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Abstract

Ostracism is social exclusion often without explanation (Williams, 2007). Past research reports mixed findings on the effect that ostracism has on individuals' tendencies to seek or avoid social contact following rejection. Some findings suggest that ostracism threatens individuals' need for belonging, leading them to seek further social contact. Theory of Mind (ToM) decoding involves inferring the internal mental states of others using observable information in the social environment, and past research has found that ToM is enhanced by social motivation. The present study examined the effect of ostracism on subsequent ToM decoding among a female undergraduate sample (n = 295). Participants were randomly assigned to be included or excluded by computer-generated players during an online game of ball toss, wherein participants were led to believe they were playing with real peers. ToM was subsequently assessed using a task that involves attributing complex mental states to photographs of eyes. Results indicated that ostracism was associated with enhanced ToM decoding performance for stimuli exhibiting positive mental states. This tendency to more accurately judge others' internal states following rejection might represent an adaptive response to ostracism; individuals may identify opportunities for establishing relationships and attaining social support, which might buffer the negative psychological effects of social rejection.

Keywords: ostracism, rejection, theory of mind, cyberball, reading the mind in the eyes.

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Humans are social beings. Feeling a sense of belonging within a group is a fundamental human need, and threatening one's sense of belonging has many negative consequences, including feelings of anger and pain (Macdonald, & Leary, 2005). Ostracism is social exclusion, sometimes suddenly and without a clear reason (e.g., Williams, 2007). Ostracism has been practiced since ancient times, and can be observed in social species throughout the animal kingdom, including primates, bees, and buffalo (Williams, 2007). Rejection may serve an important purpose; ostracizing group members who break social norms might enforce conformity. The feeling of being rejected from a group is acutely painful, and this pain likely serves an evolutionary function such that individuals are highly attuned to cues of ostracism in order to optimally avoid it (Macdonald, & Leary, 2005; Wesselmann, Nairne, & Williams, 2012). The foundation of successful interpersonal functioning is Theory of Mind (ToM). ToM is one's ability to understand and predict the social behaviour of others by inferring their mental states, which include beliefs, emotions, desires and intentions (Wellman, 1990). The present study examines the effect of an ostracism manipulation on theory of mind decoding accuracy.

Ostracism has previously been linked to a number of deleterious outcomes including cognitive deficits, poor self-regulation, and self-defeating behaviours (e.g., Baumeister, DeWall, Ciarocco, & Twenge, 2005; Baumeister, Twenge, & Nuss, 2002; Twenge, Baumeister, Tice, & Stucke, 2001; Twenge, Catanese, & Baumeister, 2002). The potential influence of ostracism on symptoms of depression and anxiety has also received research attention in recent years (DeWall, Gilman, Sharif, Carboni, & Rice, 2012; Platt, Kadosh, & Lau, 2013; Slavich, Thornton, Torres, Monroe, & Gotlib, 2009; Wesselmann, Wirth, & Mroczek, 2012). Correlational research suggests that naturally occurring ostracism and depression symptoms are related and, further,

that the relationship is mediated by low self-esteem (DeWall et al., 2012). Longitudinal evidence suggests that severe stressful life events, wherein an individual is singled out for intentional rejection and social demotion, is associated with quickened onset of an episode of major depression in depressed outpatients (Slavich et al., 2009). Furthermore, a body of research suggests ostracism may be associated with the experience of pain (e.g., Macdonald & Leary, 2005; Onoda et al., 2010; Zwolinski, 2012).

ToM can be divided into two separate functional processes: decoding and reasoning (Sabbagh, 2004). Decoding is fundamental to ToM and involves inferring others' internal states using observable cues, including direction of gaze, tone of voice, and facial expression features. Reasoning involves using inferred internal states to explain or predict behaviours, and includes the ability to predict a person's actions based on second order beliefs. ToM develops in children by the age of 4 years, when they are able to use gaze orientation to infer whether other people are interested in objects in the environment, or are focused on their own mental states (Baron-Cohen & Cross, 1992).

Naïve theories about the motivations and emotional states of others allow us to function effectively in groups. For example, children's ToM abilities predict teacher ratings of social skills (Capage & Watson, 2001; Watson, Nixon, Wilson, & Capage, 1999) and ToM performance is impaired in populations that tend to experience social difficulties, such as individuals diagnosed with Asperger's Syndrome or schizophrenia (Craig, Hatton, Craig, & Bentall, 2004). Research suggests that ToM abilities are also compromised in individuals who are acutely or chronically depressed (Inoue, Tonooka, Yamada, & Kanba, 2004; Zobel et al., 2010), but are enhanced in dysphoric individuals (Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005; Lee, Harkness, Sabbagh, & Jacobson, 2005). Furthermore, among dysphoric

individuals, ToM decoding accuracy is driven by a desire to interpret the mental states of others (Harkness et al., 2005). Dysphoric individuals show the greatest increases in ToM decoding accuracy when they believe their performance will predict social success through life; social motivation improves performance more than monetary motivation (Harkness, 2012). In addition to enhancing an individual's ability to detect rejection, ToM abilities may help him or her to successfully repair relationships after an exclusion event. The present study aims to elucidate whether ostracism influences subsequent ToM abilities, and whether depression symptoms might moderate that effect.

Two general reaction styles to ostracism have been reported (see Williams, 2007). Some research suggests that social rejection causes individuals to seek out interaction with others and engage pro-socially in an attempt to bolster their sense of belonging and repair damaged relationships (e.g., Maner, DeWall, Baumeister, & Schaller, 2007). Alternatively, the "porcupine" theory suggests that ostracism leads to antisocial behaviour as a result of feelings of anger and accompanying impaired executive functioning, as well as a need to enhance self-esteem (e.g., DeWall & Baumeister, 2006). Two distinct patterns of ToM performance might be expected based on the literature. Processing an experience of social rejection may monopolize cognitive resources, resulting in poorer ToM task performance. Alternatively, rejected individuals might be motivated to seek positive social contact or restore relationships, resulting in improved ToM performance.

Antisocial Responses to Ostracism

Being ostracized from a social group has been linked to poor emotional self-regulation, in turn leading to temporary cognitive deficits and subsequent aggressive behaviour. Individuals process messages of rejection intensively, which can result in poor attention regulation and

reduced perseverance on complex tasks including tests of general mental ability (Baumeister et al., 2002). Since ostracism elicits feelings of anger, rejection, hurt, and sadness, Baumeister and colleagues (2002) argue that social exclusion impairs controlled cognitive processes by monopolizing executive functioning resources for the task of emotion regulation. Further, people who are ostracized have shown reduced altruistic behaviours (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). Aggression is an antisocial reaction to rejection, and is maladaptive to fulfilling threatened social needs and counterproductive to reestablishing group acceptance (Twenge, Baumeister, Tice, & Stucke, 2001). However, aggression may give the individual a greater sense of control and may bolster his or her sense of self-esteem (Williams, 2007). Aggressive reactions are more likely to occur when rejection takes place in a setting that does not allow the rejected individual any control over the situation (Warburton, Williams, & Cairns, 2006). One study found that a forecast of a lonesome future can lead to decreased sensitivity to both physical and emotional pain and reduced empathy for the suffering of others (DeWall & Baumeister, 2006). As empathy and ToM both involve mental representations of the internal motivations and feelings of other people, this suggests that ToM abilities may also be compromised by messages of rejection.

Prosocial Responses to Ostracism

The affiliation hypothesis of ostracism holds that after a rejection experience one will seek contact with others to repair threatened social needs. Experiments suggest that people do show prosocial proclivities following ostracism. Maner, DeWall, Baumeister, and Schaller (2007), for example, found that social exclusion increases motivation to forge social bonds with new sources of potential affiliation. In this study, individuals expressed increased desire to make new friends and to work with others after being excluded from a group. Further, rejected

participants formed more positive impressions of new people, and tended to give greater rewards in game scenarios than did socially accepted participants. When ostracized in group work settings, evidence suggests that women are likely to attempt to contribute more in an effort to regain social acceptance, whereas men are more likely to socially loaf (Williams & Sommer, 1997). Gender may therefore moderate individuals' reactions to ostracism such that women increase effort in social situations while men might withdraw. Individuals report greater interest in affiliating with others either in person or on chat rooms after being ostracized; thus, affiliative reactions to ostracism have been observed in online settings (Zwolinski, 2012). Gere and MacDonald (2010) argue that belongingness is a fundamental need which is threatened in situations where one is excluded from a social group. Increased feelings of belongingness needs have predicted increased performance on emotion decoding tasks (Pickett, Gardner, & Knowles, 2004). Altogether, a significant body of evidence suggests rejected people might be motivated to affiliate with others to reduce emergent threatened needs thereby devoting effort to interpreting the internal states of others.

The Current Study

The present aims to explore the relationship between social ostracism and subsequent ToM decoding abilities. Participants first completed the Beck Depression Inventory – II (BDI-II; Beck, Steer, & Brown, 1996) online. This measure has been validated with clinical and non-clinical populations (Smarr & Keefer, 2011). At the lab, participants played a game of Cyberball, a commonly used ostracism paradigm (Williams & Jarvis 2006). Cyberball is a computer-based simulation of social ostracism wherein an individual is led to believe that she or he has been either included or excluded from a virtual game of ball toss by two peers (Sethi, Moulds, & Richardson, 2006; Williams & Jarvis 2006). Participants were randomly assigned to either an

inclusion or exclusion condition. Following Cyberball, participants completed the need-threat questionnaire which included three manipulation check items to determine whether participants felt excluded during the game (*Need Threat Questionnaire;* Williams, 2009). ToM decoding was measured using the computer-based Reading the Mind in the Eyes task (Eyes task; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001).

Hypotheses of the present study are based on two alternative patterns of ostracism reactions suggested by the literature. On the one hand, rejection is associated with devoting effort to increasing social acceptance through mimicry, and contributing to group tasks (Lakin, Chartrand, & Arkin, 2008; Williams & Sommer, 1997). Social exclusion may increase motivation to forge new social bonds in a pattern and thereby increase motivation to understand the internal states of others (e.g., Harkness et al., 2005; Maner, DeWall, Baumeister, & Schaller, 2007; Zwolinski, 2012). Motivation to seek social contact may influence one to pay more attention to the internal states of others, such that ostracized individuals may display enhanced ToM decoding accuracy. Alternatively, there is evidence that exclusion increases antisocial behaviour; in effect, pushing others away after one is rejected from a group. Both cognitive capacity and empathy may be limited following ostracism (Baumeister et al., 2002; DeWall, & Baumeister, 2006). Complex cognitive processes underlie ToM (Hutto, 2009); as deficits in cognitive functioning may follow an ostracism experience, this might interfere with one's ability to decode the internal states of others.

Previous research suggests that individuals who have current major depressive disorder or chronic depression tend to perform poorly on ToM tasks, whereas dysphoric individuals (who have subclinical symptomatology) tend to perform better than healthy individuals do (Harkness

et. al. 2005; Harkness, Jacobson, Duong & Sabbagh, 2010; Zobel et. al. 2010). Depression is tested as a moderator of the relation between ostracism and ToM.

Methods

Participants

Participants were female Western University students (n = 295). Participants ranged in age from 18 to 29 (M = 19.58, SD = 1.71) years. Of the sample, 55.50% (n = 165) identified as White, 28.30% Asian (n = 83), and 15.80% other (n = 47). We recruited participants using advertisements posted around campus, and online through Western University Facebook groups. Participants were compensated for their time with $20.00 and were entered in a draw to win one of two iPads.

Materials

Beck Depression Inventory II. The Beck Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996) consists of 21 items and measures depressive symptomology. For each item, participants choose one of four statements (with corresponding values of 0-3) according to how well it describes how they have felt over the past two weeks. Scores are summed to create a total, with higher scores indicating greater symptoms of depression. A sample statement is "I am so sad or unhappy that I can't stand it.". Previous reviews of psychometric properties of the BDI-II suggest acceptable internal consistency, test-retest reliability, and that the content assessed DSM-IV criteria for major depression (Smarr & Keefer, 2011). In the present study Chronbach's alpha was high suggest strong internal reliability ($\alpha = 0.93$).

Cyberball. Ostracism was manipulated using Cyberball, a computer-based game of ball toss whereby participants are either excluded from or included in the game by two computer-generated confederates, whom participants are led to believe are their peers (Williams & Jarvis, 2006). Cyberball is open-access and was obtained from (https://cyberball.wikispaces.com/). Before logging a participant onto the game, a research assistant made a scripted hoax phone call

within earshot of the participant to "another university" to lead the participant to believe that she will be playing with peers at another institution (see Figure 1 in Appendix). Following a script, the research assistant pretended to coordinate with a researcher at another university to maintain the illusion that the players in the game were peers. The research assistant took a photograph of the participant and uploaded it to the computer to be used as the participants' avatar during the game. However, these photographs were not uploaded, and participants were informed that although they could see other participants' avatars, participants could not view their own. Once logged on, participants could see the avatars of the two confederates. Confederates were university aged females; one Asian and the other Caucasian selected to be representative of the Western University female student population. The computer randomly assigned participants to either the inclusion or exclusion condition. During the game, the ball was passed a total of thirty times. In the inclusion condition, the participant received approximately one third of tosses and in the exclusion condition, participants received the ball only twice.

Need Threat Questionnaire. The need threat questionnaire contains three items to check the effectiveness of the cyberball manipulation. Two items are measured on a scale from one (not at all) to five (extremely), and the final item asks the participant to estimate the proportion of ball tosses which she received during the game in terms of a percentage. An example item rated on the one to five scale is, "I felt rejected." (Need Threat Questionnaire; Williams, 2009). The two items measuring feeling ignored and rejected had a high Chronbach's alpha suggesting strong internal reliability ($\alpha = 0.95$).

Reading the Mind in the Eyes Task - Revised. Theory of mind (ToM) decoding was measured with the computer-based 'Reading the Mind in the Eyes' task-Revised (Eyes task; Baron-Cohen,Wheelwright, Hill, Raste, & Plumb, 2001). During this task, participants are

presented with 36 black and white photographs of eye regions (from just below the bridge of the nose to just above the eyebrows) displaying mental states of an emotional (positive or negative) or neutral valence. The pictures are 14.5 x 5.5 cm, and were originally taken from magazines (see Figure 2 in Appendix). Items are scored as correct or incorrect, and total accuracy score is computed as the percentage of correct responses. Pictures are presented one at a time with a mental state adjective displayed at each of the four corners of the picture, equidistant from the center. Participants must select the correct adjective by pressing a key (i.e., S, X, K, or M) that is spatially analogous on the keyboard to the location of the adjective on the screen. Participants are instructed to respond as quickly and accurately as possible and reaction times (in milliseconds) are recorded. The task requires the participant has a working vocabulary of internal states, and requires mapping these descriptors onto fragments of facial expressions. The task involves attributing, or decoding internal states only and does not involve any ToM reasoning or inference (Baron-Cohen et al., 2001; Sabbagh, 2004). The task is designed to draw on semantic knowledge and application of vocabulary for recognizing complex mental states in others and has face validity. The test can discriminate individuals with high functioning autism, a disorder which features social-cognitive deficits, from control participants which lends support to construct validity.

Animals task. The Animals task (Harkness, Sabbagh, Jacobson, Chowdrey, & Chen, 2005) was embedded within the Eyes task as a control measure to ensure that the Eyes task measures ToM decoding rather than task demands. The task consists of 12 animal pictures in black and white (see Figure 3 in Appendix). Each picture is the same size (14.5 x 5.5 cm) as the Eyes task stimuli. For each photograph, four descriptors (e.g., ferocious) are displayed in each corner, and participants are instructed to select the correct adjective by pressing a spatially

analogous key (S, X, K, or M). Participants are asked to choose the most appropriate descriptor as quickly as possible, and accuracy as well as reaction time (in milliseconds) are recorded. The 12 animal task items are randomly distributed amongst the 36 items of the eyes task for a total of 48 randomly ordered items. The task is preceded by one practice trial.

Procedure

Participants completed the first portion of the study online. After providing informed consent, participants answered demographic questions and completed the BDI-II as well as a number of additional tasks and questionnaires as part of a larger study. The BDI-II, the Penn State Worry Questionnaire, the Young Schema Questionnaire-Short Version 1, the UPPS-P, the Ruminative Responses Scale, the Functional Status Questionnaire, Depressive Interpersonal Relationships Inventory, Brief Fear of Negative Evaluation Scale, the Psychological Distance Scaling Task, the Experiences in Close Relationships-Revised scale, and the Dot Probe Task in a randomized order. After completing the online portion of the study, participants were scheduled to come to the laboratory for the second portion of the study. Upon arriving at the laboratory, participants again provided informed consent and played Cyberball. Following the game, participants completed the NTQ (along with a visual analogue scale for distress, and the Positive and Negative Affect scale both related to a larger study) followed by the Eyes and Animals tasks. The Eyes task and the Animals task were presented together; items from both tasks were presented one after another in a random order. Participants were then debriefed as to the nature of the deception used in the study, reaffirmed their consent for data use, and compensated.

Design

This experiment utilized a between-subject experimental design. Ostracism was manipulated, such that participants were randomly assigned to an exclusion (ostracism) or

inclusion condition. Eyes task accuracy (total and separately for each emotional valence i.e., positive, neutral, negative) served as the dependent variable.

Results

The dependent variable of interest was accuracy on the Eyes task defined as proportion of items on the task participants chose correctly ($M = 0.68$, $SD = 0.11$). Binomial analyses were conducted to determine that test items were selected more often than chance (i.e., 0.25). The correct response was chosen by participants more often than chance for all items (all ps < 0.05), supporting the validity of test items. Eyes task accuracy (total, as well as accuracy on positive, negative, and neutral stimuli) was not significantly correlated to, age (all ps > 0.27) or BDI-II scores (all ps > 0.14).

An ANOVA indicated significant differences across ethnic groups on overall eyes accuracy, $F(2, 294) = 10.40$, $MSE = 0.12$, $p < 0.001$, partial $\eta^2 = 0.07$ (see Table 1 for descriptive statistics). Further, there was a significant effect of ethnicity on positive valence accuracy, $F(2, 294) = 10.27$, $MSE = 0.39$, $p < 0.001$, partial $\eta^2 = 0.07$. A significant effect of ethnicity was found on neutral valence accuracy, $F(2, 294) = 4.71$, $MSE = 0.11$, $p = 0.01$, partial $\eta^2 = 0.03$. The effect of ethnicity on negative eyes accuracy was not statistically signficant, $F(2, 294) = 2.41$, $MSE = 0.05$, $p = 0.09$, partial $\eta^2 = 0.02$.

Table 1

Eyes Accuracy and Ethnicity

Ethnicity	Caucasian (*n* = 166)	Asian (*n* = 84)	Other (*n* = 47)
Eyes accuracy *M (SD)*	70% (10%)	64% (12%)	68% (11%)
Positive valence accuracy *M (SD)*	67% (19%)	56% (22%)	68% (18%)
Neutral valence accuracy *M (SD)*	69% (14%)	64% (18%)	69% (13%)
Negative valence accuracy *M (SD)*	73% (14%)	68% (13%)	70% (20%)

Table 1. Table summarizing mean and standard deviations of Eyes task accuracy across stimuli of differing valences by ethnicity.

Tukey's honestly significant difference test indicated that Caucasian participants were more accurate on the eyes task than Asian participants ($p < 0.001$), but did not differ significantly from individuals of other ethnicities ($p = 0.89$). Similarly, Caucasian participants performed more accurately at judging positive valence eyes items than Asian participants ($p < 0.001$), but were non-significantly different than people of other ethnicities (($p = 0.98$). Caucasian participants were more accurate at identifying neutral valence eyes items than Asian participants ($p < 0.01$), but were non-significantly different than people of other ethnicities ($p = 1.00$). Participants of other ethnicities were more accurate at identifying eyes items than Asian participants ($p = 0.01$). Participants of other ethnicities were more accurate than Asian participants at identifying positive valence eyes items, $p = 0.003$. Participants of other ethnicities non-significantly different from Asian participants at identifying neutral valence eyes items, ($p = 0.08$).

The sample's demographic and clinical characteristics are stratified by Cyberball exclusionary status and presented in Table 2. Potential differences in the demographic features of included and excluded participants were examined using a series of independent samples t-tests for continuous measures, and chi-square tests for categorical measures. Results revealed no significant group differences on age, ethnicity, or BDI-II scores (all *p*s > 0.05).

Table 2

Exclusion Condition Sample Characteristics

	Included (n = 145)	Excluded (n = 154)
Age *M* (*SD*)	19.79 (1.83)	19.43 (1.60)
Ethnicity		
White *n* (%)	73 (0.50)	93 (60.40)
Asian *n* (%)	46 (31.90)	38 (24.70)
Other *n* (%)	26 (10.40)	21 (7.80)
BDI-II *M* (*SD*)	17.53 (11.47)	16.30 (11.16)
Eyes accuracy *M* (*SD*)	0.69 (0.11)	0.67 (0.12)
Positive valence accuracy *M* (*SD*)	0.66 (0.20)	0.62 (0.20)
Neutral valence accuracy *M* (*SD*)	0.68 (0.15)	0.67 (0.16)
Negative valence accuracy *M* (*SD*)	0.73 (0.13)	0.70 (0.17)

Table 2. Descriptive statistics and characteristics of included and excluded participants

The results of the three manipulation checks indicated that Cyberball successfully induced the experience of ostracism, and individuals were attentive during the game. Participants in the excluded group (M = 4.37, SD = 0.89) felt significantly more excluded than the included group (M = 1.76, SD = 0.93), $t(293) = 24.53$, $p < 0.001$. Further, the excluded group (M = 4.37, SD = 0.86) reported feeling significantly more ignored than the included group (M = 1.82, SD = 1.00), $t(297) = 23.673$, $p < 0.001$. Finally, excluded individuals estimated receiving the ball during the Cyberball game significantly less (M = 6.83%, SD = 3.55%) than included participants (M = 30.45%, SD = 8.91%), $t(184) = -29.54$, $p < 0.001$.

Accuracy Analyses

A series of four one-way Analyses of Covariance (ANCOVAs) were conducted to examine the relation of exclusionary status to Eyes Task accuracy for total accuracy and accuracy on stimuli with a positive, negative, or neutral valence. In all analyses accuracy on the Animals task and median reaction time on the Eyes task were entered as covariates. As well, ethnicity was entered as a covariate in the ANCOVA models for overall eyes task accuracy, positive valence eyes items, and neutral valence items.

The relation of exclusionary status with total accuracy in the first ANCOVA model was non-significant, $F(1, 295) = 2.75$, $MSE = 0.03$, $p = 0.10$, partial $\eta^2 = 0.01$. Ostracism condition was significantly related to positive Eyes item performance, $F(1, 295) = 3.98$, $MSE = 0.139$, $p < 0.05$, partial $\eta^2 = 0.01$. Marginal means indicated that the excluded group (M = 0.66, SD = 0.19) was more accurate at judging the positive valence eyes items than the included group (M = 0.62, SD = 0.20). Ostracism condition was non-significantly related to performance on neutral-valence eyes task items, $F(1, 295) = 0.05$, $MSE = 0.01$, $p = 0.82$, partial $\eta^2 < 0.001$. Exclusionary

status was non-significantly related to negative Eyes accuracy, $F(1, 295) = 2.71$, $MSE = 0.06$, $p = 0.10$, partial $\eta^2 = 0.01$.

Discussion

The present study examined the effect of ostracism on ToM decoding accuracy. The literature offers two competing hypotheses; either being ostracized will increase ToM accuracy through motivation to regain social acceptance, or it will decrease ToM accuracy by making internal states more salient and monopolizing cognitive resources. Results support the hypothesis that ostracism increases motivation for social interaction. Rejected participants were more accurate at identifying positive-valence internal states than included participants. Thus rejected participants devoted more cognitive resources to interpreting social cues which might help to identify opportunities for interaction. Harkness, Jacobson, Sinclair, Chan, and Sabbagh (2012) suggest that among people with dysphoria, social motivation can improve performance on the Eyes task. In the present study, motivation to experience positive social interactions after being rejected might have caused participants to exert more effort at attending to, identifying, and decoding positive internal states. Increasing effort at identifying positive internal states in others might be an adaptive response to rejection as previous work suggests social support might buffer the negative effects of rejection (Teng & Chen, 2012).

A logical extension of the present research would involve examining whether ostracism might increase performance in social situations through an increase in ToM decoding performance. It is, however, important to remember that ToM decoding is one of many social tools available for individuals and that increases in accuracy will not necessarily directly translate to social action. One could understand the internal state of another without acting on the knowledge. One must be motivated to interact with others, and situational characteristics which make social needs salient might increase the likeliness one will feel motivated to act. Further one must have social self-efficacy to believe that reaching out socially will result in the desired

interaction. The salience of motivation, that is the (Harkness et al. 2012). So ToM decoding is one tool available to individuals which might increase belief in the efficacy of one's ability to initiate a successful interaction through helping a person to identify potential conversational partners.

The motivation-efficacy framework might be applied to situations featuring ostracism. When one is rejected social needs become salient motivating increasing cognitive resources devoted to interpreting positive internal states in others. Attempting to interact with a person already showing positive internal states offers the greatest chance for successful interaction, so one's efforts are best directed toward people displaying positive internal states. The pattern of results in the present study represents a maximally adaptive response to ostracism and might increase chances at gaining social support. In the present study, ostracized participants did not show a change in accuracy at identifying internal states of either neutral or negative valence. Motivation to regain acceptance through the most efficient route would make neutral, or negative state recognition less important than recognizing positive internal states.

The difference in performance on positive internal state decoding between the two groups was rather small; after controlling for task demands, the trade-off between speed and accuracy of answers, and ethnicity, exclusion status accounted for approximately one percent of accuracy. To an extent, the small effect size might be adaptive; an extreme jump in ToM decoding might reduce the cognitive resources available for other components of social interaction such as ToM reasoning. Again, ToM decoding is one social tool available to an individual and cognitive resources might be necessary for other activities such as ToM reasoning or planning social actions. Indeed, Harkness has suggested positively biased, but less accurate mental state decoding might be adaptive for social functioning (Harkness et al., 2010). Further, the small

effect size might be explained in part due to the nature of the ostracism manipulation used in the present study. A manipulation check embedded in the need threat questionnaire indicated that people who were rejected during Cyberball felt significantly more ignored, more excluded, and estimated that they received the ball a significantly smaller proportion of the time, however real-world ostracism might be more personally salient motivating greater increases in accuracy at identifying positive internal states. Future research could examine the effect of exclusion on ToM reasoning as well as decoding and behavioural measures of interaction-seeking. Including multiple social-cognitive variables might help to identify the relative importance of various social-cognitive processes in regaining acceptance. Further research might also vary the salience of the social rejection using in-person rejection manipulations.

People of different ethnicities showed distinct patterns of performance on the Eyes task. Tests indicated that Caucasian participants, and participants of other ethnicities, performed significantly more accurately than Asian participants. A study conducted in France found that Asian participants performed worse on the task than did people of other ethnicities, suggesting that individuals from Asian cultures do not rely on ToM (Prevost et al., 2014). Alternatively, Soto and Levenson (2009) found that Asian people more accurately identified emotions of Asian targets, but performed more poorly at identifying emotions of Caucasian targets leading the researchers to argue differences in performance are due to physiological similarity with stimuli. Indeed, on review the items in the Eyes task over-represent Caucasian faces; of the thirty six items in the task only three appear to be of Asian descent. The effect of physiological dissimilarity might have reduced the accuracy of Asian participants on the eyes task.

The homogeneous sample of university-aged females limits the generalizability of the present study. Recall that the all-female sample of the present study was selected to account for

differential accuracy between sexes on the Eyes task (Kirkland, Peterson, Baker, Miller & Pulos, 2013); therefore, using general population samples in future research would help to generalize findings to the overall Canadian population. Using a female sample in the present study helped to account for gender differences in reactions to ostracism and in ToM decoding accuracy. Males have shown decreased social interaction following rejection (Williams & Sommer, 1997) so using a male sample to examine ostracism might result in less accurate ToM decoding performance. Findings suggest that rejection improves ToM decoding of positive emotional states among young adult females. Such a positive attentional bias might be instrumental in regaining social acceptance and the personal benefits that affiliation provides. Future research should examine the effects that ostracism has, and the interactive effects of social motivation, salience, social-efficacy, and the roles that ToM reasoning and decoding play in influencing situations where a person might initiate interactions. The relative importance of each variable might be better understood through multivariate analysis. Social ostracism research might help to increase understanding of the effects which contribute to and maintain social exclusion and support, both of which have implications for personal well-being.

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Appendix

Figure 1.

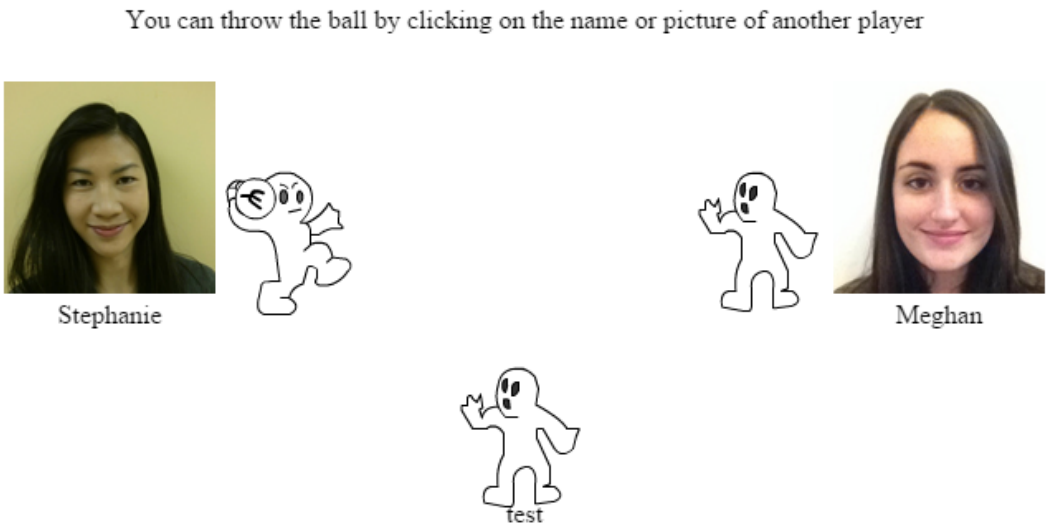

Figure 1. Screen shot of Cyberball gameplay with "test" as participant name. Note images on computer screen are presented in colour.

Figure 2

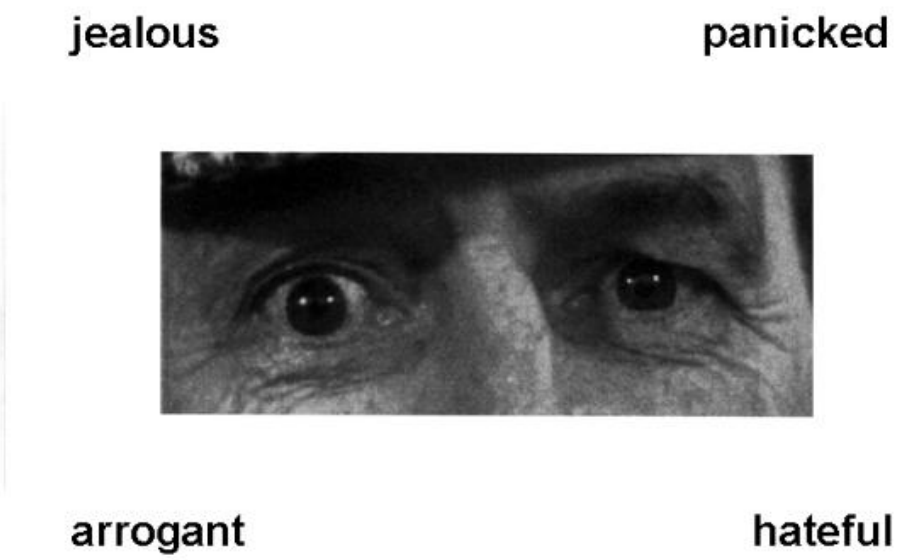

Figure 2. Example item from Reading the Mind in the Eyes Task Revised.

Figure 3

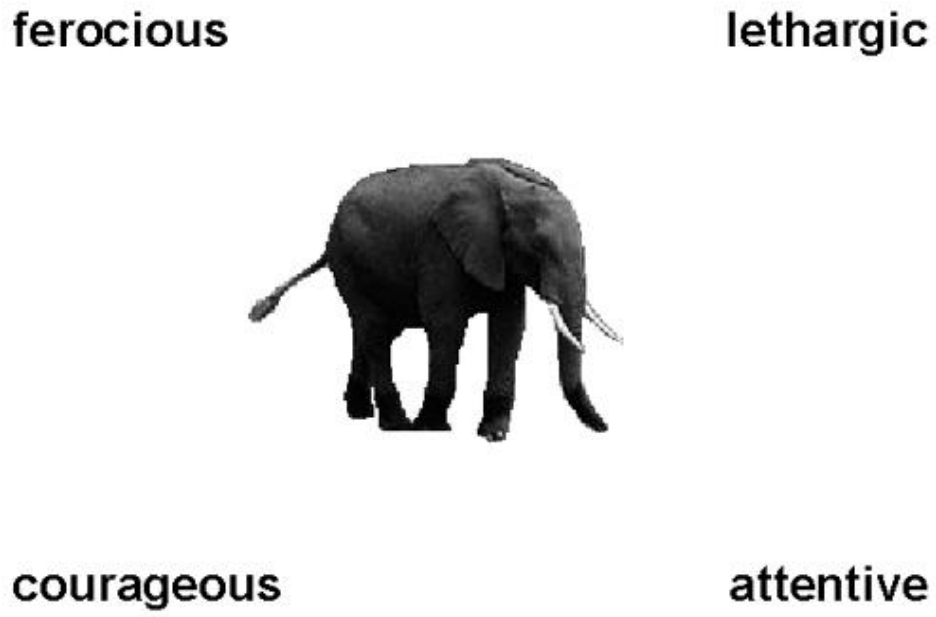

Figure 3. Example item from Animals Task.