Nightmare frequency is related to a propensity for mirror behaviors

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ABSTRACT

We previously reported that college students who indicated engaging in frequent dream-enacting behaviors also scored high on a new measure of mirror behaviors, which is the propensity to imitate another person's emotions or actions. Since dream-enacting behaviors are frequently the culmination of nightmares, one explanation for the observed relationship is that individuals who frequently display mirror behaviors are also prone to nightmares. We used the Mirror Behavior Questionnaire (MBQ) and self-reported frequencies of nightmares to assess this possibility.

A sample of 480 students, consisting of 188 males (19.2 ± 1.73 years) and 292 females (19.0 ± 1.55 years) enrolled in a first-year university psychology course, participated for course credit. They completed a battery of questionnaires that included the 16-item MBQ, plus an item about nightmare frequency (NMF) in the past 30 days. NMF scores were split to create low, medium, and high NMF groups.

MBQ total scores were significantly higher for female than for male subjects, but an interaction revealed that this was true only for Hi-NMF subjects. MBQ Factor 4, *Motor Skill Imitation*, paralleled this global interaction for females, whereas MBQ Factor 3, *Sleepiness/Anger Contagion*, was elevated only for Hi-NMF males. Item analyses indicated that *Hi-* and *Med-NMF* females scored higher than *Lo-NMF females* on the 3 items of Factor 4 that reflect voluntary imitation (*imitating famous/cartoon voices*, *being a physically active spectator*, and *learning new skills by observing*), as well as on 2 other items that reflect involuntary imitation (*contagious yawning* and *self-rated empathy*). *Although Hi-* and *Lo-NMF* males differed most clearly on the *sleepiness* item of Factor 3, all 3 items on this factor (including *anger contagion* and *contagious yawning*) are plausibly associated with perception of and response to social threat.

Results provide evidence that among females nightmares are associated with voluntary and involuntary mirror behaviors during wakefulness, while among males nightmares are associated with threat-related mirror behaviors during wakefulness. They thus support the possibility that the association between mirror behaviors and dream-enacting behaviors is due to a common mirror neuron mechanism that underlies mirror behaviors and nightmares and that involves motor, rather than emotional, resonance. These results have implications for understanding the comorbidity of nightmares and other pathological symptoms such as imitative suicidal behaviors, the influence of observational learning on dissociative symptomatology, and the predominance of threat and aggression in the dream enacting behaviors of REM sleep behavior disorder.

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1. Introduction

Mirror behaviors, such as empathizing with another's emotions or imitating their actions or speech, are more frequent among individuals who act out fictive behaviors in their dreams than they are among individuals who do not (Nielsen & Kuiken, 2013). Dream-enacting behaviors are frequently the culmination of highly disturbing dreams, including the typical nightmares of college students (Nielsen, Svob, & Kuiken, 2009), the unpleasant 'baby-in-peril' dreams of postpartum mothers (Nielsen & Paquette, 2007), and the violence-filled nightmares of patients with REM sleep behavior disorder (RBD) (Schenck, Bundlie, Ettinger, & Mahowald, 1986; Schenck, Lee, Bornemann, & Mahowald, 2009). However, it is unknown whether a propensity for mirroring others' emotions and behaviors while awake is associated specifically with self-reported nightmare frequency.

The possibility of an association between mirror behaviors and disturbing dreams is pertinent both for clarification of nightmares as a clinical problem and for a coherent theory of nightmares. Clinically, nightmares are associated with several pathologies (see Levin & Nielsen, 2007 for review) whose relationship to mirror behaviors and the mirror neuron system is under investigation. For example, nightmares are symptomatic of affective disorders, such as bipolar disorder (Beauchemin & Hays, 1996; Mehl et al., 2006) and alexithymia, both of which are linked to anomalies in the mirror neuron system (Kim et al., 2009; Moriguchi et al., 2009). Similarly, nightmares are predictive of suicidal and self-harm behaviors (Li, Lam, Yu, Zhang, & Wing, 2010; Nadorff, Nazem, & Fiske, 2011; Sjostrom, Hetta, & Waern, 2009), which may be linked to mirror processes to the extent that they are influenced by similar behaviors in others, e.g., contagious suicides (Hagihara & Abe, 2012; Jeong et al., 2012; Yang et al., 2012). Nightmares also commonly accompany dissociative disorders (e.g., Watson, 2001), the symptoms of which can be influenced by observational learning, including media portrayals of the disorder (e.g., Lilienfeld et al., 1999).

A related question concerns the types of mirror behaviors that might be associated with nightmares. Factor analysis of the Mirror Behavior Questionnaire (MBQ) revealed four types of mirror behaviors (Nielsen & Kuiken, 2013): *Empathy/Emotional Contagion*, *Behavioral Imitation*, *Sleepiness/Anger Contagion*, and *Motor Skill Imitation*. This pattern is broadly consistent with other research that supports a distinction between cognitive and emotional empathy (Reniers, Corcoran, Drake, Shryane, & Vollm, 2011), the multidimensionality of empathy (Derntl et al., 2010), and the existence of different forms of motor resonance (Gazzola, ziz-Zadeh, & Keysers, 2006) and emotional contagion (Lundqvist, 2006). There is also a substantial literature on sex differences in (1) empathy, with females being more empathic; (2) contagious behaviors, with females exhibiting more emotion-congruent facial responses and higher self-reported contagion (Sonnby-Borgstrom, Jonsson, & Svensson, 2008; Wakabayashi, Sasaki, & Ogawa, 2012): and (3) the early developmental origins of emotional contagion (Geangu, Benga, Stahl, & Striano, 2010). Both sex and age are important factors in the etiology of nightmares as well.

The goal of the present study was therefore to assess possible relationships between nightmares and mirror behaviors in a college student population. The MBQ (Nielsen & Kuiken, 2013) permitted us to examine the specific types of mirror behaviors that might characterize subjects who frequently report nightmares.

2. Methods

Subjects were 480 students enrolled in a first-year university psychology course who received partial course credit for participation. Of these, 188 were male (19.2 ± 1.73 years; range: 17–27) and 292 were female (19.0 ± 1.55 years; range: 17–29). They gave informed consent and participated voluntarily; they were also free to choose an alternative educational activity for course credit. The male and female groups did not differ in age ($p = .18$).

All subjects completed an extensive battery of questionnaires as part of a larger research program on personality and dreaming. Details about the battery and results from some of the questionnaires are published elsewhere (Nielsen & Kuiken, 2013; Nielsen et al., 2009), and only some of the findings are described here. Subjects responded to questionnaires on optically scored answer sheets; these were subsequently scanned and verified by an assistant to remove cases with incorrectly coded or out of range responses. Following participation, subjects were given a thorough written debriefing.

2.1. Questionnaire measures

2.1.1. Nightmare frequency (NMF)

Subjects were given written definitions of nightmares, bad dreams, sleep terrors, and sleep paralysis to allow them to discriminate among these different phenomena. Nightmares were defined as *disturbing dreams* (*usually in the second half of the night*) *that awaken you from sleep and that are clearly recalled*. Subjects were then asked: *How often have you experienced* **nightmares** *during the* **last 30 days**? A 7-point (0–6) response scale was provided where 0 = *Not at all*; 1 = *Once*; 2 = 2–5 *times*; 3 = 6–10 *times*; 4 = 11–15 *times*; 5 = 16–20 *times*; 6 = 21 *or more times*. The *NMF* measure was used to create three groups: *Lo-NMF* (score = 0; $n = 271$), *Med-NMF* (score = 1; $n = 109$); and *Hi-NMF* (score > 1; $n = 100$).

2.1.2. Mirror Behavior Questionnaire (MBQ)

Mirror behaviors were assessed with a 16-item self-report scale containing items that represent empathy as well as contagious emotions (*Empathy/Emotional Contagion*: e.g., smiling, laughing, crying), mirroring of body postures and speech patterns (*Behavioral Imitation*: e.g., speech and motor tics, accents, body movements), imitative learning of motor skills