger being viewed from a distance, has been explained by the notion of the observer "putting her/himself in the shoes of the person being embarrassed" [Miller, 1987]. Hawk, Fischer, and Van Kleef [2011] showed that both perspective-taking and mimicry contribute to empathic

embarrassment. Additionally, Krach et al. [2011] showed that differences in trait empathy are positively correlated with vicarious embarrassment, a term that describes the feeling of embarrassment for another with or without said individual herself or himself feeling embarrassment. Empathic embarrassment, on the other hand, describes one feeling embarrassment for another who is also embarrassed [Paulus, Müller-Pinzler, Westermann, & Krach, 2013].

It has been reported that viewers may consistently recognize embarrassment in protagonists and that empathic embarrassment is correlated with the observer's trait embarrassability, but not to the protagonist's perceived embarrassment [Marcus & Miller, 1999]. Moreover, embarrassment itself also requires empathy, especially the understanding of possible evaluation by others.

Considering that empathic embarrassment involves basic empathic abilities, it is possible that individuals with impaired empathy may show diminished empathic embarrassment. Many studies have shown that one of the core features of autism spectrum disorder (ASD) is a deficit in empathic abilities [Gillberg, 1992], particularly in the perspective-taking aspect of empathy [Rogers, Dziobek, Hassenstab, Wolf, & Convit, 2007]. ASD is a neurodevelopmental disorder characterized by impairments in social interaction, impairments in communication, and restricted, repetitive, and stereotyped patterns

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of behavior, interests, and activities [American Psychiatric Association, 2013]. At the higher functioning end of the autism spectrum, individuals usually have a normal to high IQ and are able to communicate, but have poor social understanding, and as a result have difficulty getting along in our socially based society. One major difficulty exhibited by individuals with ASD is in their empathic response [Baron-Cohen and Wheelwright, 2004; Yirmiya, Sigman, Kasari, & Mundy, 1992]. Individuals with ASD experience difficulties in recognizing the correct emotion from emotional videos [Golan & Baron-Cohen, 2006], in inferring the emotions of the other from a story [Happé, 1994], in expressing emotions [Capps, Yirmiya, & Sigman, 1992], and as a result in understanding the complex social world.

Ponnet, Buysse, Roeyers, and De Clercq [2008] found that individuals with ASD had difficulty inferring the thoughts and feelings of protagonists in empathic accuracy tasks that were less structured. Similarly, Yirmiya et al. [1992] found that autistic children were less accurate than controls in assessing the emotions of others from video clips.

While previous studies have shown that individuals with ASD have difficulties in recognizing [Golan, Baron-Cohen, & Golan, 2008; Heerey, Keltner, & Capps, 2003] and experiencing [Capps et al., 1992] embarrassment, empathic embarrassment accuracy has never been investigated among these individuals. To examine empathic embarrassment accuracy in ASD, we recently developed a variant of a naturalistic empathic embarrassment accuracy paradigm that enables us to examine how a participant's levels of embarrassment match those of a protagonist. The task involves presenting participants with films in which protagonists performed potentially embarrassing actions (e.g., singing, dancing). Participants are subsequently asked to rate how embarrassed they feel (empathic embarrassment) as well as how embarrassed they think the protagonist feels. The participant's empathic embarrassment was compared with the protagonist's own ratings to produce a measure of empathic embarrassment accuracy.

We hypothesized that participants with ASD would display lower empathic embarrassment accuracy compared with controls. Additionally, in line with Capps et al. [1992], we hypothesized that participants with ASD would exhibit lower empathic embarrassment and lower levels of embarrassment than those in the control group.

Methods

Participants

Seventeen participants diagnosed with ASD (16 males and one female) were recruited for this study through ads posted at local universities, autism centers, and organizations. All were diagnosed by at least one psychiatrist as

meeting the Diagnostic and statistical manual of mental disorders IV (DSM-IV) criteria either for high-functioning autism or for Asperger's syndrome (American Psychiatric Association, 2000). The experiment was administered prior to the publication of DSM 5, and therefore the criteria of DSM-IV were used. Fourteen of the participants went through additional confirmation in our lab using the Autism Diagnostic Observation Schedule–Generic [Lord et al., 2000]. The control group included 24 normal individuals matched with the experimental group for age and IQ (21 males and 3 females). No differences were found between the groups for age [$t_{(39)} = 1.09$, n.s.], years of education [$t_{(32)} = 1.16$, n.s.], or IQ as measured by the Shipley Institute of Living Scale (SILS) [$t_{(21)} = 1.86$, n.s.].

Participants completed the Autism-Spectrum Quotient (AQ) [Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001], and as expected those in the ASD group scored significantly higher [$M = 25.88$, standard deviation (SD) = 7.5] than controls ($M = 15.25$, SD = 5.9) for the total AQ score [$t_{(39)} = 5.08$, $P < .001$], further supporting the diagnosis.

All participants were native Hebrew speakers and had normal or corrected-to-normal visual acuity. Written consent was obtained from the participants and when feasible (in the ASD group) from their parents as well. Participants were told that they could withdraw at any time. Ethical approval was provided by the University of Haifa's Ethics Committee.

Tasks

Assessment of empathic abilities. The Interpersonal Reactivity Index (IRI) [Davis, 1980] is a tool commonly used to assess cognitive and emotional empathy. The IRI is a 28-item self-report questionnaire answered on a scale of 1–5. It consists of four discrete, seven-item subscales: (a) the fantasy scale (FS) measures the tendency to imaginatively transpose oneself into fictional situations (e.g., books, movies, daydreams: “When I am reading an interesting story or novel I imagine how I would feel if the events in the story were happening to me”); (b) the perspective-taking scale (PT) measures an individual's ability to shift perspectives or to step inside another's shoes in the real world rather than in fictitious situations (e.g., “I sometimes try to understand my friends better by imagining how things look from their perspective”); (c) the empathic concern scale (EC) measures the degree to which a respondent experiences feelings of warmth, compassion, and concern for an observed individual (e.g., “I often have tender, concerned feelings for people less fortunate than me”); and (d) the personal distress scale (PD) measures an individual's own feelings of fear, apprehension, and discomfort at witnessing the negative experiences of others (e.g., “being in a tense emotional situation scares me”). The FS and PT subscales comprise

the cognitive empathy scale, while the EC and PD subscales comprise the emotional empathy scale [Davis, 1980]. The IRI has been translated into Hebrew and used in a number of empathy-related studies [Shamay-Tsoory et al., 2009; Tibi-Elhanany & Shamay-Tsoory, 2011].

Assessment of embarrassability. The Modigliani Embarrassability Scale (MES) [Edelmann, 1987; Modigliani, 1968] was used to measure an individual's tendency to be embarrassed. The Hebrew version has 22 items and is rated on a 9-point Likert scale. It was previously found to be reliable and valid (Cronbach's $\alpha = .92$; Adler and Shamay-Tsoory, unpublished).

Assessment of intellectual abilities. The SILS [Shipley, 1940; Zachary, 1986] was used to assess participants' intellectual abilities. The SILS is a two-part self-administered test consisting of a verbal section and an abstraction section. The verbal section is composed of 40 multiple-choice questions requiring the respondent to choose which of four presented words is closest in meaning to a target word. The abstraction section consists of 20 questions that include sequences of numbers, letters, or words, with the final part in each sequence omitted. The respondent is required to complete each of the sequences [Zachary, 1986].

Assessment of embarrassment and empathic embarrassment accuracy. A new task was designed based on Miller [1987] and Gerlach, Wilhelm, and Roth [2003] to assess embarrassment and empathic embarrassment accuracy using films of protagonists performing embarrassing acts. As detailed below, the task included four measures: (a) live self-embarrassment—participants' reported embarrassment while performing embarrassing actions; (b) self-embarrassment from a film—participants' reported embarrassment while watching themselves in a film performing embarrassing actions; (c) perceived protagonist embarrassment—participants' assessment of how embarrassed the protagonists are in their films; and (d) empathic embarrassment—the degree to which participants feel embarrassed while watching the protagonists in the films.

The measure of empathic embarrassment accuracy reflected the level of matching between the protagonist's self-embarrassment from his/her own film and the participant's empathic embarrassment from the same film.

Preparation of the stimuli. The first phase of the task involved preparing the protagonists' films. The protagonists were videotaped by an experimenter while performing five potentially embarrassing actions: (a) singing the national anthem, which has a difficult melody and is usually sung in a group; (b) singing a known children's song accompanied by typical hand movements; (c) dancing to a children song; (d) dancing to a classical

melody; and (e) telling a joke. After each action, protagonists were asked to rate their level of embarrassment on a 9-point Likert scale. A week later, they watched their films, rated their embarrassment on a 9-point Likert scale, and gave their consent to show their films to others.

The Task Phase

The second phase, as illustrated in Figure 1, involved the participants performing the same actions and rating them on a 9-point Likert scale while being videotaped by an experimenter. The goal of this phase was to obtain a measure of live self-embarrassment for each participant. A week later, the participants came back to the lab and viewed 15 films: They viewed five films of themselves performing the actions filmed the week before, and after viewing each film they rated their emotions on a 9-point Likert scale, which yielded a measure of self-embarrassment from a film. They also viewed ten films of two protagonists performing the same actions. After each protagonist's film, participants rated their own emotions on a 9-point Likert scale (empathic embarrassment) as well as the protagonists' emotions (perceived protagonists' embarrassment).

As noted above, in order to assess participants' empathic embarrassment accuracy, we calculated the difference between the protagonists' own ratings of self-embarrassment from their films (from the first phase) and the participants' ratings of empathic embarrassment as a result of watching the same films (from the second phase).

Procedure

All participants signed informed consent forms after being told that the procedure would be videotaped. Each participant was assessed individually in two sessions.

The first stage of the experiment involved filling out the IRI and MES questionnaires. In order for us to obtain an estimate of overall intellectual ability, participants also completed the SILS.

In the last stage of the first session, participants were asked to perform potentially embarrassing actions in a randomized order. Participants' performance was videotaped, and upon completing each task participants were asked to rate their emotions.

Subsequently, participants completed the final stage, which involved emotional ratings of the films.

Statistical Analysis

First, the groups' AQ and IRI scores were compared in order to verify the groups' scores act as usually seen in the literature. Additionally, measures of embarrassability and of protagonists' perceived embarrassment were compared

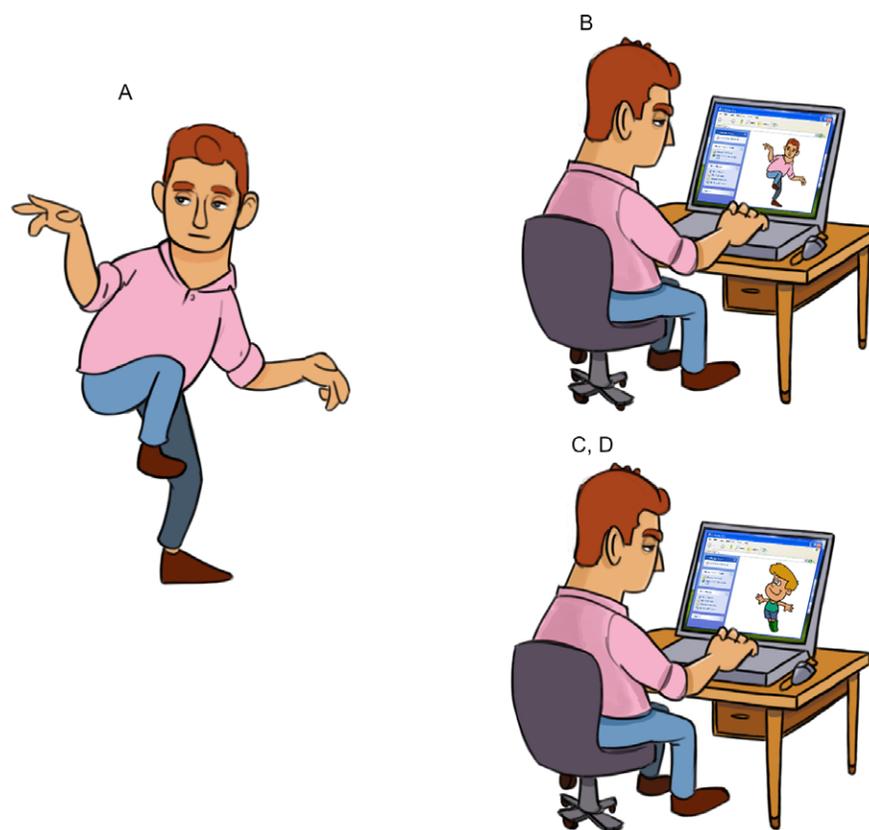


Figure 1. The participants' phase of the task. In the first session, the participants perform potentially embarrassing acts and are asked to report how embarrassed they feel after the performance of each act (A). In the second session, the participants watch films that portray the same embarrassing acts. After watching their own films, they are asked to report how they are feeling (B). After watching strangers' films, they are asked to report how they are feeling (C) and, to assess how the stranger was feeling during his/her performance (D).

between the two groups to ensure that each group sees the protagonists' films in the same light and that their ability to feel embarrassment is also similar.

In order to test the main hypothesis, we created an empathic embarrassment accuracy measure by dividing the participant's empathic embarrassment score by the protagonist's score for self-embarrassment from his/her films. In this measure, higher scores represent less accuracy. This measure was further used to compare between the groups and to examine the relationship between empathic embarrassment accuracy and the AQ and the IRI scales.

To further explore the possible differences between the groups in embarrassment, a repeated-measure analysis of variance (ANOVA) was subsequently conducted to examine the difference between live self-embarrassment and self-embarrassment from the films.

To explore which type of empathy predicts empathic embarrassment for each group, we carried out two step-wise regression analyses.

Results

As reported in Table 1, on the IRI empathy scale, the control group scored higher than the ASD group both on perspective-taking and on empathic concern, while the ASD group scored higher than the control group on personal distress. No group difference was found on the FS of the IRI.

As shown in Table 1, no difference was found between the groups in their perceived protagonists' embarrassment [$t_{(39)} = .12$, n.s., Cohen's $d = .04$], confirming that while watching the protagonists' performances, both groups perceived the same level of embarrassment. Additionally, no group differences were found in embarrassability [$t_{(39)} = .42$, n.s., Cohen's $d = .13$], indicating similar levels of embarrassment among both groups.

Therefore, it can be seen that both groups share the same tendency to become embarrassed and that they perceive the same level of embarrassment in protagonists' films.

Table 1. Results of Between-Group Comparisons on the Questionnaires (Means and SD)

Task	ASD	Control	t-Test	Cohen's d
AQ	M = 25.88, SD = 7.5	M = 15.25, SD = 5.9	$t_{(39)} = 5.08, P < .001$	1.58
Perceived protagonists' embarrassment	M = 4.98, SD = 1.54	M = 4.92, SD = 1.51	$t_{(39)} = .12, n.s.$.04
MES	M = 5.54, SD = 1.63	M = 5.36, SD = 1.1	$t_{(39)} = .42, n.s.$.13
IRI perspective-taking	M = 3.13, SD = .61	M = 3.73, SD = .72	$t_{(39)} = 2.84, P < .01$.9
IRI fantasy scale	M = 3.17, SD = .81	M = 3.16, SD = .72	$t_{(39)} = .03, n.s.$.01
IRI empathic concern	M = 3.34, SD = .66	M = 3.76, SD = .51	$t_{(39)} = 2.26, P < .05$.71
IRI personal distress	M = 3.19, SD = .88	M = 2.55, SD = .68	$t_{(39)} = 2.64, P < .05$.81

AQ, Autism-Spectrum Quotient; ASD, autism spectrum disorders; IRI, Interpersonal Reactivity Index; MES, Modigliani Embarrassability Scale; SD, standard deviation.

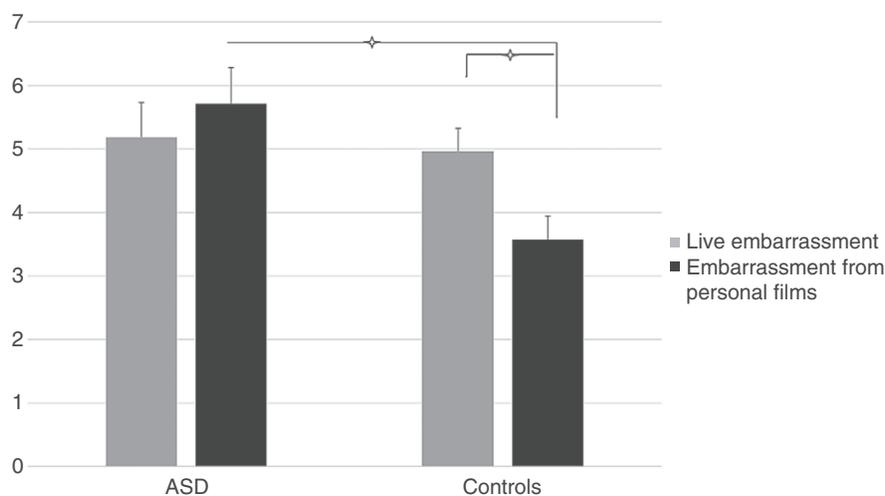


Figure 2. The means and standard errors of participants' live self-embarrassment (how they felt during performance of the task) compared with their self-embarrassment from their own films (how they felt while watching themselves on film), for both the ASD and the control groups. ASD, autism spectrum disorder.

Empathic Embarrassment Accuracy

Using the calculated measure of empathic accuracy, we conducted an independent *t*-test to compare the two groups. This analysis indicated a significant difference between the groups in their empathic embarrassment accuracy measure [$t_{(39)} = 2.05, P < .05, \text{Cohen's } d = .63$]. Those in the ASD group ($M = 1.63, SD = 1.43$) were significantly less accurate than controls ($M = .87, SD = .92$).

To further explore the relationship between empathic embarrassment accuracy and empathy, we examined the correlation between empathy empathic embarrassment accuracy. This analysis indicated that, in the ASD group, empathic embarrassment accuracy is positively correlated with the personal distress subscale ($r = .61, P < .01$). The other three subscales were not significantly correlated with empathic embarrassment accuracy. These results indicate that the higher personal distress, the more inaccurate participants' empathic embarrassment is.

Furthermore, we found a marginal positive correlation ($r = .45, P = .07$) between the empathic embarrassment

accuracy and the AQ scores in the ASD group, indicating that higher AQ scores predict low empathic accuracy.

The same analysis was carried out in the healthy control group, and no significant correlations were found in this group.

Self-Embarrassment

To examine self-embarrassment, we conducted a General Linear Model (GLM) repeated-measures ANOVA of group (ASD, control) by condition (live self-embarrassment, self-embarrassment from a film). The results indicate no main effects of group [$F_{(1,38)} = 3.39, n.s., \text{partial } \eta^2 = .08$] or of condition [$F_{(1,38)} = 1.89, n.s., \text{partial } \eta^2 = .05$]. Nevertheless, a significant group \times condition interaction [$F_{(1,38)} = 18, P < .001, \text{partial } \eta^2 = .32$] was found (Fig. 2).

To further explore the source of the interaction, we conducted follow-up independent *t*-tests between the ASD and the control groups. These analyses indicated that while in the live condition there were no group

Table 2. Betas and *t*-Values of Both Groups Regression Analysis

ASD			
Variable	Beta	<i>t</i>	<i>P</i>
IRI—perspective-taking	.2	1.02	n.s.
IRI—fantasy scale	-.16	-.64	n.s.
IRI—empathic concern	.08	.4	n.s.
IRI—personal distress	.66	3.37	<.01
Control			
Variable	Beta	<i>t</i>	<i>P</i>
IRI—perspective-taking	-.13	-.6	n.s.
IRI—fantasy scale	-.27	-1.16	n.s.
IRI—empathic concern	.44	2.28	<.05
IRI—personal distress	.13	.65	n.s.

ASD, autism spectrum disorders; IRI, Interpersonal Reactivity Index.

differences in embarrassment ratings [$t_{(39)} = .35$, n.s., Cohen's $d = .01$], after viewing films of themselves the ASD group rated self-embarrassment higher ($M = 5.71$, $SD = 2.3$) than did the controls ($M = 3.57$, $SD = 1.83$), [$t_{(38)} = 3.27$, $P < .01$, Cohen's $d = 1.03$].

These results demonstrate differences in embarrassment among the control group between performing the tasks and viewing themselves on film. These differences were not observed in the ASD group.

Empathy and Empathic Embarrassment

To explore the relationship between empathy and empathic embarrassment, we conducted stepwise regressions for each group separately. All four subscales of the IRI were entered together and were added and removed by a statistical criterion of significance contribution to the variance, as a stepwise regression. As can be seen in Table 2, the results showed that empathic concern is the subscale that predicts empathic embarrassment for the control group [$F_{(1,21)} = 4.43$, $P < .05$], explaining 13.5% of the variance in the group's empathic embarrassment, whereas personal distress is the subscale that predicts empathic embarrassment for the ASD group [$F_{(1,15)} = 11.37$, $P < .01$], explaining 39.3% of the variance in the group's empathic embarrassment (Table 2).

Discussion

The current study sought to compare differences in empathic embarrassment accuracy between individuals with and without ASD. We hypothesized that individuals with ASD would display impaired empathic embarrassment accuracy and would report lower levels of self- and empathic embarrassment compared with controls.

As expected, the ASD group displayed less empathic embarrassment accuracy compared with the control group. Reports of empathic embarrassment among the ASD group were further away from the protagonists' reported emotion, while the controls were closer to the protagonists in their reports of empathic embarrassment. This inaccurate response among the ASD group is similar to other reports on emotion recognition in ASD [Ponnet et al., 2008; Yirmiya et al., 1992]. These findings are also in line with Ponnet et al. [2008], who showed participants films of interactions between two strangers and found that those in the ASD group have difficulties in accuracy when the interaction is less structured.

Additionally, and in contrast to our original hypothesis, the ASD group reported greater empathic embarrassment than did the control group. These findings can be explained as an overreaction among the ASD group to a socially oriented cue. While individuals with ASD appear to be able to recognize that the protagonist is embarrassed and perceive the level of embarrassment as well as controls, they fail to feel empathic embarrassment in an accurate and proportionate manner. Individuals with ASD tended to exaggerate their emotional reaction to the protagonist's embarrassment, leading to an inflated and inaccurate empathic embarrassment response.

aan het Rot and Hogenelst (2014) have recently demonstrated a negative correlation between empathic accuracy and autism spectrum traits among normally developed participants. Our findings are in line with aan het Rot and Hogenelst: Our results demonstrate that higher AQ score predicts lower empathic embarrassment accuracy. Difficulty with empathic accuracy observed in ASD could be explained by difficulty in emotion regulation. Emotion regulation refers to the processes by which we monitor, evaluate, and modify our emotional reactions [Gross, 1998; Thompson, 1994]. It has been recently suggested that individuals with ASD have difficulties in emotion regulation [Laurent & Rubin, 2004]. Thus, in the current study, individuals with ASD may possibly fail to regulate their own embarrassment once they experience it, and therefore tend to rate both their self-embarrassment in viewing their own films and their empathic embarrassment in viewing the protagonists' films as higher than the embarrassment they experienced while actually performing the actions. While both groups perceived the same degree of embarrassment in the protagonists, those in the ASD group were unable to regulate their own embarrassment. They report heightened empathic embarrassment, and as a result were less accurate. It may be argued that the controls used the film as a way to distance themselves from the emotional situation, thus making the scenario less aversive and embarrassing, which can be thought as a form of emotion regulation. Lamm, Batson, and Decety [2007] have reported that imagining oneself in someone else's shoes triggers higher

personal distress, whereas trying to imagine how another person feels triggers stronger empathic concern. Thus, possible support for this explanation can be seen in the different empathic traits that lead to each group's empathic embarrassment. While the control group relies on empathic concern to create their empathic embarrassment, the ASD group relies on personal distress. The use of empathic concern focuses on another individual could be considered as more regulated than personal distress that focuses on the self.

Another possible explanation is that by watching the films, we made the participants become more aware of their own actions and those of others, causing them to become more embarrassed. This explanation is in line with Beer, John, Scabini, and Knight [2006], who showed a self-monitoring effect between performance of actions and watching oneself on film. The authors demonstrated that patients with orbitofrontal cortex lesion do not feel embarrassed or feel that they are behaving inappropriately while performing an action, but once they see they behavior on film they catch up to controls and feel embarrassed and know they were behaving inappropriately. Yet this explanation does not completely correspond with the current findings, as we would expect an increase in self-embarrassment among the ASD group after watching their own films and not just a rise in their empathic embarrassment.

In a recent study, Paulus, Kamp-Becker, and Krach [2013] examined vicarious embarrassment among individuals with ASD. The authors showed that participants with ASD reported levels of vicarious embarrassment similar to those of controls in accidental situations (e.g., someone forgetting her lines while speaking in front of an audience), but not in more complex intentional norm violations on the part of the protagonist, which are more dependent on mentalizing abilities. Furthermore, the authors showed that cognitive empathy positively correlates with vicarious embarrassment in ASD. Contrary to these results, our study demonstrated that empathic embarrassment in ASD is based on personal distress, which is a form of emotional empathy [Davis, 1983]. The differences between the current findings and those of Paulus, Kamp-Becker, et al. [2013] could be attributed to the different methods used, which also accounts for the difference in terminology. Vicarious embarrassment is a term used to describe the embarrassment of a perceiver caused by a protagonist's actions when he/she does not share the same situation or emotion (someone could feel embarrassed for a calm protagonist). In contrast, empathic embarrassment is described as a shared situation and emotion [Paulus, Müller-Pinzler, et al., 2013]. Here, we focused on empathic embarrassment as we used the same actions for both protagonists and participants, and aimed to explore the shared emotion of embarrassment for an embarrassed protagonist. The difference in

type of empathy between the current study and that of Paulus, Kamp-Becker, et al. [2013] could also be attributed to the different methods used. While Paulus, Kamp-Becker, et al. [2013] used written vignettes, we used filmed scenarios. It is possible that films as opposed to vignettes trigger higher emotional arousal, that the participants had to regulate. Indeed, it has been shown that films are highly effective stimuli for inducing empathy [Raz et al., 2014]. This explanation is in line with Eisenberg and Fabes [1992], who suggested that overarousal due to viewing another's negative emotion promotes self-focus—that is, personal distress.

In line with previous studies, we found that the ASD group reported lower perspective-taking and lower empathic concern compared with the control group [Rogers et al., 2007]. Our results also show that the ASD group reported higher personal distress than the control group [Rogers et al., 2007]. The personal distress subscale of the IRI measures feelings of unease and discomfort as a result of someone else's negative feelings [Davis, 1980], and is usually found to be higher among individuals with psychopathologies such as schizophrenia [Smith et al., 2012].

Our results also indicate that empathic embarrassment among the control group is predicted by empathic concern, which is also a form of emotional empathy [Davis, 1983]. This difference between the groups in the type of emotional empathy used to build empathic embarrassment can be explained as a more internal process for the ASD group, as compared with a more socially oriented process for the control group [Dvash, Ben-Ze'ev, Adler, & Shamay-Tsoory, 2014].

Finally, this study has several limitations that need to be acknowledged. The main limitation is the low number of participants. Replication of the study with a greater number of participants is advised. Additionally, this study has a complex ecological design, which could make it culturally biased. The use of known songs and dances requires this study to be modified for culturally tailored embarrassing actions in order to replicate it. Finally, the within-subjects design incorporating both self-embarrassment and empathic embarrassment could be considered both an advantage and a disadvantage. It is possible that repeated presentation of embarrassing stimuli may lead to habituation of the stimuli. To address this issue, we spaced the self and empathic sessions a week apart. On the other hand, the current design has several advantages in that it allows assessment of both self and empathic embarrassment, something that has been rarely done.

Taken together, our results may indicate that individuals with ASD exhibit a deficit in empathic accuracy, which may stem from difficulties in emotion regulation. While these individuals exhibited intact personal embarrassment and were able to recognize the embarrassment of

others, their ratings of protagonists' embarrassment were exaggerated, thus pointing to impairment in their empathic accuracy.

This finding of greater empathic embarrassment among individuals with ASD, whether originating from a deficit in empathic embarrassment accuracy or in emotion regulation, can be used to create ecologically and socially oriented interventions for higher functioning individuals. If indeed individuals with ASD recognize and feel empathic embarrassment, they should be able to be taught to act upon these emotions in a more appropriate fashion, which could help them cope better in social situations.

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