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Personal prayer counteracts self-control depletion

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ABSTRACT

Praying over longer time spans can foster self-control. Less is known about the immediate, short-term consequences of praying. Here we investigated the possibility that praying may counteract self-control depletion. Participants suppressed or did not suppress thoughts about a white bear before engaging in a brief period of either personal prayer or free thought. Then, all participants completed a Stroop task. As expected, thought suppression led to poorer Stroop performance in the free thought, but not in the prayer condition. This effect emerged on a dependent variable devoid of any religious or moral associations (Stroop task). Possible mediating mechanisms and directions for future research are discussed.

1. Introduction

For millions of people all over the world, praying is a central part of their daily lives. In many major religions including Judaism, Christianity, Islam, and Hinduism praying is a core element of religious practices. Not only does regular praying comply with religious customs and prescriptions in many traditions, a large literature, comprising primarily correlational studies, suggests that frequent prayer can strengthen self-control (McCullough & Willoughby, 2009). Recent experimental evidence supports this notion and extends these findings by addressing questions of causality. For example, individuals who prayed daily for a period of four weeks consumed significantly less alcohol and were more faithful to their partners than individuals in control conditions (Fincham, Lambert, & Beach, 2010; Lambert, Fincham, Marks, & Stillman, 2010). In contrast to the ample knowledge on the long-term correlates and consequences of praying, evidence about the immediate, short-term effects of praying is surprisingly rare. In the present research, we investigated the hypothesis that a brief period of personal prayer can counteract the deleterious effects of self-control depletion (Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000).

The strength model of self-control assumes that the ability to self-control relies on a domain-independent, limited resource (Baumeister et al., 2007; Muraven & Baumeister, 2000). An initial exertion of self-control depletes this resource to a certain extent and makes self-control failure in any subsequent activity requiring self-control more likely. Abundant empirical evidence is consistent with the model's predictions (Hagger, Wood, Stiff, & Chatzisarantis, 2010). For example, after initial acts of self-control such as the control of attention, thoughts, or emotions, individuals showed decrements in control in that they ate more of a tempting snack, engaged in riskier behavior, or performed more poorly on executive func-

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tion tasks (Freeman & Muraven, 2010; Friese, Binder, Luechinger, Boesiger, & Rasch, 2013; Schmeichel, 2007; Vohs & Heatherton, 2000). Given that self-control failures contribute to many serious individual and societal problems in domains like eating, drinking, drugs, sexuality, or crime (Baumeister, Heatherton, & Tice, 1994), it appears critical to identify strategies that counteract the deleterious effects of self-control depletion.

A decent amount of research has in fact investigated strategies to mitigate the effects of self-control depletion. This research revealed that individuals can overcome typical depletion effects by an increased motivation to perform well (Muraven & Slessareva, 2003), positive mood (Tice, Baumeister, Shmueli, & Muraven, 2007), a temporary increase in self-awareness (Alberts, Martijn, & de Vries, 2011), mindfulness meditation (Friese, Messner, & Schaffner, 2012), or an abstract information processing mode (high construal level; Agrawal & Wan, 2009; Schmeichel & Vohs, 2009).

In the present research, we argue that a brief period of personal prayer may have similar positive effects on self-control performance. A number of different literatures pave the way for this assumption. Psychologists as early as James (1902/1982) theorized that praying would activate "energy, which otherwise would slumber" (p. 477). Research supports the view that praying serves as a means to regain strength and resources necessary for a successful coping with daily problems and challenges (Ellison & Taylor, 1996; McCullough & Larson, 1999). Indeed, praying evokes feelings of inner strength, rest, and relief (Bänziger, van Uden, & Janssen, 2008; Janssen, Dehart, & Dendraak, 1990), and individuals often pray when demands on personal capacities are particularly high (Ellison & Taylor, 1996; McCullough & Larson, 1999). In a study investigating coping strategies with emotional distress following the terrorist attacks on September 11, 2001, higher levels of negative emotions in response to the attacks were associated with a higher frequency of prayer for coping, which in turn led to less distress (Ai, Tice, Peterson, & Huang, 2005).

In addition to these general observations on praying, several lines of research provide initial support for the idea that personal prayer could counteract self-control depletion. First, Rounding, Lee, Jacobson, and Ji (2012) provided support for the assumption that religious primes such as *God*, *spirit*, or *divine* foster self-control. In one study (Study 3), individuals depleted of self-control resources, but primed with religious concepts outside of conscious awareness, persisted longer on an unsolvable puzzles task than depleted participants who were primed with neutral concepts. Interestingly, participants in this study were only moderately religious, about a third of participants reported being agnostic or atheist, and results were similar for religious and non-religious participants.

Second, several studies investigated the effects of prayer on anger and anger-related behavior (Bremner, Koole, & Bushman, 2011). Participants who were provoked and prayed for an unrelated person after the provocation reported less anger (Study 1) and lower anger-typical likelihood estimates of certain fictitious events (Study 3). Participants who were asked to pray for the person who had insulted them retaliated less against this person when given the opportunity to do so (Study 2). Apparently, participants who had prayed for another person were better able to control their aggressive impulses than participants who had only thought about this person. From the perspective of the strength model of self-control, a provocation may be functionally equivalent to a resource depletion task in that it impairs self-control and is commonly associated with subsequent impulsive (aggressive) behavior (Denson, DeWall, & Finkel, 2012). Praying counteracted this effect of impaired self-control after provocation. Consistent with the research by Rounding et al. (2012), neither religiosity nor religious affiliation affected the results in any study.

Finally, in a recent study a brief period of personal prayer just before an effortful self-control task buffered the effect of self-control depletion (Friese & Wänke, 2014). Participants who had engaged in a control task at the start of the study showed the regular depletion effect (i.e. impaired performance on a Stroop task), but when they had initially prayed this effect was diminished. Again, this effect was not moderated by religiosity.

Based on these lines of research, we expected impaired self-control performance after initial attempts at self-control, but a brief period of personal prayer should counteract this effect. We did not expect praying to improve self-control performance of non-depleted individuals, as evidence suggests that it is difficult to improve self-control above baseline levels in the short-term (e.g., Bremner et al., 2011; Muraven & Slessareva, 2003; Robinson, Schmeichel, & Inzlicht, 2010; Schmeichel & Vohs, 2009). Participants engaged or did not engage in a thought suppression task that requires self-control (Wegner, 1989), prayed or did not pray for several minutes, and subsequently completed a Stroop task as the dependent variable.

2. Methods

2.1. Participants and design

Sixty-seven participants, predominantly students of psychology, were randomly assigned to a 2 (thought suppression: yes vs. no) × 2 (intermediate task: prayer vs. free thought) between-subjects design. We excluded one participant who reported being aware of the hypotheses and five participants who reported not having followed the instructions during the thought suppression task. The final sample (51 females, 10 males) had a mean age of 24.05 years (SD_{age} = 4.31). Thirty-eight participants (62%) described themselves as Christian, nine as agnostic, four as atheistic, and ten reported various other religious affiliations.

2.2. Procedure

Participants took part in individual sessions. After providing informed consent, participants first completed the thought control task as the manipulation of self-control resources. They then engaged in either a brief period of personal prayer or free thought before completing the Stroop task as the main dependent variable. Finally, participants answered questions about their religious affiliation, religiosity and demographics.

2.3. Manipulation of self-control resources

Participants were instructed to write down all thoughts that came to their mind for 6 min. In the suppression condition, they were additionally asked to avoid thinking about a white bear. Should they nevertheless think about a white bear, they were to suppress this thought, redirect their attention away from it immediately, and think about something different. In the control condition, participants were asked to think about anything that came to mind, including a white bear (Wegner, 1989). This task requires self-control, because participants need to actively and repeatedly suppress a thought that comes to mind easily. It has been repeatedly used to manipulate self-control resources (Hagger et al., 2010).

2.4. Prayer manipulation

Participants were asked to either engage in personal prayer or free thought as intensively as possible for 5 min. In the prayer condition, they were instructed to *pray* freely for a person, a group of persons, their own hopes and wishes, something they were currently concerned with, or anything else they wished in whatever manner they wished to do so. Participants in the free thought condition received identical instructions, except that the word *pray* was substituted by the word *think*. They were informed that it would not be possible to hear their voice in adjacent rooms should they wish to speak and that no one would be able to see them. The experimenter then informed the participant that she would leave the room during the next 5 min and would not return before an hourglass on the participant's table had run out.

The prayer manipulation was modeled after one used in other research (Friese & Wänke, 2014). It was intended to impose as little constraints as possible on participants to allow each participant to pray in a way that would be fitting with individual habits, needs, and desires. Participants should have to spend as little attention and resources on following guidelines so that they could engage as deeply as possible in the prayer. The free thought condition was modeled to be as similar as possible to the prayer condition except for the subjective awareness that one is praying and not merely thinking. It paralleled previous control conditions for personal prayer (Bremner et al., 2011) except that in previous research participants were asked to think about a particular person while in the present study they were allowed to think about anything they wished.

2.5. Dependent variable: Stroop task

As the dependent variable, participants completed a verbal Stroop task (Stroop, 1935) on the computer. The task requires self-control because on incongruent trials participants need to override the dominant response tendency of saying the semantic meaning of the presented word and name the ink color instead. The Stroop task has been repeatedly used as an indicator of self-control resources (Hagger et al., 2010).

In each trial, a stimulus appeared in blue, red, or yellow ink and participants were instructed to name the ink color and ignore the semantic meaning of the stimulus. In congruent trials, the semantic meaning of the word matched the ink color (e.g., the word "red" printed in red ink). In incongruent trials, the semantic meaning and in the ink color mismatched (e.g., the word "red" written in blue ink). In neutral trials, 'XXX' appeared in one of the three colors. There were 120 congruent, 30 incongruent, and 30 neutral trials. The inter-stimulus interval varied randomly between 1000 and 2000 ms. Participants wore a headset with a microphone positioned closely in front of their mouth. Response latencies for each trial were recorded by the computer software. The difference in response latencies of incongruent and congruent trials served as the dependent variable. The experimenter also surreptitiously noted the number of errors participants made. Note that previous studies in the realm of the strength model of self-control have found susceptibility to depletion effects for error rates but not response latencies and vice versa (Gailliot et al., 2007).

2.6. Religiosity

Two questions served as an index of religiosity (How religious are you?, 0 'not at all religious' to 6 'very religious'; How often do you pray?, 0 'almost never' to 6 'daily'; $\alpha = .81$). Mean religiosity was moderately low ($M = 1.59$; $SD = 1.45$).

3. Results

In the present study, we did not assess mood. Two independent data sets showed that neither the thought suppression task ($t(45) < 1$; Friese, Grimm, & Rasch, 2010) nor the intermediate task (prayer vs. free thought, $t(44) < 1$; Schweizer, Friese, & Wänke, 2011) affected mood.

Response latencies are depicted in Table 1. Stroop interference effects of response latencies were analyzed with a 2 (thought suppression: yes vs. no) × 2 (intermediate task: prayer vs. free thought) between-subjects ANOVA. This analysis revealed the expected interaction between thought suppression and prayer ($F(1,57) = 4.23$, $p = .044$, $\eta_p^2 = .069$, Fig. 1). A priori defined contrast analyses showed that thought suppression led to poorer Stroop performance after free thought ($t(57) = 2.01$, $p = .049$, $d = 0.53$), but not after personal prayer ($t < 1$), as expected. While the two no suppression conditions did not differ ($t < 1$), Stroop performance was significantly improved in the suppression/personal prayer condition as compared to the suppression/free thought condition ($t(57) = -2.53$, $p = .014$, $d = -0.67$). Neither the main effect of thought suppression ($F < 1$) nor the main effect of prayer (vs. free thought; $F(1,57) = 2.56$, $p = .115$, $\eta_p^2 = .043$) were significant. When calculating the Stroop effect based on error rates, neither main effect nor the interaction came close to significance, all $ps > .65$.

Religiosity did not affect the results. The interaction between thought suppression and prayer remained significant when controlling for religiosity ($F(1,56) = 4.32$, $p = .042$, $\eta_p^2 = .072$) and when treating religiosity as a z-standardized continuous predictor in a multiple regression analysis, the two-way interaction between thought suppression and prayer remained marginally significant ($t(53) = -1.94$, $p = .058$) while the three-way interaction with religiosity was not significant ($t(53) = -1.14$, $p = .260$). These results are in line with previous research (Bremner et al., 2011; Friese & Wänke, 2014; Lambert, Fincham, Stillman, Graham, & Beach, 2010; Rounding et al., 2012). However, due to the small sample size it is not possible to confidently rule out a possible moderation by religiosity. Although the finding is in line with previous research, it does therefore not allow for strong conclusions and should be interpreted with caution.

4. Discussion

The exertion of self-control in a thought suppression task led to the expected decrement in subsequent self-control performance for individuals in a control condition. A brief episode of personal prayer after the initial self-control task counteracted this depletion effect and led to similar self-control performances by participants who had previously engaged in and not engaged in self-control. This finding emerged on the Stroop task as the dependent variable, a task that is devoid of religious associations and moral norms of "right" and "wrong". It fits well with recent evidence that primes of God-related concepts outside of conscious awareness can foster self-control after depletion (Rounding et al., 2012), and brief periods of personal prayer can improve resistance against the urge to retaliate against a person who has been insulting shortly before (Bremner et al., 2011). It further suggest that a brief episode of personal prayer may not only prevent depletion effects from unfolding (Friese & Wänke, 2014), but also thwart against them once they have occurred.

Although this study adds another piece of evidence to the growing line of work on the effects of prayer by providing initial evidence that personal prayer may counteract self-control depletion, it can only be the starting point rather than an end point for the investigation of the effects of prayer on self-control depletion. Even though the results fit well with several other recent studies, the sample size is too small to warrant far-reaching conclusions. Most pressingly, the processes underlying the beneficial effects of prayer on self-control are unknown. To be sure, we do not suggest in any way that the processes triggered by praying are necessarily unique in the sense that other activities could not trigger similar processes. In fact, previous work has revealed some good candidates for processes that may have driven the present effect and should be investigated in future studies. We will outline three possibilities. First, it seems plausible that praying activates central personal values, akin to a self-affirmation manipulation. Self-affirmation has been shown to counteract self-control depletion (Schmeichel & Vohs, 2009). In this work, Schmeichel and Vohs showed that thinking about central personal values led participants to adopt a higher construal level and think in more abstract terms (Trope & Liberman, 2010), which in turn has been shown to counteract self-control depletion effects (see also Agrawal & Wan, 2009).

Second, great amounts of work suggest that lay theories about the stability vs. malleability of human attributes can influence social perceptions and (self-regulatory) behaviors (Molden & Dweck, 2006). Building on this evidence, work by Job and colleagues suggests that lay theories about the finiteness of willpower impacts on their susceptibility to self-control depletion (Job, Dweck, & Walton, 2010). Applying this rationale to the present context, if participants entertained the lay theory that praying gives strength and rejuvenates from temporary mental strain, this could explain the present pattern of results.

Third, in a study in which a brief episode of prayer reduced the susceptibility to self-control depletion, the effect was mediated by the extent to which participants felt they were in social interaction with someone else during praying (Friese & Wänke, 2014). This finding corresponded to work suggesting that even brief social interactions can trigger cognitive

Table 1
Response latencies in milliseconds for congruent trials, incongruent trials and Stroop interferences (incongruent minus congruent trials) as a function of prayer and thought control conditions. Standard deviations are given in parentheses.

Experimental condition	Congruent trials	Incongruent trials	Stroop interference
Free thought/no suppression	589 (73)	714 (85)	126 (39)
Free thought/suppression	610 (73)	774 (105)	164 (54)
Prayer/no suppression	592 (97)	723 (129)	132 (58)
Prayer/suppression	590 (97)	707 (98)	117 (45)

Note: $N = 61$.

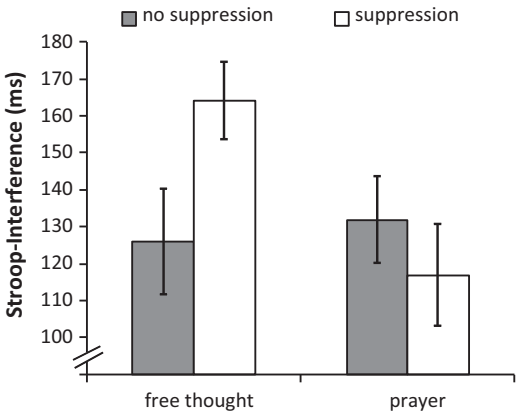

Fig. 1. Stroop interference as a function of condition in the first self-control task (thought suppression: yes vs. no) and the intermediate task (free thought vs. personal prayer). After thought suppression, participants showed greater Stroop interference in the free thought condition, whereas no significant difference emerged in the personal prayer condition. Error bars indicate ± one standard error of the mean.

resources (as indicated by performance on executive function tasks) that are necessary to maintain smooth social interactions (Ybarra et al., 2008). To the extent that praying is experienced as a social interaction it may thus trigger cognitive resources and facilitate subsequent self-control performance.

In the present study, religiosity did not affect the results, in line with previous related research (Bremner et al., 2011; Rounding et al., 2012). It is interesting to note though that although almost 80% of participants indicated being religiously affiliated, religion did not seem to be very important in their lives. They neither considered themselves very religious, nor did they pray very often. Hence, future research should investigate whether results would be different in a more diverse sample including individuals for whom religion plays a more important role in life. Perhaps, in this study the sample size was simply too small and variance in religiosity was too restrained to detect any indication for moderation by religiosity.

In a related vein, the particular instruction for the praying manipulation may have played a role in this study. We tried to impose as little constraints as possible on participants in terms of how they pray and left it to participants to pray for a person, a group of persons, or about anything else they wished. One reviewer pointed out that participants may nevertheless have felt encouraged to pray for something in particular instead of praying to clear one's mind, or to contemplate a religious icon, and this may have impacted on the effects of the prayer manipulation. At the moment, we do not have evidence for different effects as a function of various kinds of prayers such as free, meditative or ritualized prayer (e.g., the Lord's Prayer in the Christian tradition), but we agree that this is a highly interesting question that future research should investigate.

A strength of the present study is simultaneously a limitation: the laboratory setting. While this assures adequate experimental control it also implicates a somewhat artificial setting that does not correspond well with natural settings in which individuals pray. To date, it remains unknown if and how this affects the effects of prayer on self-control. One way to further develop the present line of research would be to use experience sampling methodology to track individuals' praying behavior in real life (Mehl & Conner, 2011), and investigate its consequences for self-control-relevant behaviors and subjective experiences such as feelings of strength, exhaustion, or inner conflicts. This correlational approach could even be extended to ecological momentary interventions (Heron & Smyth, 2010), that is, small experimental manipulations in the field that would signal individuals to pray during the next possible instance, and investigate the effects of these interventions on the respective behaviors and experiences. A combination of the suggested studies and further laboratory studies such as the ones presented in this article would provide an internally and externally valid picture of the effects of praying on self-control.

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