

## How Can You Resist? Executive Control Helps Romantically Involved Individuals to Stay Faithful

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In the present research, we examined why some people have more difficulty than others in staying faithful to their romantic partners. Three studies supported our main prediction that executive control is associated with romantically involved individuals' ability to stay faithful. Study 1 showed that participants with a higher level of executive control reported less difficulty in staying faithful to their partners than did those with lower levels of executive control. In Study 2, romantically involved male participants were placed in a waiting room together with an attractive female confederate. Results showed that participants with a higher level of executive control showed less flirting behavior with the confederate than did those with lower levels of executive control. Study 3 demonstrated that a higher level of executive control was related to a lower expressed desire to meet an attractive other, but only for romantically involved participants. Together, these studies showed that executive control helps romantically involved individuals to deal with the lure of attractive alternatives.

*Keywords:* executive control, infidelity, romantic relationships, attractive alternatives, self-regulation

Donald Trump with Marla Maples, Bill Clinton with Monica Lewinsky, and Tiger Woods with numerous mistresses: There are plenty of examples of celebrities who experienced severe costs of their infidelity. Trump lost tons of money, Clinton's affair almost led to impeachment, whereas Woods lost not only various sponsorships but perhaps also part of his dignity. Of course, cheating has disastrous consequences for all sorts of people, not just the rich and famous. In the lives of the less known, cheating often ends with the biggest sacrifice of all: losing the love and respect of your partner. Indeed, the number one reason for breaking up, at least in the Netherlands, is someone else (Centraal Bureau voor de Statistiek, 2009), and extramarital affairs are the leading reason for divorce across 160 cultures (Betzig, 1989).

With the knowledge of what is at stake, why is it so hard for people to resist the temptation to cheat? When people are asked for why they were unfaithful, explanations vary from having a need for various sexual partners (e.g., Roscoe, Cavanaugh, & Kennedy, 1988) to being sexually incompatible with their own partner (e.g., Buunk, 1980). Characteristics of the relationship—for example,

low marital or dating satisfaction—can also be a reason people cheat (Buss & Shackelford, 1997; Roscoe et al., 1988). These findings converge with research on the precursors of infidelity, showing that people who are less committed to their partner have a higher chance of being unfaithful (Drigotas, Safstrom, & Gentilia, 1999).

However, even in well-functioning relationships—where both partners are happy with each other and sexually satisfied—cheating can occur. Cheating men or women often exclaim that they “could not help themselves,” even though they wanted to, or that the attraction was “stronger than they were.” Such claims suggest that resisting the temptation of attractive alternatives entails more than simply the motivation to stay faithful to one's current partner. That is, refraining from infidelity may partly rest on an individual's ability to do so. In the present research, we examine this ability aspect of infidelity, proposing that executive control helps people to shield themselves from the temptation of attractive others. Specifically, we examine whether individual differences in executive control may partly explain individual differences in the ability to stay faithful.

### Executive Control and Resisting the Lure of Attractive Alternatives

Executive control (also referred to as *cognitive control* or *executive functioning*) is used as an umbrella term to describe several cognitive control processes working together in regulating and shaping behavior in a goal-directed manner (Borkowski & Burke, 1996; Denckla, 1996; Payne, 2005; Pennington & Ozonoff, 1996; Scholnick & Friedman, 1993). The cognitive control processes often identified as core aspects of executive control are inhibition, task switching, and updating (see, e.g., Miyake et al., 2000; Nor-

This article was published Online First January 17, 2011.

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The present research was partly funded by Veni Grant 451-04-104 from the Dutch Association of Scientific Research, awarded to Johan C. Karremans. We thank the confederates and the independent raters for their help in Study 2.

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man & Shallice, 1986). When these processes are described separately, inhibition is defined as the ability to deliberately restrain from acting on dominant or automatic responses (Miyake et al., 2000); task switching is the ability to shift between several tasks, operations, or mental sets (Monsell, 1996); and updating is the coding and monitoring of relevant information in working memory (Morris & Jones, 1990). Despite the distinctions, it has been argued that these different aspects of executive control share important underlying processes. Specifically, they all involve the capacity to focus attention on relevant information and processes while inhibiting irrelevant ones (Smith & Jonides, 1999, p. 1659; see also J. D. Cohen, Dunbar, & McClelland, 1990; MacLeod, 1991).

Only recently, researchers have started to test the basic assumption that individual differences in executive control—as measured with performance on low-level executive control tasks such as a Stroop task (which measures inhibition capacity)—are indeed related to successful self-regulatory behavior, like the ability to inhibit undesired impulses. For example, Hofmann, Gschwendner, Friese, Wiers, and Schmitt (2008) demonstrated that individual differences in executive control predict the ability to resist the urge to eat M&M's candies when one's goal is to refrain from eating sweets (i.e., when on a diet). Executive control is also related to the successful regulation of social behavior. For example, Hofmann et al. (2008) showed that individuals high in executive control—as indicated by a high level of working memory capacity—expressed less anger toward an ostensible interaction partner who provided them with anger-provoking negative feedback. Specifically, they retaliated less against this interaction partner when given the opportunity to provide performance and sympathy feedback on him or her. In addition, Pronk, Karremans, Overbeek, Vermulst, and Wigboldus (2010) demonstrated that in relationships where people have a long-term goal to maintain the relationship, executive control is positively related to the inhibition of retaliatory responses after an offense.

Why would executive control and the attention and inhibition processes it entails help people to successfully deal with the lure of attractive alternatives? When an individual is confronted with an attractive alternative, a conflict between immediate impulsive responses and more long-term relationship protective goal-directed responses may arise. Regardless of whether they are in a romantic relationship, people seem to be automatically pulled toward beautiful people. Van Leeuwen et al. (2010) showed that this is almost literally the case, as automatic approach tendencies are activated when people are confronted with attractive, as opposed to unattractive, others. Also, when people have a conversation with an attractive—as opposed to unattractive—other, they tend to gaze longer into the eyes of this person (Van Straaten, Holland, Finkenauer, Hollenstein, & Engels, 2010). Correspondingly, neurophysiological research demonstrated that having eye contact with attractive people activates reward-related areas in the brain (Kampe, Frith, Dolan, & Frith, 2001). Thus, it seems that, when confronted with attractive others, people's impulsive response is to pay attention to them and to experience a pleasant feeling of attraction.

These feelings of attraction are likely to result in a desire for short-term mating and a tendency to want to impress the other, at least for men (e.g., Karremans, Verwijmeren, Pronk, & Reitsma, 2009; Van Straaten, Engels, Finkenauer, & Holland, 2008). The impulses to pay attention to, interact with, or even flirt with an

attractive other might lead people to get involved with this alternative partner, which may obviously have negative consequences for the stability of the current relationship. So, for the long-term goal of staying committed to one's current partner, a better strategy would be to control and inhibit such impulses. This process should be facilitated by executive control, as executive control helps people to focus their attention on their long-term goals and to inhibit impulsive responses that may interfere with these goals. Similar to the findings of Hofmann et al. (2008) showing that executive control helps dieters to refrain from eating sweets, it should help committed, romantically involved people to stay away from the lure of attractive alternative partners.

Luckily, people do protect their relationships from attractive alternatives in several ways. First, in contrast with single individuals, romantically involved individuals tend to pay less attention to attractive others. They spend less time browsing through pictures of beautiful opposite-sex others (Miller, 1997),<sup>1</sup> and—when they have been reminded of the love they feel for their partner—they are less distracted when pictures of attractive others are presented on the screen while they are completing a task (Maner, Rouby, & Gonzaga, 2008). Second, when romantically involved individuals do notice attractive others, they seem to be less impressed by them than singles are. That is, romantically involved individuals, compared with their single counterparts, tend to devalue the attractiveness of attractive opposite-sex others. This derogation of attractive alternatives mechanism has been shown in several studies. For example, romantically involved individuals are less impressed by attractive others in terms of their physical beauty (Lydon, Fitzsimons, & Naidoo, 2003; Simpson, Gangestad, & Lerma, 1990) and their personal qualities (e.g., sense of humor or intelligence; Johnson & Rusbult, 1989). Also, people in a romantic relationship tend to mimic attractive others to a lesser extent than single people do, presumably as a means to keep psychological distance (Karremans & Verwijmeren, 2008).

Although it has been suggested that these relationship-protecting strategies occur more or less spontaneously (e.g., Maner et al., 2008), we suggest that executive control should enhance the shielding of a romantic relationship when an attractive alternative presents itself. As explained earlier, executive control should help a strongly committed individual to maintain his or her current relationship by inhibiting responses toward the attractive alternative that may threaten the stability of the current relationship. There is some preliminary empirical evidence in line with this notion. Recently, Ritter, Karremans, and Van Schie (2010) showed that the depletion of self-regulatory resources influences participants' responses to attractive, hypothetical dating partners. Specially, romantically involved participants were less likely to reject pictures of attractive others as potential mates than were single participants, but only when their regulatory resources were intact. These findings were replicated in a second study, showing that romantically involved participants only rejected hypothetical dating partners when they had ample time to respond to the pictures but not when they had to respond within a limited time frame (<800 ms).

<sup>1</sup> The research by Miller (1997)—as well as the present research—studied heterosexual relationships.

Thus, the results of these previous studies suggest that romantically involved participants only reject (hypothetical) partners when they have enough cognitive resources and time to make up their minds. Instead of using in-the-moment time and energy constraints, our current research investigates individual differences in executive control and their association with relationship-shielding responses to attractive alternatives. Although situational manipulations of self-regulation as used in previous studies (Ritter et al., 2010) are presumed to affect cognitive control processes, the present research more directly addresses this issue by specifically examining the role of high-level executive control in dealing with attractive alternatives. Second, it is important to note that whereas the studies by Ritter et al. (2010) only examined participants' responses to hypothetical situations (while explicitly asking them to ignore their current relationship status), the current research takes a more real-life approach by including studies examining actual behavioral responses toward an attractive alternative.

### The Present Research

The central hypothesis guiding this research is that executive control is associated with romantically involved individuals' ability to stay faithful to their partners. Specifically, we expect executive control to be related to the ability to refrain from potentially relationship-threatening responses to attractive alternatives. To test this prediction, we investigated the association between individual differences in executive control and responses toward attractive alternatives. We applied widely used and validated individual difference measures of executive control, allowing us to examine whether performance on such measures is predictive of relationship-shielding responses toward attractive alternatives. Whereas most studies only examined participants' responses to hypothetical situations (i.e., "Would you regard the person in the picture a potential partner?"), the current research includes studies examining actual behavioral responses toward an attractive alternative.

Across three studies, we examined a number of complementary dependent variables to seek support for this general hypothesis. Study 1 tested the relationship between executive control and participants' self-reported level of experienced difficulty in staying faithful to their partners. Study 2 tested the relationship between executive control and participants' actual behavioral responses during an interaction with an attractive other. Specifically, we tested whether executive control predicted flirting behavior of romantically involved male participants toward an attractive female confederate. Finally, Study 3 examined the relationship between executive control and the desire to meet an attractive other as expressed by the participants.

We used a variety of different executive control tasks. Specifically, we used tasks that were originally designed to measure either one of the previously described different executive control processes, namely, task switching, inhibition, and updating. As explained above, although these executive control processes are distinct, it has been convincingly argued that they all involve attention and inhibition processes (e.g., Smith & Jonides, 1999). Because we reason that exactly these processes are involved in the ability to protect one's relationship against the temptation of attractive others, an interesting question is whether each of the

cognitive control processes is predictive of relationship-protective behavior in the realm of tempting alternatives.

### Study 1

To provide initial evidence for our main hypothesis, in Study 1, we examined the association between executive control and the self-reported difficulty experienced by romantically involved individuals in staying faithful to their partners. We reasoned that if executive control is associated with people's ability to stay faithful, on the basis of their own experiences, people low in executive control should report relatively more difficulty in staying faithful. In this study, we measured executive control using a task-switching task, that is, an adapted version of the extrinsic affective Simon task (EAST; De Houwer, 2003; see also Koole & Jostmann, 2004; Voss & Klauer, 2007). Task switching is considered to be one of the major aspects of executive control (see, e.g., Miyake et al., 2000; Norman & Shallice, 1986).

### Method

**Participants.** Seventy-two romantically involved students (13 men, 59 women) took part in this study. They received €2 (approximately \$2.67) or course credits in exchange for their participation.

**Procedure.** In the first part of the study, participants completed a variation of the EAST (De Houwer, 2003) in which performance depends on the ability to shift between two sets of instructions. The task consisted of three blocks of 30 trials each. In each trial, an emotion word (e.g., *happy*) was presented on the screen, in either blue, green, or white (on a black background). When the word was presented in white, participants' task was to respond, as quickly and accurately as possible, by pressing a designated key on the left side of the keyboard when the word had a positive valence or by pressing a designated key on the right side of the keyboard when the word had a negative valence. However, when the word was presented in blue or green, participants had to ignore the content of the word and instead respond to the color of the word by pressing the designated key on the left when the word was presented in green or by pressing the designated key on the right when the word was presented in blue. The words were preceded by a fixation cross in the middle of the screen, presented for 100 ms, after which each word was presented for 1,000 ms. This was also the time frame within which participants had to respond. The words and colors were presented in random order. Participants completed this task after a 20-trial practice task.

After completing the executive control task, participants were asked to complete a short questionnaire. This questionnaire was designed to measure participants' self-reported level of difficulty in staying faithful to their partner and consisted of the following three items ( $\alpha = .88$ ): "I find it hard to stay faithful to my partner"; "If a cute guy/girl shows interest in me, I find it hard to resist temptation"; and "I find it very easy to stay faithful to my partner" (reverse scored).

### Results

When creating our dependent measure of executive control, we first recoded incorrect responses of the EAST and reaction times

faster than 300 ms (1%) as missing values. Next, the reaction times on the separate trials were log transformed to reduce positive skew, which resulted in a normally distributed data set. To create our measure of executive control, we computed a mean of these log-transformed reaction times on the EAST. A lower score on this measure represents faster response latencies, thus a better performance on the task.

Most important and in line with our predictions, there was a positive significant relation between reaction times on the EAST and participants' self-reported level of difficulty in staying faithful,  $r(72) = .30, p = .01$ . Thus, slower response latencies on the executive control task—indicating a lower level of executive control—were related to a higher level of difficulty in staying faithful. This finding indicates that participants with a higher level of executive control experience less difficulty in staying faithful. Men and women did not statistically differ in their self-reported level of difficulty in staying faithful,  $F(1, 70) = 0.91, p = .34$ . Also, there was no significant interaction between gender and executive control on level of difficulty in staying faithful,  $\beta = .17, t(68) = 1.31, p = .20$ .<sup>2</sup> The results of this first study provided initial and promising support for our general hypothesis that executive control helps romantically involved individuals to stay faithful to their partners.

## Study 2

The results of Study 1 showed that executive control is related to the self-reported level of difficulty people experience in staying faithful to their partner. Our goal in Study 2 was to extend this finding. Most important, Study 1 relied on a self-report measure, which inevitably brings about issues of social desirability and self-presentation. To avoid these issues, instead of using a questionnaire in Study 2, we explored how executive control relates to actual behavior toward an attractive opposite-sex other. Specifically, in Study 2, romantically involved, heterosexual participants were placed in a waiting room for 10 min with an attractive opposite-sex confederate. Afterward, the confederates indicated to what extent they perceived the participants to be flirting with them. Also, four independent raters watched the videos of the interactions and evaluated participants' flirting behavior.

In Study 2, we used a different executive control task—namely, the two-back task (Jonides et al., 1997)—to investigate the role of executive control in withholding the tendency to flirt with attractive others. The two-back task is designed to measure updating, which is considered to be one of the major cognitive control processes (see, e.g., Miyake et al., 2000; Norman & Shallice, 1986).

## Method

**Participants.** Twenty-one heterosexual romantically involved men, with a mean age of 22.95 years ( $SD = 2.60$ ), participated in this study.<sup>3</sup> They received €5 (approximately \$6.69) or course credits in exchange for their participation.

**Procedure.** In the first part of the experiment, participants completed the two-back task (Jonides et al., 1997). In this task, participants responded to a series of letters presented one by one in the middle of the screen. In each trial, participants had to indicate whether the letter on the screen resembled the letter presented two

trials back. Participants were asked to respond by pressing a designated key if the letter did not match and another designated key if the letter did match. Each letter was preceded by a blank screen for 1,500 ms, after which the letter was presented for 1,500 ms. This was also the time frame in which participants had to respond. In total, there were 45 trials, which can be divided into 14 trials of matching letters and 31 trials of nonmatching letters. Prior to the actual task, participants completed a practice block of 10 trials.

After completing the two-back task, participants were asked to call the experimenter, who subsequently informed them that the next part of the experiment had to be set up, which would take some time. In the meantime, participants were asked to sit on one of the chairs in the waiting room until the experimenter called on them. One of the female confederates, supposedly a participant from a different study, was also present in that room. There were two different confederates, whom we preselected on the basis of their physical attractiveness. We strived to create smooth and naturalistic interactions, and therefore the confederates were not trained. The main instruction to the confederates was to interact with the participant as if it were a coincidental meeting. We did ask them to behave in a friendly, but not overly interested or flirtatious, manner. The interaction between the participant and the confederate was videotaped. After 10 min, the experimenter entered the room and directed the participant back to the cubicle, where he completed the last part of the study.

In this last part, participants answered a question on the attractiveness of the girl they met in the waiting room (“I found the girl I met in the waiting room attractive”) on a 7-point scale (1 = *totally agree*, 7 = *totally disagree*). The mean level of attractiveness of the two confederates was relatively high ( $M = 5.43, SD = 1.21$ ), and the confederates did not statistically differ from one another in level of attractiveness,  $F(1, 19) = 1.69, p = .21$ .

The attractiveness rating constituted the end of the experiment. Participants were thanked for their cooperation, and the experimenter asked them whether they had any comments or questions. None of the participants suspected that the woman they met in the waiting room was, in fact, a confederate. Participants were then informed about the identity of the woman and were fully debriefed regarding the goals of the study. Participants were paid or their course credits were assigned.

The flirting behavior of participants was rated in two different ways. First, the confederates rated the flirting behavior of each male participant as they themselves experienced it. They performed these ratings about one week after the experiment took place, because we did not want to inform the confederates of the goals of the study, that is, they did not know we were interested in

<sup>2</sup> The results regarding the role of gender should, however, be considered with care, because of the small sample of men in this study (13 men vs. 59 women). We address the issue of possible gender effects in the General Discussion section.

<sup>3</sup> Ideally, the study would have included more participants to increase its validity. J. Cohen (1992) argued that the ideal sample size for large effect sizes like ours ( $\beta = .45$ ), at power = .80 for  $\alpha = .05$ , is 28. Our current sample size of 21 is somewhat lower. However, the consistency of the findings of Study 2, along with the findings of Studies 1 and 3, indicate the robustness of the central finding (i.e., the association between executive control and relationship-protective responses to attractive alternatives).

participants' flirting behavior. Awareness of the purpose of the study might have influenced their behavior toward the participants. The confederates were shown the first 5 min of the videos of their interaction with each participant.<sup>4</sup> The flirting behavior of the participant was measured by having the confederate rate her agreement with two statements on a scale of 1 = *totally agree* to 7 = *totally disagree*: "This participant was flirting with me" and "I think this participant wanted 'more' from me" ( $\alpha = .92$ ).

The perceived attractiveness of the participant was also rated with one item: "I found the participant attractive" ( $M = 2.57$ ,  $SD = 1.83$ ). The confederates did not statistically differ from one another in their scores of the level of perceived attractiveness of the participants,  $F(1, 19) = 2.84$ ,  $p = .11$ . We measured the attractiveness of the participant because confederates may (unconsciously) show more flirting behavior toward a participant when the level of perceived attractiveness of the participant was higher, and more flirting by the confederate could lead to more flirting by the participant.

Besides these judgments of the confederates, the videos were scored by four independent raters. Just like the confederates, these raters were shown the first 5 min of the videos of the interaction of the confederates with each participant, and they answered the same questions regarding the flirting behavior and perceived attractiveness. The interrater reliability for both of the flirting items ( $\alpha = .92$ ), as well as the perceived attractiveness of the participant ( $\alpha = .90$ ), was high. There was a high correlation between the flirting scores of the confederates and the flirting scores of the independent raters,  $r(21) = .67$ ,  $p = .001$ , as well as between the perceived attractiveness of the participants as rated by the confederates and by the independent raters,  $r(21) = .80$ ,  $p < .001$ . Therefore, we averaged the scores of the ratings of the confederates and of the independent raters, which served as our measure of participants' flirting behavior and as our measure of the attractiveness of the participants.

## Results

When creating our measure of executive control, we first recoded the incorrect responses on the two-back task and reaction times faster than 300 ms (1%) as missing values. Next, the reaction times on the separate trials were log transformed to reduce positive skew, which resulted in a normally distributed data set. A mean of these log-transformed reaction times was computed. A lower score on this measure represents a faster mean reaction time, thus a higher level of executive control.

To test our main prediction, we performed a regression analysis in which participants' flirting behavior was regressed onto executive control, controlling for perceived attractiveness of the participant, perceived attractiveness of the confederate, and identity of the confederate. The results of this analysis are shown in Table 1. As can be seen, a higher level of executive control—as indicated by lower reaction times—was related to less flirting behavior,  $\beta = .45$ ,  $t(16) = 2.29$ ,  $p = .036$ .<sup>5</sup>

Second, we tested the simple correlations between attractiveness of the confederate, attractiveness of the participant, identity of the confederate, and perceived flirting behavior. Perceived attractiveness of the participant was related to perceived flirting behavior,  $r(21) = .55$ ,  $p = .009$ . However, attractiveness of the confederate—as perceived by the participants—was not related to flirting

Table 1

*Regression Model Predicting Participants' Flirting Behavior With Executive Control, Controlled for Attractiveness of the Participant, Attractiveness of the Confederate, and Identity of the Confederate, Study 2*

Variable	<i>r</i>	Regression results		
		$\beta$	<i>F</i>	<i>R</i> <sup>2</sup>
Executive control	.21	.45*	4.40*	.52
Attractiveness of the participant	.55***	.47*		
Attractiveness of the confederate	.07	.09		
Identity of the confederate	.41	.42 <sup>†</sup>		

<sup>†</sup>  $p = .05$ . \*  $p < .05$ . \*\*\*  $p < .01$ .

behavior,  $r(21) = .07$ ,  $p = .76$ . The identity of the confederates was marginally related to perceived flirting behavior,  $r(21) = .41$ ,  $p = .068$ . In other words, participants generally flirted somewhat more with one confederate ( $M = 3.37$ ,  $SD = 1.23$ ) than with the other ( $M = 2.41$ ,  $SD = 0.84$ ),  $F(1, 19) = 3.73$ ,  $p = .068$ . Performance on the executive control task was not significantly related to participants' level of attraction toward the woman they met in the waiting room,  $r(21) = -.36$ ,  $p = .11$ .

## Study 3

So far, our results have shown that romantically involved people with higher levels of executive control experience less difficulty in staying faithful to their partner (Study 1) and show less flirting behavior when actually interacting with an attractive opposite-sex other (Study 2). The goal of Study 3 was to extend these findings in several important ways. First, Study 3 explored the relation between people's level of executive control and their expressed desire to meet an attractive opposite-sex other. Whereas Study 2 demonstrated that romantically involved individuals' executive control helps them to deal with the threat of an attractive alternative by refraining from flirting when interacting with a tempting other, Study 3 examined whether executive control helps people to prevent themselves from ending up in a situation with an attractive alternative in the first place. Participants were introduced to an attractive member of the opposite sex through the computer and got to know this person in a so-called acquaintance game. After playing this game, we asked participants whether they would like to meet this other in real life.

Second, in Study 3, we explored the relationship between executive control and the expressed desire to meet attractive opposite-sex others for both romantically involved and single people. Because our main prediction is that executive control helps romantically involved people to protect their relationship by shielding themselves against the temptation of attractive others, we

<sup>4</sup> For practical reasons, the first 5 min of the interactions were used to rate the behavior of the participant. Also, previous literature showed that brief fragments are often a better indicator of behavior than longer fragments (see, e.g., Murphy, 2005).

<sup>5</sup> Omitting the covariates perceived attractiveness of the confederate and attractiveness of the participants from the analysis yielded even stronger results,  $\beta = .53$ ,  $t(18) = 3.33$ ,  $p = .004$ .

expected that executive control would be related to a lower expressed desire to meet an attractive other. Put differently, if romantically involved individuals are given the opportunity to meet an attractive alternative, they could protect their relationship by refusing this offer, thereby avoiding a potentially relationship-threatening situation. However, because single individuals do not have this relationship-protection goal, we did not expect executive control to be predictive of the expressed desire to meet an attractive other for this group of participants. In other words, we expected the effect of executive control on participants' expressed desire to meet an attractive other to depend on the participant's relationship status.

Finally, in examining the role of executive control in protecting one's relationship against the temptation of attractive others, in Study 3, we again used a different executive control task, namely, the Stroop task (Stroop, 1935). The Stroop task is one of the most widely used tasks to measure inhibition, which is a core component of executive control (see, e.g., Miyake et al., 2000).

## Method

**Participants.** Sixty-five heterosexual students (16 men, 49 women) participated in this study. They received €5 (approximately \$6.69) or course credits in exchange for their participation. In this group of participants, 37 were romantically involved (7 men, 30 women) and 28 were single (9 men, 19 women). Before entering the lab, participants were told they would virtually meet another participant in a so-called acquaintance game. In this game, they would also be presented with a picture of this person. We also took a picture of the participant to make the cover story more plausible.

**Procedure.** In the first part of the study, participants performed a Stroop task (Stroop, 1935). In this task, participants have to name the color of a word while ignoring the meaning of that word. The Stroop task used in this study was the Web Stroop, in which responses are made by clicking with the mouse on one of four boxes representing the colors (Linnman, Carlbring, Åhman, Andersson, & Andersson, 2004). Specifically, in this task, color words (*red, blue, green, or yellow*) and filler words (*hair, hat, spear, or crown*) appear in either red, green, blue, or yellow type. The word on the screen could thus be a consistent word (e.g., the word *red* in red), an inconsistent word (e.g., the word *red* in blue), or a filler word (e.g., the word *hat* in red). For every word, participants were instructed to click with the mouse on one of the four color boxes in the screen (red, blue, green, or yellow), each representing the color of the word in the screen. The words were presented in the middle of the screen in random order and disappeared when the participants chose one of the four color boxes. Immediately after the participants clicked on a box, the next word appeared. The task consisted of 36 trials and was preceded by a practice block of 12 trials.

After completing the Stroop task, participants were told that the computer randomly assigned them to one of the other participants so they could play the acquaintance game together. They were shown a picture of the "other participant," who was always an attractive opposite-sex other. The people in the pictures were pretested on their attractiveness, and both the woman and the man in the pictures were rated above average in level of attractiveness (above 5 on a 7-point scale). The game consisted of two parts: In

the first part, participants could select the questions they wanted to ask the other participant; in the second part, participants answered the question the other participant supposedly selected for them (e.g., "Do you like to travel?" "Are you sick often?"; "Would you like to be famous?"). The game lasted for approximately three minutes. After these three minutes, participants indicated how attractive they found the other participant. They did so by moving a slider somewhere between *totally not attractive* (which would result in a score of 0) and *very attractive* (which would result in a score of 100). Subsequently, they indicated, as our main dependent variable, to what extent they would like to meet the other participant in real life ("How would you feel about meeting this person?"). Again, they did so by moving a slider somewhere between 0 (*would absolutely not like it*) and 100 (*would like it very much*). Finally, participants were thanked for their cooperation and paid.

## Results

When creating our measure of executive control, we first recoded the incorrect responses on the Stroop task as missing values, as well as reaction times faster than 400 ms (1%) and slower than 2,500 ms (1%). Next, the reaction times on the separate trials were log transformed to reduce positive skew, which resulted in a normally distributed data set. We computed a mean of these log-transformed reaction times for the consistent as well as the inconsistent trials. To create our measure of executive control, we subtracted the mean log-transformed reaction times on the consistent trials from the mean log-transformed reaction times on the inconsistent trials. This difference score is representative of the Stroop effect: The higher this score is, the more difficulty the participant experienced in inhibiting the tendency to respond to the valence of the word. Therefore, a lower score on this measure represents a better performance on the task.

Our main prediction was that executive control would predict the expressed desire to meet the other, but only for romantically involved participants. To test this hypothesis, we performed a hierarchical regression analysis in which expressed desire to meet the attractive other was regressed onto executive control, relationship status, and the interaction between these two while controlling for the perceived attractiveness of the other. The results of this analysis are shown in Table 2. This analysis revealed a significant interaction between executive control and relationship status on

Table 2  
*Regression Model Predicting Expressed Desire to Meet the Attractive Other With Executive Control and Relationship Status, Controlling for Perceived Attractiveness of the Other, Study 3*

Variable	Regression results			
	<i>r</i>	$\beta$	<i>F</i>	<i>R</i> <sup>2</sup>
Executive control	.13	-.18	4.03***	.21
Relationship status	.05	.01		
Attractiveness other	.33***	.34***		
Executive Control $\times$ Relationship Status		.41**		

\*\*  $p = .01$ . \*\*\*  $p < .01$ .

the expressed desire to meet the attractive other,  $\beta = .41$ ,  $t(60) = 2.62$ ,  $p = .011$ .<sup>6</sup>

The hypothesis that the association between executive control and the expressed desire to meet the other would be moderated by relationship status was tested via moderated regression analysis (Aiken & West, 1991). Executive control served as the predictor variable, relationship status as the moderator variable, and expressed desire to meet as the dependent variable. In all of the analyses, we controlled for level of perceived attractiveness of the other. As shown in Table 2, there was a significant interaction effect of executive control and relationship status on the expressed desire to meet. Furthermore, the pattern of the interaction effect is in line with the hypothesis. Figure 1 illustrates the moderator effect with respect to the expressed desire to meet. It can be seen that the effect of executive control on the expressed desire to meet depends on relationship status. Simple slope testing revealed that for romantically involved participants, the regression line indeed was significant,  $\beta = .44$ ,  $t(60) = 2.50$ ,  $p = .015$ . Thus, for participants in a romantic relationship, a stronger Stroop effect—a lower level of executive control—is associated with stronger expressed desire to meet the attractive other. Even though the trend reverses for single participants, this effect was not significant,  $\beta = -.18$ ,  $t(60) = -1.14$ ,  $p = .261$ . To summarize, executive control reduces the expressed desire to meet an attractive other, but only for romantically involved individuals.

Second, we looked at the simple correlations between the various variables. There was a relationship between the perceived attractiveness of the other and the expressed desire to meet the other,  $r(65) = .33$ ,  $p = .006$ . If participants perceived the other as being more attractive, they also expressed a stronger desire to meet this person.<sup>7</sup> There was no significant relationship between executive control and level of attraction toward the other participant,  $r(65) = .10$ ,  $p = .41$ . Additionally, there was no significant interaction between relationship status and executive control in predicting the level of attractiveness,  $\beta = .09$ ,  $t(61) = 0.45$ ,  $p = .66$ .

Third, we investigated whether relationship status predicted perceived attractiveness of the other participant and the expressed

desire to meet the other. On the basis of literature showing that people with a relationship tend to derogate attractive others (e.g., Lydon et al., 2003; Simpson et al., 1990), we expected single participants to rate the attractiveness of the other participant higher than romantically involved participants did. However, relationship status did not predict the perceived attractiveness of the other,  $F(1, 63) = 0.25$ ,  $p = .62$ , nor did it predict the expressed desire to meet the other,  $F(1, 63) = 0.15$ ,  $p = .70$ . In other words, single and romantically involved participants did not statistically differ from each other in how attractive they found the other or in how much they would like to meet the other.

We also looked at the role of gender in participants' desire to meet the other and the perceived attractiveness of the other. Men rated the other participant as being more attractive ( $M = 70.13$ ,  $SD = 5.78$ ) than did women ( $M = 55.86$ ,  $SD = 17.40$ ),  $F(1, 63) = 10.30$ ,  $p = .002$ . However, men and women did not statistically differ in their expressed desire to meet the other,  $F(1, 63) = 2.52$ ,  $p = .12$ . There was no significant interaction between executive control and gender on the expressed desire to meet the other,  $\beta = .24$ ,  $t(56) = 0.89$ ,  $p = .38$ , nor was there an interaction between relationship status and gender on the expressed desire to meet the other,  $\beta = .11$ ,  $t(56) = 0.39$ ,  $p = .70$ . Additionally, there was no significant three-way interaction between executive control, relationship status, and gender on the expressed desire to meet the other,  $\beta = -.24$ ,  $t(56) = -0.69$ ,  $p = .49$ .

## General Discussion

In a series of three studies, we sought support for our general hypothesis that executive control is associated with romantically involved individuals' ability to stay faithful. When being confronted with an attractive alternative, a person's hedonistic impulse to get involved with this alternative might compete with the more prorelational response of refraining from having contact. We ar-

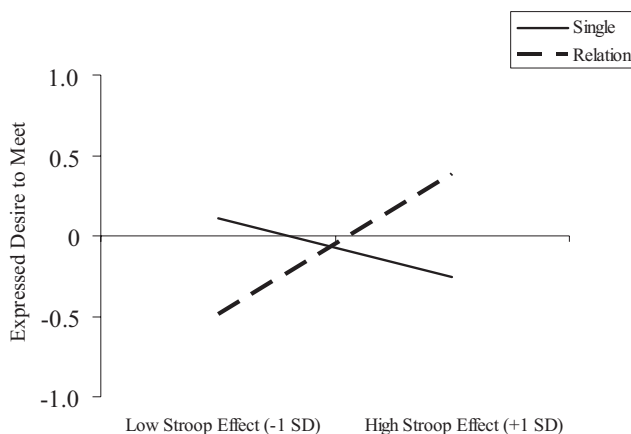


Figure 1. The effect of varying levels of performance on the Stroop task (low Stroop effect to high Stroop effect) on the expressed desire to meet the other, for participants with and without a relationship, while controlling for level of perceived attractiveness of the other, Study 3.

<sup>6</sup> Similar results were obtained when omitting the covariate attractiveness of the other participant. Specifically, the interaction between executive control and relationship status on the expressed desire to meet remained significant,  $\beta = .38$ ,  $t(61) = 2.31$ ,  $p = .024$ , as did the simple slope for romantically involved participants,  $\beta = .45$ ,  $t(61) = 2.41$ ,  $p = .019$ . The simple slope for single participants remained nonsignificant,  $\beta = -.13$ ,  $t(61) = -0.78$ ,  $p = .44$ .

<sup>7</sup> The finding that perceived attractiveness was positively related to the expressed desire to meet an attractive other seems inconsistent with the finding in Study 2, showing that perceived attractiveness of the confederate was not related to participants' flirting behavior. There are several possible explanations for this inconsistency. First, as in Study 3, both variables—perceived attractiveness and expressed desire to meet—are explicit questions answered by means of a slider, but participants' flirting behavior in Study 2 was rated by others and might represent more implicit or automatic flirting tendencies. Second, perceived attractiveness of the confederate in Study 2 was rated after the interaction with the confederate took place. Because all participants in Study 2 were romantically involved, participants who did show relatively high levels of flirting behavior might have felt the urge to downplay or deny their feelings of attraction toward the confederate to restore their relationship. However, participants who did not show much flirting behavior might have felt free to acknowledge the attractiveness of the confederate. This may have led participants to explicitly state that they were or were not attracted to the confederate, whereas their behavior showed otherwise.

gued that executive control might help people to deal with this dilemma by facilitating the relationship-protective response. The results of the present studies provided strong support for this idea by demonstrating that executive control helps people to deal with the lure of attractive alternatives in several ways. Romantically involved people with a higher level of cognitive control experience less difficulty in staying faithful to their partners (Study 1) and—when being confronted with an attractive other—show less relationship-threatening behavior (Study 2). Additionally, they have a greater tendency to prevent themselves from being confronted with an attractive other (Study 3).

Why does executive control help people to protect their relationship from attractive alternatives? We reasoned that executive control is directly linked to relationship-protective responses by inhibiting relationship-threatening responses. Executive control helps people to refrain from acting on the experienced attraction toward desirable alternatives, leading people to show less interest in meeting them and to communicate less sexual interest (i.e., flirting behavior) when being confronted with them. Thus, the present research provides insight into the process of why it is, at times, difficult to stay faithful: It requires executive control.

Additionally, there may be related, more specific psychological mechanisms at play by which executive control is associated with being faithful. For example, the lack of executive control has been shown to be involved in the failure to suppress unwanted thoughts (e.g., Anderson & Green, 2001). Consequently, romantically involved people low in executive control may fantasize more about alternative relationships, which may make them more vulnerable when confronted with attractive others. Or high levels of executive control may facilitate a cognitive regulation mechanism by which one's long-term relationship goals with respect to the current relationship become more accessible upon seeing an attractive alternative, which, in turn, would trigger relationship-protective behaviors. Related to this, people low in executive control may not fully realize the costs or consequences of giving in to the temptation to get involved with someone else. Finally, it may even be the case that varying levels of executive control lead people to experience different levels of temptations when being confronted with an attractive alternative. These possibilities provide interesting and important issues for future research to explore. Researchers should also examine at what stage or stages of the process executive control kicks in to facilitate relationship-protective responses.

The present findings are in line with recent research on the more general role of cognitive control processes and self-regulation in relationship functioning (for an overview, see Vohs & Finkel, 2006). Most important, these previous findings have demonstrated the beneficial role of self-regulation in relationship protection and maintenance. For example, when performing a task together with their romantic partner, participants whose self-regulatory resources were impaired took more credit for joint success and blamed the partner for joint failure more often than did participants whose self-regulatory resources were intact (Vohs & Baumeister, 2004). Additionally, participants responded more constructively to hypothetical transgressions by their partner when their self-regulatory resources were intact as opposed to when their regulatory resources were depleted (Finkel & Campbell, 2001). Recent findings showed that the detrimental effects of decreases in self-regulation on relationship functioning might be explained in terms of a lack of executive control, as previously argued by Baumeister,

Schmeichel, and Vohs (2007). Specifically, Pronk et al. (2010) showed that individual differences in level of executive control predicted forgiveness in close relationships. The present research adds to this by demonstrating that a higher level of executive control helps people to stay faithful to their partner. Together, these findings demonstrate that individual differences in executive control may indeed underlie the ability to show prorelationship responses in relationship-threatening situations.

The present research helps to understand why some people have more difficulty in resisting the temptation to cheat than others. Infidelity has been attributed mostly to certain personality characteristics, primarily narcissism but also psychoticism and low conscientiousness (e.g., Buunk & Van Driel, 1989; Buss & Shackelford, 1997). An interesting observation made by Buss and Shackelford (1997) is that most of these personality traits share an important component: impulsivity and the inability to delay gratification. Although the dynamics of the impulsivity–infidelity link has remained unclear so far, our findings contribute to this matter. As argued, a core aspect of executive control is the ability to inhibit impulses. It is possible that a low level of executive control underlies the relations between impulsivity and infidelity, thereby explaining why certain personality traits predict infidelity. Future research is needed to further investigate this intriguing matter.

An important implication of the present study is that people might be more vulnerable to infidelity when their ability to exert executive control is reduced. An impairment of executive control could, for example, be due to cognitive load, created by a high workload or stress. Recent research has shown that people are more prone to infidelity when they experience a high level of psychological distress (Hall & Fincham, 2009). Another factor often linked to infidelity, by laypeople as well as by scholars, is the use of alcohol. Indeed, alcoholics have a greater chance of being unfaithful (e.g., Hall, Fals-Stewart, & Fincham, 2008) but also, at a more situational level, the use of alcohol enhances the chances of infidelity (e.g., Cooper, 2002). These findings are often explained in terms of alcohol consumption leading people to behave more impulsively, taking sexual risks they would not have taken when sober. Because alcohol weakens cognitive control processes (e.g., Easdon & Vogel-Sprott, 2000; Rose & Duka, 2007), the link between alcohol use and infidelity might well be (partly) due to an impairment of executive control.

Throughout the present studies, we used different executive control tasks to test our main hypothesis. These tasks each focused on a separate aspect of executive control: task switching, updating, or inhibition. In the introduction, we outlined that, notwithstanding the differences, these separate aspects share two underlying processes, namely, inhibition and attention (e.g., Smith & Jonides, 1999). Because we predicted exactly these processes to be involved in dealing with the lure of attractive alternatives, we expected each of these different aspects to be related to the ability to stay faithful. Indeed, our results showed that—irrespective of the task we used—executive control helps people to show prorelational responses when being confronted with attractive alternatives. These findings are in line with recent research showing that various executive control tasks—that is, updating, task-switching, and inhibition tasks—were related to the ability to forgive a close other after the occurrence of an offense (Pronk et al., 2010). Together, these findings provide cumulative evidence for the idea



that executive control generally predicts relationship protection and maintenance.

It is important to note that we only expect executive control to predict the ability to stay faithful when the motivation to maintain the relationship is present. Executive control facilitates goal-directed responses, and when there is no overarching goal to protect the relationship—for example, when satisfaction or commitment is low—executive control might not come into play. Because the participants in the present studies all scored high on commitment to their partner (all scored more than 6.3 points on a 7-point scale), the present data did not allow us to test this. It is plausible that executive control only plays a role in relationships of relatively high, as opposed to low, quality. However, it is also possible that executive control plays an even bigger role in preventing infidelity when people experience a (temporary) drop in commitment to and satisfaction with their romantic partner, because in this case, it may even be harder to behave in a relationship-protective manner. Research is needed to test the possible interaction between executive control and relational quality on infidelity.

An interesting question is whether gender influences the relationship between executive control and faithfulness. On the basis of previous research showing that men have a higher sex drive than women (for an overview, see Baumeister, Catanese, & Vohs, 2001), one might expect men to have a harder time staying faithful than women and perhaps a higher need for executive control to prevent infidelity. However, in the present research, we did not find significant interactions between gender and executive control on our proxies for infidelity. Also, we replicated the main effect across the three studies, while Study 1 included primarily women, Study 2 only men, and Study 3 an almost equal distribution of men and women. Yet, it is important to note that the present research does have its limitations in this regard. For example, Studies 1 and 3 do not have enough statistical power to adequately test for possible gender interactions. Also, the present studies were not specifically designed to test for gender effects; therefore, the stimulus materials for male and female participants might have been insufficiently matched. Future research is thus needed to arrive at any firm conclusions regarding the role of gender in the relationship between executive control and infidelity.

We note some other limitations and strengths of the present research. We do not have data concerning the role of executive control and its relationship to actual infidelity. It is, for obvious reasons, difficult to acquire such data. Researchers therefore have relied on proxies for infidelity, for example, by using questionnaires measuring the level of intimacy with opposite-sex others (e.g., Drigotas et al., 1999). Although still not actual infidelity, in the present research, we examined participants' real behavior toward real attractive opposite-sex others. Flirting behavior as displayed in Study 2 may well be associated with greater chances of actual infidelity in the long run (e.g., Buss & Shackelford, 1997). In addition, not giving in to the opportunity to meet an attractive other, as studied in Study 3, would be the most straightforward way to avoid a potentially relationship-threatening situation. By focusing on actual behavior, the present research makes an important contribution to the more general literature on attractive alternatives, which has mostly examined people's responses to hypothetical attractive alternatives presented only on paper. For example, the derogation effect has mostly been examined concern-

ing pictures or descriptions of opposite-sex others (e.g., Maner et al., 2008; Simpson et al., 1990; for an exception, see Karremans & Verwijmeren, 2008). It is not clear whether such effects would be obtained in actual interactions, and it is therefore important to examine actual behavioral responses toward attractive opposite-sex others (see Baumeister, Vohs, & Funder, 2007).

## Conclusion

People in a romantic relationship inevitably are confronted with attractive alternative partners from time to time. And even in well-functioning, stable relationships, it may be hard to resist the temptation to get involved with someone else. Although some people may have a greater motivation to prevent infidelity than others, people also vary in their ability to stay faithful. The present research showed that executive control is a key factor to consider when examining why some people have a harder time preventing infidelity than others. Consistent with our expectations, people with a higher level of executive control find it easier to stay faithful to their partners, flirt less when being confronted with an attractive alternative, and express a lower desire to meet attractive others. The present research showed that executive control helps people to stay faithful, thereby underlining the importance of cognitive control processes in relationship protection and maintenance.

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Received June 17, 2010

Revision received September 24, 2010

Accepted September 27, 2010 ■

### **Call for Papers: *Journal of Consulting and Clinical Psychology* Special Issue on Behavioral Medicine and Clinical Health Psychology**

The *Journal of Consulting and Clinical Psychology* plans to publish a special issue on “Behavioral Medicine and Clinical Health Psychology” in 2012. As such, we are calling for original manuscript submissions within this broad area. Such a special issue will be the fourth that *JCCP* has published in behavioral medicine over the last four decades. Past issues have proven to be a seminal resource for researchers, practitioners, and policymakers interested in the relationships among behavior, psychological science, and health. Empirical, review (descriptive or quantitative), or novel conceptual or methodological contributions related to the association between clinical and behavioral science and the development and course of disease or the promotion of health are welcomed. Updated or innovative examinations of topics addressed in previous *JCCP* behavioral medicine and clinical health psychology special issues (e.g., interventions targeting behavioral risk factors for disease, behavioral management of chronic conditions) are welcomed, as are examinations of recently emerging topics (e.g., technology and behavioral medicine, implications of behavioral and psychological science for the clinical translation of genomic methods). Papers addressing behavioral medicine and clinical health psychology topics as part of a broader biopsychosocial or ecological systems perspective are also welcomed. Articles addressing issues of diversity in behavioral medicine (e.g., RCTs of culturally-sensitive psychosocial interventions, diversity-related health care disparities) are especially sought.

The editors for this issue are Alan J. Christensen (Guest Editor) and Arthur M. Nezu (*JCCP* Editor). Authors interested in having a manuscript considered for this special issue need to first submit a 1-page proposal outlining the full manuscript by **July 1, 2011**. Authors of selected proposals will be notified inviting them to submit a full paper due **September 30, 2011**. All such papers will undergo normal peer review evaluations. Note that an initial invitation does not signify eventual acceptance. All manuscripts should be prepared in strict accordance with *JCCP* guidelines (please refer to the website: <http://www.apa.org/pubs/journals/ccp/>) and eventually submitted through the standard *JCCP* portal. Questions about appropriate topics, as well as the 1-page proposals, can be sent to either Alan Christensen ([alan-christensen@uiowa.edu](mailto:alan-christensen@uiowa.edu)) or Art Nezu ([amn23@drexel.edu](mailto:amn23@drexel.edu)).