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Original Article:

TERROR MANAGEMENT AND EVOLUTIONARY THEORY: EXAMINATION OF JEALOUSY REACTIONS AFTER MORTALITY SALIENCE

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Abstract

There has been much debate in the literature regarding the intermingling of evolutionary theory and terror management theory. The purpose of the current paper was to examine any possible effects of mortality salience (MS) in evolutionary domains, namely jealous reactions to infidelity. Using traditional methodology from both sets of theories, participants were placed into one of four conditions based on the presence of MS and type of partner cheating (emotional or sexual) and then reported their feelings toward the behavior and the partner. Results indicated that participants who are aware of their death reacted in ways predicted by evolutionary theory, above and beyond their reactions without mortality salience. These results suggest that while there is still much room for investigation and no final conclusions can be drawn, terror management theory may be more relevant in evolutionary based theories than previously thought.

Keywords: Evolutionary theory, terror management theory, jealousy, mortality salience

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INTRODUCTION

Recent literature has begun to highlight a debate regarding the overlaps and differences between two theories: evolutionary theory and terror management theory (TMT). Both theories will often predict the same outcomes and even appear to stem from the same origins. That is, at face value, both of the theoretical frameworks appear to be based in survival. The basis for evolutionary theory is the idea that all constructs or behaviors should be studied and evaluated with respect to their present or past adaptive benefits (DeSteno & Salovey, 1996; Wiederman & Allgeier, 1993). Thus, a large amount of evolutionary research focuses on survival, reproductive capabilities or genetic fitness.

In a similar vein, according to terror management theory (TMT) human beings are oriented toward self-preservation and survival. TMT adds that when individuals are made aware of death, often referred to as mortality salience (MS), a substantial source of anxiety is created that those individuals are then motivated to buffer (Solomon, Greenberg, & Psyszczynski, 1991). That is, a reminder of one's inevitable and impending death leads to anxiety that instigates behaviors that should lead to an increased chance for survival. Hundreds of studies utilizing TMT have shown that when death is made salient, individuals engage in a broad range of behaviors including, but not limited to, avoidance of the death-related object, aggression and derogation of others, strengthening in-group ties, and more (see Burke, Martens, & Faucher, 2010 for a review and meta-analysis). In one specific example, Arndt, Greenberg, Psyszczynski, and Solomon (1997) found that participants who were reminded of their impending death reported higher adherence to cultural values and more disregard for those who deviated from those values than participants who were not reminded of their death. The authors argued that mortality salience leads individuals to increase their adherence to cultural values as a means of increasing their feelings of unity with in-group members, thus strengthening one's chances of survival while simultaneously easing feelings of anxiety.

Regardless, TMT is often criticized and separated from evolutionary theory because as far as most evolutionary theorists are concerned survival is only important in so far as death impedes one's ability to reproduce (Buss, 1997; Kirkpatrick & Navarrete, 2006; Leary & Schreindorfer, 1997). Simply, it is argued that the evolutionary theory is actually based in reproduction not survival and the usefulness or empirical evidence of TMT processes in reproduction is still unclear. The argument lies in the notion that the vast majority of TMT studies provide evidence of mortality salience processes as an aid for survival or a need to survive (Buss, 1997), not as an aid to reproduction. However, the rebuttal is that any behaviors that motivate an individual to stay alive automatically serve to facilitate reproduction (Pyszczynski, Greenberg, & Solomon, 1999).

Although relatively limited, it is important to note that some findings have loosely related TMT to reproduction. For example, correlational studies in South Carolina indicated increased birth rates in the year following Hurricane Hugo (Cohen & Cole, 2002). Also experimental procedures have suggested that mortality salience increases one's desire

for offspring (Fritsche, Jonas, Fischer, Koranya, Berger, & Flesichmann, 2007; Wisman & Goldenberg, 2005), sexual intimacy even after partner criticism (Hirschberger, Florian, & Mikulincer, 2003), desire for romantic (i.e., within a relational context) sex (Birnbaum, Hirschberger, & Goldenberg, 2011), and gender typical responses to jealousy (Goldenberg, Landau, Pyszczynski, Cox, Greenberg, Solomon, & Dunnam, 2003). While these studies indicate a relationship between TMT and the reproduction-bases of evolutionary theory, some of these claims are not highly supported across the discipline (Buss, 1997; Kirkpatrick & Navarrete, 2006; Leary & Schreindorfer, 1997).

Modern evolutionary theory focuses on reproduction and considers it to be the ultimate motive for behavior (see Buss, 1997 for a review). As it relates directly to sex or reproduction, past research has shown a connection to mortality salience. A recent series of studies indicated that mortality salience increased men's desire for a one-night stand, increased desire for a short-term romantic fling regardless of one's gender, and increased desire for romantic sex over physical sex (Birnbaum et al., 2011). This last finding is especially interesting, as some studies (Goldenberg, Pyszcynski, McCoy, Greenberg, & Solomon, 1999) have indicated that desire for animalistic sex is actually correlated with highly accessible thoughts of death. It is these contradictory findings that may have led to the initial debate among TMT and evolutionary theorists.

Another exploration in this particular part of the debate may lie in the romantic relationship. Romantic partners are often also sexual partners (Hazan & Zeifman, 1994) and sexual intercourse with a committed romantic partner is a means to successful reproduction, especially for women (Buss, 1994; Buss, Larsen, Westen, & Semmelroth, 1992; Nannini & Myers, 2000; Sabini and Silver, 2005). Thus, it should not be all that surprising that a romantic relationship would become more appealing when thoughts of death are salient (Goldenberg et al., 1999; Mikulincer, Florian, & Hirschberger, 2003).

If romantic relationships have symbolic meaning because they suggest sexual intercourse and potentially children (Birnbaum et al., 2011; Buss, 1997; Goldenberg et al., 1999; Hazan & Zeifman, 1994; Hirschberger et al., 2002; Regan & Berscheid, 1999), then a threat to that relationship should also produce evolutionarily predictable responses. That is, salient death thoughts should logically exacerbate those tendencies. It was posited that if terror management is working under the same premises as modern evolutionary theory then mortality salience should produce the same, or even exaggerated, reactions as seen in previous evolutionary research.

One area that is particularly relevant for this paper is jealousy. Specifically, romantic partner behaviors that tend to spark jealousy allow for an evolutionary based evaluation due to some fairly consistent sex differences that are based in reproductive capabilities (e.g., Buss et al., 1992; Milhausen & Herold, 1999). That is, males tend to be more upset by a partner engaging in physical sexual infidelity (e.g., intercourse with an extra-dyadic other) whereas females tend to be more upset by a partner engaging in emotional infidelity (e.g., spending an evening talking to an extra-dyadic other; Buss, 1994;

Buss, Larsen, Westen, & Semmelroth, 1992; Nannini & Myers, 2000; Sabini and Silver, 2005). It is asserted that males are more threatened by sexual infidelity because their paternity can never be 100% certain. Thus, a partner engaging in extra-dyadic sexual activities threatens to interrupt his genetic success more so than an emotional affair. Conversely, females are certain of their genetic success through the pregnancy itself. Therefore, females are predominantly concerned with the loss of resources that may occur if the partner were to 'fall in love' with someone else (Buss et al., 1992). The take home point: ensuring reproductive success motivates our sexual and romantic behaviors (see Buss, 1997 for a review). One of the most notable outcomes indicating those sex differences in past evolutionary research (e.g., Buss et al., 1992) is the forced-choice paradigm: when asked to choose which is more distressing, males report higher distress by a partner's physical infidelity, and females report higher distress from a partner's emotional infidelity.

Goldenberg and colleagues (2003) utilized this paradigm by first creating MS (in the experimental group) and then asking the forced-choice jealousy measure. The results indicated that MS interacted with sex to heighten the sex-typical responses. However, it should be mentioned that this forced choice paradigm is debatable in its validity, because recent studies have shown that there is an established subset of men who believe that emotional infidelity is just as distressing as physical infidelity (Desteno, Bartlett, & Salovey, 2002). Many of the more recent evolutionary studies have shown that when participants are not forced to choose, their reactions tend not to be as extremely dichotomous (see Desteno & Salovey, 1996 for a review).

The purpose of the current study was to simply investigate this further. Participants were examined in light of MS, and asked to report their perceptions of cheating, their levels of distress, and their likelihood of terminating the relationship following infidelity. Although the motives behind this research were predominantly exploratory, our initial hypotheses were directly in line with sex-typical responses. It was expected that females would perceive emotional infidelity as a bigger betrayal, report more distress, and express a higher likelihood of terminating the relationship than males. Conversely, males would perceive physical infidelity as a bigger betrayal, report more distress, and express a higher likelihood of terminating the relationship than females.

To examine the specific TMT effects, MS priming essays were used to examine participants' sex differences in reactions to emotional and physical infidelity. Based on Goldenberg and colleague's (2003) previous research, it was expected that the addition of MS would exacerbate those sex-typical effects. That is, it was expected that female participants under mortality salience might increase their distress and jealousy reactions in the emotional infidelity condition as compared to when MS was not present. Conversely, a male's jealous reactions should be increased in the physical infidelity conditions when in the MS condition as compared to when MS is not present.

METHOD

Participants

A total sample of 176 heterosexual undergraduates (111 females and 65 males) was recruited from a Midwestern college to participate in this study. Ages of the individuals ranged from 18 to 51 years old (M = 20.38, Med = 19.00, SD = 4.97). It should be noted that five of the participants are more than three standard deviations above the norm on age. However, analysis was conducted and found that age was not correlated with relationship status, thus they were not removed from the analysis. Additionally, there was no significant differences between the sexes on age ($p > .05$) Approximately 83.6% of participants reported themselves as Caucasian, 4.5% as African American, 4.5% as Asian, 4.6% as Middle Eastern, 2.3% as Biracial, and .5% as Italian. All participants were given credit for participating in research by their introductory level psychology courses.

Materials and Procedure

The current study was approved by the Institutional Review Board. In a typical TMT paradigm (e.g., Greenberg, Pyszczynski, Solomon, Simon, & Breus, 1994), participants were randomly assigned to one of two conditions: mortality salience or a comparison condition (i.e. dental pain). (Note: A chi-square test of independence indicated that males and females were randomly assigned to the conditions equally, $p > .05$). According to their condition, participants were asked to respond to two open-ended questions: "Please briefly describe the emotions that the thought of your own death (or dental pain) arouses in you." Subsequently, the following instructions were given: "Jot down, as specifically as you can, what you think will happen to you physically as you die (or experience dental pain) and once you are physically dead (or have experienced dental pain)." After writing for five minutes, participants were given a filler task (i.e. a neutral word search), as prior studies have shown that mortality salience can take a few minutes to take effect (Greenberg et al., 1994).

Immediately following the filler task, participants in both conditions read one of two infidelity vignettes, commonly used in evolutionary research (e.g., Buss, 1994). In one vignette a partner 'cheated' physically and in the other he/she 'cheated' emotionally. It should be noted that in both conditions, the participants were given a vignette describing the opposite sex.

The physical infidelity vignette prompted the participants as follows: "Please think of a serious or committed relationship that you have had in the past, currently have, or would like to have. Imagine that your romantic partner tells you that he/she has a confession to make. He/She tells you that last weekend he/she had a one-night stand with a stranger he/she met at the nightclub. The sex was passionate but it was just sex. Your partner then tells you that he/she has never done anything like this before, and he/she will never see the person again."

Similarly, the vignette for emotional infidelity read: "Please think of a serious or committed relationship that you have had in the past, currently have, or would like to have. Imagine that your romantic partner tells you that he/she has a confession to make. He/She tells you that last weekend he/she met a person at a nightclub. They left the club together, had dinner, and went back to his/her apartment and spent the whole night talking and cuddling together on the couch. They were tempted to have sex, but did not. However, he/she felt very connected emotionally to the stranger. Your partner then tells you that he/she has never done anything like this before, but he/she will never see the person again."

Immediately following the vignettes, participants completed the dependent measures.

Jealousy/distress. Participants were asked a total of nine questions, consisting of three subscales (Hackathorn, 2009; Hackathorn & Harvey, 2011). The first subscale measured participants' perceptions of the actual behavior in the vignette (e.g., "Would you consider this behavior to be 'cheating'?") on a scale of 1 (*Not at all*) to 10 (*Definitely*). This subscale showed adequate reliability in the current sample (α = .72). The second subscale measured participants' perceived distress as a result of the behavior (e.g., "How upset would you be if your partner engaged in this behavior?") on a scale of 1 (*Not at all*) to 10 (*Extremely*). This subscale also showed adequate reliability in the current sample (α = .77). Finally, the third subscale measured participants' perceptions of the likelihood of terminating the relationship (e.g., "Would you break up if your partner engaged in this behavior?") on a scale of 1(*Not at all*) to 10 (*Definitely*). This subscale also showed adequate reliability in the current sample (α = .67). It is important to note that this scale was slightly revised from the original version. The original measure asked specifically about computer-mediated infidelity behaviors, thus, any mention of computer-mediated infidelity was removed from the stem and the participant was directed to think of the behavior in the vignette instead.

RESULTS

The current study sought to examine the effects of mortality salience in traditional evolutionary paradigms. To test our expectations for perceptions of cheating, distress, and likelihood to terminate the relationship, a series of 2 (sex) x 2 (infidelity type) x 2 (mortality salience) ANOVAs were conducted. It should be noted that due to a ceiling effect, a transformation for a severe negative skew was performed on all three dependent measures to normalize the distribution. Descriptive information (i.e., means and standard deviations) are presented in terms of the original values, for the sake of clarity and interpretation.

Our first hypothesis proposed that sex differences in perceptions of cheating would be exacerbated by mortality salience. Results of the factorial ANOVA indicated a main effect of MS, $F(1,168) = 4.66$, $p = .032$, which indicated that individuals under MS (M =

9.09, *SD* = 1.06) perceived the behavior as a larger betrayal than those in comparison condition (*M* = 8.71, *SD* = 1.30). However, there were no other significant interactions.

Additionally, we tested our expectations for reported distress. Results of the analysis indicated a main effect of sex [$F(1,168) = 22.84$, $p < .001$] in that females (*M* = 9.54, *SD* = .72) reported more distress than males (*M* = 8.93, *SD* = .97) regardless of the type of infidelity. Additionally, a main effect of mortality salience [$F(1,168) = 3.92$, $p = .049$] was present suggesting that individuals in the MS condition reported more distress (*M* = 9.47, *SD* = .75) than those in the no MS condition (*M* = 9.17, *SD* = .95). There were no other significant influences in the results.

Finally, we tested our expectations for likelihood of terminating the relationship. There was a significant three-way interaction [$F(1, 168) = 4.01$, $p = .047$] indicating that each sex acted more in accordance with evolutionary theory when under mortality salience (see Figure 1a and 1b). Post hoc analyses indicated the difference lay between the MS and dental-pain conditions, in regards to the sex-typical responses. That is, for males, the MS condition had higher termination scores after physical infidelity than the dental pain condition whereas females in the MS condition had higher terminations scores after emotional infidelity than the dental pain condition (see Figures 1a and 1b for an illustration of this interaction). Additionally, there was a significant effect of sex [$F(1,168) = 13.48$, $p < .001$], in that females (*M* = 8.58, *SD* = 1.37, see Figure 1b) were more likely to terminate the relationship than males (*M* = 7.61, *SD* = 1.66, see Figure 1a) regardless of the type of infidelity. Also, there was a main effect of mortality salience [$F(1,168) = 2.98$, $p = .043$] in that those in the mortality condition (*M* = 8.51, *SD* = 1.43) were more likely to terminate the relationship than those in the dental condition (*M* = 7.98, *SD* = 1.59).

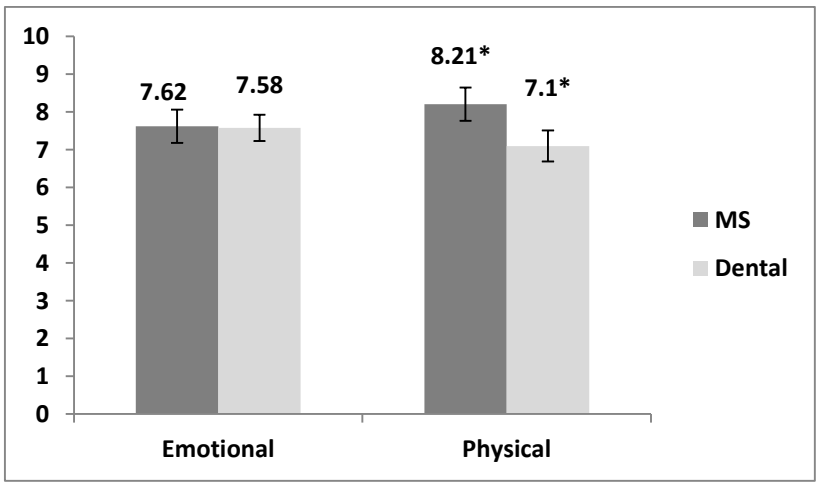

Figure 1a. Male likelihood of terminating the relationship.

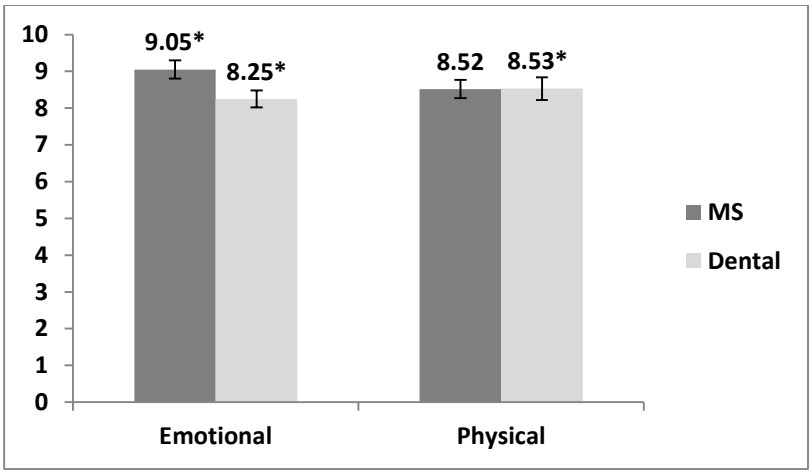

Figure 1b. Female likelihood of terminating the relationship.

DISCUSSION

The findings of the current study are interesting in a multitude of ways. We posited that mortality salience (MS) would exacerbate traditional evolutionary responses to infidelity, through measures of perceptions of cheating, distress, and likelihood to terminate the relationship. We expected to see interactions between sex and MS. Surprisingly, there was only one significant interaction between sex and MS, which would suggest an evolutionary link. However, a deeper examination of the findings suggests that mortality salience did create jealous responses, even when traditional evolutionary patterns were not present.

In regards to perceptions of the actual behaviors as cheating, there were no evolutionarily expected findings. In examining a ceiling effect on the measure, it would appear that the behavior was considered cheating regardless of the sex of the participants or type of infidelity. However, participants became increasingly conservative regarding their perceptions of cheating when primed with death. The behavior was deemed as a bigger betrayal (more prototypical) under the mortality salience conditions than in the control condition. Although not reflective of a sex difference, this is directly in line with an evolutionary response. When death thoughts are salient, an extradyadic individual is a threat regardless of the situation. Future researchers should definitely examine this further.

Results also indicated that females reported more distress than males and expressed a higher likelihood of terminating the relationship than males regardless of the type of infidelity. This replicates past research using continuous measures in jealousy responses to infidelity (Desteno et al., 2002; Desteno & Salovey, 1996). Relevant to the purpose of the current study, a main effect of mortality salience also emerged in that individuals who were in the MS condition reported more distress and indicated a higher likelihood to terminate the relationship than those in the comparison condition. Although there was not an

interaction between sex and mortality salience, it is still worth noting that MS exacerbates one's reactions to a cheating experience.

Finally, a three-way interaction indicated that MS exacerbated the potential for relationship termination in line with traditional evolutionary predictions. When primed with death, females were more likely to terminate if the infidelity was emotional, and males were more likely to terminate if the infidelity was physical (above and beyond a control condition). This lends evidence in support of past studies that suggest that a threat to self-esteem is connected with both jealousy responses (Desteno, Valdestoro, & Bartlett, 2006) and mortality salience responses (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). Bolstering self-esteem is one way to battle the threat of death, and is also accomplished by engaging in a behavior that will reduce the self-esteem threat (e.g., terminating a relationship with a cheating partner; see Desteno et al., 2006 for a review).

All in all, these findings suggest mortality salience does fit somewhere under the umbrella of evolutionary paradigms. Our results suggest that perhaps MS exacerbates jealous reactions to infidelity. And, this is a logical happenstance that can be corroborated in past research that shows MS heightens jealousy (Goldenberg et al., 2003). Importantly, past research has also shown that MS increases our desire for *our* offspring (Fritsche et al., 2007; Wisman & Goldenberg, 2005). Thus, a threat to that relationship via a significant other's potential extradyadic behaviors should produce a heightened response.

Interestingly, the sex-typical differences traditionally expected in this evolutionary paradigm did not replicate in the current sample. We are not really sure why this occurred. One potential explanation is due to the age of the participants. That is, there are five participants who are outliers in terms of age. Although age was not correlated with relationship status in this sample, age can be correlated with various sex related outcomes (e.g., number of partners). Thus, these participants may have different sexual selection strategies in regards to whether they are searching for a short term or long term mate. However, this assumption was not assessed in the current study. Instead, an examination of the findings suggests that MS overrides the expected sex differences and instead exacerbates responses (i.e., more conservative views of cheating, more distress, and an increased likelihood of terminating the relationship) regardless of the threats origin. One potential explanation is related to self-esteem, as both have been shown to be relevant constructs in past research (Desteno et al., 2006; Pyszczynski et al., 2004). However, whether or not these responses are mediated by self-esteem is yet to be seen. Future researchers should definitely examine the underlying mechanisms or potential influences of self-esteem in both theories.

Although this particular study was examined under the umbrella of psychology, research regarding the interplay of these two theories can provide beneficial information for any social science. Evolutionary based motivations influence all human actions. Similarly, relationships and our need to belong is a basic motivator for many human interactions and decisions (Baumeister & Leary, 1995). Therefore, the independent effects

and interactions of evolutionary and interpersonal drives can be investigated in a variety of common social situations and decisions. These factors may impact the formation of groups and interpersonal bonds, religious inclination, belief in a just world, cultural customs, social and societal conventions, even lawmaking, particularly in family court or voting tendencies. Furthermore, it would be of particular interest to examine the interaction of evolutionary predicted patterns and mortality salience as it influences relationships with respect to gender norms and equality, particularly in societal roles. For example, do evolutionary tendencies prevail within collectivist cultures when faced with mortality salience (e.g., the priority is the group's survival)? Does infidelity tear a group apart or does the group's existence prevail? Does death salience change these tendencies? Similarly, how does mortality salience interact with infidelity in our perceptions of platonic relationships? Do our economic evolutionary drives (to be financially sound, keep a job, etc.) prevail over our assumptions and opinions of infidelity, particularly when considering romantic or platonic relationships with bosses or coworkers? How does mortality salience affect family structure? Does infidelity or jealousy change those effects? These are just a few of the potential outlets of examination regarding the interaction between these two theories.

The purpose of the current study was to examine terror management outcomes in a traditional evolutionary paradigm. Specifically, the current study examined the effects of mortality salience on typical jealous responses to infidelity. The results suggest that mortality salience may increase jealousy responses on each of the dependent variables. Participants in the MS condition followed an evolutionarily predicted pattern of responses: they perceived the behavior as more representative of cheating, reported more distress, and were more likely to terminate the relationship when a partner cheated. Of particular relevance is that participants' reactions under MS were exacerbated in line with evolutionary predictions in regards to their likelihood to terminate the relationship following infidelity.

Although this is no way solves the debate, regarding whether TMT is rooted in evolutionary theory, this provides some evidence that TMT might have some overlap with evolutionary theory. Granted, much more research is needed to differentiate if mortality salience is merely an escalating factor, or if mortality salience could perhaps act as a moderator in traditional evolutionary tendencies. However, this study helps to highlight some of the oddities regarding the discrimination of the theories. That is, although it adds to the literature, it might also add to the debate.

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