Prayer, self-affirmation, and distraction improve recovery from short-term ostracism

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HIGHLIGHTS

- We tested three interventions to aid recovery following ostracism.
- Prayer, affirmation, and distraction aided recovery relative to a control condition
- Commitment to God predicted recovery among participants who prayed
- Reduced rumination mediated the effect of distraction on improvement

ARTICLE INFO

ABSTRACT

Brief episodes of ostracism trigger immediate pain, thwarted needs, and negative affect. Whereas the immediate effects of ostracism tend to be resistant to moderation, people differ in how quickly they recover. Here we investigated three strategies that may promote recovery from ostracism: prayer, self-affirmation, and distraction. In three experiments we found that all three interventions lead to greater recovery of basic needs satisfaction than a control condition in which participants were allowed to naturally ruminate. While all three interventions lead to a similar amount of recovery, only the effects of distraction condition were mediated by reductions in rumination, suggesting that prayer and self-affirmation promote recovery, but do so through mechanisms other than distraction. In addition, we found that religious commitment to God was associated with greater recovery following prayer, but not self-affirmation. Practical and theoretical implications are discussed.

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What does it feel like to be a ghost? Ostracism – being ignored or excluded – offers a taste of what this experience would be like. Not only have ostracized people provided anecdotes about feeling like they were ghosts or like they did not exist (Williams, 2001), many researchers have argued that ostracism can be considered a metaphor for death (Case & Williams, 2004) or a form of social death, both for ancestral humans and also in current tribal settings (Wesselmann, Nairne & Williams, 2012; Williams, 2012). Ostracism is surprisingly powerful in its capacity to simultaneously threaten four basic psychological needs: belonging, control, self-esteem, and meaningful existence (Williams, 2009).

For example, ostracism hurts even when it comes from a despised outgroup (Gonsalkorale & Williams, 2007), or even a computer (Zadro, Williams, & Richardson, 2004). An ostracism experience need not be dramatic or enduring to provoke these responses; simply being denied acknowledgement by a passerby is sufficient (Wesselmann, Cardoso, Slater & Williams, 2012). Even when people do not receive text messages (Smith & Williams, 2004) or feedback on social networking updates (e.g., Facebook posts; Tobin, Vanman, Verreynne, & Saeri, 2014) they experience reduced feelings of inclusion and threatened psychological needs. Ostracism is clearly a painful experience that people would want to avoid.

Unfortunately, avoiding ostracism is not easily accomplished. Ostracism likely evolved as a social influence mechanism that provided numerous benefits to groups including protection against people who hindered, burdened, or otherwise threatened group functioning (Kurzban & Leary, 2001; Wesselmann, Williams, & Wirth, 2014; Wesselmann, Wirth, Pryor, Reeder, & Williams, 2013; Williams, 2009). Ostracism can be motivated by a number of factors including enforcement of social norms, desire to punish others, and simple inattention to those who are viewed as unimportant (Williams, 2001). It is perhaps not surprising then that people experience ostracism on a daily basis (Nezlek, Wesselmann, Wheeler, & Williams, 2012).

Considering the well-documented negative effects of ostracism, and the frequency with which it occurs, it is important to identify strategies that buffer against its unpleasant consequences. The goal of the present

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research is to test three strategies that may promote recovery following ostracism: prayer, self-affirmation, and distraction. Prayer and self-affirmation are themselves likely to be distracting, so we also explore whether these two strategies provide any psychological benefit above and beyond their role in directing attention away from ostracism, and whether they operate through the same mechanism as distraction.

1. Temporal need–threat model of ostracism

The temporal need–threat model of ostracism (Williams, 2009) informs our predictions regarding effective coping strategies. This model describes reactions to ostracism in stages. First, people in the *reflexive stage* detect that they are being ostracized and experience immediate feelings of pain, negative affect, and psychological need threat. Ostracized individuals are alerted to the potential danger ostracism presents by these automatic negative effects, which motivate them to either seek re-inclusion or alternative avenues for recovering basic need satisfaction. In the *reflective stage*, ostracized people focus their cognitive resources on appraising the event to choose the most appropriate recovery strategy. In this stage there is variability in how quickly people recover, influenced by both situational and individual factors. For example, people are equally sensitive to the *immediate* pain of ostracism regardless of how socially anxious they are, but after a *delay* highly socially anxious people recover significantly less than non-socially anxious people (Zadro, Boland, & Richardson, 2006). Similar patterns have been shown with situational factors. For example, people recovered more quickly when ostracized on the basis of a temporary, rather than permanent group membership (Wirth & Williams, 2009). We note that there is a large literature documenting factors that moderate reflective recovery from ostracism (Wesselmann, Ren, & Williams, 2015). However, this research tends to focus on fixed properties of either the person (e.g., Ren, Wesselmann, & Williams, 2013) or the ostracism event (e.g., Goodwin, Williams, & Carter-Sowell, 2010) that either speed or slow recovery. In contrast, the current investigation is interested in implementable interventions that promote recovery in the wake of on ostracism episode. In other words, given a specific instance of ostracism, what can one do to improve their psychological state?

Of course, the most obvious treatment for ostracism is its antithesis: social inclusion. Indeed, research has shown that inclusion by even one or two people can powerfully reduce aggression and negative affect following ostracism (DeWall, Twenge, Bushman, Im, & Williams, 2010). Likewise, a period of inclusion following ostracism can also help undo the negative effects (Tang & Richardson, 2013). But what if a person is unable to reconnect with others following an acute ostracism episode?

One answer to this question is provided by the Belonging Regulation Model (Gardner, Pickett, & Knowles, 2005), which proposes that just as individuals seek food when hungry, so too do they seek connection when belonging is threatened. When connection is not possible, they may settle for mere reminders of connection, or *social snacks* (e.g., a photo of a loved one), which can help buffer affect in the presence of reminders of exclusion. An initial investigation into a strategy to cope with ostracism found that mindfulness training prior to an ostracism experience produces greater recovery of basic needs (Molet, Macquet, Lefebvre, & Williams, 2013). Similarly, writing about an unconditionally accepting relationship prior to ostracism provided a buffering effect, but only for securely-attached participants (Hermann, Skulborstad, & Wirth, 2014). The purpose of the present investigation is to build on this initial evidence by testing the effectiveness of strategies that are implemented *following* the ostracism event. We suggest that prayer, self-affirmation, and distraction are well suited to address threatened need satisfaction following ostracism.

2. Prayer

There are good reasons to believe that religion in general, and prayer in particular, buffers each of the four basic needs. First, as a communal act (Spilka & Ladd, 2013), prayer is likely to buffer the need for *belonging*. Prayer can remind people that they are members of a religious community that provides social identity and opportunities for interpersonal connection. Second, religion and prayer can provide *self-esteem*. Religions often teach that each person holds special status and is loved by their deity. Prayer can act as reminder of this status and thereby increase self-esteem. Third, religion can provide feelings of *control* by teaching that one may control the circumstances of their afterlife based on current behaviors and choices. Prayer, especially prayer that makes requests from a deity, can induce a sense of vicarious control by encouraging the belief that a deity is monitoring and controlling life events (Pyszczynski, Greenberg, & Solomon, 1998; Rothbaum, Weisz, & Snyder, 1982). The effect of prayer on control may not just be metaphorical, but also literal; in recent research people who engaged in prayer, rather than a neutral activity did not show the regular decreases in self-control following a depleting activity (Friese & Wänke, 2014). Additionally, longitudinal research has shown that prayer and religiosity predict greater self-control, which in turn predicts reduced substance use (DeWall et al., 2014). Fourth, religion can provide a sense of *meaningful existence* by offering direct answers to questions about the purpose of life and the nature of existence. Consistent with this idea, daily fluctuations in spirituality have been found to predict feelings of meaning in life (Kashdan & Nezlek, 2012). Additionally, when people are reminded of their mortality, they report greater religious beliefs (Norenzayan & Hansen, 2006). Because ostracism itself arouses mortality salience (C. Steele, Kidd, & Castano, 2015), the sense of meaning that is provided by religion is likely especially valuable to targets of ostracism.

A buffering effect of religion/spirituality on responses to ostracism has been theoretically predicted (Wesselmann & Williams, 2010). Related research has established that people do in fact use religion to cope with ostracism. For example, Aydin, Fischer, and Frey (2010) showed that thinking and writing about a time when one was excluded causes not only increased levels of religious affiliation, but also greater intentions to engage in religious behavior. Likewise, Epley, Akalis, Waytz, and Cacioppo (2008) showed that learning that one would be likely to spend one's life in isolation increased belief in God and other super-natural agents. Also, Laurin, Schumann, and Holmes (2014) showed that threats to close relationships caused people to compensate by indicating greater closeness with God. What these studies have in common is that they tested whether people turn to religion in the face of social exclusion.

In the present investigation we build on this important work by directly testing whether a specific religious-based behavior, *prayer*, can promote recovery from ostracism. Whereas Aydin et al. (2010) primed religion generally by asking participants to write how it is relevant to their lives, we ask participants to write a prayer to their deity. Psychologically, prayer is a faith-based behavior — a personal communication with one's deity (Spilka & Ladd, 2013). Aydin et al. (2010) documented the effects of religiosity on aggressive behavior, but did not assess whether religion is sufficient to reduce psychological distress following exclusion. In the current research we answer this question by measuring psychological need satisfaction (Williams, 2009). We also consider individual differences in religiosity as a predictor of recovery from ostracism among participants who pray. If prayer is indeed an active expression of one's personal faith (Spilka & Ladd, 2013), then individual differences in religiosity should be related to prayer-focused coping, rather than other forms of coping.

3. Religious commitment

Indirect evidence for a relationship between trait religiosity and ostracism recovery is provided by the diary study mentioned earlier; not only does daily spirituality predict self-esteem and meaningfulness, but it does so especially well for those who are high in *trait* spirituality (Kashdan & Nezlek, 2012). We therefore examine the effect of prayer

across different levels of *religious commitment*. Drawing from interdependence theory (Kelley et al., 2003), recent research has mapped parallels between interpersonal commitment, and commitment to various aspects of one's religion (e.g., commitment to one's congregation, religious leader, or even God; Wesselmann, VanderDrift, & Agnew, 2015). Similar to interpersonal commitment, people vary in how committed they are to aspects of their religion (e.g., deity, denomination). That is, they vary in (a) intentions to remain with their religion, (b) psychological attachment to the religion, and (c) the degree to which they have a long-term orientation towards their religion. As with interpersonal commitment, commitment to various aspects of religion varies over time and is predicted by greater satisfaction with the relationship, greater investment in the relationship, and lower perceived quality of alternatives (Wesselmann, VanderDrift, et al., 2015).

In the present research we are concerned primarily with religious commitment to God, as the specific figure to whom people address their prayers. Religious commitment predicts whether people stay in their relationship with God, with those who are lower in religious commitment being more likely to abandon belief in a deity over a four-month period (Wesselmann, VanderDrift, et al., 2015, Study 3) and also over an eight-month period (Wesselmann, VanderDrift, et al., 2015, Study 4). Because commitment to God largely mirrors interpersonal commitment in other close relationships (i.e., it varies over time and is predicted by satisfaction, investment, and alternatives), we were interested in seeing if commitment to God interacts with the prayer intervention in predicting ostracism recovery.

4. Self-affirmation

Self-affirmation is another strategy that may promote recovery from ostracism. According to self-affirmation theory (C. M. Steele, 1988), people are motivated to maintain the integrity of the self. When one's integrity is threatened, self-affirmations can minimize the implications of the threat for the self, even when those affirmations are in a domain other than the self-threat (Sherman & Cohen, 2006). One of the more widely studied features of self-affirmation is its capacity to reduce defensiveness and increase open-mindedness (e.g.Correll, Spencer, & Zanna, 2004, Lehmiller, Law, & Tormala, 2010). However, self-affirmation has additional positive effects on well-being that make it a likely source of need fortification following ostracism. The specific needs that are addressed by self-affirmation likely depend on the domain in which the self is affirmed. Regardless, the overall act of self-affirmation provides emotional benefits that suggest it will be helpful in recovering from ostracism, as predicted by Richman and Leary's (2009) model of reactions to various forms of interpersonal rejection.

Self-affirmation can increase *belonging* by giving people a chance to emphasize their relationships with others. Sherman and Cohen (2006) note that in self-affirmation studies where participants are asked to rank the importance of various values, relationships with friends and family are consistently ranked highly. Self-affirmation can also indirectly increase belonging by giving people a chance to reflect on the importance of values that may be important to friends and family (C. M. Steele, 1988). Self-affirmations are theorized to serve the purpose of maintaining a positive self-image, and therefore offer a likely source of *self-esteem* (Sherman & Cohen, 2006). Like prayer, self-affirmation has been shown to improve *self-control* (Schmeichel & Vohs, 2009), even following social exclusion, especially when the values affirmed are self-transcendent (i.e., focused on topics such as caring relationships, empathy, and trust/openness; Burson, Crocker, & Mischkowski, 2012). Finally, by offering an opportunity to reflect on globally important values, self-affirmation reduces mortality salience and bolsters *meaningful existence* (Schmeichel & Martens, 2005).

Available evidence suggests that self-affirmation bolsters basic need satisfaction, even in the absence of ostracism. Two longitudinal experiments found that relative to a control group, those who experienced a self-affirmation intervention reported higher autonomy, competence, relatedness, and meaning in life (Nelson, Fuller, Choi, & Lyubomiersky, 2014). Given these benefits, it is reasonable to expect self-affirmation to speed recovery following ostracism, when needs have been threatened.

Further reason to expect that self-affirmation restores needs satisfaction following ostracism is provided by Knowles, Lucas, Molden, Gardner, and Dean (2010), who found that when people are presented with threats to belonging (by recalling a rejection experience), they are more likely to choose to affirm social (versus non-social) values. They also found that receiving negative feedback on a test of social aptitude had a similar effect, increasing the proportion of social (versus non-social) traits participants chose to write about. Further, participants who affirmed more social traits tended to derogate the test less, providing indirect evidence that the social affirmations had led to recovery. In the present research we build on this research by directly testing the effects of self-affirmation on the recovery of basic needs satisfaction following an actual ostracism experience. We also build on this research by directly comparing self-affirmation to other recovery strategies.

As with prayer, it is likely that people who are high in certain individual differences are especially responsive to self-affirmation following ostracism. However, the specific individual differences that matter likely depend on the specific value that is being affirmed (e.g., people high in the need to belong may respond to affirmations of relationships, while people high in achievement orientation may respond to affirmations of academics or finances). Because of this, in this initial investigation we focused only on a religion-relevant individual difference measure.

5. Research overview

To determine the relative effectiveness of prayer and self-affirmation in promoting recovery from ostracism we conducted three experiments in which participants were ostracized and reported immediate need satisfaction and affect prior to any intervention. Following this, participants engaged in prayer, self-affirmation, distraction, or no intervention, and then reported post-intervention needs satisfaction and affect. If prayer and self-affirmation have additional effects beyond mere distraction, then participants in these conditions will show more recovery relative not only to the no intervention condition, but also to the distraction condition. Additionally, religious commitment should be associated with different amounts of recovery in the prayer condition than in the other conditions. We also explore whether rumination is a possible mechanism explaining the effectiveness of not only distraction, but also prayer and self-affirmation.

6. Study 1

In Study 1 we began by examining the effects of two different interventions (prayer and self-affirmation) against a control (no intervention) condition in which participants were instructed to think about whatever was on their mind (which allows for rumination; Wesselmann, Ren, Swim, & Williams, 2013, Wesselmann, Wirth, et al., 2013).

6.1. Method

6.1.1. Participants and design

Participants were 179 introductory psychology students (69 males, $M_{Age} = 19.11$, $SD_{Age} = 2.02$) who had indicated in a prescreening survey that they were Christians (29.6% Roman Catholic, 19.6% Non-Denominational, 50.8% Other).[1] We did not conduct an a priori power analysis, but instead aimed to collect roughly 25 participants per

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[1] Three participants indicated at the time of the experiment that they were not Christian. The analysis reported here includes these three participants. The results are not appreciably different when they are omitted. The same is true of one participant in Study 2.

condition. Data were not observed prior to terminating collection. All measures and conditions are reported in this and subsequent studies. The experimental design was a 2 (inclusion status: ostracized, included) × 3 (intervention condition: prayer, self-affirmation, non-distracting control) × 2 (stage: pre-intervention, post-intervention) mixed design, with the first two factors between-S, and the second factor within-S.

6.1.2. Procedure

After reporting demographic information participants engaged in Cyberball, an online ball tossing game designed to manipulate ostracism (Williams, Cheung, & Choi, 2000). Participants were told that the purpose of the activity was to practice mental visualization skills by playing a virtual ball toss game online with two other players connected online. In reality the other players were virtual confederates programmed to either ostracize or include the participant based on condition. Participants in the ostracized condition received two throws at the beginning of the game and received no tosses thereafter. Participants in the inclusion condition received an equal number of throws compared to the other players throughout the experience. The game lasted 30 throws and took approximately 2 min to complete.

Immediately following Cyberball participants reported their pre-intervention needs satisfaction and affect. Following these measures, participants were randomly assigned to one of three different activities. Participants in the control condition were instructed, "People think about different things from moment to moment. Please take a moment to notice what you are thinking about right now. Then, in the space below, please write about what you are thinking." Those in the prayer condition read, "People pray frequently. Prayer comes in many forms, and people choose to pray about different things. Please take a moment to say a prayer in your heart. Then, in the space below, please write out the content of your prayer, addressed to the deity in whom you believe." Finally, those in the self-affirmation condition read, "People value various areas of their life differently. Some areas of life are especially important to some people. Select the area of your life from the drop-down list below that is most important to you. Please take a moment to think about why it is important to you personally. Then, in the space below, please write about why this value is important to you." Participants in the self-affirmation condition were able to select between "Finances/business" (5.4%), "Art/Music/Theater" (14.3%), "Social life/Relationships" (58.9%), and "Education/Pursuit of knowledge" (21.4%). Directly following the activity participants reported their current basic needs satisfaction and affect, followed by manipulation checks. After completing the measures participants were debriefed.

6.1.3. Measures

Pre-intervention needs satisfaction was measured with 12 items assessing belonging (e.g., "I felt like an outsider," reverse scored), self-esteem (e.g., "I felt good about myself") control (e.g., "I felt powerful") and meaningful existence (e.g., "I felt non-existent," reverse scored; Williams, 2009). These items were averaged to form a composite needs satisfaction index ($\alpha = .95$). Participants also reported pre-intervention positive affect with four items (good, friendly, pleasant, happy; $\alpha = .87$), and negative affect with four items (bad, unfriendly, angry, sad; $\alpha = .88$). Following the writing task, participants reported needs satisfaction ($\alpha = .93$; pre/post correlation = .14), positive affect ($\alpha = .92$; pre/post correlation = .27), and negative affect ($\alpha = .90$; pre/post correlation = .33) using the same items, but in reference to their current state (e.g., "I feel good about myself"). As a manipulation check participants rated the extent to which they were *ignored* during the game and *excluded* during the game. These two items were averaged together (Spearman–Brown r = .95). Participants also estimated the percentage of ball tosses they received. For all items responses were made on a scale from 1 (not at all) to 5 (extremely). See Table 1 for correlations between dependent variables.

6.2. Results

6.2.1. Manipulation checks

The ostracism manipulation was effective, with ostracized participants reporting being more ignored and excluded ($M = 4.37$, $SD = .96$) than included participants ($M = 2.00$, $SD = 1.08$), $t(177) = 15.59$, $p < .001$, $d = 2.31$. Ostracized participants also correctly reported receiving a smaller percentage of ball throws ($M = 8.17$, $SD = 5.78$) than included participants ($M = 30.86$, $SD = 9.11$), $t(176) = -19.89$, $p < .001$, $d = -2.97$.

6.2.2. Self-affirmation choices

Because the writing task came after the ostracism manipulation it is possible that being ostracized affected which topic participants chose to write about in the self-affirmation condition (the only condition for which there was a choice). We examined this possibility with a chi-square test of independence, testing the effect of the ostracism manipulation on topic choice within the self-affirmation condition. The test revealed that ostracism affected the value participants selected, $\chi^2 (3, N = 56) = 8.91$, $p = .03$. In included participants zero participants chose finance/business, 12.9% chose art/music/theater, 12.9% chose education/pursuit of knowledge, and 74.2% chose social life/relationships. In contrast, among ostracized participants 12% chose finance/business, 16% chose art/music/theater, 32% chose education/pursuit of knowledge, 40% chose social life/relationships. The noteworthy difference is that ostracized participants were less likely to select social life/relationships.

6.2.3. Written responses

For descriptive purposes two coders independently categorized each response for whether it mentioned Cyberball (kappa = .92), whether it made a request (kappa = .87), and whether it mentioned close others (kappa = .90). Participants were more likely to mention the game in the control condition (81%) than the prayer (1.7%) or self-affirmation conditions (0%), χ^2 (N = 179) = 127.09, $p < .001$. Participants made requests only in the prayer condition (85%), but not in the control (0%) or self-affirmation (0%) conditions, χ^2 (N = 179) = 141.45, $p < .001$. Finally, participants were more likely to mention close others in the prayer (61.7%) and self-affirmation conditions (62.5%) than in the control condition (18.2%), χ^2 (N = 179) = 21.98, $p < .001$.

6.2.4. Ostracism recovery

We assessed whether the interventions produced greater improvement of needs satisfaction, positive affect, and negative affect in a series of 2 (included versus ostracized) × 3 (prayer versus self-affirmation versus control) × 2 (pre-intervention versus post-intervention) mixed ANOVAs, with the last factor within-subjects (see Table 2 for means and standard deviations). This analysis revealed a 3-way interaction on needs satisfaction, $F(2, 173) = 3.90$, $p = .02$, $\eta_p^2 = .04$, such that the interventions lead to greater improvement for ostracized participants, 2-way interaction $F(2, 88) = 11.50$, $p < .001$, $\eta_p^2 = .21$, but not included participants, $F(2, 85) = .94$, $p = .39$, $\eta_p^2 = .02$ (see Fig. 1). Post hoc analyses (Tukey) revealed that among ostracized participants on the post-intervention measures, those who had prayed reported significantly greater needs satisfaction than those in the control condition, $p = .001$, $d = .85$. Self-affirmation also significantly improved needs satisfaction, $p = .02$, $d = .70$. There was no significant difference between ostracized participants who prayed compared to those who self-affirmed, $p = .78$, $d = .21$.[2]

The interventions had a similar effect on positive affect. There was a marginal 3-way interaction, $F(2, 173) = 2.94$, $p = .06$, $\eta_p^2 = .03$, in

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[2] Among ostracized participants in the self-affirmation condition, no particular self-affirmation topic lead to detectably greater recovery on any outcome, strongest effect $F(3, 21) = 1.49$, $p = .25$, $\eta_p^2 = .18$. Limited power prevents drawing strong conclusions about differences between topics.

Table 1
Correlations between main variables in Study 1.

Variables	2.	3.	4.	5.	6.	7.	8.	9.
1. Needs, pre-intervention	.73***	0.81***	.14	.03	−.21**	−.83***	.74***	−.07
2. Positive affect, pre-intervention		−.69***	.22**	.27***	−.24**	−.61***	.53***	−.05
3. Negative affect, pre-intervention			−.19*	−.04	.33***	.78***	−.60***	.07
4. Needs, post-intervention				.82***	−.79***	−.102	−.01	.13
5. Positive affect, post-intervention					−.70***	−.01	−.07	.11
6. Negative affect, post-intervention						.26***	−.10	−.04
7. Ignored/excluded							−.75***	.09
8. Percent of throws								−.03
9. Writing task sincerity								

* $p < .05$.
** $p < .01$.
*** $p < .001$.

which the prayer and self-affirmation lead to greater improvement for ostracized participants, $F(2, 88) = 14.97$, $p < .001$, $\eta_p^2 = .25$, than for included participants, $F(2, 85) = 3.65$, $p = .03$, $\eta_p^2 = .08$. Again, post hoc comparisons showed that ostracized participants who prayed or self-affirmed showed significant positive affect increases relative to the control group ($p = .002$, $d = .80$ and $p = .03$, $d = .74$, respectively), but neither intervention was more effective than the other, $p = .83$, $d = .17$.

Finally, the same 3-way interaction emerged for negative affect, $F(2, 173) = 3.53$, $p = .03$, $\eta_p^2 = .04$. The interventions produced improvement for ostracized participants, $F(2, 88) = 8.60$, $p < .001$, $\eta_p^2 = .16$, but not for included participants, $F(2, 85) = 1.14$, $p = .32$, $\eta_p^2 = .03$. Post hoc analyses showed that in ostracized participants, relative to the control condition prayer ($p = .02$, $d = −.64$) and self-affirmation ($p = .02$, $d = −.78$) each reduced negative affect. Again, neither the prayer nor the self-affirmation condition experienced a greater reduction of negative affect, $p = .97$, $d = −.07$.

6.3. Discussion

Study 1 demonstrates the effectiveness of prayer and self-affirmation in promoting recovery of basic needs and affective state following ostracism. Compared to ostracized participants who were allowed to write about what was on their minds (control condition), those who prayed or self-affirmed experienced significantly greater recovery of basic needs satisfaction and affect.

Unexpectedly, within the self-affirmation condition, ostracism decreased the likelihood of selecting "social life/relationships" as the life value to think about. This runs counter to theory and research that emphasize social reconnection following ostracism, including Knowles et al.'s (2010) finding that social rejection experiences actually *increased* the selection of social topics for self-affirmation. Alternatively, given that ostracism has been documented to produce aggression (Williams & Wesselmann, 2011) and disagreeableness (Hales, Kassner, Williams, & Graziano, 2014), it is possible that this effect is the result of ostracized participants seeking further disaffiliation (Ren, Wesselmann, & Williams, in press; Wesselmann, Williams, Ren, & Hales, 2014). From

this perspective, a likely reason for these discrepant findings is differences in the paradigms that were employed to induce ostracism/rejection (see Bernstein & Claypool, 2012). Cyberball-induced ostracism could be more threatening than the reliving of a previous rejection experience (from which one has presumably recovered in the past), or test feedback that one has poor social skills (which portends, but does not induce, social exclusion) and therefore produces a *flight* response (Wesselmann, Ren, et al., 2015).

Study 1 is an important first step in testing the effectiveness of prayer and self-affirmation; relative to participants who are left to think about what is on their minds, prayer and self-affirmation promoted recovery of basic needs satisfaction and affect. However, given that rumination has been shown to slow recovery of basic needs satisfaction after ostracism (Wesselmann, Ren, et al., 2013), in the following studies we tested these interventions against a condition in which participants were distracted. Additionally, because the effects of the two interventions were either non-significant or minimal in the inclusion condition, we dropped these conditions in the next studies. This fits with our primary goal in this research, which is to compare the effectiveness of different strategies among people who have been ostracized.

7. Study 2

In Study 2 we directly compared the effectiveness of prayer to the effectiveness of distraction following ostracism. Based on the literature demonstrating the relevance of religion and spirituality to all four of the basic needs, and also the results of Study 1, we expected prayer to promote recovery in comparison to a condition in which participants were distracted by thinking about the food in the most recent meal they ate.

7.1. Method

7.1.1. Participants and design

Participants were 53 introductory psychology students (20 males, $M_{Age} = 19.45$, $SD_{Age} = 1.01$). All participants indicated on a prescreening

Table 2
Reflexive and reflective ostracism outcomes by intervention in Study 1.

	Included			Ostracized		
	Needs	Positive affect	Negative affect	Needs	Positive affect	Negative affect
Reflexive (pre-intervention)						
Control	3.37[a] (.81)	3.23[a] (.90)	1.81[a] (.89)	2.06[a] (.78)	2.48[a] (.90)	2.90[a] (.82)
Prayer	3.46[a] (.82)	3.16[a] (.87)	1.85[a] (1.02)	1.68[a] (.63)	2.04[a] (.76)	3.12[a] (1.06)
Self-affirmation	3.47[a] (.55)	3.23[a] (.93)	1.70[a] (.78)	1.84[a] (.60)	2.01[a] (.67)	3.34[a] (.83)
Reflective (post-intervention)						
Control	3.68[a] (.81)	3.36[ab] (.93)	1.74[a] (.92)	3.42[a] (.99)	3.23[a] (1.04)	2.17[a] (1.00)
Prayer	4.05[a] (.54)	3.94[bc] (.93)	1.44[a] (.74)	4.16[b] (.75)	4.02[b] (.98)	1.58[b] (.90)
Self-affirmation	3.89[a] (.61)	3.64[c] (.88)	1.50[a] (.70)	4.01[b] (.63)	3.88[b] (.62)	1.52[b] (.60)

Note. $N = 25–33$ (per cell). Standard deviations are in parentheses. Responses on all scales are on a 1 (not at all)–5 (extremely) scale. For the three means within each stage and within each column, those not sharing a superscript are significantly different with Tukey post hoc corrections, $p < .05$.
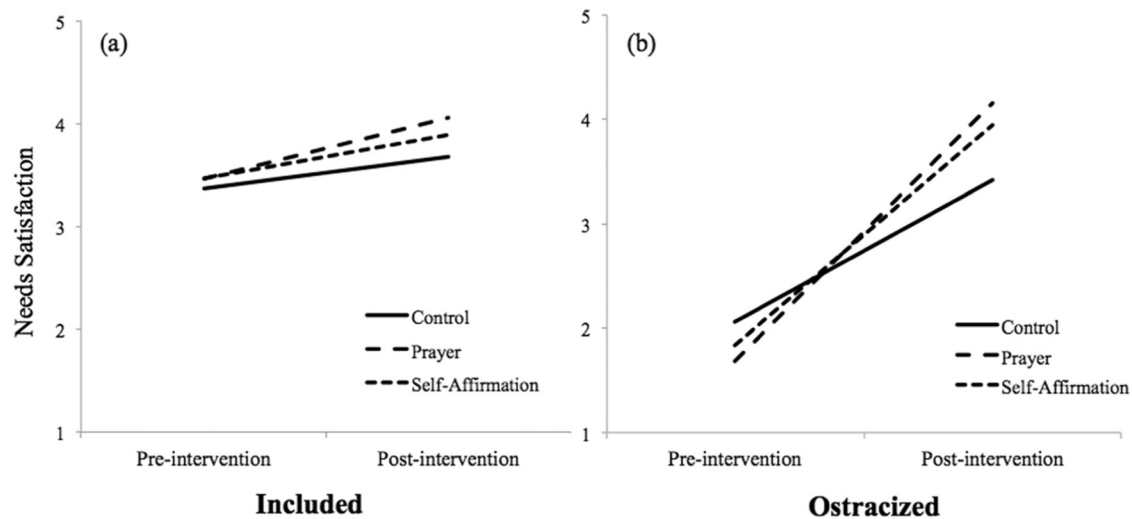
Fig. 1. Effects of prayer and self-affirmation on basic needs satisfaction following inclusion and ostracism in Study 1.

survey that they were Christians (35.8% Roman Catholic, 13.2% Non-Denominational, 51% Other). We did not conduct an a priori power analysis; the study was conducted at the end of the semester and so we ran as many participants as possible prior to the close of the semester. All participants were ostracized, and then randomly assigned to a prayer or control condition.

7.1.2. Procedure

The procedure was nearly identical to Study 1. All participants were ostracized in Cyberball. Instructions in the prayer condition were the same as those used in Study 1. Instructions in the distraction condition were as follows, "Food comes in many forms, and people choose to eat different things. Please take a moment to think about the last meal you ate. Then, in the space below, please describe in detail all of the things that you ate."

7.1.3. Measures

Needs satisfaction, positive affect, and negative affect were measured with the same items in Study 1 (all αs > .80; pre/post correlations range from .30 to .37). Because ostracism has been shown to lead to aggression against those who perpetrate the ostracism (Williams & Wesselmann, 2011), we also measured hostility towards the other players in both prior to the intervention in the reflexive stage (e.g., "I wanted to insult the other players" α = .82), and also following the intervention, in the reflective stage, (e.g., "I want to insult the other players" α = .83; pre/post correlation = .80). Finally, as manipulation checks, participants rated agreement with the statements "my response on the writing task was sincere," and "my response in the writing task was spiritually meaningful." Participants also responded to the same ostracism manipulation check items used in Study 1 (although ostracism was not manipulated). See Table 3 for correlations between measures.

7.2. Results

7.2.1. Manipulation checks

The two conditions did not differ in their ratings of how sincere their response was $t(51) = -.60$, $p = .55$, $d = -.17$, but participants in the prayer condition ($M = 3.97$, $SD = 1.12$) rated their responses as more spiritually meaningful than those in the distraction condition ($M = 2.29$, $SD = 1.33$), $t(51) = 4.97$, $p < .001$, $d = 1.39$.

7.2.2. Written responses

As in Study 1, responses were coded for whether they mentioned the game (Kappa = .88), made a request (Kappa = .96), and for whether

they mentioned close others (Kappa = .96). None of the participants in the distraction condition included these responses; instead, all participants described a recent meal without reference to the game, close others, or a request (in other words, they followed directions. However in the prayer condition, 17% mentioned the game, χ^2 (N = 53) = 4.57, $p = .033$, 86% made a request, χ^2 (N = 53) = 39.16, $p < .001$, and 31% mentioned close others, χ^2 (N = 53) = 8.97, $p = .003$.

7.2.3. Ostracism recovery

Results were analyzed in series of 2 (prayer versus distraction) × 2 (pre-intervention versus post-intervention) mixed ANOVAs. The intervention had no effect on recovery of basic needs, positive affect, negative affect, or hostility, all interaction $Fs < 1$, all $ps \leq .33$, and all η_p^2s ≤ .02 (see Table 4 for means and standard deviations). There was a significant interaction between condition and gender on the post-intervention hostility measure, $F(1, 49) = 8.10$, $p = .006$, $\eta_p^2 = .14$, such that prayer reduced hostility for males, $t(18) = 2.89$, $p = .01$, $d = .96$, but not for females, $t(31) = -1.08$, $p = .29$, $d = -.28$.

7.3. Discussion

Unlike Study 1, in which prayer was compared with a non-distracting control condition, in Study 2 prayer did not produce a detectable improvement in recovery on any of the four outcome variables, with the exception of hostility, which was reduced by prayer in males. Our initial hypothesis when executing Studies 1 and 2 was that prayer and self-affirmation would be beneficial above and beyond the effects of distraction. In light of the finding that prayer produces a benefit, but only compared to a non-distracted control condition, it is plausible that benefits of prayer and self-affirmation operate by directing attention away from the ostracism event. Alternatively, prayer and self-affirmation may be equally effective as distraction, but promote recovery through different mechanisms.

It has been noted that distraction may be an especially important component of reflective recovery from ostracism, given the negative consequences of rumination (Zadro et al., 2006). Rumination, or passively perseverating on a distressing event, is associated with negative consequences including depression, negative thinking, aggression, and reduced social support (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Pedersen et al., 2011). Research indicates that distraction can combat rumination and its subsequent effects. In one experiment, for example, participants recalled a memory that produced feelings of anger. This anger dissipated more quickly for participants who were randomly assigned to a distracting writing task (describing the layout

Table 3
Correlations between main variables in Study 2.

Variables	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Needs, pre-intervention	.78***	−.77***	−.47***	.36**	.25	−.32*	−.26	−.67***	.15	.06	.03
2. Positive affect, pre-intervention		−.75***	−.44**	.46**	.30*	−.35*	−.24	−.64***	.04	.17	−.07
3. Negative affect, pre-intervention			.61***	−.39**	−.23	.37**	.36**	.62***	−.07	.13	−.04
4. Hostility, pre-intervention				−.22	−.33*	.35*	.80***	.42**	.11	−.35**	−.09
5. Needs, post-intervention					.68***	−.61***	−.24	−.29*	−.12	.28	.13
6. Positive affect, post-intervention						−.72***	−.34*	−.27*	−.23	.30*	.09
7. Negative affect, post-intervention							.39**	.21	−.01	−.27*	.01
8. Hostility, post-intervention								.26	.10	−.43**	−.24
9. Ignored/Excluded									<.01	−.20	−.17
10. Percent of throws										.06	.12
11. Writing task sincerity											.31*
12. Writing task spiritual meaning											

* $p < .05$.
** $p < .01$.
*** $p < .001$.

of a college campus) than a ruminative writing task (describing the causes and consequences of the event; Denson, Moulds, & Grisham, 2012). Anger is an important outcome of ostracism (Williams, 2009), so this finding suggests that distraction itself should be at least partially effective in promoting recovery from ostracism. Accordingly, Wesselmann, Ren, et al. (2013) found that (1) participants naturally tend to ruminate following ostracism, and (2), interrupting this rumination with a distracting task speeded recovery of need satisfaction.

Based on this finding, we asked whether prayer and self-affirmation offer a benefit above and beyond distraction. It is possible that, for the reasons outlined earlier, prayer and self-affirmation are especially powerful tools for recovering basic needs satisfaction and affective state following ostracism. Alternatively, it may be that *any* activity that distracts one from the ostracism event is sufficient to aid recovery. In this case, any additional benefits of prayer and self-affirmation would be rendered redundant by the power of distraction, which would be consistent with the findings from Study 2. Finally, all three interventions may provide the same *amount* of recovery of basic needs satisfaction and affect, but differ in the *mechanism* through which recovery is achieved. In this case rumination should mediate the effect of the distraction intervention, but not the other two interventions, for which the effects should remain significant after controlling for rumination.

Because our original expectation was that prayer and self-affirmation would lead to greater recovery, even in comparison to distracted participants, neither Study 1 nor Study 2 contained all conditions of interest. We consider the cross-study comparisons to be highly informative: we see that ostracized participants who pray or self-affirm experience more recovery of basic needs satisfaction and affect when compared to participants who are allowed to think about the game (Study 1), but not when compared to participants who were distracted (Study 2). However, aware of the limitations of such cross-study comparisons, in Study 3 we sought to replicate these effects in a single study in which ostracized participants were randomly assigned to

pray, self-affirm, distract, or were allowed to think about the game as they naturally would (non-distracting control condition).

Prior research has found that writing essays about comfort food buffered feelings of loneliness following a threat to belongingness (Troisi & Gabriel, 2011; Study 2). This seems to raise the possibility that the distraction condition produced similar recovery of basic needs satisfaction and positive affect as the prayer condition not because it was distracting, but instead because of emotional benefits of writing about food. We consider this unlikely. The documented beneficial effects of writing about food are unique to (1) foods that the individual considers to be comforting and (2) individuals who are insecurely attached (Troisi & Gabriel, 2011). In Study 2 participants were instructed to write specifically about the last meal that they ate. There is no reason to believe that the most recent meal happened to be comfort food for any substantial proportion of participants, or that the sample included an unusually large number of insecurely attached individuals.

One explanation for the observations that prayer does not produce significantly greater benefit compared to self-affirmation (Study 1) or distraction (Study 2) is that the benefits of prayer are only experienced by participants who are highly committed to God (Wesselmann, VanderDrift, et al., 2015). To address this possibility, in Study 3 we measured participants' commitment to God as a moderating variable.

Finally, in Study 1 the act of choosing a valued area of life was confounded with condition: only participants in the self-affirmation condition made a selection (those in the prayer or distraction conditions were offered no choice in what to write about). One concern is that by choosing a value from among multiple options, participants were exerting influence over the subsequent task, which itself may have refortified their need for control. Research has shown that refortified control can affect responses to ostracism (Warburton, Williams, & Cairns, 2006). Allowing participants to select a value is generally ideal for testing hypotheses related to self-affirmation, and is how self-affirmation manipulations are typically implemented (e.g., Lehmiller et al., 2010). However, for this particular research it could potentially explained why self-affirmation was effective. If affirmation continues to be effective even when participants do not exercise control by selecting their writing topic, then there is stronger evidence for the effectiveness of the affirmation. Because of this, in Study 3 we chose to have all participants write about the most commonly selected value (social life/relationships). Having all participants write about the same affirmation topic has the advantage of removing sense of control as a confound that could potentially explain our results. However, it constrains the breadth of topic participants write about, and also limits the extent to which the topic represents *self*-affirmation (two factors which might make the intervention less effective). Because the value was not designated by participants as self-important, we refer to this as a *social*-affirmation intervention.

Table 4
Reflexive and reflective ostracism outcomes by intervention in Study 2.

	Needs satisfaction	Positive affect	Negative affect	Hostility
Reflexive (pre-intervention)				
Distraction	2.01 (.63)	2.07 (.67)	3.28 (.96)	2.30 (.73)
Prayer	2.23 (1.00)	2.15 (.94)	3.07 (1.11)	2.24 (.99)
Reflective (post-intervention)				
Distraction	3.66 (.88)	3.58 (1.11)	1.77 (.95)	1.87 (.65)
Prayer	3.80 (.83)	3.69 (.85)	1.85 (.83)	1.75 (.76)

Note. $n = 24$–29 (per cell). Standard deviations are in parentheses. Responses on all scales are on a 1 (not at all)–5 (extremely) scale. There were no significant differences between the distraction and prayer conditions, all $|ts| < 1$, all ps ≤ .37, strongest $d = .21$.

8. Study 3

8.1. Method

8.1.1. Participants and design

Participants were 166 introductory psychology students who indicated that they had a religious preference[3] (92 males, $M_{Age} = 19.51$, $SD_{Age} = 1.39$). The sample was primarily Christian ($N = 154$), but also included Buddhists ($N = 5$), Hindus ($N = 3$), Muslims ($N = 2$), and Jews ($N = 2$). A power analysis was not conducted a priori. The data were examined after 84 responses, and the interaction effect between condition and religious commitment was suggestive but not significant, $F(3, 79) = 1.87$, $p = .142$, $\Delta R^2 = .05$. We added a second interval of data collection giving a final sample of 166. All participants were ostracized during Cyberball, and then randomly assigned to one of four conditions: prayer, social-affirmation, distraction, and non-distraction control.[4]

8.1.2. Procedure

As in Studies 1 and 2, participants played Cyberball immediately before reporting pre-intervention needs satisfaction, positive affect, and negative affect (pre/post correlations range from .13 to .39). Next participants completed the intervention manipulation. The instructions for the prayer, social-affirmation and control conditions were the same as those used in Study 1, with the exception of the social-affirmation condition. Instead of selecting from a list of values, participants were given the following instructions: "Relationships come in many forms and people chose to focus on different types of relationships. Please take a moment to think about why social life and relationships are important to you. Then, in the space below, please write about why this value is important to you." The instructions for the distraction condition were the same as those used in Study 2. Participants then completed post-intervention measures of ostracism outcomes and manipulation checks. Next participants completed a set of questions measuring rumination, which we included to verify that participants in the prayer, social-affirmation, and distraction conditions were ruminating less than those in the control condition. Finally, participants reported their levels of commitment to God.

8.1.3. Measures

We used the same items as earlier studies to measure needs satisfaction (pre-intervention $\alpha = .93$, post-intervention $\alpha = .95$), positive affect (pre-intervention $\alpha = .87$, post-intervention $\alpha = .92$), and negative affect (pre-intervention $\alpha = .84$, post-intervention $\alpha = .90$). Similarly, as manipulation checks participants reported how ignored and excluded they were during the game (Spearman-Brown $r = .89$), and estimated the percentage of ball tosses they received. They also rated their agreement with the statements, "My response on the writing task was sincere," and "My response in the writing task was spiritually meaningful."

Rumination was then assessed with four items: (1) "During the writing task I was still focused on the game," (2) "During the writing task I couldn't get my mind off the game," (3) "During the writing task I was thinking about topics other than what happened in the game," (reversed) and (4) "During the writing task I couldn't stop going over in my mind what happened during the game" ($\alpha = .81$). Finally, commitment to God was measured with six items (e.g., "I am committed to maintaining my relationship with God"; Wesselmann, VanderDrift, et al., 2015; $\alpha = .94$). See Table 5 for correlations between measures.

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[3] Participants who indicated in an initial demographics questionnaire that they were atheists, agnostics, or "no preference" were redirected to an alternative experiment.

[4] We also collected a control condition of 21 participants who were included in Cyberball and performed the non-distraction control writing task. When this condition is included in the ANOVA models described below the results remain significant, all interaction ≥ Fs ≥ 5.97, all ps ≤ .001, and all η_p^2s ≥ .09. Because this condition is not directly relevant to our hypotheses it is not discussed further.

8.2. Results

8.2.1. Manipulation checks

There were no differences between intervention conditions in how much participants reported being ignored and excluded, $F(3, 162) = 1.15$, $p = .33$, $\eta_p^2 = .02$, or in the estimates of percentage of ball tosses received ($M_{control} = 14.73$, $SD = 11.91$; $M_{prayer} = 12.24$, $SD = 13.26$; $M_{social-affirmation} = 11.94$, $SD = 10.14$; $M_{distraction} = 9.20$, $SD = 9.28$), $F(3, 159) = 1.66$, $p = .18$, $\eta_p^2 = .03$ (recall that ostracism was held constant in this study). Participants did not differ in their self-reported sincerity across conditions, $F(3, 162) = .37$, $p = .77$, $\eta_p^2 < .01$. They did differ in the ratings of how spiritually meaningful their responses were, $F(3, 162) = 27.56$, $p < .001$, $\eta_p^2 = .34$. The prayer ($M = 4.12$, $SD = 1.01$) and social-affirmation ($M = 3.98$, $SD = .79$) conditions did not differ from each other, $p = .93$, $d = .16$, but were each higher than the distraction ($M = 2.37$, $SD = 1.20$), ps < .001, ds ≥ 1.61 and control conditions ($M = 2.74$, $SD = 1.24$) ps = .001, ds ≥ 1.19. The control and distraction conditions were not significantly different, $p = .37$, $d = -.31$.

Reports of rumination varied between conditions, $F(3, 162) = 22.73$, $p < .001$, $\eta_p^2 = .29$, but the effect was entirely the result of more reported rumination in the control condition. Participants in the control condition ($M = 3.01$, $SD = 1.08$) reported ruminating more than those in the prayer ($M = 1.83$, $SD = .91$), social-affirmation ($M = 1.73$, $SD = .62$), or distraction ($M = 1.74$, $SD = .68$), conditions, ps < .001, $|d|$s ≥ 1.19 (none of which were significantly different from each other, ps ≥ .946, $|d|$s ≥ .13).

8.2.2. Written responses

Nearly all participants in the control condition mentioned the game (90%), compared to very few in the prayer (7.3%), social-affirmation (2.4%), and distraction (0%) conditions, χ^2 (N = 166) = 113.42, $p < .001$ (Kappa = .98). The only participants to issue requests were in the prayer condition (92.7%), χ^2 (N = 166) = 150.25, $p < .001$ (Kappa = .89). Participants in the prayer (48.8%) and social-affirmation (68.63%) were more likely to mention close others than those in the distraction (7.3%) or control condition (9.3%), χ^2 (N = 166) = 50.76, $p < .001$ (Kappa = .76).

8.2.3. Ostracism recovery

Replicating the findings from Studies 1 and 2, prayer, social-affirmation, and distraction all lead to greater recovery relative to the control condition as indicated by a significant interaction between condition and stage for needs satisfaction, $F(3, 162) = 6.28$, $p < .001$, $\eta_p^2 = .10$ (see Fig. 2), positive affect, $F(3, 162) = 5.53$, $p = .001$, $\eta_p^2 = .09$, and negative affect, $F(3, 162) = 4.59$, $p = .004$, $\eta_p^2 = .08$. One-way ANOVAs with Tukey post hoc comparisons on post-intervention needs satisfaction, positive affect, and negative affect revealed that greater recovery occurred for participants in each of the intervention conditions relative to the control condition (see Table 6).

8.2.4. Commitment to God

We used a regression-based analysis to test commitment to God as a continuous moderating variable in interaction with condition (Aiken & West, 1991). We represented ostracism recovery by calculating difference scores between post-intervention measures and pre-intervention measures (except for negative affect, in which the difference was reversed so that higher scores indicate greater recovery for all three outcomes). We represented the intervention condition with three dummy codes comparing the control condition (reference group) to the prayer condition (dummy code 1), the social-affirmation condition (dummy code 2), and the distraction condition (dummy code 3). We centered commitment to God and multiplied it by each dummy code, producing three interaction terms. We then conducted a two-step hierarchical regression analysis (see Table 7). The first step tested the effects of condition and commitment to God. Consistent with the analysis above, each

Table 5
Correlations between main variables in Study 3.

Variables	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Religious commitment	−.05	.09	.02	.26**	.23**	−.20**	.05	.01	.23**	.22**	−.08
2. Needs, pre-intervention		.69***	−.68***	.13	.01	−.14	−.84***	.74***	−.01	−.05	−.05
3. Positive affect, pre-intervention			−.61***	.22**	.27***	−.19*	−.58***	.48***	.09	.03	−.03
4. Negative affect, pre-intervention				−.24**	−.05	.39***	.64***	−.52***	<.01	.03	.11
5. Needs, post-intervention					.71***	−.78***	.11	.08	.04	.11	−.37***
6. Positive affect, post-intervention						−.63***	<.01	−.05	.06	.20**	−.26**
7. Negative affect, post-intervention							.15	−.08	−.11	−.08	.35***
8. Ignored/excluded								−.77***	.02	.06	.04
9. Percent of throws									−.01	.01	−.02
10. Writing task sincerity										.30***	.05
11. Writing task spiritual meaning											−.17*
12. Rumination											

* $p < .05$.
** $p < .01$.
*** $p < .001$.

dummy code was significant, demonstrating effects of condition; participants in each intervention condition experienced greater needs satisfaction recovery than those in the control condition. The effect of commitment to God was also significantly associated the greater needs satisfaction recovery.

The second step revealed that these main effects were qualified by an interaction (see Fig. 3); adding the three interaction terms to the model significantly increased the explained variance, $F(3, 158) = 3.69, p = .026, \Delta R^2 = .05$.[5] An examination of the individual interaction terms reveals that commitment to God is more predictive of needs satisfaction improvement in the prayer condition than in the control condition, $b = .84, t(158) = 2.89, p = .004$. In contrast, commitment to God was not significantly more predictive of needs satisfaction improvement in the social-affirmation condition, $t < 1$, or the distraction condition, $b = .53, t(158) = 1.82, p = .07$.

We performed follow-up tests of the simple slopes within each condition. Religious commitment was most predictive of recovery in the prayer condition, $b = .74, t(158) = 3.31, p = .001$, but also marginally predicted recovery in the distraction condition, $b = .43, t(158) = 1.93, p = .056$. Religious commitment did not, however, predict recovery in the social-affirmation condition, $b = .10, t(158) = .45, p = .653$, or control condition, $b = −.10, t(158) = −.52, p = .604$.

To test whether prayer is especially effective for highly religiously committed individuals, we also performed simple effects of condition at high ($+1$ SD; 4.99) and low ($−1$ SD; 3.41) levels of religious commitment. Among highly religiously committed individuals the prayer intervention increased recovery relative to the control condition, $b = 1.45, t(158) = 4.31, p < .001$, but not the distraction condition, $b = −.18, t(158) = −.54, p = .593$, or social-affirmation condition, $b = −.42, t(158) = −1.31, p = .194$. In low religiously committed individuals, those in the prayer condition did not differ significantly from any other group, strongest $b = −.60, t(158) = −1.62, p = .106$.

Commitment to God did not have an interactive effect with condition in predicting positive affect, $F(3, 158) = 1.00, p = .40$, or negative affect, $F(3, 158) = 1.18, p = .32$.

8.2.5. Mediation analyses

Although rumination was measured after the primary outcome measures, we performed a set of mediation analyses to explore

rumination as a plausible mechanism underlying the effectiveness of each intervention. For each mediation analysis (performed using Process, model 4; Hayes, 2013), we entered a dummy code contrasting an intervention condition with the control condition as an independent variable to predict rumination (mediating variable) and subsequent needs improvement (dependent variable). As shown in Fig. 4, rumination was reduced to roughly the same extent by prayer, $b = −1.18, t(82) = −5.37, p < .001$, social-affirmation, $b = −1.28, t(82) = −6.60, p < .001$, and distraction, $b = −1.26, t(82) = −6.35, p < .001$. In the prayer and social-affirmation conditions rumination did not go on to predict needs recovery, $b = −.02, t(81) = −.17, p = .862$, and $b = −.13, t(81) = −.99, p = .327$ respectively. However, in the distraction condition rumination did marginally predict less needs recovery, $b = −.24, t(81) = −1.88, p = .063$. Tests of the indirect effects were not significant for prayer or social-affirmation, but were significant for rumination (see Fig. 4 for 95% CIs).

The same analyses performed on improvements in positive and negative affect showed generally similar results. Rumination was not associated with positive affect in the prayer condition, $b = .04, t(81) = .39, p = .696$, or social-affirmation condition, $b = −.09, t(81) = −.67, p = .507$, and the corresponding indirect effects were not significant, .13, CI [−.37, 20], and .12, CI [−.24, .48], respectively. In the rumination condition, however, greater rumination was associated with marginally less positive affect improvement, $b = −.23, t(81) = −1.86, p = .067$, however, the indirect effect was not significant, .29, CI [−.07, 70]. Similarly, rumination did not predict negative affect in the prayer condition, $b =$
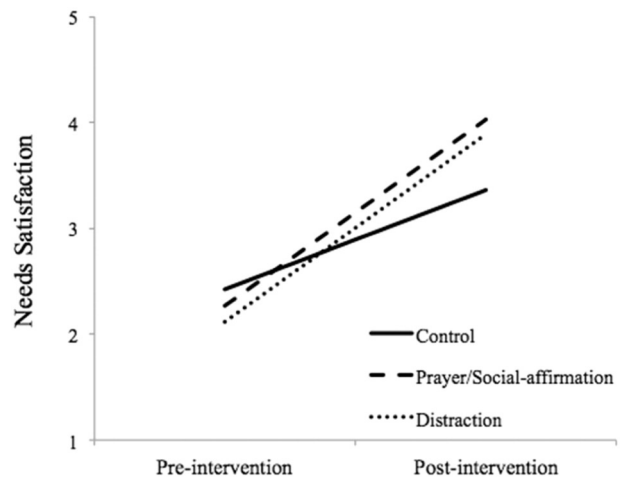
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[5] Following recommendations of Sagarin, Ambler, and Lee (2014), to account for optional stopping we calculated adjusted alpha levels for the final (full sample) interaction test, $p_{augmented} = [.057, .065]$. The first number represents the adjusted alpha level assuming that collection would not have continued if the initial p value had been any less promising. The second number represents the adjusted alpha assuming that data collection would have continued regardless of the initial p value. In other words, under the most pessimistic assumptions, $p = .065$. Also, in a separate post-hoc analysis that excluded the 12 non-Christian participants this interaction was not significant, most likely reflecting a reduction in power, $F(3, 146) = 2.33, p = .077, \Delta R^2 = .04$.

Fig. 2. Effects of prayer, social-affirmation, and distraction on basic needs satisfaction following ostracism in Study 3. Note that both means for the prayer and social-affirmation conditions were nearly identical (differing by only .03 scale points), so for graphing purposes they are represented with one line.

Table 6
Reflexive and reflective ostracism outcomes by intervention in Study 3.

	Needs	Positive affect	Negative affect
Reflexive (pre-intervention)			
Control	2.42[a] (1.02)	2.60[a] (.99)	2.66[a] (1.09)
Prayer	2.27[a] (.91)	2.47[a] (.82)	2.77[a] (1.17)
Social-affirmation	2.24[a] (.89)	2.50[a] (1.04)	2.62[a] (1.04)
Distraction	2.11[a] (.85)	2.42[a] (.82)	2.82[a] (.93)
Reflective (post-intervention)			
Control	3.36[b] (1.02)	3.19[b] (1.02)	2.13[b] (1.00)
Prayer	4.02[a] (.53)	3.81[a] (.77)	1.56[a] (.74)
Social-affirmation	4.04[a] (.71)	3.77[a] (1.02)	1.51[a] (.66)
Distraction	3.89[a] (.68)	3.87[a] (.76)	1.58[a] (.69)

Note. $n = 41$–43 (per cell). Standard deviations are in parentheses. Responses on all scales are on a 1 (not at all)–5 (extremely) scale. For the three means within each stage and within each column, those not sharing a superscript are significantly different with Tukey post hoc corrections, $p < .05$.

.06, $t(81) = .61$, $p = .546$, or the social-affirmation condition, $b = -.15$, $t(81) = -1.23$, $p = .222$, nor were the indirect effects significant, $-.08$ [$-.33$, .24], and .19 [$-.08$, 59], respectively. However, in the distraction condition rumination was associated with less negative affect recovery, $b = -.29$, $t(81) = -2.51$, $p = .014$, and did significantly mediate the effect of the distraction intervention, .37, CI [.12, .82].

8.3. Discussion

Study 3 replicated the general pattern of findings from Study 1 and Study 2, and did so in a single randomized design. All three interventions were effective in promoting recovery of basic needs satisfaction and mood. Moreover, religious commitment to God was especially predictive of recovery of basic needs satisfaction in the prayer condition.

It is noteworthy that commitment to God did not moderate the effects of interventions on either positive or negative affect. It seems, rather, that prayer helped highly committed people to restore belonging, self-esteem, control, and meaningful existence. This is consistent with theorizing that religion is especially well-suited to address threats to these four needs (Wesselmann & Williams, 2010), although, in contrast to research documenting overall benefits of spirituality (Kashdan & Nezlek, 2012) it seems not to be an overall boost for general well-being as indicated by the lack of moderation of affect measures.

We expected prayer to be especially effective for those who were highly committed to God. This was not supported by the simple effects tests; among highly committed individuals those in the prayer condition did not recover needs satisfaction more than those in the other intervention conditions. Instead what we see is that commitment to God was associated with greater needs satisfaction recovery in the prayer condition, but not the social-affirmation or control conditions.

Table 7
Hierarchical multiple regression analysis predicting needs satisfaction recovery from the intervention condition and its interaction with commitment to God.

|	Model 1			Model 2		
Predictor:	b	t value	p	b	t value	p
Step 1						
Prayer v. control (DC 1)	.75	3.15	.002	.79	3.35	.001
Social-affirmation v. control (DC 2)	.78	3.29	.001	.87	3.70	<.001
Distraction v. control (DC 3)	.78	3.30	.001	.85	3.63	<.001
Commitment to God	.25	2.33	.02	−.10	−.52	.64
Step 2						
DC 1 × commitment to God				.84	2.89	.004
DC 2 × commitment to God				.20	.68	.50
DC 3 × commitment to God				.53	1.82	.07
R^2	.13	F = 6.19	<.001	.18	F = 5.04	<.001
R^2 change				.05	F = 3.16	<.001
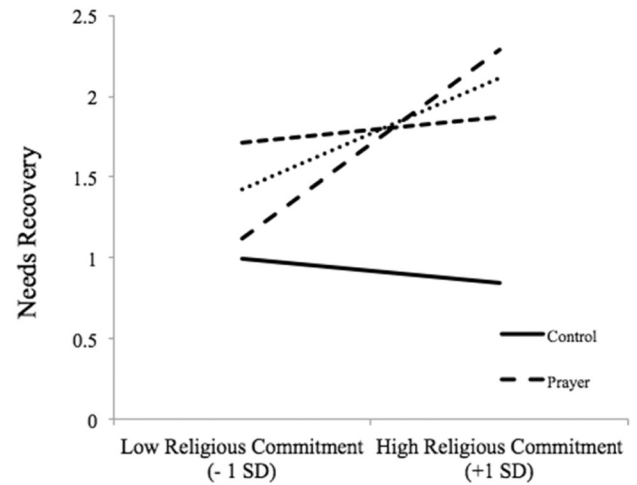
Fig. 3. The relationship between religious commitment and needs recovery (post-intervention score − pre-intervention score) each condition in Study 3.

It seems that among those who pray, greater benefits can be expected by the more committed believers. Interestingly, we also found that commitment to God was also marginally ($p = .056$) predictive of needs satisfaction recovery in the distraction condition, when people were thinking and writing about food. It is unclear to us why this might be the case. Regardless of the meaning of this finding, Study 3 provides compelling evidence that religious commitment predicts recovery following prayer.

Study 3 also provides an indication that the distraction intervention operates by successfully reducing the amount of rumination following an ostracism episode. Importantly, the direct effects of the prayer and social-affirmation interventions remained significant after controlling for rumination (see Fig. 4), suggesting that they operate through alternative mechanisms. Although they were not designed to, it is possible that the rumination items also measured more thoughtful and productive forms of processing about the game. However, we consider this unlikely given that rumination tended to be associated with less, rather than more recovery.

9. General discussion

Together, the present studies demonstrate the effectiveness of three interventions following an ostracism episode. Relative to participants who were allowed to think and write about whatever was on their mind, those who prayed, socially affirmed, or engaged in distraction experienced greater recovery of their basic needs satisfaction and affect. Moreover, religious commitment was especially predictive of needs satisfaction recovery when participants had the opportunity to pray.

This is an important first step in developing strategies to help people manage the pain of ostracism. Unlike earlier research that documents that the amount of recovery varies by contextual factors (e.g., Wirth & Williams, 2009), or individual differences (e.g., Zadro et al., 2006), or training interventions that precede ostracism (Molet et al., 2013), here we show that specific strategies can be employed to boost recovery of basic needs satisfaction and affective state in the wake of a painful ostracism experience.

Despite good reasons to expect prayer and affirmation to be especially effective, they did not produce more recovery than distraction (for either needs satisfaction or affective state). However, mediation analyses suggest they operate through mechanisms different from rumination. Future research should identify how each intervention promotes recovery.

For example, prayer may provide a sense of belonging by making people feel like they are involved in communication with a loving and personal deity. Research suggests that connections with a deity often
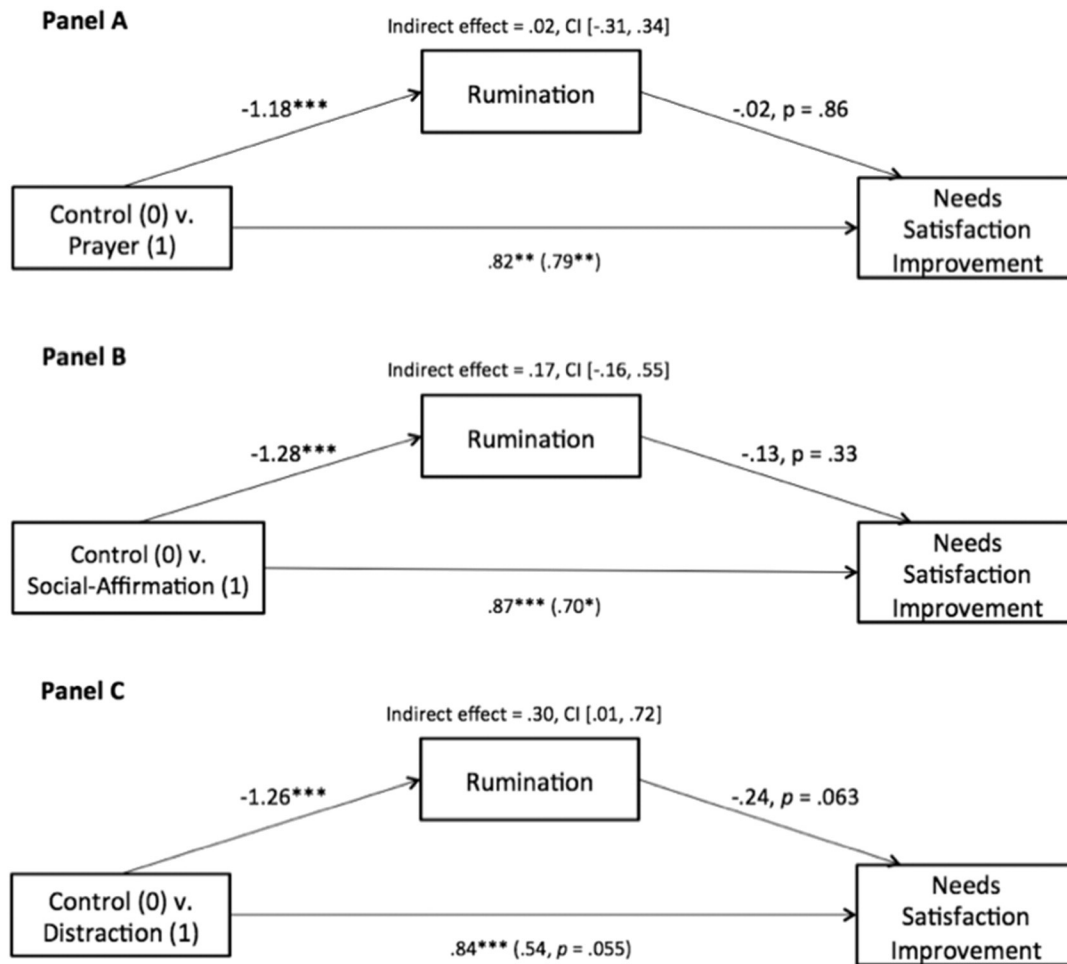
Panel A

Indirect effect = .02, CI [-.31, .34]

Panel B

Indirect effect = .17, CI [-.16, .55]

Panel C

Indirect effect = .30, CI [.01, .72]

Fig. 4. Tests of rumination as a mediator of the effect of each intervention compared to the control condition. The betas in parentheses represent the value when rumination is included in the regression.* $p < .05$. **$p < .01$. ***$p < .001$.

mirror dynamics in close interpersonal relationships (Kirkpatrick, 2005; Wesselmann, VanderDrift, et al., 2015). In this sense, prayer may resemble engagement in a parasocial relationship, which likely promotes recovery from exclusion (Gardner et al., 2005). Indeed, psychological research on prayer generally considers it a *social* behavior: communication between individuals and their deity (Spilka & Ladd, 2013).

Similarly, prayer, and religion more generally, might increase self-esteem by making people feel accepted by a community. According to the sociometer account of self-esteem, people feel greater self-esteem when provided with cues that they are accepted (Leary, 2005). Religion generally provides opportunities to receive positive social cues from members of the religious community. Consistent with this reasoning, diary research shows that on days when people experience greater spirituality they also experience greater self-esteem (Kashdan & Nezlek, 2012).

Self-affirmation might work through different mechanisms. Assuming that the affirmed value is important to the self, feelings of self-worth or integrity may be the general pathway through which self-affirmation promotes recovery (Sherman & Cohen, 2006). Self-affirmation may also bolster meaningful existence through a process of *fluid compensation*. According to the meaning maintenance model (Heine, Proulx, & Vohs, 2006) threats to one's sense of meaning in a particular domain can be alleviated through affirmations of meaning even in unrelated domains.

These strategies may also differ in their effects on longterm recovery. If prayer and self-affirmation work by directly addressing the threaten needs, recovery may be long-lasting. Distraction, on the other hand, may simply postpone the inevitable distress of ostracism, rendering

ostracized individuals vulnerable to rebound effects. It also leaves them less prepared to cope with future ostracism. Research should directly test the mechanisms through which prayer, self-affirmation, and distraction promote recovery, and assess whether they provide longer lasting recovery.

It is important to note that these strategies operate in the reflective stage, rather than the reflexive stage (Williams, 2009). We think that the reflective stage is the optimal point of intervention. Although it is possible to numb the reflexive pain of ostracism, this approach has two serious drawbacks. First, it may require chemical interventions with potentially harmful side effects (i.e., marijuana, acetaminophen or alcohol; Deckman, DeWall, Way, Gilman, & Richman, 2014; DeWall, MacDonald, et al., 2010; DeWall, Twenge, et al., 2010; Hales, Williams, & Eckhardt, 2016). Second, the reflexive pain of ostracism is adaptive. By shutting down this important signal, people risk failing to recognize situations in which their behavior needs to be corrected (Wesselmann, Nairne, et al., 2012). This is likely to produce continued or escalated ostracism. Additionally, we tested the effectiveness of prayer, affirmation, and distraction *after* the ostracism had occurred, and found an ameliorative effect. Future research can explore whether there is any protective benefit to these activities if engaged in *before* ostracism occurs. The mindfulness training used by Molet et al. (2013) preceded ostracism, and yielded the benefit of faster recovery, although it did not reduce the reflexive need threat. It may well be that prayer and self-affirmation can reduce the sting of ostracism after it occurs, but do little to reduce the pain of an impending ostracism event. Such a pattern would mirror research showing that social inclusion produces better

outcomes if it follows ostracism, but does not provide a protective benefit if it precedes ostracism (Tang & Richardson, 2013).

This research also further demonstrates the predictive utility of commitment to God. It seems that people who are highly committed to God are not only more likely to maintain belief in God (Wesselmann, VanderDrift, et al., 2015), but they also enjoy greater benefits from prayer following ostracism. We do note, however, that our instructions did not explicitly direct non-Christian participants to substitute the name "God" with the deity in which they believe. We recommend that future researchers take this step.

Three limitations are worth noting in this research. First, while we investigated the role of an individual difference related to prayer (religious commitment; Wesselmann, VanderDrift, et al., 2015), we did not explore the role of individual differences related to either distraction (such as the dispositional tendency to ruminate; Treynor, Gonzalez, & Nolen-Hoeksema, 2003), or self-affirmation (such as self-integrity, Sherman & Cohen, 2006; or, alternatively, characteristics corresponding to the specific value being affirmed). Based on our reasoning, any stable trait that corresponds to an important value may moderate the effects of self-affirmation.

Second, in our control condition participants were directly instructed to write about what was on their minds, which could have caused participants to ruminate. Prior research has found that people naturally tend to ruminate following ostracism (Wesselmann, Ren, et al., 2013), so participants in this condition likely behaved as they would have without any instructions, especially since no other distracters were present. However for future research we encourage experimenters to use a more natural control condition in which participants are not constrained by any instructions.

Third, with the exception of Study 2 (which included a hostility measure), this research only measured personal and emotional reactions to ostracism (i.e., basic needs satisfaction, positive affect, and negative affect). Thus, we provide strong evidence that prayer, self-affirmation, and distraction are useful in reducing distress following ostracism, future work is necessary to see if these interventions also effect other known cognitive and behavioral consequences of ostracism (e.g., aggression).

10. Conclusion

Two decades of research testify to the corrosive effects of ostracism. Here we identified three tools that can be used to fight back. What does it feel like to be a ghost? It does not feel good, but through prayer, self-affirmation, and distraction, it is less bad. In the present investigation we focused on three interventions that, based on prior research, would be likely candidates for boosting ostracism recovery. It is likely that there are other beneficial interventions, some of which may even be more powerful. We invite researchers to explore additional strategies to promote recovery.

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