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ORIGINAL PAPER

# Relatedness needs and negative fantasies as the origins of obsessive thinking in romantic relationships

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## Abstract

Surprisingly little experimental research has been conducted regarding the origins of obsessive thinking. Based on prior research on basic psychological needs (Sheldon and Gunz in J Pers 77(5):1467–1492, 2009) and future fantasies (Kappes and Oettingen in J Exp Soc Psychol 47(4):719–729, 2011), we proposed that a threat to the need for relatedness increases obsessive thinking about a romantic partner (i.e., a need-relevant target) when combined with a negatively valenced future fantasy about the partner. We tested this hypothesis in three experiments: Experiment 1, administered online, used a metacognitive relatedness threat manipulation, a scenario-based fantasy valence manipulation, and a measure of obsessive thinking. Experiment 2 used a modified fantasy valence manipulation, a new obsessive thinking measure, and a measure of romantic proximity-seeking. Experiment 3 used cyberball to manipulate relatedness threat in the lab. An internal meta-analysis revealed that threats to relatedness (vs. no threat) and negative fantasies (vs. positive fantasies) both led to small increases in obsessive thinking; however, inconsistent evidence emerged for the hypothesized threat-by-fantasy valence interaction.

**Keywords** Obsessive thinking · Self-determination theory · Need frustration · Fantasies · Relatedness · Romantic relationships

## Introduction

Consider a hypothetical couple, Andy and Trina, on a night when Trina is out dancing with friends but Andy has no plans. Andy has not heard from his friend group lately so he is feeling a bit lonely, especially in comparison to Trina. As Andy sits at home, the image of Trina cheating on him creeps into his mind. He cannot seem to let go of vivid thoughts of her betraying and abandoning him, and he even starts to fear that these thoughts might become real. Panicked, he fires off several text messages to Trina asking what she is doing and when she will be home.

This is a story of obsessive thinking brought on by an aroused relatedness need and a negative fantasy. Although some theoretical work has considered that the roots of obsessive thinking may lie in motivational dysfunction (Ryan and Deci 2017), surprisingly little experimental research has been conducted regarding its origins (Feygin et al. 2006). Research on psychological needs and fantasies illuminates one possible process, which we examine here. Just as Andy fixated on Trina after feeling lonely and doubting her faithfulness, interpersonal obsessive thinking may emerge when one has an aroused relatedness need and negative fantasies impede mentalized need-satisfaction.

### The need for relatedness

According to basic psychological needs theory (BPNT), a mini-theory of self-determination theory, the basic psychological needs of relatedness, competence, and autonomy are universal and essential ingredients for human flourishing (Deci and Ryan 2000, 2014). We focus in this paper on the need for relatedness, which is the fundamental need to feel emotionally close to and connected with important others (Ryan et al. 1995; see also Baumeister and Leary 1995 on belongingness needs). When these basic needs, such as relatedness, are fulfilled, people experience *need*

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*satisfaction* and benefit from improved psychological well-being and performance (for a review, see Ryan and Deci 2017). However, when these needs are actively undermined, people experience *need frustration*, which begets ill-being and, in extreme cases, psychopathology (Bartholomew et al. 2011; Baumeister and Leary 1995; Ryan and Deci 2000; Strauss and Ryan 1987; Vansteenkiste and Ryan 2013). These consequences emerge regardless of individual differences in the capacity to feel satisfied by attaining need-satisfying experiences (i.e., differences in motive disposition; see McClelland 1985; Denzinger and Brandstätter 2018). Indeed, Chen et al. (2015) found that explicit need strength did not moderate the effects of need satisfaction or frustration on well-being.

### The relatedness need as a motivating force

Given that basic psychological needs are regarded as universal requirements, most BPNT research has examined the effects of need satisfaction and frustration on adaptive behavior and well-being (Chen et al. 2015; Deci and Ryan 2000, 2014; Ryan and Deci 2017). In contrast, other need traditions have focused more on how state-like and trait-like differences in need strength affect behavior (e.g., implicit motives: McClelland et al. 1953; psychogenic needs: Murray 1938; physiological needs: Hull 1943; belongingness need: Baumeister and Leary 1995). Distinctions aside, findings from multiple need theories indicate that the presence of a psychological need is associated with the motivation to satisfy the need (McClelland and Kirshnit 1988; Schultheiss et al. 2004; Sheldon 2011; Sheldon et al. 2011).

Drawing on and integrating this prior research, we define need arousal as a state in which one is motivated to fulfill a need (e.g., thirst is a state accompanied by the motivation to find and drink water). Need threats induce need arousal and can take the form of deprivation (e.g., going several hours without consuming liquids) or active thwarting (e.g., eating salty food). Accordingly, a threat to relatedness should induce relatedness arousal, a state in which energy is mobilized towards attaining relatedness satisfaction (see Klinger and Cox 2011; Lewin 1946; Oettingen et al. 2009). For instance, Sheldon and Gunz (2009, Study 2) found that participants who experienced a relatedness threat (being given false feedback about ending up lonely) desired more relatedness-satisfying experiences such as idealized romantic relationships. In a longitudinal study (Study 3), they also found that decreases in need satisfaction over 6 weeks were associated with increases in self-reported need-relevant motivations (see also, Gardner et al. 2000; Gardner et al. 2005; Maner et al. 2007).

### Responses to relatedness threats

Pursuit of relatedness-satisfying experiences is but one possible response to relatedness threats. As Vansteenkiste and Ryan (2013) delineate, need-thwarting contexts and the subsequent experience of need frustration can also lead to compensatory behaviors. The multimotive model of reactions to interpersonal rejection experiences (Smart Richman and Leary 2009) also provides a framework for predicting responses to relatedness-thwarting events (e.g., rejection, ostracism). This model emphasizes that situational construals of specific rejection episodes determine motivated responses including those of interpersonal approach (both prosocial and antisocial) or avoidance. That being rejected can produce an interpersonal approach response is consistent with our view that relatedness threats arouse motivation to fulfill the relatedness need. However, the consequences of relatedness arousal may vary depending on the mental imagery that follows it.

## Fantasies

Fantasies may be an important determinant of downstream consequences of an aroused relatedness need. We define fantasies, in keeping with Oettingen (1996, 2012), as free-flowing thoughts and images depicting future events that vary in valence, depending on whether the imagined future is idealized and desired (positive) or feared and undesired (negative). Fantasies can be considered under the broad umbrella of constructs including mental simulations (Taylor et al. 1998; Taylor and Schneider 1989), episodic future thinking (Atance and O'Neill 2001; Szpunar 2010), mental time travel (Suddendorf and Corballis 1997, 2007), prospection (Spreng and Grady 2010; Spreng et al. 2009), and imagining the future (see Addis et al. 2007; Schacter et al. 2012). Unlike expectancy judgments or beliefs, which are based on past experiences (Bandura 1977), future fantasies are borne from states of need or deficiency and can occur irrespective of expectations (James 1890; Oettingen 2012; Oettingen and Mayer 2002; Oettingen et al. 2018).

It is also important to distinguish future fantasies from other related constructs. Positive fantasies about a romantic partner are different from positive illusions about a romantic partner (e.g., Murray et al. 1996). Positive illusions are positively biased judgments about the value of one's romantic partner or the likelihood of being able to start or keep up a wanted relationship; in contrast, positive fantasies tend to unfold experientially over time and occur regardless of judgments about value or likelihood of success (Oettingen and Mayer 2002; Oettingen 2012). Put more concretely, Andy may have a positive fantasy of growing old with Trina even if his expectations of their future together are not so rosy. Conversely, Andy might have negative fantasies of splitting

from Trina despite optimistic beliefs that they are a strong couple.

Although negative fantasies about a romantic partner may commonly involve jealousy-inducing events, jealousy (see Buss et al. 1992) is not a necessary experiential component of such fantasies. Sexual fantasies may also seem relevant to the present research; indeed, previous work (Birnbaum et al. 2008, 2011) has suggested that the content of sexual fantasies often reflects important insights into individuals' desire for closeness to or distance from a romantic partner. However, we are interested in future fantasies that can span a wide array of contexts. The reader might also be reminded of sociometer theory (Leary 2005; Leary and Baumeister 2000), according to which self-esteem functions as an indicator of one's relational value and social acceptance. Although the events depicted in a negative fantasy about a romantic partner would be relationally threatening and thus have consequences for self-esteem *if they were to become reality*, these outcomes are precluded so long as the events remain imaginary.

#### Positive fantasies temporarily satisfy aroused needs

When action in pursuit of need satisfaction is not possible, psychological resources including conscious thoughts are directed towards satiating the need (Fiske 1992). Kappes et al. (2012) demonstrated in four studies that when psychological or physiological needs are aroused, and action is presently impossible, people spontaneously generate positively-valenced future fantasies about need-relevant stimuli. For example, participants generated fantasies about drinking water that were experienced more positively if they were made thirsty than if their thirst was quenched (Study 2). The authors argued that need arousal begets positive fantasies because these fantasies allow people to mentally satiate the need, albeit temporarily.

Further supporting this point, prior research (with both physiological and self-report measures) has shown that positive fantasies reduce energization (Kappes and Oettingen 2011; summary by Sevincer and Oettingen 2015). In one study (Kappes and Oettingen 2011, Study 4), participants were randomly assigned to a high or low need for achievement condition, then engaged in positive fantasies with either need-relevant content (fantasies of academic success) or need-irrelevant content (fantasies of drinking water). When the need for achievement was high, engaging in positive fantasies reduced energization—operationalized as reduced systolic blood pressure—only if the fantasies were need-relevant. When the achievement need was superseded by thirst (i.e., made low), the academic fantasies did not reduce energy, but positive fantasies of drinking water did. Although the evidence is indirect, these findings support the notion that positive fantasies about a need-relevant object serve as need substitutes because reductions in energization following the activation of a need imply that no further pursuit of need-satisfying stimuli is necessary. Consequently, we expect relatedness-relevant positive fantasies to diminish the likelihood of obsessive thinking about a romantic partner following a threat to relatedness.

#### Negative fantasies impede need-satisfaction in the mind

Andy's negatively-valenced fantasies of Trina's infidelity, however, would not be expected to serve as need substitutes. In fact, negative fantasies have been shown to increase pursuit of desired end-states. For example, in one study (Oettingen and Mayer 2002), participants fantasized about interacting with a person in whom they were romantically interested, then rated the valence of these fantasies from *very negative* to *very positive*. Months later, participants reported whether they had started an intimate relationship with the person from their fantasies. The more negatively participants had rated their fantasies, the more likely they were to confess their love to or be in a relationship with their "crushee" thereafter. Thus, people who did not meet relatedness needs in their minds via positive fantasies and instead imagined a negative future were more likely to later seek relatedness satisfaction in reality.

#### Dual role of fantasies

Consistent with the thematic apperception test (TAT) tradition of fantasies reflecting implicit motives (McClelland 1985; McClelland et al. 1953; for a review, see Denzinger and Brandstätter 2018), the content of our free thoughts reveals our present motivational state, such as when positive fantasies emerge in response to an aroused need (Kappes et al. 2012; see also, Suddendorf and Corballis 2007). However, fantasies can also influence self-regulation of behavior (Oettingen 1996, 2012). In other words, they play two important theoretical roles with respect to motivation: positive fantasies are both an outcome resulting from an aroused (relatedness) need, as well as an independent variable which can influence self-regulatory processes. While research could profitably examine positive fantasies as a response to changes in basic psychological need states, in the present research, we instead investigate whether negative future fantasies can modulate the effects of an aroused relatedness need on obsessive thinking.

### Obsessive thinking

We define obsessive thinking as thoughts, images, and impulses characterized by catastrophic misinterpretations and overvaluations (Rachman 1998). Because of their importance, and the sometimes-stressful nature of relationship

formation, romantic relationships are frequently cited as a source of obsessive thinking (Doron et al. 2012); thus, we are specifically interested in obsessive thinking about a relationship partner. Although our work is directly influenced by the burgeoning area of obsessional themes in clinical obsessive-compulsive tendencies (Doron et al. 2012), we are primarily interested in obsessive thinking as a nonclinical phenomenon.

Obsessive thinking may appear similar to rumination (e.g., Nolen-Hoeksema 2000; Martin and Tesser 2006): both modes of thought are characterized by repetitiveness, intrusiveness, and distress (McIntosh and Martin 1992; Wahl et al. 2011). In particular, our conceptualization of obsessive thinking is consistent with rumination as defined by goal progress theory: "conscious thinking directed toward a given object for an extended period of time," which is incited by thwarted goals (Martin and Tesser 1989, p. 306; see also Martin and Tesser 2006). However, obsessive thinking is distinct from rumination as defined by response styles theory: "a mode of responding to distress that involves repetitively and passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms" (Nolen-Hoeksema et al. 2008, p. 400; see also Nolen-Hoeksema 2000). Unlike this latter conceptualization of rumination, obsessive thinking can center on themes beyond one's own distress, including obsessive thoughts about other people (Doron and Kyrios 2005; Freeston and Ladouceur 1997).

#### Obsessive thinking and negative fantasies

Although there is some conceptual similarity between obsessive thinking and negative fantasies about the future, they are distinct constructs. Importantly, negative fantasies are defined by the unpleasant and future-oriented content of thoughts and images, whereas obsessive thinking is defined by an intrusive, repetitive, catastrophic manner of thinking. Obsessive thinking is not necessarily future-oriented, and thus some obsessive themes (e.g., a past betrayal by a romantic partner) would not be considered negative future fantasies. However, it is possible to engage in negative fantasies in an obsessive manner, devoting disproportionate value and attention to them (i.e., catastrophic misinterpretation, Rachman 1998). We theorize that this is especially likely to occur when the negative fantasies are about a stimulus which could potentially satisfy in the future a presently aroused need. Thus, we expect negative future fantasies about a romantic partner that follow arousal of the relatedness need to fail to satisfy the need, leaving thoughts about the relatedness-relevant romantic partner at the forefront of one's mind (e.g., Klinger and Cox 2011), and leading to an increase in obsessive thinking about the partner.

However, this is not always the case—negative fantasies could instead be fleeting and deemed unimportant. Indeed, worrying or having doubts about the future of oneself and one's romantic partner is a typical experience in the development and maintenance of a romantic relationship (e.g., Brickman 1987; Thompson and Holmes 1996). We theorize that negative future fantasies are less likely to become obsessive in nature if their subject is related to a presently satisfied need, because thoughts and attention would more efficiently be devoted to a need, goal, or concern that is currently activated.

#### Behaviors following from obsessive thinking

While obsessive thinking is unpleasant in its own right, one might also expect these thought patterns to meaningfully impact behaviors, such as proximity-seeking. We conceptualize proximity-seeking behaviors as a constellation of romantic advances that vary in terms of severity and can be stalking-like in nature when characterized by unwanted persistence (Davis et al. 2012; Langhinrichsen-Rohling and Taylor 2003; Sinclair et al. 2011). When a romantic pursuer is rejected by a romantic target whom they are particularly dependent upon (Attridge et al. 1998; Rusbult et al. 1998), rejection—a relatedness-thwarting event—fuels efforts to repair and maintain the relationship (Cupach and Spitzberg 2014). The pursuer is thought to become preoccupied with negative, anxiety-provoking thoughts and images about the romantic target (Rachman 1998). As the romantic analogue of hand-washing out of purity concerns, proximity-seeking behavior is performed to attenuate these obsessive thoughts. Returning to our example of Andy and Trina, after the lonely Andy begins having negative, intrusive, and obsessive thoughts about Trina, he may send her multiple text messages or begin trawling social media in an attempt to quell his pangs of anxiety.

### The present research

In the present research, we aim to address whether negative fantasies about a romantic partner following a threat to the basic psychological need for relatedness will lead to increased obsessive thinking. We propose that when relatedness is threatened, and thus aroused as a motive, negatively-valenced fantasies about a relevant stimulus, compared with positively-valenced fantasies, will increase obsessive thinking about the stimulus. Consistent with prior research, such obsessive thinking should also increase proximity-seeking towards the object (e.g., Cupach and Spitzberg 2014).

Specifically, in three experiments we assessed the effects of relatedness arousal—induced via threat—and valence of induced fantasies specifically about a romantic partner on obsessive thinking about that partner (Experiments 1, 2, and 3) and proximity-seeking (Experiments 2 and 3). To increase generalizability, we used two different manipulations for

each independent variable, as well as two different measures of obsessive thinking across all three studies. In each case, we predicted that a threatened relatedness need followed by a negative fantasy would increase obsessive thinking relative to a neutral or positive fantasy. This should, in turn, predict higher endorsement of proximity-seeking behaviors.

## Experiment 1: testing relatedness threat and fantasy valence manipulations

In this experiment, we aroused the need for relatedness in half of our sample using a metacognitive threat manipulation (Schwarz et al. 1991). Then, participants fantasized about a future scenario with their romantic partner which was either positively, negatively, or neutrally valenced. The primary outcome was self-reported obsessive thinking about the partner. We hypothesized that for those in the relatedness threat condition, negative fantasies would increase obsessive thinking relative to neutral or positive fantasies, but we did not expect this increase in the no threat condition.

## Method

### Participants and design

In Experiment 1, 489 Amazon MTurk workers who were currently in a romantic relationship ($M_{duration}$ = 8.76 years) participated. Our sample—89.9% of whom were straight and 10.1% of whom identified as not straight or queer—comprised 205 men, 253 women, and 31 trans and gender non-binary participants. We used a 2 × 3 between-subjects design to manipulate relatedness threat (threat vs. no threat) and fantasy valence (negative vs. positive vs. neutral), and then assessed obsessive thinking.

### Procedure and materials

#### Relationship status

Following consent, the survey asked participants if they were currently in a romantic relationship. If not, participants reported whether they were "currently interested in or pursuing anyone sexually or romantically (e.g. crush)." If participants again answered "no," they were asked if they could think about a friend. Once a participant responded "yes" to one of these prompts, they wrote in the person's name (e.g., if they were in a relationship, they typed in their partner's name). We inserted this name into all subsequent questions pertaining to the romantic target, including demographic questions about the target (e.g., race, gender). Most participants were in a committed romantic relationship ($n$ = 489); however, we also collected an exploratory sample of 60 participants who thought about a crush and 50 who thought about a friend. Because our predictions were developed within the domain of romantic relationships, data from these single participants were not analyzed.

#### Relatedness threat

Participants were next told that they would be completing a series of questionnaires and activities about their beliefs and impressions. Consistent with the procedure in Kappes et al. (2012, Study 3), we manipulated relatedness threat by asking participants to recall recent examples of when they felt loved. Those in the *threat* condition were asked to list 16 examples, and those in the *no threat* condition were asked to list four examples. Research suggests that listing many examples feels relatively difficult, whereas listing few feels relatively easy (Sanna and Schwarz 2003; Schwarz et al. 1991). The metacognitive experience of relative difficulty has been shown to influence judgments—in this case, about relatedness (Kappes et al. 2012). We anticipated, in accordance with past research, that the more difficult task of listing 16 examples would make participants feel deprived of love from important others, constituting a threat to relatedness. This manipulation is conceptually consistent with the relatedness threat used in Sheldon and Gunz (2009, Study 2), which was found to increase relatedness-relevant motivations. To strengthen the threat, we 1.) told all participants that it would be relatively easy to recall these examples and 2.) placed a timer on the page so participants were aware of how long it took for them to list examples. After, two questions assessed the success of our manipulation: "How easy was it for you to remember times in which you felt loved?" (1 = *not at all difficult*, 7 = *extremely difficult*), and "How loved do you feel?" (1 = *not at all loved*, 7 = *extremely loved*).

#### Fantasy valence

After the threat manipulation, we manipulated fantasy valence by altering the content of scenarios—adapted from Kappes et al. (2012, Study 3)—to cue either a negative, positive, or neutral fantasy. Regardless of condition, the scenarios referenced the romantic target named at the beginning of the study, with their name replacing "[ROMANTIC TARGET]". The negative fantasy scenario read, "Today you don't feel really great about yourself. While running an errand, you see [ROMANTIC TARGET] across the street. As you cross the street to say hello, you wave to him/her/them and are upset by this unexpected encounter. You then proceed to have a short and uncomfortable conversation about the little surprise until he/she/they tells you that he/she/they has to…". The positive fantasy scenario read,

"While running an errand, you unexpectedly see [ROMANTIC TARGET] across the street. As you cross the street to say hello, you wave to him/her/them and are glad for the unexpected encounter. You then proceed to have a long and fun conversation about the surprise until he/she/they tells you that he/she/they has to…". The neutral fantasy prompt was narratively identical but devoid of affectively-laden events: "Today is like any other day. While running an errand, you see [ROMANTIC TARGET] across the street. As you cross the street to say hello, you notice a man tying his shoe beside you. You then proceed to have an average, unremarkable conversation with [ROMANTIC TARGET] until he/she/they tell you that he/she/they has to…" Participants were asked to think very deeply about what might happen next and write down those thoughts and images in the essay text box provided. To ensure participants spent the same amount of time fantasizing, the page only (and automatically) advanced after 90 s.

As a manipulation check, participants saw four items assessing fantasy valence on a 1 (*not at all*) to 7 (*very*) scale (e.g., Oettingen et al. 2009). The items read, "In the situation that you just described, how [positive/satisfied/negative/unpleasant] did your thoughts and images make you feel?" The positivity and negativity item sets were negatively correlated, $r(489) = -.49$, $p < .001$, so we reverse-coded the negativity items and computed an index of fantasy valence ($\alpha = .93$), whereby higher scores indicate more positive (and less negative) fantasies.

### Obsessive thinking

To assess obsessive thinking, we adapted the 10-item Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al. 1989). Because the Y-BOCS assesses clinically significant, domain-general obsessive-compulsive symptomatology, we made a number of adjustments. First, we adapted the items to assess obsessive thoughts specific to a romantic target. For example, "How much distress do your obsessive thoughts cause you?" became, "How much distress are your thoughts about [ROMANTIC TARGET] currently causing you?". Second, to tap into obsessive thinking in the moment, we emphasized in the instructions that "people's feelings and emotions often fluctuate," so they should answer with respect to how these thoughts "are affecting you in the present moment." We also modified items to emphasize the present moment (using phrases like "right now" and "currently") and dropped three Y-BOCS items which were incompatible with a momentary assessment of obsessive thinking. The seven adapted items displayed sufficient internal consistency ($\alpha = .87$) and were averaged into a composite score.

Next, participants filled out background[1] and demographic questions. Finally, participants were debriefed about the aims of the study and compensated. Participants spent 8.33 min on average (median) and were compensated $1.10, according to the recommended 10 cents/min convention (for a review on MTurk recommendations see Buhrmester et al. 2011; Woo et al. 2015).

## Results

### Preliminary analyses

It is possible that participants dropped out at different rates across experimental conditions, which could lead to important biases (see Zhou and Fishbach 2016). To assess potentially meaningful differences in attrition, we evaluated whether participant dropout was dependent upon relatedness threat condition using a Chi square test. We found that this was the case, $\chi^2(1, N = 449) = 5.67$, $p = .02$. However, contrary to expectations of higher drop-out in the more labor-intensive condition, drop-out was higher in the no threat condition ($n = 17$) compared to the threat condition ($n = 5$), suggesting that participants are not dropping out due to the sensitive nature of the relatedness threat.[2] Additionally, we observed no differential attrition across the fantasy valence manipulation.[3]

Participants in the threat condition reported more difficulty recalling times when they felt loved ($M = 3.36$, $SD = 1.77$) compared to participants in the no threat condition ($M = 2.55$, $SD = 1.77$), $t(489) = 5.10$, $p < .001$, $d = 0.46$. Compared to no threat participants ($M = 5.61$, $SD = 1.50$), participants in the threat condition also reported feeling less loved ($M = 5.29$, $SD = 1.44$), $t(489) = -2.37$, $p = .02$, $d = 0.22$. Responses to these checks suggest that we successfully threatened relatedness. With respect to fantasy valence, the negative ($M = 3.83$, $SD = .92$), positive ($M = 4.61$, $SD = .88$), and neutral ($M = 4.75$, $SD = .68$) conditions differed significantly, $F(2, 424) = 51.50$, $p < .001$, $\eta = 0.16$, with less positivity reported by participants in the negative condition than those in the positive condition, $M_{\text{diff.}} = -.79$, $SE = .10$, $p < .001$, 95% CI [−1.02, −.56], or the neutral condition $M_{\text{diff.}} = -.93$, $SE = .10$, $p < .001$, 95% CI [−1.02, −.69].

[1] These measures, which were collected for exploratory purposes, included general entitlement (Campbell et al. 2004), perceived stress (Cohen et al. 1983), and general mental health (Kroenke et al. 2009).

[2] We did not observe this pattern of attrition in Experiment 2, $\chi^2(1, N = 111) = 0.89$, $p = .35$, or in Experiment 3, $\chi^2(1, N = 139) = 1.02$, $p = .32$, thus easing concerns that our results are influenced by differential attrition.

[3] We did not observe differential attrition in Experiments 2 or 3 either.

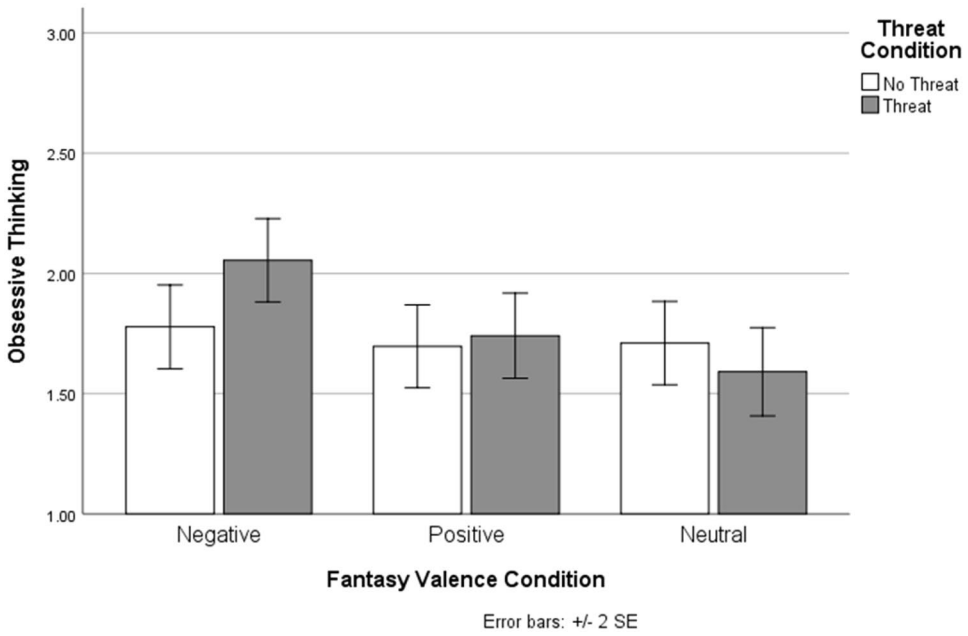


**Fig. 1** Effects of relatedness threat and fantasy valence on obsessive thinking (Exp. 1)

**Table 1** Means and standard deviations (in parentheses) for obsessive thinking and proximity-seeking behavioral intentions across all three experiments

| | Conditions | Obsessive thinking | | | Proximity-seeking behavioral intentions | |
|---|---|---|---|---|---|---|
| | | Negative | Positive | Neutral | Negative | Positive |
| Experiment 1 | No threat | 1.78 (0.82) | 1.70 (0.74) | 1.71 (0.73) | | |
| | Threat | 2.05 (0.71) | 1.74 (0.81) | 1.59 (0.60) | | |
| Experiment 2 | No threat | 3.71 (1.07) | 3.38 (0.95) | | 2.49 (0.85) | 2.48 (0.96) |
| | Threat | 4.15 (1.39) | 3.42 (0.70) | | 2.90 (0.99) | 2.37 (0.62) |
| Experiment 3 | No threat | 3.95 (0.96) | 3.12 (0.93) | | 2.46 (0.75) | 2.27 (0.77) |
| | Threat | 4.12 (1.26) | 3.73 (1.14) | | 2.81 (0.88) | 2.49 (0.86) |

Participants in the positive and neutral conditions did not report different levels of fantasy positivity, $M_{\text{diff.}} = .14$, $SE = .10$, $p = .35$, 95% CI [−.10, .37]. These analyses suggest that our inductions of negative and positive fantasy valence, respectively, were effective, with the negative fantasy condition standing apart from both the neutral and positive conditions. The finding that participants in the positive and neutral conditions did not differ in fantasy positivity is consistent with prior research (Sevincer and Oettingen 2013; Sevincer et al. 2017) which suggests that people's spontaneous fantasies tend to be positively valenced.

## Primary analyses

We conducted a 2 (Relatedness Threat: no threat vs. threat) x 3 (Fantasy Valence: negative vs. positive vs. neutral) factorial ANOVA on obsessive thinking. We hypothesized that relatedness need arousal via threat, coupled with a negative fantasy, would cause increases in obsessive thinking about one's romantic partner relative to the other fantasy conditions. As can be seen in Fig. 1, people whose relatedness need was threatened did not report significantly different levels of obsessive thinking compared to those whose relatedness need was not threatened, $F(1, 421) = .88$, $p = .35$, $\eta = .002$. Obsessive thinking differed by fantasy valence condition, $F(2, 421) = 4.95$, $p = .01$, $\eta = .023$, whereby obsessive thinking was significantly higher in the negative fantasy condition than in both the positive fantasy condition, $F(1, 421) = 5.23$, $p = .06$, and the neutral fantasy condition, $F(1, 421) = 8.93$, $p = .01$. Importantly, the positive and neutral fantasy conditions did not differ in obsessive thinking, $F(1, 421) = .53$, $p = .75$. However, these effects were qualified by a marginally significant interaction, $F(2, 421) = 2.56$, $p = .08$, $\eta = .01$ (see Table 1 for cell means and standard deviations). We found no effect of fantasy valence for participants whose need was not threatened, $F(2, 421) = .25$, $p = .78$, $\eta = .001$; but, for those whose relatedness need was threatened, obsessive thinking differed as a function of fantasy valence condition, $F(2, 421) = 7.13$, $p = .001$, $\eta = .033$. More specifically, in the relatedness threat condition,

participants who also negatively fantasized reported more obsessive thinking than either those who positively fantasized, $F(1, 421) = 6.41$, $p = .01$, or those in the neutral fantasy condition, $F(1, 421) = 13.56$, $p < .001$.

## Brief discussion

Exp. 1 provided support for our hypothesis that the combinatory effect of threatened relatedness and negative fantasies about a romantic partner increases obsessive thinking about the partner. Importantly, we found that negative fantasies of an uncomfortable encounter with one's romantic partner led to stronger increases in obsessive thinking for participants who had already been made to feel unloved. Participants who had the opportunity to indulge in a positive fantasy of interacting with their partner, however, were not more prone to obsessing following the threat induction. This finding is in line with our expectation that positive fantasies of connecting with a romantic partner would ameliorate the threat to relatedness by serving as a need substitute. Yet, participants in the neutral fantasy condition were also no more prone to obsessing following a relatedness threat. Although alternative explanations cannot be ruled out, we suspect this to be the case because, as reported earlier, the positivity of fantasies in the neutral condition was higher than that of the negative condition and no different from that of the positive condition. This implies that regardless of relatedness threat, participants fantasizing based on an affectively neutral scenario stem spontaneously generated positively valenced fantasies about their romantic partner which may have also served as need substitutes, mitigating increased obsessing in response to threat.

However, the measure of obsessive thinking used in this experiment may have called upon more dispositional features of obsessive thinking by alluding to social, work, or other roles. Consequently, this measure may not have fully captured the momentary, state-like effects of our manipulations. In Experiment 2, we address this limitation with a new measure of obsessive thinking.

# Experiment 2: predicting behavioral intentions

In this experiment, we sought to replicate the findings from Exp. 1 in a sample of undergraduates, to improve the fantasy valence manipulation and obsessive thinking measure, and to examine whether relatedness threats and fantasy valence also affect intentions to perform proximity-seeking behaviors. People may be motivated to seek proximity because engagement with a romantic target (vs. mere thoughts) may relieve distress caused by relationship-focused obsessions (Cupach et al. 2000; Doron et al. 2012). Consistent with this notion, as well as the research on stalking-like behaviors (e.g., Cupach et al. 2011; Davis et al. 2012; Sinclair et al. 2011; Spitzberg et al. 2014), we hypothesized that the presence of both a relatedness threat and negative fantasies would yield intentions to engage in proximity-seeking behavior. Accepted as the most immediate antecedent of behavior (e.g., Ajzen 1985), behavioral intentions served as a proxy for actual pursuit behavior.

## Method

### Participants and design

In Exp. 2, a sample of 112 undergraduate students from a large Mid-Atlantic university who were in a committed romantic relationship ($M_{\text{duration}} = 21.15$ months) completed this study online for course credit. Our sample—84.8% of whom were straight, 15.2% of whom identified as not straight or queer—comprised 32 men, 75 women, and 5 trans or gender non-binary participants. Again, we manipulated relatedness need arousal via a threat (threat vs. no threat) and fantasy valence (negative vs. positive). In addition to measuring obsessive thinking, we also assessed proximity-seeking behavioral intentions.

### Procedure and materials

Following the same procedures as in Exp. 1, after consenting, participants answered questions about their relationship status, named a romantic partner, crush, or friend, then completed a variety of demographic questions (e.g., race, gender, and sexual orientation) about the romantic target. We again collected an exploratory sample of 90 participants who were single and thought about a crush ($n = 59$) or a platonic friend ($n = 31$) during the survey; like in Exp. 1, we did not include these participants in our analyses because our *a priori* predictions were regarding romantic partners.

#### Relatedness threat

Participants were then randomly assigned to the threat or no threat condition and underwent the manipulation, which followed the exact same procedure as in Exp. 1, including the same manipulation check questions.

#### Fantasy valence

In Exp. 1, the fantasy scenario prompts were highly directive, specifying a scene that may not have struck participants as personally meaningful or realistic (see Schwarz 2004). Accordingly, we modified the fantasy-valence manipulation

to be more personalizable. Moreover, we dropped the neutral fantasy condition because our hypotheses applied to negative and positive fantasies, the pattern of results for obsessive thinking in Exp. 1 did not differ for neutral and positive participants, and it is difficult to conceive of anyone generating a truly non-valenced fantasy. In this experiment, participants assigned to the negative fantasy condition were asked to think about the *worst possible outcome* they could imagine occurring with their romantic target in the upcoming months; those in the positive fantasy condition were asked to think about the *best possible outcome*. These prompts are consistent with established fantasy generation procedures (e.g., Kappes and Oettingen 2011; Kappes et al. 2013). In both conditions, participants were asked to think deeply about these thoughts, images, and feelings and then write them in the textbox below the prompt. Participants were automatically advanced to the next page of the survey after 120 s had elapsed. After fantasizing, participants responded to only two of the four items from Exp. 1—those assessing fantasy positivity ("…how positive…") and fantasy negativity ("…how negative…"). These two items were again negatively correlated, $r(108) = -.84$, $p < .001$, so we reverse-coded the negativity item then computed an average score ($\alpha = .92$), such that higher scores represent more positivity.

#### Obsessive thinking

In Exp. 2, we sought a truly momentary assessment of obsessive thinking. Accordingly, we created a new obsessive thinking measure by selecting pertinent items across several commonly-used diagnostic measures (e.g., Cooper 1970; Myers et al. 2008; Rassin et al. 2001). The resulting twelve items measure features of obsessiveness (e.g., thought-action fusion, intrusiveness, etc.) and included statements like, "I am overcome by my current thoughts and images about [ROMANTIC TARGET]" and "Right now I just want to make sure everything is okay with [ROMANTIC TARGET]" (1 = *Strongly Disagree*, 7 = *Strongly Agree*). Instructions directed participants to report obsessive thoughts specific to their romantic target, and, as in Exp. 1, emphasis was placed on the momentary nature of the thoughts. We averaged across the items such that higher scores indicate more obsessive thinking ($\alpha = .86$).

#### Proximity-seeking behaviors

We also assessed intentions to engage in proximity-seeking behaviors by adapting a measure from research on Obsessive Relational Intrusion (Cupach and Spitzberg 1998). The original measure, a checklist of 53 behaviors ranging in extremity, has been used in research on victims' reports of stalking experiences (Spitzberg et al. 1998) as well as—relevant to our aims—retrospective recall of one's own romantic stalking-like behaviors (Spitzberg et al. 2014). First, we told participants that "sometimes people engage in a variety of behaviors to get the attention of romantic or sexual interest or relationship partner." Then, as a prospective measure on a 1 (*not at all likely*) to 7 (*extremely likely*) Likert-type scale, we asked participants to indicate how likely they "would be to engage in the following behaviors while trying to attract a romantic interest or relationship partner." Sample items include, "show up to [ROMANTIC TARGET]'s house unannounced" and "send desperate messages." We then averaged across all 53 items, such that higher scores indicate greater intentions to perform proximity-seeking behaviors ($\alpha = .95$). Note, this measure is of tendencies to seek proximity with a general, not necessarily a specific, romantic target. After the dependent measures, participants filled out the same background and demographic questions as in Experiment 1. Finally, participants were debriefed about the aims of the study, thanked, and granted credit for participation.

## Results

### Preliminary analyses

Consistent with Exp. 1, participants in the relatedness threat condition reported more difficulty in recalling times when they felt loved ($M = 3.50$, $SD = 1.65$) compared to those in the no threat condition ($M = 2.27$, $SD = 1.46$), $t(109) = 4.16$, $p < .001$, $d = 0.79$. Similarly, participants in the threat condition reported feeling less loved ($M = 5.19$, $SD = 1.52$) than participants in the no threat condition ($M = 5.80$, $SD = 1.30$), $t(109) = 2.26$, $p = .03$, $d = 0.43$. These patterns are consistent with Exp. 1 and suggest that the recall task successfully manipulated threat to relatedness. Also in line with Exp. 1, participants in the negative fantasy condition reported feeling less positively about their fantasies ($M = 2.76$, $SD = 1.67$) compared to those in the positive fantasy condition ($M = 5.80$, $SD = 1.30$), $t(106) = 9.93$, $p < .001$, $d = 2.04$. It appears that the new fantasy prompts manipulated valence as expected.

### Primary analyses

As in Exp. 1, we hypothesized that the combinatory effect of a threatened relatedness need coupled with a negative fantasy about one's romantic partner would increase obsessive thoughts about that person. Using the same analytic strategy as in Experiment 1, we conducted a 2 (Relatedness Threat: no threat vs. threat) × 2 (Fantasy Valence: negative vs. positive) factorial ANOVA on obsessive thinking.

Participants with a threatened relatedness need and those with no threat did not differ in their self-reported levels of

obsessive thinking, $F(1, 106) = 1.40$, $p = .24$, $\eta = .01$. We again found a main effect of fantasy valence, whereby those in the negative fantasy condition reported significantly more obsessive thinking relative to participants in the positive fantasy condition, $F(1, 106) = 6.71$, $p = .01$, $\eta = .060$. Although the main effect results are consistent with Exp. 1 and the overall pattern is similar, we did not replicate the interaction effect: changes in obsessive thinking due to fantasy valence did not differ based on threat condition, though this effect was in the same direction as Exp. 1, $F(1, 106) = .92$, $p = .34$, $\eta = .009$. To probe these effects further, we conducted a planned contrast comparing participants with both a threatened need and induced negative fantasies to those in the other three groups and found that they reported more obsessive thinking, thus supporting our hypothesis, $L = 1.94$, $SE = .70$, $p = .01$, 95% CI [.54, 3.33].

A secondary aim of Experiment 2 was to examine the effects of relatedness arousal and fantasies on proximity-seeking behaviors. We hypothesized that a threat to relatedness followed by a negative relationship-specific fantasy would yield the highest intentions to engage in proximity-seeking behaviors. We found partial support for this claim. Participants' self-reported intentions to engage in proximity-seeking behaviors did not differ as a function of relatedness threat condition, $F(1, 106) = .82$, $p = .37$, $\eta = .008$. The effect of fantasy valence condition was trending such that participants in the negative condition reported more intentions to engage in proximity-seeking behavior than those in the positive condition, $F(1, 106) = 2.54$, $p = .11$, $\eta = .023$. The interaction was also trending, $F(1, 106) = 2.37$, $p = .13$, $\eta = .022$. We again conducted a planned contrast comparing participants in the threat and negative fantasy conditions to those in the other three experimental groups and found, in support of our hypothesis, that they were higher in proximity-seeking intentions, $L = 1.35$, $SE = .58$, $p = .02$, 95% CI [.21, 2.50]. Irrespective of condition, obsessive thinking positively predicted proximity-seeking behavioral intentions, $b = .30$, $SE = .06$, $t(109) = 5.15$, $p < .001$, 95% CI [.18, .41].

## Brief discussion

In Exp. 2, we partially replicated and expanded on Exp. 1. We again found support for a relatedness threat and negative fantasies producing the most obsessive thinking, this time using a new manipulation of fantasy valence and a new obsessive thinking measure. We did not find the expected interaction effect, but it was in the predicted direction and a subsequent analysis suggests that when a relatedness need is aroused and negative fantasies impede satisfaction of that need, obsessive thinking is highest. A likely reason that the pattern we observed in Exp. 2 was colored more by the main effect of negative fantasies than an interaction is that our fantasy valence induction—imagining the worst or best possible relationship outcome—was more intense than the induction used in Experiment 1—imagining a single uncomfortable or pleasant encounter with one's partner. Though obsessive thinking was still descriptively highest for those who also had a threatened relatedness need, intense negative fantasies appear to be sufficient to increase obsessive thinking even in the absence of need arousal—or, perhaps intense negative fantasies may themselves arouse a need. Exp. 2 also extrapolated the pattern of results from obsessive thinking into the context of behavioral intentions, lending initial support to the role of need threats in producing pursuit-oriented compensatory behaviors (Vansteenkiste and Ryan 2013).

## Experiment 3: threatening relatedness via social exclusion

In Experiment 3, we aimed to test the same phenomena in a lab setting and to make a number of improvements. Additionally, the love recall relatedness threat manipulation used in Exp. 1–2 most likely led participants to experience a lack of relatedness satisfaction, which should be distinguished from the experience of need frustration brought about by contexts which actively undermine or thwart the need (Bartholomew et al. 2011; Chen et al. 2015; Ryan and Deci 2017). Because we are interested in the origins of obsessive thinking, a negative psychological outcome, and such outcomes are better predicted by need frustration than need satisfaction (Chen et al. 2015), we sought in this experiment to threaten relatedness by actively thwarting it via a social exclusion manipulation: cyberball (Williams 2002; Williams and Jarvis 2006). Previous research has shown that social exclusion via cyberball thwarts relatedness (Legate et al. 2013, Study 2).[4] Finally, we aimed to replicate the pattern of results with respect to proximity-seeking behaviors. All hypotheses remained the same as in Exp. 2.

[4] One might reasonably question why we expect an exclusion manipulation entirely unrelated to the romantic partner to affect obsessive thinking about and proximity-seeking to the partner, specifically. Both the cyberball manipulation and the metacognitive relatedness threat manipulation used in Exp. 1 and 2 are used to threaten the basic psychological need for relatedness, rather than a partner-specific relatedness. Given that a romantic partner is an important source of relatedness satisfaction, we consider fantasies about, obsessive thinking about, and proximity-seeking towards the partner as relevant to the need for relatedness. Although it is not the focus of this paper, we would make the same predictions regarding obsessive thinking about and proximity-seeking towards any person—a friend, a family member, etc.—who consistently provides feelings of interpersonal closeness.

## Method

### Participants and design

Participants were 137 undergraduate psychology students at a large Mid-Atlantic university who were in a committed romantic relationship ($M_{duration}$ = 18.84 months) and completed our study in the lab for course credit. As in Exp. 1–2, single participants' data were not analyzed ($n$ = 70). Our sample—75.9% of whom were straight, 24.1% of whom identified as not straight or queer—comprised 30 men, 104 women, and 3 gender non-binary participants. We manipulated relatedness threat using a cyberball paradigm (threat vs. no threat) and fantasy valence (negative vs. positive). We again measured obsessive thinking and intentions to engage in proximity-seeking behaviors.

### Procedure and materials

Participants were invited to the laboratory and seated in a private cubicle by an experimenter who remained blind to experimental condition. Following consent, the experimenter instructed participants that they would be completing a variety of questions and activities on the computer in front of them, then left the room. After answering questions about their relationship status and demographic information about their relationship partner (consistent with Exp. 1–2), participants read that the next part of the study involved mental visualization and that they would be playing an internet ball-toss game (Williams 2002). This animated game involves three players (two computers and one participant) throwing a ball back-and-forth. When the ball is tossed to the participant's icon, they selected one of the other two icons to throw the ball. They were informed that performance in the game was not important; it was more important to engage their mental visualization skills. In particular, they were told to focus on the situation, themselves, and the other players in the game. Accessed via the Cyberball server, the game was embedded within the online survey and set for 40 total throws.

#### Relatedness threat

In order to arouse the need for relatedness, we manipulated the parameters of the cyberball game. Specifically, participants randomly assigned to the *no threat* condition were socially included, receiving the ball for approximately one-third of the total throws. However, in the *threat* condition, participants were socially excluded, receiving the ball only twice, within the first five throws of the game. Prior research suggests that such virtual exclusion causes substantial social pain and distress (Williams 2002), which ought to thwart relatedness (Legate et al. 2013). After completing the cyberball game, participants filled out a brief set of questions (Williams and Jarvis 2006) assessing the degree to which we successfully manipulated relatedness threat via social exclusion—how excluded they felt ("I was excluded"; 1 = *not at all true*, 5 = *very true*), how ignored they felt ("I was ignored"; 1 = *not at all true*, 5 = *very true*), and how often they were thrown the ball ("What percent of the throws were thrown to you?").

#### Fantasy valence

We followed the same fantasy-valence manipulation procedure as in Exp. 2, wherein participants in the negative condition imagined the worst possible outcome with their romantic target in the coming months, and those in the positive condition imagined the best possible outcome. Participants then responded to the same two items from Exp. 2 assessing fantasy positivity and fantasy negativity; we reverse-scored the negativity item and computed an index of fantasy positivity (higher scores indicate more positivity; α = .92).

#### Dependent measures

We used the same obsessive thinking (α = .85) and proximity-seeking intentions (α = .93) measures as in Exp. 2. After completing additional background and demographic questions as in Exp. 1 and 2, participants were debriefed about the aims of the study, thanked, and granted credit for participation.

## Results

### Preliminary analyses

Participants in the relatedness threat (social exclusion) condition ($M$ = 3.16, $SD$ = 1.02), compared to participants in the no threat (social inclusion) condition ($M$ = 1.57, $SD$ = .80), reported that they felt more excluded, $t(134) = 10.14$, $p < .001$, $d = 1.73$. Similarly, in the threat condition ($M$ = 3.24, $SD$ = .99) participants also reported feeling more ignored than those in the no threat condition ($M$ = 1.54, $SD$ = .80), $t(132) = 10.95$, $p < .001$, $d = 1.88$. Additionally, participants in the threat group ($M$ = 12.79, $SD$ = 12.59) reported being passed the ball significantly less than those in the no threat group ($M$ = 27.13, $SD$ = 10.87), $t(135)$ = 7.14, $p < .001$, $d = 1.22$. Consistent with Exp. 1 and 2, participants in the negative valence condition reported less fantasy positivity ($M$ = 2.27, $SD$ = 1.16), compared to participants in the positive valence condition ($M$ = 5.81, $SD$

= 1.44), $t(135) = -16.03$, $p < .001$, $d = 2.72$. In short, our manipulations worked as expected.

### Primary analyses

As in Exp. 1 and 2, we hypothesized that the combinatory effect of a threatened relatedness need coupled with a negative fantasy about one's romantic partner would increase obsessive thoughts about that person. Using the same analytic strategy, we conducted a 2 (Relatedness Threat: no threat vs. threat) × 2 (Fantasy Valence: negative vs. positive) factorial ANOVA on obsessive thinking.[5]

Participants with a threatened relatedness need reported significantly higher levels of obsessive thinking than those with no threat, $F(1, 134) = 4.39$, $p = .04$, $\eta = .032$. We again found a main effect of fantasy valence, whereby those in the negative fantasy condition reported significantly more obsessive thinking relative to participants in the positive fantasy condition, $F(1, 134) = 11.08$, $p = .001$, $\eta = .076$. The overall pattern observed in Exp. 3 is similar to the pattern found in Exp. 1 and 2. As in Exp. 2, we did not find an interaction effect: changes in obsessive thinking due to fantasy valence did not differ based on threat condition, though this effect was in the same direction as Exp. 1, $F(1, 134) = 1.46$, $p = .23$, $\eta = .011$. However, it should be noted that in Exp. 3 the interaction term is descriptively in the opposite direction of the interaction terms in Exp. 1 and 2. To probe these effects further, we again conducted a planned contrast comparing participants with both a threatened need and induced negative fantasies to those in the other three groups and found that they reported more obsessive thinking, consistent with our hypotheses and the results of Exp. 1 and 2, $L = 1.55$, $SE = .65$, $p = .02$, 95% CI [.28, 2.83].

In an attempt to replicate Exp. 2, we again examined the role of relatedness need arousal and negative fantasies in predicting proximity-seeking intentions. We hypothesized that the presence of both a relatedness threat and negative fantasies about a romantic partner would yield the strongest intentions to seek proximity to a romantic target. Experiment 3 replicated some of the effects found in Exp. 2. Participants in the relatedness threat (social exclusion) condition reported significantly greater intentions to seek proximity to a romantic target compared to those in the no threat condition, $F(1, 134) = 4.21$, $p = .04$, $\eta = .030$. Participants in the negative fantasy valence condition reported marginally, significantly greater proximity-seeking intentions relative to participants in the positive valence condition, $F(1, 134) = 3.39$, $p = .07$, $\eta = .025$. The effect of fantasy valence did not significantly differ between participants in the threat and no threat conditions, $F(1, 134) = .23$, $p = .63$, $\eta = .002$. Consistent with Exp. 2, obsessive thinking positively predicted intentions to engage in proximity-seeking behaviors, $b = .30$, $SE = .06$, $t(136) = 5.16$, $p < .001$, 95% CI [.18, .41].

## Brief discussion

In Exp. 3, we found, using a social exclusion paradigm, that a threat to relatedness may increase obsessive thinking about a relevant stimulus. We again found support for negative fantasies producing heightened obsessive thoughts. Although participants with an aroused relatedness need who engaged in subsequent negative fantasies exhibited the most obsessive thinking, as in Exp. 1 and 2, we did not find evidence for an interaction between need arousal and fantasy valence. In addition to the intensity of the fantasy valence manipulation as discussed in Exp. 2, the lack of an interaction may also be a result of fundamental differences between the love recall paradigm (Exp. 1–2) and the cyberball paradigm. Perhaps a milder need threat (e.g., difficult love recall) also requires negatively valenced fantasies to spur obsessive thinking, whereas a stronger need threat (e.g., cyberball exclusion) is sufficient to produce obsessing even when followed by positive fantasies. This is consistent with perspectives on social pain sensitivity, which finds that high-severity social exclusion manipulations can elicit a numbing, rather than sensitizing, effect on social pain (Bernstein and Claypool 2012). If this were the case, participants' obsessive thinking in the threat condition would have been inured to increases provoked by negative fantasies. Though the present data are unable to speak to these possibilities, future research might explore the characteristics of need states which are necessary and sufficient to provoke obsessive thinking. Finally, with respect to the role of the relatedness threat and fantasy valence on proximity-seeking behavior, we replicated the effects found in Exp. 2; thus, need arousal and negative fantasies may independently contribute to compensatory behaviors.

[5] In Exp. 3, we also tested whether our results would be influenced by trait-level differences in need satisfaction and frustration; so, we included a global measure of Basic Psychological Need Satisfaction and Frustration (BPNSF; Chen et al. 2015). To avoid priming effects of the BPNSF scale on the primary results, we included it after the manipulations and dependent measures. In testing whether the BPNSF measures were contaminated by our manipulations, we found that the relatedness satisfaction and frustration subscales were *not* affected, *p*s > .15, with one exception: participants in the positive fantasy valence condition reported greater relatedness satisfaction than those in the negative valence condition, $b = -.24$, $SE = .12$, $t(132) = 1.94$, $p = .05$, 95% CI [−.48, .001]. Potential order effects aside, we found evidence suggesting that need satisfaction negatively predicts obsessive thinking, $b = -.33$, $SE = .13$, $t(134) = -2.57$, $p = .01$, 95% CI [−.59, −.08], and need frustration positively predicts obsessive thinking, $b = .41$, $SE = .11$, $t(136) = 3.68$, $p < .001$, 95% CI [.19, .63]. However, we found no differences in the effects of our manipulations on obsessive thinking when adjusting for need satisfaction and need frustration. For brevity and consistency with Experiments 1 and 2, we report only the unadjusted models.

## Internal meta-analysis

To assess the estimated effect sizes of the relatedness threat and fantasy valence manipulations on obsessive thinking, as well as the effect size of the threat-by-valence interaction, we conducted a random effects internal meta-analysis using the data from all three studies (see Goh et al. 2016; Viechtbauer 2010). Across the three experiments, we converted the partial-eta squared for each respective effect to a Fisher's *r*-to-z transformed coefficient, as recommended by Aloe and Becker (2012; Aloe 2014). With respect to relatedness threat (vs. no threat), we found evidence for a small (Cohen 1988), but significant meta-analytic effect, $k = 3$, $N = 712$, $r_p = .11$, $p = .05$, 95% CI [.01, .21]. Similarly, the meta-analytic effect of fantasy valence (negative vs. positive) was small-to-medium (Cohen 1988) and significant, $k = 3$, $N = 712$, $r_p = .22$, $p < .001$, 95% CI [.11, .32]. The meta-analytic effect of the interaction was not significant, $k = 3$, $N = 712$, $r_p = .07$, $p = .22$, 95% CI [− .04, .19]. Figure 2 displays a forest plot summarizing these meta-analytic effects.

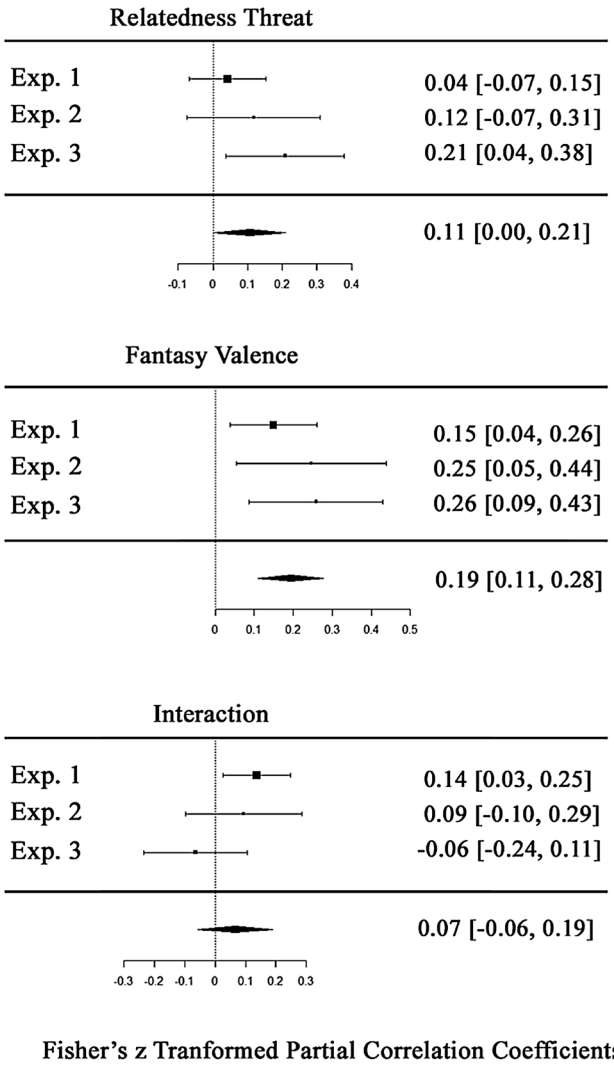


**Fig. 2** Summary of effect sizes across all three experiments. For the sake of continuity across studies, the fantasy valence effect size for Experiment 1 was re-calculated with positive fantasy scenario as the reference group

## General discussion

The present research is the first to provide evidence for the claim that psychological relatedness needs and negative fantasies contribute to obsessive thinking about and seeking proximity to a need-relevant target. Specifically, in Exp. 1 we found—using a metacognitive relatedness threat manipulation and a fantasy-stem completion procedure—that relatedness arousal heightened the effect of negative fantasies on participants' obsessive thinking about their relationship partner. In Exp. 2, we introduced a new fantasy valence manipulation and obsessive thinking measure and replicated the finding that a relatedness threat plus negative fantasies produced the most obsessive thinking about one's partner. Negative fantasies increased obsessive thinking about one's partner irrespective of relatedness threat. In Exp. 3, we used a virtual social exclusion paradigm to arouse relatedness needs and partially replicated the results found in Exp. 2; independently, a relatedness threat and induced negative fantasy each produced increases in obsessive thinking, but no interaction emerged. Jointly considering the effects found in Exp. 1–3, an internal meta-analysis revealed that both the relatedness threat and fantasy valence manipulations have small effects on obsessive thinking, such that obsessive thinking was increased by relatedness threats and negative fantasies, respectively. Less consistent evidence emerged for the interaction effect of these two manipulations (see Results and Discussion sections of Exp. 2 and 3). Across Exp. 2 and 3, we found correlational evidence that obsessive thinking is associated with increased intentions to seek proximity to a romantic target. We also found initial support for the independent causal effects of a relatedness threat and fantasy valence on proximity-seeking behaviors, such that both relatedness arousal and negative fantasies, which impede the mentalized satisfaction of a relatedness need, can motivate proximity-seeking behavior in an attempt to meet the need.

This work directly addresses questions of interest to BPNT and the broader self-determination theory. For instance, consistent with findings that need frustration uniquely predicts ill-being (e.g., Chen et al. 2015), we demonstrate that an experimentally-induced need threat

increases obsessive thinking, a subjectively unpleasant outcome. Additionally, we build on prior research on psychological needs as motivators of behavior (e.g., Sheldon 2011) by investigating the motivational consequences of relatedness threats, as well as future fantasies as a potential moderating factor. Additionally, our experiments extend past research on the multimotive model of rejection (Smart Richman and Leary 2009) by considering cognitive processes as both a potential moderator of responses to rejection (i.e., negative fantasies), as well as an outcome in their own right (i.e., obsessive thinking).

Nonetheless, the present research leaves many questions unanswered. For example, we did not include a no-fantasy control condition. Even in the neutral valence condition from Exp. 1, participants engaged in fantasies which were experienced just as positively as those in the positive fantasy condition. Consequently, we are unable to make claims about the unadulterated effect of basic psychological need arousal on need-relevant obsessive thinking. However, the meta-analytic main effect of relatedness threat suggests that independent of fantasies, threatening relatedness increases obsessive thoughts about a target with potential to satisfy this need. Thus, the same threats that activate a need as a motive (as in Sheldon and Gunz 2009) and induce positive fantasies of need-relevant stimuli (as in Kappes et al. 2012) may also increase the obsessive qualities of need-related thoughts.

Additional research should also seek to understand the differences between proximity-seeking tendencies in general (as we measured them) versus proximity-seeking with a specific target. Similarly, in the present research, we assessed obsessive thinking about a romantic partner who was also the subject of the induced fantasies. The question remains whether the effects of fantasies on obsessive thinking occur only in the presence of such congruence (i.e., only fantasies about a romantic target produce obsessive thoughts about that target), or whether the effects are more general (e.g., fantasies about an unpleasant interaction with a relative triggering obsessive thoughts about a romantic partner). Additional research should also consider the mechanism underlying the role of negative fantasies in fostering obsessive thinking. Drawing from research on obsessive compulsive tendencies, it may be that negative fantasies about a stimulus with the potential to satisfy a need induce doubts about that stimulus's ability to satisfy the need (Aardema et al. 2009; Dar 2004). In light of this possibility, it may be particularly interesting for future work to understand the ways in which these processes differ as a function of the seriousness of the relationship. That is, the association between needs, fantasies, and obsessive thinking may be different when the relationship does *not* serve a need-satisfying role.

Moreover, the arousal of all three basic psychological needs, not just relatedness, should matter in predicting obsessive thinking and compensatory behaviors. Accordingly, future research should test these phenomena within the context of other basic psychological needs, as well as the question of whether arousal of one basic psychological need can affect obsessive thinking about a stimulus relevant to a different need. The results of our meta-analysis indicate that the threat-by-fantasy valence interaction was not consistent across our three studies—additional research should continue to examine the boundary conditions and contexts that modify the interaction between need arousal and fantasies.

What at first may appear to be a limitation of this paper—that negatively or positively valenced interactions with a romantic target were merely imagined and not experienced—we consider a strength. We would expect a real negative interaction, such as receiving a cold text message from one's partner, to spur the same pattern of results as a negative fantasy; but, with the present research, we were able to demonstrate that even the mental simulation of such an event is sufficient to provoke obsessive thinking. These simulations or fantasies occur in everyday life (Sevincer and Oettingen 2013; Oettingen et al. 2018), and our findings suggest that they should be seriously considered as a factor in the onset of potentially problematic thought and behavior patterns.

It is also interesting to consider our findings as they pertain to adaptive functioning and self-regulation. Although obsessive thinking and proximity-seeking behaviors can undergird damaging relationship behavior (Cupach and Spitzberg 2014), we do not claim that they are maladaptive or harmful, per se. Following a competence threat, for example, obsessing about a work project may incite action and even facilitate success. However, for people who *would* like to let go of their obsessive thoughts, future research should consider self-regulatory interventions that facilitate disengagement from intrusive thoughts. For example, a thought- and imagery-based strategy called mental contrasting helps people disengage from counterfactual thoughts and reduce regret and resentment (Krott and Oettingen 2018a, b). Given this and other prior research, mental contrasting or mental contrasting with implementation intentions (MCII; e.g., Houssais et al. 2013), may be effective strategies for reducing obsessive thinking. As an alternative to self-regulatory approaches, one may also consider the directive function of episodic memories as an additional route through which individuals can satisfy psychological needs and guide relationships towards better quality and satisfaction (Philippe et al. 2013; Van der Kaap-Deeder et al. 2016).

Finally, our findings are interesting to consider from the perspective of adult attachment, which places heavy emphasis on the close emotional bond in intimate relationships (Fraley and Shaver 2000). Mikulincer and Shaver (2016) and Mikulincer et al. (2003) detail a tripartite model of dynamic attachment system activation involving (1) an

initial activation of an attachment figure in response to signs of safety threats, (2) proximity-seeking behaviors towards the attachment figure, and (3) either hypervigilance (continued activation) or distancing (deactivation) strategies following continued distress. The parallels between this model and our experimental paradigms—for example, obsessive thinking following a relatedness threat as a hypervigilant strategy—indicate that integrative research on basic psychological needs, mental imagery, and attachment in the context of romantic relationships might prove fruitful.

## Conclusion

We found across three experiments that for people in romantic relationships, an aroused relatedness need followed by negative fantasies about a romantic target promotes both obsessive thinking about and intentions to seek proximity towards that target. Returning to the hypothetical couple Andy and Trina, our research suggests that when lonely and dispirited, fantasizing about the rejection he dreads most causes Trina to become Andy's insatiable idée fixe—at least until she returns home to pacify his longing disquietudes.

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### Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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