# Dial a feeling: Detecting moderation of affect decline during ostracism

**Eric D. Wesselmann**[a,*], **James H. Wirth**[b], **Daniel K. Mroczek**[a], and **Kipling D. Williams**[a]

[a]Purdue University, West Lafayette, IN 47907, United States

[b]University of North Florida, Jacksonville, FL 32224, United States

## Abstract

Ostracism, being excluded and ignored, is a common and painful experience. Previous research has found ostracism's immediate effects robust to moderation by individual differences. However, this could be the result of using retrospective measures taken after the ostracism occurs, rather than assessing the effects of ostracism *throughout* the episode. Participants completed measures of loneliness and social avoidance and distress before either being ostracized or included in a virtual ball-toss game, Cyberball. During Cyberball, participants recorded second-by-second phenomenological affect using a dial device. Individual differences in loneliness and social avoidance and distress moderated affective reactions throughout ostracism and inclusion. Lonely individuals, compared to less-lonely individuals, had slower affect decrease when ostracized but quicker affective increase when included. Additionally, socially-avoidant individuals recovered more slowly from ostracism than less-avoidant individuals. Replicating previous research, moderation by individual differences was not detected with measures taken only at end of the interaction or with retrospective measures.

## Keywords

Ostracism; Loneliness; Social avoidance

## 1. Introduction

Ostracism, being excluded and ignored, is a pervasive phenomenon that increases negative affect and threatens basic needs (i.e., belonging, self-esteem, control, and meaningful existence; Williams, 2009). Ostracism is experienced neurologically as pain (Eisenberger, Lieberman, & Williams, 2003), and hurts even when being ostracized by a hated outgroup (Gonsalkorale & Williams, 2007). Williams (2009) argues that humans evolved to detect the slightest cues of ostracism and experience immediate discomfort. Research supports this argument: Individuals felt ostracized after being refused eye-contact by a computer confederate (Wirth, Sacco, Hugenberg, & Williams, 2010). Also, pedestrians who were given an "air-gaze" (i.e., having someone look in their direction, but not giving them direct eye-contact) by a passerby felt decreased social connection (Wesselmann, Cardoso, Slater, & Williams, 2012).

Previous research suggests ostracized individuals may "react first and ask questions later." Ostracism's reflexive (immediate) effects appear insensitive to moderation by individual

*Corresponding author. Address: Department of Psychological Sciences, Purdue University, 703 Third Street, West Lafayette, IN 47907, Unites States. edwesse@psych.purdue.edu (E.D. Wesselmann)..

differences (Williams, 2009). For example, gender, introversion–extraversion, loneliness, need for belonging and social anxiety have failed to demonstrate moderation. However, extreme individual differences have shown moderation of ostracism's effects. For example, ostracized participants with higher levels of personality traits symptomatic of Cluster A personality disorders (i.e., discomfort with social interaction, severe interpersonal distrust, and/or detachment) self-reported experiencing a less aversive impact, compared to participants with lower levels of these traits (Wirth, Lynam, & Williams, 2010). Another study demonstrated that elderly participants who were ostracized self-reported experiencing less aversive effects than younger ostracized participants (Hawkley, Williams, & Cacioppo, 2011).

The difficulty researchers previously had finding moderation may lead them to conclude that individual differences do not moderate initial reactions to ostracism. Might it be the case that individual differences moderate ostracism's effects *during* the course of the ostracism episode but have little effect on individuals at the *end* of the episode? Without using methods that assess these questions, researchers may erroneously make conclusions that underestimate the dynamic nature of experiencing ostracism. We argue certain individual differences may moderate ostracism's effects over time, and this can be detected by monitoring participants' second-by-second reactions *during* an ostracism episode.

## 1.1. Examining ostracism while it occurs

The dynamics of the entire experience of ostracism largely has been ignored in previous research. Some researchers have used cardiovascular or fMRI technology to measure physiological distress during ostracism (Eisenberger et al., 2003; Williams & Zadro, 2004). Unfortunately, these methods require expensive technology, as well as necessarily averaged data across time intervals that result in approximations. A time-course measure of participants' reactions may allow for nuanced investigations of ostracism's reflexive effects, but without utilizing expensive biofeedback technology. Time-course measures have elucidated other complicated social and cognitive processes, such as juror perceptions of eyewitness testimony (Brewer, Williams, ForsterLee, & Hargreaves, 2004), relationship conflict (Gottman & Levenson, 1992), social judgment (Vallacher, Nowak, & Kaufman, 1994), and ambivalence to stigmatized individuals (Pryor, Reeder, Yeadon, & Hesson-McInnis, 2004). A time-course approach may also elucidate the complexities of ostracism's effects.

## 1.2. Individual difference moderators during ostracism

Extreme individual differences (e.g., Cluster A personality disorder characteristics, old age) may represent boundary conditions that attenuate ostracism's overall effects, whereas other less extreme individual differences may moderate ostracism's effects during the episode but have little effect on individuals at the end of the episode. Most ostracism research relies on participants retrospectively reporting their feelings during ostracism (Williams, 2009). This approach may limit researchers from understanding the complex ways in which individual differences moderate ostracism's immediate effects. We revisit two individual differences, loneliness and social avoidance and distress, which failed to moderate ostracism's immediate effects using traditional retrospective measures. These individual differences may moderate the overall magnitude of ostracism's effects, the speed at which participants are affected by ostracism, and the speed of recovery.

**1.2.1. Loneliness**—Lonely individuals perceive that their current social relationships are inadequate, and they chronically experience feelings of isolation (Cacioppo & Patrick, 2008). Lonely individuals hunger for increased social connection and sometimes even anthropomorphize non-social agents as a way to satisfy their need (Epley, Akalis, Waytz, &

Cacioppo, 2008). Lonely individuals often experience a double-bind; they desperately want to be included, but tend to feel anxious and distressed about social situations (Leary, 1990). Because of this bind, lonely people may become hyper-sensitive to social information, particularly exclusion-relevant cues (Cacioppo & Patrick, 2008; Carter-Sowell, Chen, & Williams, 2006; Gardner, Pickett, Jefferis, & Knowles, 2005). These studies suggest that lonely individuals should show more affective decline to ostracism over time than non-lonely participants because of their hypersensitivity to exclusion-relevant cues. Lonely participants should also respond more positively to inclusion over time than non-lonely participants because their hunger for human connection is being satisfied.

**1.2.2. Social avoidance and distress—**Social avoidance and distress is the experience of distress in and deliberate avoidance of social situations (La Greca & Stone, 1993; Watson & Friend, 1969).[1] Past research suggests two potential directions for moderation by social avoidance/distress. One possibility is that individuals high in this construct, compared with those who are low, would be affected less negatively by ostracism because they already have a preference for avoiding others (similar to Cluster A personality disorder, see Wirth, Lynam, et al., 2010). Alternatively, those individuals high in social avoidance and distress may have stronger reactions to ostracism over time because they are already going to be uncomfortable in a social situation – ostracism may compound their discomfort. Participants high in social avoidance/distress should also have less positive affect when being included than participants who are low in social avoidance and distress because these individuals are distressed more by social interactions (Watson & Friend, 1969).

## 1.3. Current research

We measure participants' second-by-second affective reactions during both ostracism and inclusion. This approach permits a time-course investigation of ostracism that is more sensitive for detecting moderation than using measures taken solely at the end of the interaction. We expect to replicate previous research by demonstrating an overall main effect of ostracism, such that ostracized participants' affect will decrease over time, whereas included participants' affect will remain relatively stable. We also hypothesize that when ostracized, more-lonely participants will show more affect decrease over time than less-lonely participants, and more-lonely participants will also have more affect increase to inclusion over time than less-lonely participants. We also hypothesize that participants high in social avoidance and distress will have less affect increase over time in response to inclusion than participants low in social avoidance and distress. Past research suggests two potential competing hypotheses for how social avoidance and distress may moderate reactions to ostracism: Participants high in social avoidance and distress will either have more affect decline to ostracism over time, or alternatively they may have less affect decline over time than individuals who are low in social avoidance and distress. Finally, we will use this time-course approach to explore the possibility that individual differences may influence the speed of affect decline in addition to overall change, as well as any effects on recovery.

# 2. Method

## 2.1. Participants and design

Ninety-one undergraduate students (33 females; 74% Caucasian; $M_{age}$ = 19.19 years, $SD_{age}$ = 1.13) participated in the study for partial course credit. Participants were randomly assigned to be included ($N$ = 41) or ostracized ($N$ = 50).

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[1]Zadro et al. (2006) found no evidence that Fear of Negative Evaluation (FNE), another component of social anxiety, moderated the immediate effects of ostracism. We ran additional analyses with FNE, and did not find significant moderation either.

### 2.2. Procedure

**2.2.1. Individual difference measures—**Participants completed the 3-item UCLA Loneliness scale (e.g., "How often do you feel isolated from others?"; Hughes, Waite, Hawkley, & Cacioppo, 2004; α = .71) on the scale of 1 (*Not at all*), 2 (*Some of the time*), or 3 (*Often*). These items were averaged, such that higher numbers represented more loneliness.

Participants also completed the Social Avoidance and Distress scale (e.g., "I usually feel uncomfortable when I am in a group of people I don't know"; Hofmann, DiBartolo, Holaway, & Heimberg, 2004; Watson & Friend, 1969; α = .88) by answering either True or False. Items were recoded as 0 or 1 and summed, such that higher numbers represented more social avoidance and distress (minimum = 0, maximum = 28).

**2.2.2. Dial practice tasks—**Participants then engaged in four tasks ostensibly to study how mental visualization influenced affect. The first three tasks focused on helping participants practice using the dial as a continuous indicator of their current affect, and were presented in random order. One task instructed participants to register their feelings as they viewed a variety of pleasant (e.g., cute animals) and unpleasant pictures (e.g., disaster victims). The second task instructed participants to turn the dial while mentally visualizing a positive event (i.e., earning a *very high* grade on an exam/paper/project) and while visualizing a negative event (i.e., earning a *very low* grade on an exam/paper/project). The third task asked participants to use the dial to indicate how they would feel when experiencing three separate emotions (i.e., very negative, neutral, and very positive). The total practice period took approximately eight minutes. Participants were given the ability to re-read all instructions for each task if they felt unclear on how to operate the dial.

**2.2.3. Ostracism/inclusion manipulation—**We used the Cyberball paradigm (Williams, 2009) to create an ostensible online-group interaction in which ostracism could be manipulated experimentally. Cyberball was designed as an ostracism experience in which participants perceive themselves to be ignored and excluded when they are not thrown the ball. The pattern of results and the effect sizes for self-reported distress are similar to those found with other experimental manipulations of ostracism and results found in diary studies of real-world experiences of everyday ostracism (Williams, 2009).

Participants were told Cyberball was a context to practice "mental visualization" and that their ball-toss performance was unimportant. Participants were instructed to focus on mentally visualizing all aspects of the game (e.g., weather, location). The game lasted approximately 2-and-a-half minutes (80 throws). *Included* participants received the ball equally throughout the game from the two computer-controlled confederates, whereas *ostracized* participants received the ball once from each of the confederates at the beginning, and then never again.

### 2.3. Dependent variables

**2.3.1. Time-course affect measure—**Each participant used a mechanical dial to indicate their affect during Cyberball (Fig. 1; Brewer et al., 2004). We applied a series of faces to the dial as anchors to indicate which direction participants needed to turn the dial to indicate positive or negative emotions. These faces were adapted from the universal pain slide and have been used previously in ostracism research (Chen, Williams, Fitness, & Newton, 2008). We reminded participants to turn the dial continuously during the interaction to record their affect.

**2.3.2. Manipulation check and one time-point measures**—After the game, participants completed a manipulation check standard to ostracism research – they estimated the percentage of tosses they received during the game (33% of the tosses indicates equal distribution among players).

At the end of the interaction, participants indicated how ostracized they felt using two items from the Williams (2009) Need Threat scale: "During the game, I felt ignored" and "During the game, I felt excluded" (1 = *Not at all*, 5 = *Extremely*; α = .96). We also created an aggregate of participants' dial positions during the last five seconds of the game (α = .99) to assess the relation between participants' final affect at the end of the game and their self-reported feelings of ostracism (i.e., ignored and excluded). This dial aggregate was used to assess if moderation found by the full time-course measure could be detected by using one (approximate) measure toward the end of the interaction. These two measures are proxies for the typical self-report measures asked of participants at the end of the Cyberball game.

# 3. Results

## 3.1. Analytic strategy

We analyzed our time-course data with multilevel modeling (Raudenbush & Bryk, 2002) using PROC MIXED in SAS 9.1. We squared the Time variable to investigate the curvature of participants' affect change during the Cyberball game. Our Time and Curvature variables were our level-1 predictors, and our two level-2 (between-participants) predictors were Condition (inclusion = 1, ostracism = 2) and continuous measures of loneliness and social avoidance and distress. As expected, the measures of loneliness and social avoidance and distress were correlated positively, $r(91) = .32$, $p < .01$ (Jones, 1990; Leary, 1990). They were entered simultaneously in the same multi-level model. Graphs of the interactions between our manipulation and the individual differences were created by plotting one *SD* above and one below the mean for each individual difference variable. The parameter estimate for the variance of slopes indicated multilevel modeling of the data was appropriate, $Z = 6.68$, $p < .01$.

We also analyzed the retrospective and ending dial measures using a univariate ANOVA, with Condition as a categorical predictor and our individual difference variables as continuous predictors. This approach approximates the typical analysis of the self-reported reflexive effects of ostracism (Williams, 2009).

## 3.2. Individual differences and manipulation check

Our sample's average loneliness score was 1.72 (*SD* = .49), and their average social avoidance and distress score was 6.58 (*SD* = 5.55). Ostracized participants reported receiving fewer tosses than included participants, $F(1, 85) = 10.97$, $p < .01$, $d = 2.40$ (Table 1). Loneliness and social avoidance and distress did not interact with the manipulation check, $Fs < .05$, $ps > .80$.

## 3.3. Time-course measure of affect during Cyberball

Fig. 1 illustrates the effect of our manipulation on participants' affect levels, controlling for the main effects and interactions with loneliness and social avoidance and distress. Regardless of individual differences, ostracized participants' affective valence decreased significantly over time (Time × Condition; see Table 2 for statistics). Further, ostracized participants' affective decline leveled off by the end of the ostracism episode, and suggested that they may begin to recover given more time (Curvature × Condition). Unexpectedly, included participants also changed over time, whereby affect dropped slightly during the latter half of the game but then improved towards the end. This change in affect, albeit

statistically significant, was still only between 7.5 and 9 on the rating scale which indicated included participants' affect was still relatively positive throughout the game.

Most importantly, the data support our hypothesis for moderation of ostracism's effects by loneliness. All ostracized participants demonstrated affective decline, but over time participants high in loneliness showed less affect decrease than participants low in loneliness (Time × Condition × Loneliness; Fig. 2). Included participants also demonstrated affective increase, with those participants high in loneliness demonstrating more affect increase than participants low in loneliness. Thus, the disparate impact of our ostracism manipulation was greater for individuals high in loneliness than for individuals low in loneliness; inclusion was better and ostracism was worse.

The data showed mixed support for our hypotheses regarding social avoidance and distress. Contrary to either hypothesis, ostracized participants high in social avoidance did not differ significantly in the magnitude of affect decline than those low in social avoidance (Time × Condition × Social Avoidance; Fig. 3); both were negatively impacted at a similar level. The data do suggest that participants high in social avoidance and distress begin to recover more slowly than those participants low in this variable (Curvature × Condition × Social Avoidance).

We also examined included participants and found social avoidance and distress did moderate participants' response to inclusion (Time × Condition × Social Avoidance); participants high in social avoidance and distress felt less positively towards inclusion than participants low in social avoidance and distress.

### 3.4. Self-report and ending time-point measures

Ostracized participants reported feeling more ostracized during the game than included participants, $F(1, 85) = 5.52$, $p = .02$, $d = 2.13$ (Table 1). Consistent with previous research, retrospective reports were not moderated by individual differences in loneliness or social avoidance and distress, $Fs < 1.00$, $ps > .39$.

When we look just at participants' dial position averaged across the last 5 s, ostracized participants reported lower affect than included participants, $F(1, 85) = 3.81$, $p = .05$, $d = 1.47$. These reports were not moderated by individual differences in loneliness or social avoidance and distress, $Fs < 1.16$, $ps > .28$, replicating past research and our retrospective measures. Participants' self-reports of feeling ostracized and their dial position at the end of the game were negatively correlated (Table 1); the less positively participants felt at the end of the game, the more ostracized they reported retrospectively feeling *during* the game.

## 4. Discussion

This research investigated if assessing second-by-second affective reactions to ostracism could capture moderation of affect by individual differences *during* ostracism. We used a continuous measure and found that individual differences in loneliness and social avoidance and distress moderated participants' experiences of both ostracism and inclusion. Lonely individuals had a more negative reaction to ostracism overall and also reacted more favorably to inclusion than less-lonely individuals. Unexpectedly, lonely participants' affect decreased less rapidly than less-lonely participants' affect (as indicated by the Curvature × Condition × Loneliness interaction). A potential explanation for this is that lonely individuals have often come to expect being excluded from social interactions (Cacioppo & Patrick, 2008), so it may be less of a surprise to them when it actually happens. That of course does not suggest that it hurts any less; indeed our data confirm that it hurts more over the course of the interaction.

However, there was no significant moderation in the decrease of ostracized participants' affect levels. The lack of significant moderation in this case does not necessarily mean that there is no influence of social anxiety on affect level over time, but this type of moderation may occur in a more extreme clinically anxious population. A possible way to assess clinical levels of anxiety is using a prototype-matching approach in which participants' trait profiles on the big five dimensions of personality are matched to expert-generated prototypes of classic anxiety patients (Lynam & Widiger, 2001; Wirth, Lynam, et al., 2010).

We did find significant moderation in recovery from ostracism; the interaction between curvature and social avoidance and distress suggested that ostracized participants recovered more slowly than if they were high in social avoidance and distress compared to low (similar to Zadro, Boland, & Richardson, 2006). We also examined the included participants and found that participants high in social avoidance and distress had less positive affect when being included than participants who were low in social avoidance and distress.

Unexpectedly, we found in general that ostracized individuals' affect levels began to rebound toward the end of the experience. Ostracized individuals' affect levels were still significantly below that of included individuals, but our interpretation of the regression estimates suggest that given additional time their affect would likely recover even more. Recovery from ostracism can be expeditious; some ostracized participants can recover within minutes after Cyberball (Wirth & Williams, 2009). We can estimate from our data that recovery may begin even during the ostracism episode itself. Future research could investigate when the recovery from ostracism begins and to what extent and under what conditions an individual can recover during an ostracism experience.

## 4.1. Limitation

Our research is limited in that we do not have the typical self-report measures used in ostracism research (i.e., belonging, control, self-esteem, meaningful existence, mood; Williams, 2009). It would have been ideal to correlate traditional self-report measures of ostracism with our dial measure. However, we contend the dial position at the end of the Cyberball game seems to be a reasonable approximation of what participants would likely report on the traditional measures. Participants' final dial positions were correlated moderately with their self-reported experience of being ostracized. From this, we can extrapolate how participants would have responded on other ostracism measures (e.g., belonging), given that they are highly correlated with feelings of being ignored and excluded (Williams, 2009).

## 4.2. Future directions

Future research should investigate other individual differences that theoretically may moderate ostracism's effects during the episode. We demonstrated that a more sensitive measure captured moderation of the immediate responses to ostracism by loneliness and social avoidance and distress. This moderation involved both overall affect decline and speed of decline, factors that could only be assessed *during* the episode and were obscured using measures taken only at the end of the episode. Interestingly, the slope variance remained statistically significant even in the final model, indicating continued variation across participants in rate of affect decline over the 150 s, net of the effects of loneliness and social avoidance and distress (covariance parameter $z = 6.68$, $p < .01$). This means that some individuals decline at a faster rate and others at a slower rate, even when controlling for loneliness and social avoidance, suggesting that there are other individual differences contributing to this variance. Some of the previously "failed" individual difference moderators may warrant being revisited using a time-course approach, while others to be considered are rejection sensitivity (Downey & Feldman, 1996) and self-monitoring

(Snyder, 1974). Ultimately, a number of individual differences may moderate the speed at which participants are affected by ostracism, how quickly affect levels may bottom out, and potentially the speed of recovery.

A second direction for future research is investigating the dynamics of detection and interpretation of ostracism. Williams's temporal model of ostracism (2009) argues that humans evolved to detect minimal cues of ostracism because they could quickly attend to the source of the cues and make the necessary attributions to avoid permanent ostracism. These cues may be detected quickly, but interpreting them as a viable threat to social status (compared to an indicator of friendly teasing; Keltner, Capps, Kring, Young, & Heerey, 2001), may take additional time for interpretation. Future research could utilize our dial approach to examine how quickly individuals detect cues of ostracism, and if some individuals (e.g., those high in rejection sensitivity or self-monitoring) are quicker than others at detecting the first cues of ostracism. Another related – yet neglected – area of research is accuracy of detecting the ostracism cues. Some individuals may misperceive ambiguous social cues as ostracism (e.g., lonely individuals; Cacioppo & Patrick, 2008). Our time-course approach could be used to study all of these research questions both in minimal paradigms like Cyberball and in more detailed social interactions (e.g., Zadro, 2011).

### 4.3. Conclusion

Previous research found ostracism's immediate impact resistant to moderation by many individual differences (c.f. Williams, 2009; Wirth, Lynam, et al., 2010). However, these studies typically assessed the effects of ostracism using measures taken at only one time-point at the end of the interaction, rather than examining the development of the interaction. Our time-course approach identified individual differences (i.e., loneliness and social avoidance and distress) that moderate both ostracism and inclusion experiences, whereas using measures collected at one time-point did not detect this moderation. The time-course approach also allows for investigating multiple aspects of an ostracism episode, such as the intensity of affect decline and the rate of recovery. Let us be clear that we are not suggesting that previous research using measures at only one time-point to study the reflexive impact of ostracism are invalid; we simply argue that a time-course measure can detect and magnify response differences that may emerge *during* the episode, but may be obfuscated when using measures taken only at the *end* of the episode.

## Acknowledgments

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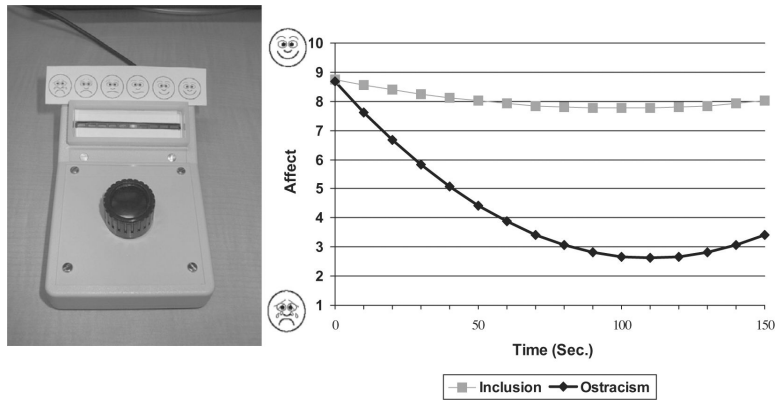**Fig. 1.**
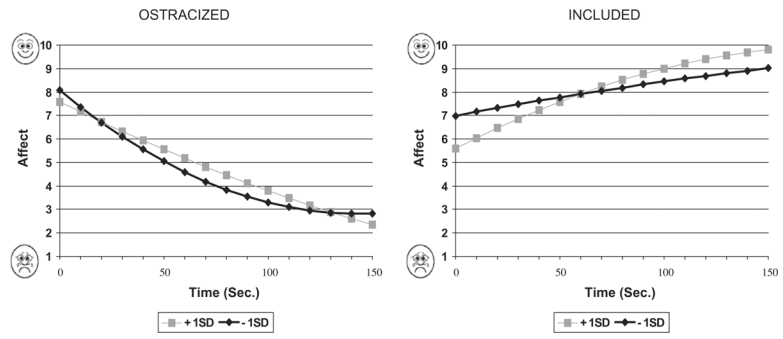Dial device and regression lines for participants' affect.

**Fig. 2.**
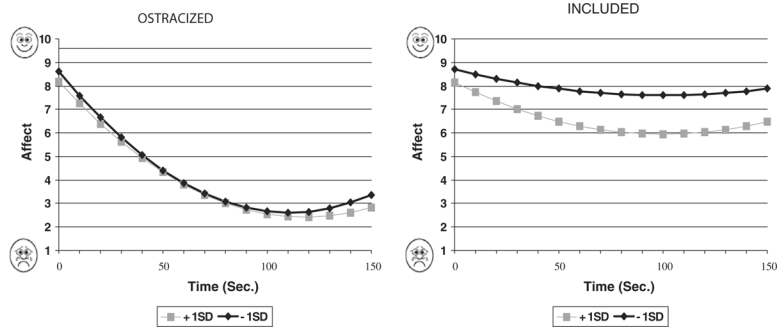Regression lines for the loneliness effects.

**Fig. 3.**
Regression lines for the social avoidancem and distress effects.

**Table 1**

Bivariate correlations and descriptive statistics for dependent variables.

| | 1 | 2 | 3 |
|---|---|---|---|
| 1. Perceived ostracism (self-report) | | | |
| 2. Dial position at ending time-point | −.41[*] | | |
| 3. Estimated % tosses received | −.69[*] | .46[*] | |
| Inclusion | 2.10 ($SD$ = 1.06) | 6.46 ($SD$ = 2.41) | 32.76 ($SD$ = 14.87) |
| Ostracism | 4.33 ($SD$ = 1.03) | 2.88 ($SD$ = 2.46) | 5.82 ($SD$ = 5.63) |

[*]
$p$ < .01.

**Table 2**

Results for the model examining the effects of ostracism, loneliness, and social avoidance/distress on affect.

| Effect | b | SE |
|---|---|---|
| Intercept | 8.67[*] | 1.35 |
| Time | −.11[*] | .02 |
| Curvature (time-squared) | .0005[*] | .00004 |
| Loneliness | −.49 | .78 |
| Social avoidance and distress (SAD) | −.04 | .07 |
| *Condition* | | |
|   Inclusion | .09 | 2.04 |
|   Ostracism[a] | | |
| *Time × condition:* | | |
|   Inclusion | .09[*] | .02 |
|   Ostracism[a] | | |
| *Curvature × condition:* | | |
|   Inclusion | −.0004[*] | .00006 |
|   Ostracism[a] | | |
| *SAD × condition:* | | |
|   Inclusion | −.01 | .10 |
|   Ostracism[a] | | |
| *Loneliness × condition:* | | |
|   Inclusion | −.94 | 1.20 |
|   Ostracism[a] | | |
| *Time × condition × SAD:* | | |
|   Included | −.002[*] | .0009 |
|   Ostracized | .001 | .0008 |
| *Curvature × condition × SAD:* | | |
|   Included | .00001[*] | .000002 |
|   Ostracized | −.000007[*] | .000002 |
| *Time × condition × loneliness:* | | |
|   Included | .03[*] | .01 |
|   Ostracized | .03[*] | .009 |
| *Curvature × condition × loneliness:* | | |
|   Included | −.0001[*] | .00002 |
|   Ostracized | −.0002[*] | .00002 |

[a] It denotes which groups were categorized as referent groups in SAS.

[*] $p < .01$.