

When a look is not enough – No evidence for direct gaze facilitating recovery after ostracism**Supplementary materials**

Aleksi Syrjämäki, Pessi Lyyra, Mikko J. Peltola Jari K. Hietanen

University of Tampere

In two experiments, we found that direct gaze did not moderate recovery of basic needs after ostracism. In both experiments, we also collected other data besides basic need measurements. To increase convergent validity for our main research question, we collected self-assessments of positive mood, negative mood, and social pain in both recovery stages. We also administered a self-awareness questionnaire in both experiments. In addition, in Experiment 1, we measured personality traits and trait self-esteem to find if they would moderate the outcomes of ostracism. In Experiment 2, we asked participants to evaluate characteristics of the model posing in the eye gaze videos, and also assessed participants' suspicion of the cover story. While these measurements were not essential for our main research question, we would like to report them nevertheless, because they could potentially prove valuable for future research (see Cumming, 2014).

Mood and social pain

In both Experiment 1 and Experiment 2, we measured positive mood, negative mood, and social pain, in addition to basic need satisfaction. Data from these measurements were analyzed using the same analytic strategy as was used for basic need satisfaction measurements. Cronbach's alpha coefficients for mood scales are displayed in Table 1.

TABLE 1. Cronbach's alpha coefficients for positive mood and negative mood scales in the reflexive and the reflective stage in Experiments 1 and 2.

Condition	Experiment 1	Experiment 2
Positive mood		
Reflexive stage	.89	.91
Reflective stage	.83	.78
Negative mood		
Reflexive stage	.79	.84
Reflective stage	.77	.67

Experiment 1

Positive mood. For positive mood scores in each experimental group in Experiment 1, see Table 2. A three-way mixed design ANOVA revealed a main effect of Inclusionary Status on positive mood scores ($F(1, 72) = 13.47, p < .001, \eta^2_p = 0.16, 95\% \text{ CI } [0.24, 0.82]$). Excluded participants reported lower positive mood ($M = 2.89, SD = 0.63$) than included participants ($M = 3.42, SD = 0.65$). A main effect of Gaze Direction was also found ($F(1, 72) = 4.54, p = .04, \eta^2_p = 0.06, 95\% \text{ CI } [0.00, 0.62]$). Participants shown a video of a person with direct gaze reported higher positive mood ($M = 3.33, SD = 0.63$) than participants shown a video of a person looking down ($M = 3.02, SD = 0.72$). The main effect of Recovery Stage was not significant ($F(1, 72) = 1.10, p = .30, \eta^2_p = 0.02, 95\% \text{ CI } [-0.32, 0.18]$).

An Inclusionary Status \times Recovery Stage interaction was found ($F(1, 72) = 40.93, p < .001, \eta^2_p = 0.36$). In the reflexive stage, included participants reported more positive mood than excluded participants ($t(74) = 6.92, p < .001, d = 1.58, 95\% \text{ CI } [0.84, 1.52]$), suggesting that ostracism lowered positive mood. Excluded participants reported more positive mood in the reflective stage than in the reflexive stage ($t(35) = 6.44, p < .001, d = 1.06, 95\% \text{ CI } [-1.00, -0.52]$), indicating significant recovery. Included participants reported lower positive mood in the reflective stage, compared to the reflexive stage ($t(39) = 3.44, p = .001, d = 0.66, 95\% \text{ CI } [0.22, 0.86]$). In the reflective stage, excluded and included participants reported similar levels of positive mood (Welch's $t(68.9) = 0.67, p = .51, d = 0.15, 95\% \text{ CI } [-0.48, 0.24]$), suggesting that the positive mood of excluded participants had completely recovered by the reflective stage. No other interactions were found (highest F was for Inclusionary Status \times Gaze Direction interaction, $F(1, 72) = 0.06, p = .80, \eta^2_p = 0.00$). Most importantly, the Inclusionary Status \times Gaze Direction \times Recovery Stage interaction was not significant ($F(1, 72) = 0.04, p = .85, \eta^2_p = 0.00$). Excluded participants shown

direct vs. downward gaze videos reported similar levels of positive mood in the reflective stage

($t(34) = 1.41, p = .17, d = 0.18, 95\% \text{ CI} [-0.13, 0.71]$).

TABLE 2. Positive mood scores for each experimental group in both recovery stages (Experiment 1)

	Direct gaze <i>M (SD)</i>	Downward gaze <i>M (SD)</i>	Overall mean <i>M (SD)</i>
Reflexive stage			
Included	3.88 (0.57)	3.51 (0.76)	3.69 (0.69)
Excluded	2.64 (0.72)	2.39 (0.87)	2.51 (0.80)
Overall mean	3.29 (0.89)	2.98 (0.98)	3.13 (0.95)
Reflective stage			
Included	3.31 (0.92)	2.99 (0.94)	3.15 (0.93)
Excluded	3.42 (0.63)	3.13 (0.61)	3.27 (0.63)
Overall mean	3.36 (0.79)	3.05 (0.80)	3.21 (0.80)

Note: The measurements were made on a 1 (not at all) to 5 (extremely) scale

Negative mood. For negative mood scores in each experimental group in Experiment 1, see Table 3. A three-way mixed design ANOVA revealed a main effect of Inclusionary Status ($F(1, 72) = 19.32, p < .001, \eta^2_p = 0.21, 95\% \text{ CI} [-0.86, -0.31]$). Excluded participants reported more negative mood ($M = 2.20, SD = 0.64$) than included participants ($M = 1.62, SD = 0.56$). A main effect of Gaze Direction was also found ($F(1, 72) = 6.25, p = .02, \eta^2_p = 0.08, 95\% \text{ CI} [-0.63, -0.04]$). Participants in the direct gaze group reported less negative mood ($M = 1.73, SD = 0.65$) than participants in the downward gaze group ($M = 2.07, SD = 0.64$). The main effect of Recovery Stage was approaching statistical significance ($F(1, 72) = 3.64, p = .06, \eta^2_p = 0.05, 95\% \text{ CI} [-0.07, 0.39]$). The mean negative mood scores in the reflexive and the reflective stage were 1.98 ($SD = 0.87$) and 1.82 ($SD = 0.79$), respectively.

An Inclusionary Status \times Recovery Stage interaction was found ($F(1, 72) = 32.07, p < .001, \eta^2_p = 0.31$). In the reflexive stage, excluded participants reported more negative mood than included participants (Welch's $t(58.7) = 7.34, p < .001, d = 1.71, 95\% \text{ CI} [-1.45, -0.83]$). In the reflective stage, compared to the reflexive stage, excluded participants reported decreased negative mood ($t(35) = 5.48, p < .001, d = 1.00, 95\% \text{ CI} [0.47, 1.02]$), while included participants reported increased negative mood ($t(39) = 2.65, p = .011, d = 0.52, 95\% \text{ CI} [-0.65, -0.09]$). In the reflective stage, the two groups reported similar levels of negative mood ($t(74) = 0.15, p = .88, d = 0.03, 95\% \text{ CI} [-0.39, 0.34]$), suggesting that the negative mood of excluded participants had recovered completely. No other interactions were found (highest F was for Inclusionary Status \times Gaze Direction \times Recovery Stage interaction, $F(1, 72) = 0.72, p = .40, \eta^2_p = 0.01$). Most importantly, excluded participants shown direct vs. downward gaze videos reported similar levels of negative mood in the reflective stage ($t(34) = 0.93, p = .36, d = 0.31, 95\% \text{ CI} [-0.71, 0.26]$).

TABLE 3. Negative mood scores for each experimental group in both recovery stages (Experiment 1)

	Direct gaze <i>M (SD)</i>	Downward gaze <i>M (SD)</i>	Overall mean <i>M (SD)</i>
Reflexive stage			
Included	1.30 (0.32)	1.58 (0.63)	1.44 (0.51)
Excluded	2.43 (0.86)	2.72 (0.72)	2.58 (0.79)
Overall mean	1.84 (0.85)	2.12 (0.88)	1.98 (0.87)
Reflective stage			
Included	1.54 (0.79)	2.08 (0.87)	1.81 (0.86)
Excluded	1.72 (0.69)	1.94 (0.74)	1.83 (0.71)
Overall mean	1.63 (0.74)	2.01 (0.80)	1.82 (0.79)

Note: The measurements were made on a 1 (not at all) to 5 (extremely) scale

Social pain. For pain scores in each experimental group in Experiment 1, see Table 4. A three-way mixed design ANOVA found no significant main effects on social pain scores (highest F was for Inclusionary Status, $F(1, 72) = 2.49, p = .12, \eta^2_p = 0.03, 95\% \text{ CI} [-11.78, 1.47]$).

An Inclusionary Status \times Recovery Stage interaction was found ($F(1, 72) = 11.62, p = .001, \eta^2_p = 0.14$). In the reflexive stage, excluded participants reported more pain than included participants (Welch's $t(41.6) = 2.95, p = .005, d = 0.75, 95\% \text{ CI} [-19.03, -3.55]$). In the reflective stage, compared to the reflexive stage, excluded participants reported less pain ($t(35) = 2.66, p = .012, d = 0.39, 95\% \text{ CI} [1.71, 12.79]$), while included participants reported more pain ($t(39) = 2.11, p = .041, d = 0.45, 95\% \text{ CI} [-9.85, -0.21]$). In the reflective stage, excluded and included participants reported similar levels of pain ($t(74) = 0.26, p = .79, d = 0.06, 95\% \text{ CI} [-6.49, 8.45]$). This suggests that the pain caused by ostracism had alleviated by the reflective stage. No other interactions were found (highest F was for Gaze Direction \times Recovery Stage interaction, $F(1, 72) = 1.99, p = .16, \eta^2_p = 0.03$). Most importantly, the Inclusionary Status \times Gaze Direction \times Recovery Stage interaction was not significant ($F(1, 72) = 0.19, p = .66, \eta^2_p = 0.00$). Excluded participants shown direct vs. downward gaze videos reported similar levels of pain in the reflective stage ($t(34) = 1.12, p = .27, d = 0.37, 95\% \text{ CI} [-15.37, 4.48]$).

TABLE 4. Pain scores for each experimental group in both recovery stages (Experiment 1)

	Direct gaze <i>M (SD)</i>	Downward gaze <i>M (SD)</i>	Overall mean <i>M (SD)</i>
Reflexive stage			
Included	5.20 (6.29)	4.05 (8.00)	3.63 (7.13)
Excluded	14.94 (22.37)	16.89 (22.19)	15.92 (21.98)
Overall mean	9.82 (16.57)	10.13 (17.36)	9.97 (16.86)
Reflective stage			
Included	6.90 (15.81)	12.40 (19.31)	9.65 (17.64)
Excluded	5.94 (11.04)	11.39 (17.53)	8.67 (14.70)
Overall mean	6.45 (13.59)	11.92 (18.25)	9.18 (16.21)

Note: The scale is from 0 to 100

Experiment 2

Positive mood. For positive mood scores in each experimental group in Experiment 2, see Table 5. A three-way mixed design ANOVA revealed a main effect of Inclusionary Status on positive mood ($F(1, 77) = 58.35, p < .001, \eta^2_p = 0.43, 95\% \text{ CI } [0.74, 1.26]$). Included participants reported more positive mood ($M = 3.89, SD = 0.60$) than excluded participants ($M = 2.89, SD = 0.59$). A main effect of Recovery Stage was also found ($F(1, 77) = 48.51, p < .001, \eta^2_p = 0.39, 95\% \text{ CI } [-0.84, -0.43]$). Participants reported more positive mood in the reflective stage ($M = 3.68, SD = 0.66$) than in the reflexive stage ($M = 3.04, SD = 1.09$). No main effect of Gaze Direction was found ($F(1, 77) = 1.40, p = .24, \eta^2_p = 0.02, 95\% \text{ CI } [-0.16, 0.52]$).

The main effects were qualified by an Inclusionary Status \times Recovery Stage interaction ($F(1, 77) = 40.14, p < .001, \eta^2_p = 0.34$). Excluded participants reported less positive mood than included participants in the reflexive stage ($t(79) = 8.96, p < .001, d = 2.01, 95\% \text{ CI } [1.20, 1.88]$). In the reflective stage, compared to the reflexive stage, excluded participants reported more positive mood ($t(42) = 8.76, p < .001, d = 1.59, 95\% \text{ CI } [-1.41, -0.88]$). Included participants reported similar levels of positive mood in the reflexive and the reflective stage ($t(37) = .57, p = .58, d = 0.09, 95\% \text{ CI } [-0.27, 0.15]$). In the reflective stage, excluded participants still reported lower positive mood than included participants ($t(79) = 3.27, p = .002, d = 0.71, 95\% \text{ CI } [0.18, 0.73]$). This interaction shows that excluded participants showed some, but not complete recovery of positive mood by the reflective stage. The Inclusionary Status \times Gaze Direction interaction was approaching statistical significance ($F(1, 77) = 3.26, p = .075, \eta^2_p = 0.04$). T-tests show that included participants shown a video with direct gaze reported more positive mood ($M = 4.08, SD = 0.57$) than included participants shown a video with downward gaze ($M = 3.69, SD = 0.57; t(36) = 2.09, p = .044, d = 0.68, 95\% \text{ CI } [0.12, 0.76]$). Excluded participants shown a video with direct gaze reported similar levels of positive mood ($M = 2.85, SD = 0.66$) to excluded participants shown a

video with downward gaze ($M = 2.93$, $SD = 0.52$; $t(41) = .45$, $p = .66$, $d = 0.13$, 95% CI [-0.44, 0.28]). Included participants shown a video with direct gaze reported more positive mood than excluded participants shown a video with direct gaze ($t(39) = 6.34$, $p < .001$, $d = 1.99$, 95% CI [0.83, 1.61]). Similarly, included participants shown a video with downward gaze reported more positive mood than excluded participants shown a video with downward gaze ($t(38) = 4.39$, $p < .001$, $d = 1.39$, 95% CI [0.41, 1.10]). No other interactions were found (highest F was for Inclusionary Status \times Gaze Direction \times Recovery Stage interaction, $F(1, 77) = 0.60$, $p = .44$, $\eta^2_p = 0.01$). Most importantly, excluded participants shown direct vs. downward gaze videos reported similar levels of positive mood in the reflective stage (Welch's $t(31.6) = 0.60$, $p = 0.56$, $d = 0.18$, 95% CI [-0.52, 0.29]).

TABLE 5. Positive mood scores for each experimental group in both recovery stages (Experiment 2)

	Direct gaze <i>M (SD)</i>	Downward gaze <i>M (SD)</i>	Overall mean <i>M (SD)</i>
Reflexive stage			
Included	4.00 (0.71)	3.71 (0.75)	3.86 (0.73)
Excluded	2.30 (0.79)	2.34 (0.84)	2.32 (0.80)
Overall mean	3.13 (1.14)	2.96 (1.05)	3.04 (1.09)
Reflective stage			
Included	4.15 (0.51)	3.67 (0.64)	3.92 (0.62)
Excluded	3.40 (0.79)	3.52 (0.46)	3.47 (0.64)
Overall mean	3.77 (0.76)	3.59 (0.54)	3.68 (0.66)

Note: The measurements were made on a 1 (not at all) to 5 (extremely) scale

Negative mood. For negative mood scores in each experimental group in Experiment 2, see Table 6. A three-way mixed design ANOVA revealed a main effect of Inclusionary Status on negative mood ($F(1, 77) = 31.19, p < .001, \eta^2_p = 0.29, 95\% \text{ CI } [0.90, 0.43]$). Included participants reported less negative mood ($M = 1.36, SD = 0.42$) than excluded participants ($M = 2.02, SD = 0.61$). A main effect of Recovery Stage was also found ($F(1, 77) = 44.61, p < .001, \eta^2_p = 0.37, 95\% \text{ CI } [0.38, 0.74]$). Participants reported more negative mood in the reflexive stage ($M = 1.99, SD = 0.94$) than in the reflective stage ($M = 1.42, SD = 0.48$). There was no main effect of Gaze Direction ($F(1, 77) = 1.71, p = .20, \eta^2_p = 0.02, 95\% \text{ CI } [-0.44, 0.11]$).

The main effects were qualified by a Recovery Stage \times Inclusionary Status interaction ($F(1, 77) = 27.26, p < .001, \eta^2_p = 0.26$). Excluded participants reported more negative mood in the reflexive stage than included participants (Welch's $t(75.7) = 6.39, p < .001, d = 1.41, 95\% \text{ CI } [-1.42, -0.74]$). Excluded participants reported less negative mood in the reflective stage than in the reflexive stage ($t(42) = 8.00, p < .001, d = 1.30, 95\% \text{ CI } [0.71, 1.19]$). Included participants reported similar levels of negative mood in the reflexive and the reflective stage ($t(37) = 1.18, p = .24, d = 0.21, 95\% \text{ CI } [-0.08, 0.32]$). In the reflective stage, excluded participants still reported more negative mood than included participants (Welch's $t(77.0) = 2.47, p = .016, d = 0.54, 95\% \text{ CI } [-0.45, -0.05]$). This interaction shows that negative mood of excluded participants decreased by the reflective stage, but they did not recover completely. No other interactions were found (highest F was for Inclusionary Status \times Gaze Direction interaction, $F(1, 77) = 1.87, p = .18, \eta^2_p = 0.02$). Most importantly, the Inclusionary Status \times Gaze Direction \times Recovery Stage interaction was not significant ($F(1, 77) = 0.31, p = .58, \eta^2_p = 0.00$). Excluded participants shown direct vs. downward gaze videos reported similar levels of negative mood in the reflective stage ($t(41) = 0.30, p = .76, d = 0.09, 95\% \text{ CI } [-0.28, 0.37]$).

TABLE 6. Negative mood scores for each experimental group in both recovery stages (Experiment 2)

	Direct gaze <i>M (SD)</i>	Downward gaze <i>M (SD)</i>	Overall mean <i>M (SD)</i>
Reflexive stage			
Included	1.29 (0.62)	1.56 (0.62)	1.41 (0.63)
Excluded	2.48 (0.90)	2.51 (0.89)	2.49 (0.88)
Overall mean	1.90 (0.97)	2.08 (0.91)	1.99 (0.94)
Reflective stage			
Included	1.13 (0.21)	1.49 (0.46)	1.30 (0.39)
Excluded	1.57 (0.60)	1.52 (0.45)	1.55 (0.52)
Overall mean	1.35 (0.50)	1.51 (0.45)	1.43 (0.48)

Note: The measurements were made on a 1 (not at all) to 5 (extremely) scale

Social pain. For pain scores in each experimental group in Experiment 2, see Table 7. A three-way mixed design ANOVA revealed a main effect of Inclusionary Status on reported level of pain ($F(1, 77) = 16.37, p < .001, \eta^2_p = 0.18, 95\% \text{ CI} [-18.97, -6.91]$). Included participants reported less pain ($M = 3.89, SD = 7.20$) than excluded participants ($M = 16.84, SD = 18.19$). A main effect of Recovery Stage was also significant ($F(1, 77) = 17.04, p < .001, \eta^2_p = 0.18, 95\% \text{ CI} [4.26, 12.97]$). Participants reported more pain in the reflexive stage ($M = 15.07, SD = 23.47$) than in the reflective stage ($M = 6.46, SD = 11.10$). No main effect of Gaze Direction was found ($F(1, 77) = 0.02, p = .89, \eta^2_p = 0.00, 95\% \text{ CI} [-7.80, 5.98]$).

The main effects were qualified by a Recovery Stage \times Inclusionary Status interaction ($F(1, 77) = 25.98, p < .001, \eta^2_p = 0.25$). Excluded participants reported more pain than included participants in the reflexive stage (Welch's $t(49.2) = 5.23, p < .001, d = 1.13, 95\% \text{ CI} [-31.89, -13.60]$). Excluded participants reported less pain in the reflective stage than in the reflexive stage ($t(42) = 5.36, p < .001, d = 0.84, 95\% \text{ CI} [11.11, 24.52]$). Included participants reported similar levels of pain in the reflexive stage and in the reflective stage ($t(37) = 1.17, p = .25, d = 0.21, 95\% \text{ CI} [-4.89, 1.31]$). In the reflective stage, included and excluded participants reported similar levels of pain ($t(79) = 1.28, p = .21, d = 0.29, 95\% \text{ CI} [-8.04, 1.76]$), indicating that the pain caused by ostracism had completely alleviated by the reflective stage. No other interactions were found (highest F was for Recovery Stage \times Gaze Direction interaction, $F(1, 77) = 0.25, p = .62, \eta^2_p = 0.00$). Most importantly, the Inclusionary Status \times Gaze Direction \times Recovery Stage interaction was not significant ($F(1, 77) = 0.10, p = .76, \eta^2_p = 0.00$). Excluded participants shown direct vs. downward gaze videos reported similar levels of pain in the reflective stage ($t(41) = 0.14, p = .89, d = 0.04, 95\% \text{ CI} [-8.16, 7.13]$).

TABLE 7. Pain scores for each experimental group in both recovery stages (Experiment 2)

	Direct gaze <i>M (SD)</i>	Downward gaze <i>M (SD)</i>	Overall mean <i>M (SD)</i>
Reflexive stage			
Included	3.40 (9.75)	2.56 (4.41)	3.00 (7.61)
Excluded	25.86 (27.71)	25.64 (27.70)	25.74 (27.37)
Overall mean	14.90 (23.63)	15.25 (27.70)	15.07 (23.47)
Reflective stage			
Included	3.70 (5.33)	6.00 (12.69)	4.79 (9.50)
Excluded	7.67 (13.12)	8.18 (11.69)	7.93 (12.26)
Overall mean	5.73 (10.20)	7.20 (12.03)	6.46 (11.10)

Note: The scale is from 0 to 100

Summary of results from mood and pain measurements

In sum, mood and social pain measurements offered mostly convergent results with the basic need measurements. Most importantly, on none of these scales, direct gaze was found to moderate recovery in excluded participants. Interestingly, in both experiments, direct gaze was found to be associated with higher positive mood (in Experiment 2 only among included participants). However, this was observed when analyzing positive mood scores in both the reflexive and the reflective stage. In the reflexive stage, participants had not seen the eye gaze video, and thus any differences between direct and downward gaze groups, in the reflexive stage, must be due to random variation. In Experiment 1, they could also be due to an observer-expectancy effect (experimenter unintentionally treating participants in different conditions differently), because the experimenter was not blind to the conditions of the participants. An important finding was that in Experiment 2, excluded participants did not report more social pain than included participants in the reflective stage, even though they reported lower mood and basic need satisfaction. This suggests that social pain recovered faster than mood and basic needs. According to the model of ostracism suggested by Williams (e.g. 2007), social pain is a reflexive reaction to ostracism, and thus would not be predicted to occur in the reflective stage.

Situational self-awareness

Previous research has shown that rejection lowers self-awareness (Hess & Pickett, 2010; Twenge, Catanese, & Baumeister, 2003), and that eye contact enhances self-awareness (see Conty, George, & Hietanen, 2016). To expand upon this research, we measured participants' self-awareness in both experiments. After the reflective stage measurements, participants filled Situational Self-Awareness Scale (SSAS; Govern & Marsch, 2001), a 9-item scale measuring private (e.g. "Right now, I am

conscious of my inner feelings”) and public self-awareness (e.g. “Right now I am self-conscious about the way I look”), as well as awareness of one’s surroundings (e.g. “Right now, I am keenly aware of everything in my environment”). While participants were filling the questionnaire, they were shown a video of the same model who was posing in the eye gaze videos, maintaining the same gaze direction as in the manipulation. The video was shown in the upper part of the screen, in a resolution of 640×480 . The questionnaire items were presented in the lower part of the screen. The video was shown for 15 seconds before presenting the first item, and kept playing as long as it took for the participant to complete the questionnaire. No a priori hypotheses were set because this research was exploratory.

In Experiment 1, SSAS data was not received from two participants (one female) due to computer error. See Table 8 for means and standard deviations of self-awareness scores in both experiments. The self-awareness scores were subjected to 2 (Inclusionary Status: included/excluded) \times 2 (Gaze Direction: direct/downward) between-subjects ANOVAs. For results of these analyses, see Table 9.

TABLE 8. Mean scores and standard deviations for private self-awareness, public self-awareness and awareness of surroundings on Situational Self-Awareness Scale in Experiments 1 and 2, as a function of Inclusionary Status and Gaze Direction

Condition	Experiment 1			Experiment 2		
	Direct gaze	Downward gaze	Overall mean	Direct gaze	Downward gaze	Overall mean
Private						
Included	10.0 (3.5)	12.4 (3.4)	11.2 (3.6)	14.5 (3.8)	14.1 (4.4)	14.3 (4.1)
Excluded	12.4 (4.1)	13.1 (3.5)	12.7 (3.8)	13.2 (3.8)	13.6 (2.6)	13.4 (3.2)
Overall mean	11.1 (3.9)	12.7 (3.4)	12.0 (3.7)	13.9 (3.8)	13.8 (3.5)	13.8 (3.6)
Public						
Included	8.7 (4.9)	7.9 (3.2)	8.3 (4.1)	6.2 (2.9)	8.6 (4.3)	7.3 (3.8)
Excluded	6.5 (3.0)	9.6 (4.9)	8.1 (4.3)	9.1 (4.4)	8.7 (4.1)	8.9 (4.2)
Overall mean	7.6 (4.2)	8.7 (4.2)	8.2 (4.2)	7.6 (4.0)	8.7 (4.1)	8.2 (4.0)
Surroundings						
Included	10.7 (4.0)	9.4 (3.9)	10.0 (4.0)	12.6 (4.4)	8.6 (3.4)	10.7 (4.4)
Excluded	10.1 (4.1)	9.9 (3.5)	10.0 (3.8)	11.1 (3.9)	9.9 (3.5)	10.4 (3.7)
Overall mean	10.4 (4.0)	9.6 (3.7)	10.0 (3.9)	11.8 (4.2)	9.3 (3.5)	10.5 (4.0)

TABLE 9. Statistics for ANOVAs comparing mean self-awareness scores between groups

Experiment 1	$F(1, 70)$	p	η^2_p	95% CI
Private				
IS	3.33	.07	.05	[-3.22, 0.19]
GD	3.28	.08	.05	[-3.27, 0.13]
IS \times GD	1.09	.30	.02	
Public				
IS	0.06	.81	.00	[-1.79, 2.13]
GD	1.44	.23	.02	[-2.99, 0.90]
IS \times GD	4.29	.04	.06	
Surroundings				
IS	0.01	.94	.00	[-1.75, 1.86]
GD	0.73	.39	.01	[-0.98, 2.60]
IS \times GD	0.45	.51	.01	
Experiment 2	$F(1, 77)$	p	η^2_p	95% CI
Private				
IS	1.17	.28	.02	[-0.72, 2.50]
GD	0.01	.93	.00	[-1.54, 1.70]
IS \times GD	0.21	.65	.00	
Public				
IS	2.94	.09	.04	[-3.34, 0.20]
GD	1.48	.23	.02	[-2.82, 0.74]
IS \times GD	2.50	.12	.03	
Surroundings				
IS	0.01	.91	.00	[-1.57, 2.01]
GD	9.27	.003	.11	[0.81, 4.20]
IS \times GD	2.73	.10	.03	

Note: Independent variables are Inclusionary Status (IS) and Gaze Direction (GD). Dependent variables are scores for private self-awareness, public self-awareness, and awareness of surroundings, measured with Situational Self-Awareness Scale

The only statistically significant interaction was on public self-awareness in Experiment 1. Pairwise comparisons revealed that excluded participants shown the downward gaze video reported higher public self-awareness than excluded participants shown the direct gaze video (Welch's $t(28.0) = 2.29, p = .03, d = 0.77, 95\% \text{ CI} [-5.95, -0.34]$). No other differences were found (all $ps > .1$).

We are hesitant to interpret these results. No a priori hypotheses were set, and results were not consistent between the two experiments. The observed effects could be due to Type I error. More research is needed to understand how ostracism influences self-awareness.

Personality and self-esteem (Experiment 1)

Previous research has examined how personality and other individual traits moderate the effects of ostracism (see Hartgerink et al., 2015). To contribute to this research, we measured participants' personality and trait self-esteem in Experiment 1. After debriefing, participants filled Short Five (Konstabel, Lönnqvist, Walkowitz, Konstabel, & Verkasalo, 2012), a 60-item questionnaire based on the Big Five model of personality, and Rosenberg Self-Esteem Scale (Rosenberg, 1965). We used an analytic strategy similar to previous studies (McDonald & Donnellan, 2012; Wirth, Lynam, & Williams, 2010). Regression analyses were conducted separately for basic need, pain, and mood measurements in the reflexive stage. All analyses investigated Inclusionary Status (inclusion = 0, exclusion = 1), a centered personality variable, and an interaction between the two. See Table 10 for results of these analyses. When a significant interaction was found, we conducted simple regression analyses for included and excluded participants separately, using the centered personality variable as the independent variable.

TABLE 10. Statistics for the regression analyses

	Basic needs			Positive mood			Negative mood			Pain		
	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i>	<i>t</i>	<i>p</i>	<i>b</i>	<i>t</i>	<i>p</i>
Openness												
IS	-.80	11.1	<.001	-.63	6.8	<.001	.66	7.3	<.001	.34	3.1	.003
O	-.03	0.3	.80	-.02	0.2	.86	-.02	0.1	.91	.04	2.6	.80
IS × O	.04	0.4	.73	-.01	0.1	.94	.03	0.2	.81	-.01	0.1	.95
Conscientiousness												
IS	-.81	11.4	<.001	-.63	6.8	<.001	.65	7.3	<.001	.34	3.0	.004
C	-.10	1.0	.30	.05	0.4	.68	-.00	0.0	.99	.00	0.0	.99
IS × C	-.02	0.2	.87	-.02	0.2	.86	.04	0.3	.75	-.01	0.1	.93
Extraversion												
IS	-.78	10.9	<.001	-.60	6.5	<.001	.63	7.0	<.001	.38	3.4	<.001
E	.18	1.9	.07	.21	1.7	.10	-.13	1.0	.30	.08	0.5	.61
IS × E	-.13	1.3	.19	.13	1.1	.29	.01	0.1	.91	.12	0.8	.44
Agreeableness												
IS	-.80	11.3	<.001	-.63	6.9	<.001	.66	7.5	<.001	.33	3.0	.004
A	.13	1.3	.20	.16	1.2	.22	-.12	0.9	.36	-.02	0.1	.89
IS × A	-.11	1.2	.25	-.12	1.0	.33	.04	0.4	.72	.08	0.5	.60
Neuroticism												
IS	-.78	11.2	<.001	-.61	6.7	<.001	.64	7.3	<.001	.33	3.0	.004
N	-.14	1.6	.11	-.15	1.3	.19	.13	1.2	.25	.00	0.0	.98
IS × N	-.01	0.1	.95	.01	0.1	.92	.05	0.4	.66	.03	0.2	.81
Self-esteem												
IS	-.80	11.4	<.001	-.62	6.9	<.001	.66	7.5	<.001	.35	3.3	.002
SE	.11	1.4	.17	.06	0.6	.58	-.11	1.1	.30	.02	0.1	.90
IS × SE	-.05	0.6	.52	-.13	1.2	.22	.16	1.5	.13	-.31	2.5	.01

Note: The analyses investigated Inclusionary Status (IS; inclusion = 0, exclusion = 1), centered personality variable (O = openness, C = conscientiousness, E = extraversion, A = agreeableness, N = neuroticism, SE = self-esteem), and an interaction between the two. Standardized regression coefficients are reported

An Inclusionary Status \times Self-Esteem interaction on social pain was found. Higher self-esteem was associated with lower social pain in the exclusion group ($b = -.34, t = 2.08, p = 0.045$), but not in the inclusion group ($b = .05, t = 0.28, p = .78$). These results are consistent with previous research that has found that trait self-esteem moderates the effect of ostracism on social pain (Onoda et al., 2010), but not on basic needs (McDonald & Donnellan, 2012). In total, our results are mostly consistent with Williams's (2007) prediction that personality has little, if any, influence on the reflexive reaction to ostracism. However, it is worth noting that our experiment likely lacked statistical power to detect potential moderators. Therefore, these results should be interpreted with caution, but they could possibly prove valuable for future meta-analyses.

Evaluation of the model (Experiment 2)

In Experiment 2, after the Situational Self-Awareness Scale, participants were asked to rate the model. Participants were asked to rate on a 1-5 scale how friendly, approachable, threatening, attractive, happy, inspiring, angry, dominating, trustworthy, scary, fluent in speech, convincing, and understandable the model was. For means and standard deviations of these ratings, see Table 11. These scores were subjected to 2 (Inclusionary Status: included/excluded) \times 2 (Gaze Direction: direct/downward) between-subjects ANOVAs. Significant interactions were broken down with *t*-tests. For the sake of brevity, we only present statistically significant main effects and interactions ($p < .05$).

TABLE 11. Means and standard deviations of scores of ratings of the models in Experiment 2

	Included, direct <i>n</i> = 20	Included, down <i>n</i> = 18	Excluded, direct <i>n</i> = 21	Excluded, down <i>n</i> = 22
Friendly	4.00 (0.97)	3.44 (0.92)	3.38 (0.87)	3.32 (0.89)
Approachable	3.45 (1.23)	2.89 (1.13)	3.05 (1.02)	2.95 (1.21)
Threatening	1.15 (0.49)	1.22 (0.55)	1.67 (1.11)	1.09 (0.29)
Attractive	2.60 (1.23)	2.67 (1.09)	2.19 (0.87)	2.45 (0.74)
Happy	2.30 (1.08)	1.72 (0.67)	1.95 (1.07)	1.77 (0.69)
Inspiring	2.25 (1.07)	1.72 (0.67)	1.67 (0.97)	1.91 (0.81)
Angry	1.30 (0.66)	1.44 (0.71)	1.67 (0.91)	1.41 (0.73)
Dominating	1.85 (1.04)	1.67 (0.91)	1.67 (0.97)	1.41 (0.80)
Trustworthy	4.00 (0.73)	3.83 (0.62)	3.86 (0.73)	3.55 (0.74)
Scary	1.50 (0.83)	1.50 (0.86)	1.62 (0.97)	1.32 (0.57)
Fluent	3.25 (1.25)	3.06 (1.16)	3.19 (1.21)	3.18 (1.05)
Convincing	3.55 (1.19)	2.83 (0.92)	3.52 (1.12)	3.18 (1.14)
Understandable	4.70 (0.57)	4.17 (1.04)	4.38 (0.92)	4.32 (0.89)

Note: The measurements were made on a 1 to 5 scale

Participants shown the direct gaze video rated the model more convincing ($M = 3.54$, $SD = 1.14$) than participants shown the downward gaze video ($M = 3.03$, $SD = 1.05$, $F(1, 77) = 4.62$, $p = .04$, $\eta^2_p = 0.06$, 95% CI [0.03, 1.0]). No other significant main effects were found. Interestingly, this study did not replicate the finding that rejected individuals rate others more positively than included individuals (Maner, DeWall, Baumeister, & Schaller, 2007).

The scores of *threatening* ratings yielded an Inclusionary Status \times Gaze Direction interaction ($F(1, 77) = 4.50$, $p = 0.04$, $\eta^2_p = 0.06$). Pairwise comparisons revealed that excluded participants shown the direct gaze video rated the model as more threatening than excluded participants shown the downward gaze video (Welch's $t(22.67) = 2.30$, $p = .03$, $d = 0.71$, 95% CI [0.06, 1.09]), and also marginally more threatening than included participants shown the direct gaze video (Welch's $t(27.77) = 1.94$, $p = 0.06$, $d = 0.61$, 95% CI [-1.06, 0.03]). Pairwise comparisons revealed no other differences (all $ps > .3$).

It is worth noting that the differences between the groups were not because the models actually acted in a more threatening fashion in the direct gaze video than in the downward gaze video. Included participants shown the different videos rated the model similarly on this scale. Furthermore, independent raters who were shown the videos with the eyes covered with a black rectangle, did not rate the models in the direct gaze videos as more threatening than in the downward gaze videos (male model: $M_{\text{direct}} = 2.17$, $SD_{\text{direct}} = 1.07$, $M_{\text{downward}} = 2.28$, $SD_{\text{downward}} = 1.04$, $t(99) = 0.51$, $p = .61$, $d = 0.10$, 95% CI [-0.52, 0.31]; female model: $M_{\text{direct}} = 1.75$, $SD_{\text{direct}} = 1.07$, $M_{\text{downward}} = 1.91$, $SD_{\text{downward}} = 0.95$, $t(41) = 0.53$, $p = .60$, $d = 0.16$, 95% CI [-0.79, 0.46]). Thus these results support our interpretation that ostracized individuals may not necessarily see direct gaze as an inclusive cue, but it could even be seen as threatening.

Suspicion (Experiment 2)

Gerber and Wheeler (2009) have called for more stringent measurement of suspicion in ostracism studies. They also noted that little is known about whether suspicious participants respond differently than non-suspicious participants. For Experiment 2, we developed a method for measuring suspicion that would: 1) minimize the effect of the experimenter in determining whether a participant is suspicious or not, 2) detect suspicion even in participants who are not willing to voice their suspicions, and 3) measure suspicion as an ordinal, rather than a dichotomous, variable. We used a funnel-type interview, administered on a computer. The questionnaire started with vague questions about the experiment, and ended with asking explicitly about suspicions. Six questions were presented in succession at the end of the experiment, before debriefing. Participants were asked to type out and submit their answers to each question before presenting the next question. The questions were as follows: a) How did you feel about the experiment? b) What do you think the experiment was about? c) What do you think was the purpose of the ball game you played? d) Was there anything confusing or odd about the ball game? e) Do you think there was something about the ball game the experimenter did not tell you about? If yes, what was it? f) If the experimenter would now tell you that he misled you with something about the ball game, what do you think he would tell you?

Each reply was scored by two independent raters, blind to the condition of each participant. Each item was scored 1 if the participant indicated awareness that the study was about ostracism, or that the Cyberball game was predetermined. Items the raters disagreed with (12 % of all items) were rated by a third rater. Thus, we received an ordinal scale suspicion score ranging from 0 to 6 for each participant.

To find whether the two ostracism conditions aroused suspicion differently, the suspicion scores were subjected to a Mann-Whitney U-test. The test revealed that excluded

participants had significantly higher suspicion scores than included participants (mean ranks of the groups were 53.4 and 27.0, respectively; $U = 285.5$, $p < .001$, $r = 0.57$). This suggests that excluded participants were more suspicious of the cover story than included participants, and more aware of the real purpose of the experiment. This is likely due to expectancy violation, inherent to the exclusion condition of Cyberball, which has been suggested to result in increased processing of cognitive conflict (Somerville, Heatherton, & Kelley, 2006). Future Cyberball studies could benefit from making adjustments to the manipulation, or to the standard mental visualization cover story, to ensure excluded participants do not become aware of the deception.

We calculated Spearman's rank correlation coefficients between suspicion scores and basic need, mood and pain scores to find if suspicion moderated participants' basic need satisfaction, mood or pain in either the reflexive stage or the reflective stage. We calculated the correlations for included and excluded participants separately. The correlations displayed in Table 12 show that the level of suspicion did not correlate with basic need, mood or pain measurements in either group. Consistent with this, previous research has found that awareness that one is being ostracized by a computer does not moderate the affective impact of ostracism (Zadro, Williams, & Richardson, 2004). These results also alleviate the concern that the effect of ostracism could be due to demand characteristics (see Gerber & Wheeler, 2009). However, our experiment may have lacked statistical power to detect correlations. More research is needed to get a clearer picture of how suspicion modulates outcomes of ostracism manipulations.

TABLE 12. Spearman's rank correlation coefficients between suspicion scores and basic need, mood and pain scores in reflexive and reflective stage in Experiment 2

		Reflexive stage				Reflective stage			
		Basic needs	Positive mood	Negative mood	Pain	Basic needs	Positive mood	Negative mood	Pain
Included	r_s	-0.03	-0.11	-0.18	0.14	0.11	-0.13	-0.05	-0.16
	p	.85	.52	.28	.28	.51	.44	.75	.33
Excluded	r_s	-0.01	0.17	-0.05	-0.14	-0.05	-0.05	0.03	-0.02
	p	.93	.27	.76	.38	.74	.77	.86	.91

Note: Correlations were calculated for included and excluded participants separately

References

- Conty, L., George, N., & Hietanen, J. K. (2016). Watching eyes effects: When others meet the self. *Consciousness and Cognition*, *45*, 184-197. doi:10.1016/j.concog.2016.08.016
- Cumming, G. (2014). The new statistics: Why and how. *Psychological Science*, *25*(1), 7-29. doi:10.1177/0956797613504966
- Gerber, J., & Wheeler, L. (2009). On being rejected a meta-analysis of experimental research on rejection. *Perspectives on Psychological Science*, *4*(5), 468-488. doi:10.1111/j.1745-6924.2009.01158.x
- Govern, J. M., & Marsch, L. A. (2001). Development and validation of the situational self-awareness scale. *Consciousness and Cognition*, *10*(3), 366-378. doi:10.1006/ccog.2001.0506
- Hartgerink, C. H., van Beest, I., Wicherts, J. M., & Williams, K. D. (2015). The ordinal effects of ostracism: A meta-analysis of 120 Cyberball studies. *PloS One*, *10*(5), e0127002. doi:10.1371/journal.pone.0127002
- Hess, Y. D., & Pickett, C. L. (2010). Social rejection and self-versus other-awareness. *Journal of Experimental Social Psychology*, *46*(2), 453-456. doi:10.1016/j.jesp.2009.12.004
- Konstabel, K., Lönnqvist, J., Walkowitz, G., Konstabel, K., & Verkasalo, M. (2012). The 'Short five' (S5): Measuring personality traits using comprehensive single items. *European Journal of Personality*, *26*(1), 13-29. doi:10.1002/per.813
- Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the "porcupine problem.". *Journal of Personality and Social Psychology*, *92*(1), 42-55. doi:10.1037/0022-3514.92.1.42

- McDonald, M. M., & Donnellan, B. M. (2012). Is ostracism a strong situation? The influence of personality in reactions to rejection. *Journal of Research in Personality, 46*(5), 614-618.
doi:10.1016/j.jrp.2012.05.008
- Onoda, K., Okamoto, Y., Nakashima, K., Nittono, H., Yoshimura, S., Yamawaki, S., . . . Ura, M. (2010). Does low self-esteem enhance social pain? The relationship between trait self-esteem and anterior cingulate cortex activation induced by ostracism. *Social Cognitive and Affective Neuroscience, 5*(4), 385-391. doi:10.1093/scan/nsq002
- Rosenberg, M. (1965). Rosenberg self-esteem scale (RSE). *Acceptance and Commitment Therapy. Measures Package, 61-62.*
- Somerville, L. H., Heatherton, T. F., & Kelley, W. M. (2006). Anterior cingulate cortex responds differentially to expectancy violation and social rejection. *Nature Neuroscience, 9*(8), 1007-1008. doi:10.1038/nn1728
- Twenge, J. M., Catanese, K. R., & Baumeister, R. F. (2003). Social exclusion and the deconstructed state: Time perception, meaninglessness, lethargy, lack of emotion, and self-awareness. *Journal of Personality and Social Psychology, 85*(3), 409-423.
- Williams, K. D. (2007). Ostracism: The kiss of social death. *Social and Personality Psychology Compass, 1*(1), 236-247. doi:10.1111/j.1751-9004.2007.00004.x
- Wirth, J. H., Lynam, D. R., & Williams, K. D. (2010). When social pain is not automatic: Personality disorder traits buffer ostracism's immediate negative impact. *Journal of Research in Personality, 44*(3), 397-401. doi:10.1016/j.jrp.2010.03.001
- Zadro, L., Williams, K. D., & Richardson, R. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and

meaningful existence. *Journal of Experimental Social Psychology*, 40(4), 560-567.

doi:10.1016/j.jesp.2003.11.006