



# Stuck in a moment and you cannot get out of it: The lingering effects of ostracism on cognition and satisfaction of basic needs <sup>☆</sup>



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## ABSTRACT

Ostracism negatively affects fundamental needs and may impair some cognitive functions. The present study examined: (1) the duration of ostracism's negative effects on fundamental needs, and (2) its associated effects on higher-order cognitive abilities. Participants were randomly assigned to be included or ostracized on Cyberball, and completed three assessments of fundamental needs over the course of 45–55 min, as well as measures of working memory, decision making, and task persistence. Results indicated significant decreases in fundamental needs immediately following ostracism and the persistence of these effects past the reflexive stage. Additionally, ostracism impaired working memory, decision making, and task persistence (but not basic attention). These results suggest that the negative effects of ostracism can last longer than a few minutes and affect executive functions, suggesting the need to examine downstream consequences of ostracism.

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## 1. Introduction

Humans are social beings and have a fundamental need to belong (Baumeister & Leary, 1995). The negative effects of being ostracized are pervasive, indicating social inclusion is necessary for healthy psychological functioning (Williams, 2007). Much research has investigated how the experience of being ignored and excluded (i.e., ostracism; Williams, Cheung, & Choi, 2000; Williams & Nida, 2011) negatively affects emotional and mental health. However, few have assessed the temporal stability of these effects on basic needs and executive functions, which are the higher-order cognitive abilities associated with frontal lobe functioning (Lezak, Howieson, & Loring, 2004). The present study sought to examine the duration of the effects of a single ostracism event on these factors.

### 1.1. Temporal effects of ostracism

Previous research suggests that individuals respond to ostracizing events in three stages (Williams, 2009). The Reflexive stage includes immediate reactions to ostracism, during which pain is experienced and the ostracism experience is thought to threaten

four fundamental psychological needs: belonging (forming lasting social relationships), self-esteem, control (belief in your ability to change your situation), and meaningful existence (belief your life has meaning). Individuals report decreases in these fundamental needs even after brief experiences of ostracism (Jamieson, Harkins, & Williams, 2010; Lau, Moulds, & Richardson, 2009; van Beest & Williams, 2006). Negative emotions are also experienced (Chow, Tiedens, & Govan, 2008; Legate, DeHaan, Weinstein, & Ryan, 2013). Thus, it is clear that there is an immediate pervasive negative reaction to ostracism.

The second stage is the Reflective stage, during which coping skills are employed to process ostracism (Williams, 2009). To date, only three studies have examined temporal effects outside the reflexive stage. These studies indicate that continued self-focus can prolong the effects of ostracism (Sethi, Moulds, & Richardson, 2013), and the arousal associated with ostracism dissipates slowly (Kelly, McDonald, & Rushby, 2012). Still other research indicates ostracism's effects diminish over time (Lau et al., 2009). In each of these cases, a second assessment of fundamental needs occurred within 10 min of the initial ostracizing event, leaving questions about the time course and duration of ostracism's effect unanswered.

Even fewer studies have examined ostracism's effect during the final (Resignation) stage, during which coping resources are depleted and individuals become resigned to their ostracized state. Zadro and colleagues (2006) examined socially anxious individuals, finding increased levels of need threat 45 min after ostracism

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(during the Resignation stage). This finding suggests that ostracism's effects have the potential to negatively affect cognition well after an ostracizing event takes place. If fundamental needs are still affected after 45 min, then other actions taking place during the interim, such as tasks requiring cognitive abilities, may also be affected. Thus, it is clear that ostracism has strong negative consequences; however, the temporal stability of these effects is still unclear as is their effect on cognitive outcomes.

### 1.2. Ostracism and executive functions

If ostracism effects persist over time, then the potential for downstream consequences increases. One area where these consequences might emerge is on measures of executive functions, which include higher-order cognitive processes such as working memory, planning, organization, and decision making (Lezak et al., 2004). Several brain areas linked to executive functions have been associated with the experience of ostracism. Intact executive functions are important for the completion of many daily activities and have been linked to frontal lobe functioning (Lezak et al., 2004). Based on previous neuroimaging studies, these cognitive abilities may be especially affected following an ostracizing experience.

Neuroimaging research indicates increased activation during experiences of ostracism in the anterior and posterior cingulate cortex, medial frontal cortex, and prefrontal cortex (Baird, Silver, & Veague, 2010; Campbell et al., 2006; Eisenberger, Lieberman, & Williams, 2003; Kross, Egner, Ochsner, Hirsch, & Downey, 2007). Although neuroimaging research links brain areas associated with executive functions to the experience of ostracism, only a few studies have directly examined performance on executive function measures following ostracism. These studies found decreased performance on word search tasks (Lustenberger & Jagacinski, 2010) and worse attention/working memory among adolescent females (Hawes et al., 2012) immediately following ostracism. To date, no studies have utilized validated neuropsychological measures of executive functions in adult participants. Thus, research examining how ostracism affects other executive functions, such as working memory and decision making, is still needed.

The use of behavioral measures to corroborate neuroimaging results is necessary as convergent evidence between neuroimaging and cognitive and behavioral assessments is not always found (e.g., Galton, Patterson, Xuereb, & Hodges, 2000) and when combined can increase predictive utility (e.g., Peters, Villeneuve, & Belleville, 2014). Thus, it is not clear whether the frontal lobe activation changes reported in neuroimaging studies correlate with impaired performance on formal executive function measures associated with everyday cognition.

### 1.3. The present study

The aims of the present study were twofold: (1) to examine the extent to which the negative effects of a single experience of ostracism on fundamental needs persist past the reflexive stage, and (2) to examine the effects of ostracism on some executive functions using validated neuropsychological measures. We hypothesized that the effects of ostracism would last past the reflexive stage. Based on previous neuroimaging research, we hypothesized that ostracism would decrease performance on measures of attention, working memory, and decision making.

## 2. Method

### 2.1. Participants

Seventy-four undergraduate students (ages 18–38,  $M_{\text{age}} = 19.50$  [ $SD = 3.09$ ]) at a regional campus of a large Midwestern university

participated in the study for partial course credit. No inclusion or exclusion criteria were utilized. Eight participants reported a history of depression or anxiety (five in the inclusion group, three in the ostracism group). Most (64%) self-identified as Caucasian, and 55% were female. A computer malfunction caused the loss of some participant demographic data ( $n = 9$ ).

### 2.2. Measures and manipulation

#### 2.2.1. Cyberball

To induce feelings of social ostracism or inclusion, all participants played Cyberball, a virtual ball toss game (Williams et al., 2000). Cyberball has been used to induce a state of ostracism in over 175 studies, with results similar to those of non-Cyberball ostracism manipulations (e.g., Claypool & Bernstein, 2014; see Williams & Jarvis, 2006, or Williams & Nida, 2011, for review). Participants were informed that they would be playing the game with two other players over the Internet, and were asked to visualize themselves, the situation, and the other players. If the ball was thrown to them, they were instructed to click on the player they chose to toss the ball to next. A total of 30 tosses were made, lasting approximately 2 min. Participants were randomly assigned to an inclusion ( $n = 38$ ) or ostracism ( $n = 36$ ) condition. Those in the inclusion condition received the ball about 33% of the time, while those in the ostracism condition received the ball once from each player at the start of the game and never again.

#### 2.2.2. Response to ostracism

The 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) and the Cyberball-specific Need Threat measure (Van Beest & Williams, 2006) assessed how participants currently felt. On the PANAS, responses to the positive and negative state mood items were averaged separately, with higher scores indicating greater levels of positive/negative mood (internal consistency:  $\alpha = .89-.91$ ). The Need Threat measure assesses threats to four basic fundamental needs: belonging, self-esteem, control, and meaningful existence. Higher total scores on each subscale indicate higher levels of the measured need (internal consistency:  $\alpha = .68-.83$ ).

#### 2.2.3. Outcome measures

Neuroimaging research has shown that the anterior cingulate cortex and prefrontal cortex are affected following an ostracizing experience. In order to assess the brain regions utilizing neuropsychological measures, we administered tests of working memory (linked with the anterior cingulate and prefrontal cortex) and decision making (prefrontal cortex) (Lezak et al., 2004). A measure of task persistence was included to measure frontal/executive systems more generally.

Working memory was assessed with the Digit Span subtest from the Wechsler Adult Intelligence Scale-IV (WAIS-IV; Wechsler, 2008). Participants repeat increasingly lengthy strings of digits in the same order (Forwards), reversed (Backwards), and in numerical order (Sequencing). The longest successful digit span on each section was used to determine performance on this task (Wechsler, 2008). Performance on Digit Span Forwards assesses basic attention, whereas Digit Span Backwards and Sequencing assess working memory and mental manipulation (Lezak et al., 2004; Wechsler, 2008). The WAIS-IV Technical Manual (Wechsler, 2008) summarizes previous research indicating greater working memory demands during Backwards and Sequencing compared to Forwards. However, there are known correlations between Digit Span performance more generally and the Verbal Comprehension Index (Wechsler, 2008), likely due to the verbal and auditory nature of the task.

Decision making was assessed with the Iowa Gambling Task (IGT; Bechara, 2008; Bechara, Damasio, Damasio, & Anderson,

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