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A Study on the Personality Characteristics of Dreamers

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Joshua Lambert

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Personality Characteristics of Dreamers

Graduate Thesis in Clinical Psychology, M.A. Program

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Abstract

Nightmares are frightening dreams that cause the dreamer to wake, with the events that occur within the nightmare well remembered after awakening. There are those who experience nightmares frequently (at least one nightmare a week). While studying nightmares, Hartmann (1989, 1991) theorized a distinct personality trait he referred to as boundaries of the mind, and conceptualized a boundary continuum ranging from thin boundaries to thick boundaries. Those with thin boundaries were hypothesized to express permeability between cognitive processes, whereas those with thick boundaries are thought to better separate cognitive processes. Those who experience frequent nightmares are typically shown to report thinner boundaries than those who do not experience frequent nightmares. Those who frequently lucid dream – which has been defined as the ability for a dreamer to recognize that he or she is asleep while in a dream and then manipulate the content of the dream, or observe the dream passively - have also been reported to have thin boundaries. Among other things, people may engage in lucid dreaming in order to cope with nightmares. The current study sought to explore shared personality traits of those who experience frequent nightmares and frequent lucid dreams. Results and potential benefits of the research findings are discussed.

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Acknowledgement

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Personality Characteristics of Dreamers

Boundary Structure

The current study seeks to explore the differences in personality characteristics between those who experience frequent nightmares and those who experience frequent lucid dreams. The first personality trait that will be explored pertains to boundary structure as theorized by Ernest Hartmann (1989). In *Boundaries of the Mind: A New Psychology of Personality*, Hartmann (1991) stated:

> When we consider the contents of our minds – thoughts, feelings, memories; ego, id, superego; perceptual processes, semantic processes, memory processes – we are speaking of parts, of regions, functions, or processes that are separate from one another and yet connected with one another. The boundaries between them are not absolute separations; they can be relatively thick or solid on the one hand or relatively thin or permeable on the other. (Hartmann, 1991, p. 4)

When Hartmann (1991) mentions the boundaries between separate processes, functions, or regions, he referred to the lines that people place between those functions, regions, or processes to divide them. He claims that these boundaries are in one's mind: they are not necessarily tangible, and they differ from one person to the next. This is a theory of mind, and not a part of one's biology or physiology. Hartmann (1989, 1991) theorized that the boundaries people use to separate functions, regions, or processes, represent a unique personality trait not measured by other psychological measures. His research led him to develop the Boundary Questionnaire (Hartmann, 1989, 1991), a

measure used to evaluate and quantify the thinness or thickness of boundaries across a number of different types of boundaries.

Types of boundaries. The following will explore each type of boundary as conceptualized by the Hartmann (1991). A more thorough review of each boundary type can be found in Hartmann (1991), and in Hartmann, Harrison, and Zborowski (2001).

The first type of boundary discussed by Hartmann (1991) is a perceptual boundary and is conceptualized as follows. Perceptual boundaries may include the boundaries between sensory input and sensations. For example, one may consider the five senses to be distinctly separate from one another, or they may blend the senses and experience synesthesia. Also pertaining to perceptual boundaries are the amount and focus of sensory input one can take in at a time. One may take in a lot of sensory input, but everything is out of focus, or they may take in a little sensory input, but everything is well-focused. Perceptual boundaries may also pertain to the level of connections of sensory percepts. Regarding the five senses one attributes to something, he or she may either perceive something as a single, distinct entity, or the sensory inputs from that entity may associate to multiple entities. For example, when receiving sensory data from a book, a person may perceive it as a book and nothing more; however, another person may receive sensory input, such as smell, and think about something else that smelled like the book. According to Hartmann, Body boundaries may include barriers against perceptual stimuli (i.e., the level of sensitivity one has to tactile stimulation or smells), the skin (i.e., the level of connection or separation between what is inside and outside of the body),

posture and musculature (i.e., posture that is inviting others to approach, or posture that demands space), and personal space (the preferred distance between two people).

According to Hartmann (1991), the boundaries related to thoughts and feelings may pertain to the level of connection or separation of one thought or feeling from another thought or feeling. For example, one individual may consider a single thought until it is completed and then continue to a separate thought, whereas another person may take that same though and connect to a myriad of different thoughts. Hartmann also described another type of boundary related to awareness or consciousness. Some individuals may spend the majority of their waking life thinking ordinary waking-state thoughts, whereas others may spend much of their time awake moving between typical wake-state cognitions and daydreams or fantasies without noticing.

Regarding sleep-dream-wake boundaries, Hartmann (1991) wrote that some people may have definite distinctions between being asleep and being awake, whereas others may feel as though they are still dreaming while they are, in fact, awake. Hartmann also described another type of boundaries involves those pertaining to play. Some people, especially children, may become totally involved in play to the point where they may think what they are playing is real, such as a fantasy game. Others would have no difficulties differentiating play time from time when one is not playing.

According to Hartmann (1991), boundaries of memory may include memories of the past (some people are able to recall memories of early childhood, whereas others cannot recall early childhood), present (some people can clearly differentiates between memories of the past and the current, but another person may have difficulties

differentiating the current from memories of the past), and planning for the future (having a clear plan of what to do in the future that is distinct from the past despite being based on it, as opposed to not knowing what will happen in the future due to the connection the future may have with the past or present).

Hartmann (1991) wrote that there may also be boundaries that exist between the conscious and unconscious, or between the id, ego, and superego. Closely linked with the field of psychodynamics, these boundaries may suggest a level of separation or connection between the hedonistic content typically found in the unconscious stemming from the id (i.e. sexual impulses or aggression), and the conscious. Similarly, Hartmann described boundaries pertaining to the use of defense mechanisms that may limit the connection one has with painful truths or realities. It is possible that there are multiple defense mechanisms, and each is capable of acting as a boundary. For example, someone may use denial as a boundary to separate themselves from the dangers of reality.

The boundaries of identity described by Hartmann (1991) are multifaceted. Identity boundaries may include sexual identity, such as the level of connection or separation between one's respective gender identity and the stereotypical characteristics of the opposite gender. Likewise, boundaries of identity may pertain to one's age such that he or she identifies according to the stereotypical characteristics of their respective age group, or they may recognize characteristics of themselves pertaining to stereotypical characteristics of other age groups. Last, boundaries of identity may pertain to one's constancy of identity (is the person's personality static or dynamic?). Related to identity boundaries are Hartmann's group boundaries. Group boundaries may pertain to how one

identifies themselves regarding group membership. Someone may consider themselves to be a member of a single group, such as psychology major, or of a larger group, such as student at a particular university. Likewise, a person may identify as Caucasian or as a member of the human race. Another boundary type, interpersonal boundaries, may include the level of connection or separateness one has in a relationship, such as one person feeling close to or distant from another person.

People may possess boundaries in the way they organize their lives, such as thinking that everything has its own place (Hartmann, 1991). Boundaries in environmental preferences may manifest themselves as preferences regarding the thinness or thickness of physical items, such as a preference for the thickness or thinness of clothing or walls. Hartmann uses the example of metaphysics (philosophy of the nature of reality), aesthetics (the nature of beauty), and ethics to describe boundaries as they pertain to one's judgments and opinions, saying that some people may have clear criteria for judging anything on each of these topics, whereas others may be unsure of how to judge something on each of these topics. Last, Hartmann writes that there may be boundaries in decision making and action. Some people may make decisions based upon some concrete system of right and wrong, whereas others may consider both sides and find it difficult to make a decision at all.

Thin and thick boundaries. According to Hartmann (1991), the boundary personality trait may exists on a continuum, with individuals possessing excessively thin boundaries on one extreme of the continuum, and individuals possessing excessively thick boundaries on the opposite end of the continuum. Generally speaking, boundary

thickness can be described as the degree of separation between different processes, functions, or regions (Hartmann, Elkin, & Garg, 1991). For example, regarding the boundaries of sexual identity, a person with a thick boundary may consider men to be stereotypically masculine, women to be stereotypically feminine, and there is no blurring of gender identities. On the contrary, a person with a thin boundary may identify themselves according to their respective sex, but also recognize the characteristics they possess pertaining to the opposite sex.

Qualities of thin boundaries. Boundary thinness can be described as the degree of connection or permeability between separate processes, functions, or regions, (Hartmann et al., 1991). Zborowski, Hartmann, Newsom, and Banar (2004) reported that excessive boundary thinness is related to insecure attachment and interpersonal dependency. The authors also indicated that boundary thinness is associated with interviewer-rated openness. John and Srivastava (1999) describe openness to experience as a personality trait that encompasses, "...the breadth, depth, originality, and complexity of an individual's mental and experiential life" (p. 30). Other researchers have also found boundary thinness to correlate strongly with openness to experience (McCrae, 1994). Additionally, Schredl and Erlacher (2004) have linked boundary thinness with imagination and absorption, which Tellegen and Atkinson (1974) defined as, ". . . a disposition for having episodes of "total" attention that fully engage one's representational (i.e., perceptual, enactive, imaginative, and ideational) resources" (p. 1). Both imagination and absorption are described by John and Srivastava (1999) as being

subscales of openness to experience. Women have frequently been shown to have thinner boundaries than men (Aumann et al., 2012; Boerger, 2009; Hartmann, 1989).

As most people exist somewhere in the middle of the continuum between boundary thickness and boundary thinness, it is expected that most people would have traits found in both thick- and thin-boundaries. Regarding the different types of boundaries mentioned previously, a person may have a relatively thick boundary for one boundary type and a relatively thin boundary on another boundary type. Because boundary structure is conceptualized as a broad personality trait, it has been reported to affect many things including choice in occupation and performance on the Rorschach Ink Blot Test (Hartmann, 1989; Levin, Gilmartin, & Lamontanaro, 1998-1999), a projective test used to evaluate the personality of examinees (Rorschach, 1921). Research has even shown that one's handedness is influenced by the thinness of one's boundaries such that individuals with thin boundaries have mixed-handedness (Hicks, Bautista, & Hicks, 1999a).

Going back to the topic of sleep-dream-wake boundaries, boundary thinness has been shown to be associated with emotional involvement in dreams (Hartmann et al., 1991; Hartmann & Kunzendorf, 2006-2007; Hartmann, Rosen, & Rand, 1998). Researchers have demonstrated a relationship between boundary structure and the meaningfulness one attributes to dreams (Aumann, Lahl, & Pietrowsky, 2012; Schredl, Kleiferchner, & Gell, 1996). Several studies have reported boundary thinness to be related to greater dream recall frequencies (Aumann et al., 2012; Hartmann, 1989; Hartmann & Kunzendorf, 2006-2007; Levin et al., 1998-1999; Schredl et al., 1996).

The Continuity Hypothesis

According to the continuity hypothesis, the things that influence a person while awake further serve to influence the person once asleep (Domhoff, 1996). That is to say that the contents of dreams are typically derived from the things that influence the dreamer while he or she is awake. Hall and Nordby (1972) state that the waking contents that continue to influence a person in their sleep can be both overt (dream content reflects waking experience) and covert (dream content reflecting fantasies and thoughts). In a study by Schredl, Lossnitzer, & Vetter (1998), the authors found supporting evidence that overt content does carry into dreams by demonstrating a relationship between the ratio of men and women encountered in waking life with the sex ratio of dream characters encountered while asleep. Another study by Kahn and Hobson (2005) found that the cognitions of dreamers in the dream state were similar to the way in which individuals think while awake. Supporting evidence that waking fantasies permeate into dreams comes from a study by Schredl, Desch, Röming, and Spachman (2009) that compared the frequency of erotic dreams with the frequency of erotic fantasies and the amount of intercourse and masturbation a person experiences in waking life. The authors found that it was the erotic fantasies that had the greatest association with erotic dreams. Overall, the research suggests there is a clear link between the experiences that one has when awake and the content of his or her dreams. This view of dream content is not entirely dissimilar to Freud's theories of dreams wherein he hypothesized that dream content reflected unconscious desires and motivations (Freud, 1900).

Contradictory hypotheses. There are, however, research findings that contradict the continuity hypothesis. Schredl (2000) found that certain activities requiring more focused thinking such as writing, reading, and computer use were rarely reflected in dream content. Thus, certain aspects of waking reality are rarely reflected in dreams. More challenging to the continuity hypothesis are the presence of discontinuities in dreams. Discontinuities in dreams involve dream content that does not reflect waking experience, or dreaming experiences that cannot possibly occur while awake, such as flying unassisted (Schredl, 2011). There are a number of theories that attempt to account for this apparent discrepancy. Malinowski and Horton (2011) reported that some dream content may be metaphorical, and the authors provide an example of what a metaphor may look like in a dream by describing the dreams of one participant in their study, saying the participant, "who said he preferred not to probe dreams for waking-life connections saw in a dream he had about cardinals playing football – which actually involved them kicking each other in the crotch – his own "interpretative portrayal" of Belgian politics" (pg. 88). In another study, Schredl (2007-2008) found that flying in a dream, a seemingly discontinuous dream element that is typically pleasurable to dreamers, was associated with personality traits, such as low neuroticism, that are found to be related to positive emotions. The author goes on to say that this may indicate continuity on an emotional level. An additional contradictory theory to the continuity hypothesis is that of compensation theory (Jung, 1964) which states that dreamed content may seek to counterbalance overly used and harmful conscious activities, as well as underused potentials of the dreamer. Jung (1964) wrote that an individual's dreams serve to make up

for, "deficiencies of their personalities, and at the same time it warns them of the dangers in their present course" (p. 34). For example, a child deprived of parental love and affection may dream of being adopted by a loving family to make up for his or her lack of required care. The author went on to state that failing to heed the warnings of dreams could prove dangerous, even fatal, by describing a client's dream predicting the man's own death.

Factors affecting continuity. Schredl (2003a) proposed five separate factors that may influence continuity of waking life experiences in dream content: time between experienced made whilst awake and the dream, emotional involvement, experiences accrued whilst awake, characteristics of one's personality, and time between falling asleep and dreaming. Research is mounting for each of these factors, such as the role emotionality plays in continuity (Malinowski & Horton, 2014; Schredl, 2006). The current study seeks to add to the existing research by investigating the role personality characteristics play in the development of two specific types of dreams: nightmares and lucid dreams. In addition to definitions for each of these dream types, a discussion of sleep-wake correlates will be provided as they pertain to the continuity hypothesis.

Nightmares

Stumbrys, Erlacher, and Schredl (2013) provided a definition of nightmares that states, "Nightmares are dreams with strong negative emotions that result in awakening. The action of the dream can be remembered well upon awakening" (p. 124). Though not inherently pathological, nightmares are common symptoms in many psychopathologies listed in *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM–5;

American Psychiatric Association, 2013), including posttraumatic stress disorder (PTSD), anxiety disorders, and depression (Swart, van Schagen, Lancee, & van den Bout, 2013). If frequent nightmares are the primary concern of a client, a diagnosis of nightmare disorder may be appropriate. Research indicates that about 2-5% of the population experiences at least one nightmare each week. (Li, Zhang, Li, & Wing, 2010; Schredl, 2010; Stepansky et al., 1998). Because of the prevalence of nightmares seen in the general population, be they afflicted with mental illness or not, as well as the distressing effects nightmares may cause, it is important to study nightmares so as to better understand what causes them, as well as to better provide treatment options for those suffering from nightmares. Likewise, studying nightmares may elucidate upon the meaning (i.e., dream-state thoughts) of dreams (Hartmann, 1998).

Research on nightmares has investigated the distressing dream phenomena from many angles. One such approach involves exploring how frequent nightmare sufferers perform on measures of psychological functioning, including projective tests and objective tests. In a study by Levin (1990), the author reported that nightmare sufferers displayed greater disordered thinking on the Rorschach inkblot test, a projective test intended to evaluate an examinee's personality (Rorschach, 1921). Some studies have demonstrated that nightmare sufferers tend to score higher on the psychotic scales of the Minnesota Multiphasic Personality Inventory (MMPI) than do those who do not experience frequent nightmares (Hartmann, Russ, Oldfield, Sivan, & Cooper, 1987; Hartmann, Russ, Van der Kolk, Falke, & Oldfield, 1981). Another approach to researching nightmares involves investigating how environmental differences between

individuals contribute to nightmare experiences. Consistent with the continuity hypothesis, Kelly (2009) observed that the pleasurable act of looking at the night-sky often was significantly related to lower nightmare frequency. Schredl (2013) reported that living in urban areas may predispose individuals to nightmares.

Yet another approach to studying a group's experiences with nightmares includes researching demographic correlates that are associated with nightmare frequency, such as age, socioeconomic status, and gender. Research investigating the relationship between age and nightmare frequency is inconsistent. Some studies have demonstrated that nightmares are less common in older adults than in younger individuals (Nielsen, Stenstrom, & Levin, 2006; Salvio, Wood, Schwartz, & Eichling, 1992; Schredl, 2013), though others demonstrated no such differences (Schredl, 2010; Schredl, Lahl, & Göritz, 2010). Li et al. (2010) found nightmare frequency to be significantly related to earning lower income, other sleep disorders, mood disorders, and being female. Indeed, the general consensus among dream researchers is that women tend to experience more nightmares than men. Supporting evidence that being female is significantly related to nightmare frequency comes from many sources (Gackenbach, Darlington, Ferguson, & Boyes, 2013; Nielsen et al., 2006; Schredl, 2010, 2013), but there are studies reporting contradictory findings (Chivers & Blagrove, 1999). A meta-analysis by Schredl (2014) revealed that neuroticism and dream recall mediate this gender difference. Many studies attest to the relationship between neuroticism and nightmare frequency (Li et al., 2010; Schredl, 2010; Schredl, Landgraf, & Zeiler, 2003), but this is not always the case (Chivers & Blagrove, 1999). Other personality traits that have been examined included,

but were not limited to, susceptibility to hypnotism (Belicki & Belicki, 1986), imaginativeness, and spatial/analytic skill (Spadafora & Hunt, 1990).

Jones and Stumbrys (2014) concluded that nightmare frequency was associated with lower mental well-being. This is not surprising given that nightmare frequency is correlated with current stress levels (Schredl, 2003b) and other sleep disorders (Li et al., 2010). Many things are hypothesized to lessen the burden of nightmares. A study by Gackenbach, Ellerman and Hall (2011) concluded that videogames inoculate military personnel without symptoms of PTSD from the negative effects of nightmares. Inoculation from the harmful effects of nightmares is certainly one way to handle nightmares. Imagery rehearsal therapy is another viable treatment option that has been shown to accomplish such an end. In imagery rehearsal therapy, the client creates a dream script of the nightmare and alters the content. The client reads the altered dream script to themselves before sleeping, and the content of the dream is intended to reflect the new dream script instead of the prior theme of the nightmare. Imagery rehearsal therapy has shown efficacy for the treatment of nightmares (Casement & Swanson, 2012; Krakow et al., 2000; Thünker & Pietrowsky, 2012), especially when combined with cognitive-behavior therapy (Harb, Cook, Gehrman, Gamble, & Ross, 2009; Margolies, Rybarczyk, Vrana, Leszczyszyn, & Lynch, 2013).

Lucid Dreaming

In the late 19th century, Frederik van Eeden, began studying dreams. He published a classic paper called *A Study of Dreams* wherein he coined the phrase lucid dream (Holzinger, 2009; van Eeden, 1913). Lucid dreaming has been defined as a dream state in

which, ". . . one is aware that one is dreaming during the dream. Thus it is possible to wake up deliberately, or to influence the action of the dream actively, or to observe the course of the dream passively" (Stumbrys et al., 2013, p. 124). Though scientific interest in lucid dreams is relatively new, the cultural and religious significance of lucid dreaming can be traced to ancient times. The Vigyan Bhairav Tantra is a 5000-year old Hindu text that explored methods of entering a higher plane of reality (Osho, 1974). Techniques inherent in lucid dreaming are referenced by the goddess Siva as methods of ascending into a transcended state of consciousness. The Bardo Thodol (Zla-ba-bsam-'grub, Evans-Wentz, & Woodroffe, 1957), known as the Tibetan Book of the Dead, also attests to the cultural significance of lucid dreaming. Tibetan Buddhists believe that dying and dreaming are similar experiences. By becoming aware that one is dreaming during a dream and thus recognizing the illusory nature of the dream, the individual is better equipped to escape the endless cycle of reincarnation and become one with Brahman.

Lucid dreaming is a useful way in which researchers can study relationships between a person's waking state and his or her dream content (continuity hypothesis). A study by LaBerge, Nagel, Dement, and Zarcone, (1981) demonstrated that participants could learn a motor task while awake (eye movements) and later perform those outwardly observable behaviors while sleeping. Further evidence was provided in a later study using a greater number of participants (LaBerge, Nagel, Taylor, Dement, & Zarcone, 1981). Another study seeking to explore memory differences as they relate to lucid dreaming frequency found that participants were able to recall in lucid dreams words that were memorized prior to sleep (Erlacher, 2009). The support these studies lend toward the

continuity hypothesis is clear: information acquired while awake remains present during dreams. Kahn and Hobson (2005) found that the cognitions of dreamers in nonlucid dreams were similar to wake-state cognition, but metacognition, a term referring to thinking about thought, was impaired. Stumbrys (2011) reported that lucid dreaming may be continuous regarding to self-reflective awareness.

In a study by Barrett (1992), the author sought to determine if the typical lucid dream is lucid as one might define the word lucid using a dictionary. Barett (1992) did so by rating the dreamer's levels of awareness across four corollaries often used to describe fully lucid dreams in prior research: ". . . 1) people in the dreams are dream characters, i.e., they are not their waking counterparts, they will not awake remembering the dream; 2) dream objects are not real, i.e., actions will not carry over concretely upon awakening; 3) the dreamer does not need to obey waking-life physics to achieve a goal; and 4) memory of the waking world is intact rather than amnestic or fictitious" (p. 223). Roughly 25% of test subjects were fully lucid across all four corollaries of lucid dreaming. The author's results indicated that lucid dreams exist on a continuum, and that most lucid dreams are not as lucid as the term implies.

Lucid dreaming frequency. Studies have revealed that it is relatively common for someone to have engaged in at least one lucid dream throughout their lifespan, but there are disagreements as to what percentage of the population has experienced a lucid dream. Gruber, Steffan, & Vonderhaar (1995) found that 87% of men and 84% of women report to have lucid dreamed at least once. Another study found that 82% of its participants report having lucid dreamed at least once in their life (Schredl & Erlacher, 2004). Jones

and Stumbrys (2014) reported that 75% of their participants claimed having engaged in lucid dreaming. Another study found 65% of its participants reported having experiencing a lucid dream (Paulsson & Parker, 2006). Fingerlin (2013) reported a prevalence of 50%, fewer than other studies, but very near to the 55% prevalence found by Holzinger, LaBerge, and Levitan (2006). There is a certainly some disagreement as to the true prevalence of those who have experienced a lucid dream, but research indicates that the majority of people are likely to have experienced a lucid dream at least once.

Though research shows that it is common for an individual to have experienced lucid dreaming, it is uncommon to engage in lucid dreaming frequently. In a study by Stumbrys et al. (2013) the authors found that only 6.5% of their participants reported to lucid dream more than once a week. Another study by Zink and Pietrowsky (2013) reported that 23.8% of their sample claimed to lucid dreamed more than once a month. A recent Swiss study demonstrated that 26% of Swiss junior college students report to lucid dreaming more than once a month (Fingerlin, 2013). Yet another study reported that 36.9% of participants claim to lucid dream more than once a month (Schredl & Erlacher, 2004). While numbers regarding frequency are inconsistent, many researchers agree that there are no significant gender differences in lucid dreaming frequency (Doll et al., 2009; Fingerlin, 2013; Schredl & Erlacher, 2004; Zink & Pietrowsky, 2013).

Differences attributing to lucid dreaming frequency. Because there are individual differences regarding one's ability to engage in lucid dreaming, as well as the frequency with which one has lucid dreams, it stands to reason that there are individual traits that account for these differences. Researchers have investigated many such possibilities since

lucid dreaming entered into the realm of psychological research, such as the psychophysiology of lucid dreamers. Much of the research investigating the biology of lucid dreaming experiences has focused on the brain, such as hemispheric regions and neural pathways associated with lucid dreaming occurrence. As such, a discussion on the correlates of lucid dreaming may benefit from an exploration of biological findings. Further, the results of studies focusing on the biology of lucid dreaming may provide supporting evidence for existing studies looking at individual personality characteristics because of the associations between brain regions and personality traits and behaviors.

One such example is a study by Holzinger et al. (2006) that sought to investigate how lucid and nonlucid dreams differ physiologically during REM (rapid eye movement) sleep. Though not statistically significant, the authors report that, "A tendency towards the greatest increase was observed in the left parietal lobe (P3), an area of the brain considered to be related to semantic understanding and self-awareness" (Holzinger et al., 2006, p. 1). Another study investigating the biological correlates of lucid dreaming found that performance on a task thought to engage the ventromedial prefrontal cortex (related to self-related social and emotional cognition) were significantly related to heightened lucidity (Neider, Pace-Schott, Forselius, Pittman, & Morgan, 2010). The authors also reported that the degree of lucidity was not significantly related to dorsolateral prefrontal cortex activity, an area of the brain thought to be related to executive function and working memory.

Another approach to studying lucid dreaming occurrence is by analyzing what the dreamer does in his or her waking life. Such research areas focus on what the lucid

dreamer does differently than nonlucid dreamers, and what environmental contexts they experience more or less than do those without frequent lucid dreams. The focus of such studies is to examine in what way these variables are associated with lucid dreams. One study revealed that lucid dreamers reported having more positive attitudes toward dreams than did nonlucid dreamers (Doll et al., 2009). Gackenbach (2006) implemented a study examining the relationship between lucid dreams and video game play. The results indicated that people who frequently played video games were prone to experiencing more lucid dreams, and were capable of controlling their dreams more so than those who did not play video games as frequently. A subsequent study (Gackenbach, 2009) provided additional support for these findings. However, a recent study provided evidence to the contrary; that is to say, the results indicated that lucid dreaming and videogame play are unassociated with one another (Gackenbach, Kuruvilla, Ferguson, Mathewson, & Darlington, 2014).

Similarly, an important area of study for lucid dreaming research regards what lucid dreamers can do differently than nonlucid dreamers. A study by Blagrove, Bell and Wilkinson (2010) provided evidence that frequent lucid dreamers are capable of performing the incongruent condition (the color of text does not match the color spelled out by the word, i.e., the word "red" spelled in green text) of the Stroop test (Stroop, 1935) faster than both occasional and nonlucid dreamers. Another study examined lucid dreaming frequencies as they relate to change blindness performance, which was defined as "an inability to detect large changes in the visual field, although the change is obvious once it is pointed out or finally noticed (Rensink, 2002)" (Blagrove & Wilkinson, 2010,

p. 1-2). The authors did not find significant differences in change blindness performance between frequent lucid dreamers, occasional lucid dreamers, and nonlucid dreamers.

Evaluating relationships between lucid dreaming and personality traits is a common approach to understanding individual differences in lucid dreaming frequency. Whereas studying in what way a frequent lucid dreamer interacts with the environment can later lead to hypothesized reasons for why such relationships exist, personality measures investigate specific traits held by lucid dreamers that potentiate greater lucid dreaming frequencies. Gackenbach (2006) hypothesized that lucid dreaming would be related to video game play because videogames are associated with visuo-spatial skills, decision making, and the like. By finding a link between lucid dreaming and videogame play, indirect evidence was provided for this hypothesis. Doll et al. (2009) held a similar hypothesis and thus used personality measures to determine if such relationships existed. Their results indicated that lucid dreaming is significantly associated with one's mental health and positive attitudes toward dreams, but the authors found no support for the hypothesis that lucid dreaming is associated with spatial ability, decision behavior, or control behavior in waking life. Thus, the results from Doll et al. (2009) support the results from Gackenbach et al. (2014) that spatial ability is not related to lucid dreaming, but contradict with the results from other studies (Gackenbach 2006; Gackenbach, 2009).

There are many other studies that examined personality correlates of lucid dreamers. Schredl and Erlacher (2004) found small correlations for lucid dreaming with the fantasy and ideas facets of openness. Small correlations were also found for absorption and imagination. Frequent lucid dreamers have commonly been found to have

greater internal locus of control than do infrequent lucid dreamers (Blagrove & Tucker, 1994; Patrick & Durndell, 2004). Lucid dreaming appears to be associated with greater creativity (Fitch & Armitage, 1988; Zink & Pietrowsky, 2013), though studies exist showing no differences in creativity between lucid dreamers and nonlucid dreamers (Blagrove & Tucker, 1994). Gruber et al. (1995) reported that, among other things, lucid dreamers are typically more socially bold, dominant, and experimenting. Frequent and infrequent lucid dreamers could be differentiated via the subdueness/independence factor of the 16PF. The authors also noted that self-reflection and volition are potential correlates to lucid dreaming. The personality traits found by Gruber et al. (1995) are qualities many find necessary in lucid dreaming, such as experimenting to try new things and self-reflection to determine one's separateness from the dream world.

Related to the topic of self-reflection is the construct field dependence/independence. A person is field dependent when he or she relies on sensory information from their environmental surroundings for perceptual judgments (Witkin & Goodenough, 1977). In a study by MacLeod, Jackson and Palmer (1986), the authors concluded that field dependence and spatial ability are not distinct constructs. Conversely, one is field independent when they rely on information gleaned from within themselves. Research shows that lucid dreamers may be more field independent than nonlucid dreamers (Gackenbach, Heilman, Boyt, & LaBerge, 1985; Gruber et al., 1995; Patrick & Durndell, 2004). That is to say, field independent dreamers can differentiate themselves from the dream and thus take control, but field dependent dreamers are unable to separate themselves from the dream because of their dependence on an external frame

of reference. There are studies that have found contradictory findings (Blagrove & Tucker, 1994).

Utility of lucid dreaming. It is important to investigate the relationships between lucid dreaming and other variables so as to better understand why some people are able to lucid dream while others cannot, but it is also important to step beyond this initial investigation and explore possible benefits that lucid dreaming may have. One such study by Erlacher and Schredl (2010) found that practicing a motor task in a lucid dream, tossing 10-cent coins into a cup, yielded better performance on the motor task when awake than did a control condition, and that the lucid dreaming condition did not significantly differ from a group that practiced the motor task while awake. This study suggests that practicing a motor task in a lucid dream may be as beneficial as practicing the task while awake. The practical benefits of such applications of lucid dreams are numerous. An online study by Schädlich and Erlacher (2012) asked participants about the benefits they gain from lucid dreaming. Their results indicate that the majority engage in lucid dreaming to have fun.

Research Goal

Research shows that the boundary structure continuum correlates with many of the constructs with which lucid dreaming frequency and nightmare frequency are associated. Perhaps it is unsurprising to then learn that researchers have demonstrated an association between the two dream phenomena and boundary structure. There are studies demonstrating a relationship between boundary thinness and nightmare frequency (Galvin, 1990; Hicks, Bautista, & Hicks, 1999b; Levin et al., 1998-1999; Pietrowsky & Kothe, 2003; Schredl, 2003b; Schredl et al., 1996), or aversive dream content (Aumann et

al., 2012). This is to be expected given that the majority of research investigating boundary structure uses Hartmann's (1989, 1991) boundary questionnaire, a measure of boundary structure related to Hartmann's research into nightmares. There is also literature attesting to a relationship between boundary thinness and lucid dreaming frequency (Galvin, 1990; Hicks et al., 1999b), and between boundary thinness and the belief that dreams can be controlled (Boerger, 2009).

Due to the distress nightmares can cause a person, it is important to better understand the personality traits of nightmare sufferers so as to determine who may be at risk for frequent nightmares. To this end, exploring the personality traits of people who experience frequent nightmares is the first goal of this study. The second goal of this study is to explore personality traits endorsed by frequent lucid dreamers. Research shows that nightmare frequency is correlated with lucid dreaming frequency (Schredl & Erlacher, 2004; Spadafora & Hunt, 1990), which may imply that lucid dreaming occurs to halt nightmares. Supporting evidence comes from a study by Schädlich and Erlacher (2012) which found that 63.8% of lucid dreamers practice lucid dreaming to alter the content of nightmares. The final goal of this study will seek to determine if specific personality traits moderate the relationship between lucid dreaming frequency and nightmare frequency. To this end, this study sought to determine whether or not the effects of nightmares on the occurrence of lucid dreams depend on the level of a contributing personality trait such as openness or boundary thinness. Research investigating the efficacy of lucid dreaming as a psychotherapeutic technique has shown promising results (Spoormaker & van den Bout, 2006; Spoormaker, van den Bout, &

Meijer, 2003), but it is still too soon to determine if lucid dreaming would be more beneficial than imagery rehearsal therapy, a therapeutic technique that works similarly to lucid dreaming by altering the dream script of one's nightmares.

Indeed, as previously discussed, there are a number of correlates between nightmare frequency and lucid dreaming frequency which include boundary structure and other personality traits. Likewise, researchers have shown that lucid dreaming may be a product of one's experience with nightmares. This leads to specific research questions. Do common personality traits shared between frequent nightmare sufferers and frequent lucid dreamers moderate this relationship? Might boundary structure and other personality traits play a role in the transition to lucid dreams during a nightmare? The current study aims to explore these relationships in order to determine what is the most predictive of lucid dreaming frequency. Determining which construct is the most predictive of lucid dreaming frequency may assist researchers in determining better ways to treat nightmares with lucid dreaming techniques. It is hypothesized that boundary structure will be the strongest predictor of both lucid dreaming frequency and nightmare frequency. The second hypothesis is that the measured personality traits will moderate the relationship between nightmares and lucid dreaming.

Methods

Participants

Undergraduate students enrolled to participate in this study via the SONA participant management system. Participation in research studies are one means of acquiring class

credit, and so participation credit was rewarded to those students who choose to participate.

Procedure

A total of 182 individuals between the ages of 18 and 30 years old participated in this study. Regarding the composition of participants, 29.1% identified as male and 70.9% identified as female. The sample was culturally diverse in that 62.1% of participants identified as being White, 29.7% identified as being Black, 6.0% identified as being Hispanic, and 1.6% responded as being of another race. Concerning class rank of the participants, 60.4% were freshmen, 25.3% were sophomores, 8.8% were juniors, 4.9% were seniors, and .5% of participants were graduate students.

Participants registered for the study through the SONA system. Once the participants enrolled, they were given a time and a location for which they should meet to participate in the study. Due to the limited availability of space, only six students participated during each available time. Informed consents were collected, and then the students were asked to follow a link to an online survey administered through the Qualtrics website. As they completed the online survey, the researcher monitored the participants' progress to make certain they followed instructions, and they were available to answer questions as needed by the participants. Once each student completed the survey, the researcher thanked the participants for completing the survey and distributed the debriefing form that elucidates upon the purpose of the study and possible benefits the research may play in the field of psychology. Participants who needed to leave before

completing the survey were allowed to do so without penalty, and credit was given to them in full.

Measures

Big Five Inventory. The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991) is a self-report measure assessing personality characteristics. The 44-item scale is comprised of 5 subscales: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. John et al. consider each personality trait as follows. Extraversion is the degree to which one socializes with others. Agreeableness is how easily a person can get along with others. Thoughtfulness and caution is measured via Conscientiousness. Neuroticism is associated with negative moods, such as anxiety or anger. Openness is a personality trait associated with one's willingness to experience new things. The personality traits measured via the subscales exist on a continuum, and so a low score on extraversion may indicate introversion, and a low score on neuroticism may indicate a relatively calm and easy-going personality. For a further review of each personality trait, see John, Naumann, and Soto (2008). Each subscale is scored separately, yielding 5 separate scores, or one score for each subscale. Item responses exist on a 5-point scale and are graduated as follows: 1 (Disagree Strongly), 2 (Disagree a little), 3 (Neither agree nor disagree), 4 (Agree a little), and 5 (Agree strongly). Research has supported the BFI as a reliable measure of the five personality constructs. According to John and Srivastava (1999), subscale alpha-values for United States and Canadian samples typically are found to range from .75 to .90, and test-retest reliabilities performed after three months ranged from .80 to .90. Refer to Appendix A for a complete list of items located in the BFI.

Short Boundary Questionnaire. The Short Boundary Questionnaire (BQ-Sh ; Rawlings, 2001-2002) is a self-report personality measure used to assess boundary structure. The BQ-Sh is a shorter form of Hartmann's (1989, 1991) 145-item boundary questionnaire. The measure has a total of 46-items and is made up of 6 subscales: Unusual Experiences (UE), Need for Order (NFO), Trust (Tr), Perceived Competence (PC), Childlikeness (Ch), and Sensitivity (Se). Scoring the BQ-Sh is performed by adding the totals of each subscale with the exception of the Tr subscale. Refer to Appendix B for a complete list of items. Item responses to the 46 items are answered on a 5-point scale ranging from 0 (Not at all true of me) to 4 (Definitely true of me). The BQ-Sh compares favorably to the original boundary questionnaire, showing a correlation of .88 between the abbreviated scale and the full scale. The subscales also show good internal consistency, with Chronbach's alpha values ranging from .65 (PC) to .80 (UE).

Dreaming Styles Questionnaire. The Dreaming Styles Questionnaire is a 7-point Likert-type scale developed by Gruber (1988) and was used to measure the dream recall frequency, nightmare frequency, and lucid dreaming frequency of participants. Refer to Appendix C for a complete list of items. Concerning the dream recall frequency item, participants read the prompt which is, "I remember a dream_____." and responded according to the following response options: 0 ("Once or more a night"), 1 ("almost every night"), 2 ("Once a week or more"), 3 ("A few times a month"), 4 ("Once a month or less"), 5 ("A few times a year"), and 6 ("Less than once a year"). The item assessing the frequency of participants' nightmares was, "I have had nightmares _____." and contained the following response options: 0 ("Once a week or more"), 1 ("Once or twice

a month"), 2 ("Every few months"), 3 ("A few times a year"), 4 ("Once a year or less"), 5 ("A few times in my life"), and 6 ("Never"). The lucid dreaming item was, "I have "lucid dreams" _____." and contained the same response options as the item inquiring regarding nightmare frequency, but it was supplemented with the definition of lucid dreaming included in the DSQ which reads as follows:

> A "Lucid dream" is a type of dream that while in progress a person realizes, "This is not really happening. It's only a dream." Here is a short example: "I was sitting and talking to my friend John...all of the sudden I realized this can't be...John is in California...I must be dreaming!! I knew it was a dream and that I was really asleep in bed, but the dream continued and I still talked to John even though I knew he was not real. (232)

Results

Because research has shown higher dream recall frequencies in both lucid dreamers (Wolpin, Marston, Randolph, & Clothier, 1992) and nightmare suffers (Stepansky et al., 1998), dream recall frequency was statistically controlled as a potentially confounding variable. The relationships between boundary structure with lucid dreaming frequency and nightmare frequency was analyzed via their correlations. Likewise, the relationships between the big five personality traits with lucid dreaming frequency and nightmare frequency were assessed according to their Pearson's r correlations. Multiple regression analysis was used to determine the predictors of lucid dreaming frequency and nightmare frequency. Tests of moderation were used to investigate the role of boundary structure and other personality traits in lucid dreaming

frequency and nightmare frequency. Regarding moderation, analyses were performed so as to determine the degree to which nightmares can cause lucid dreaming, and if personality characteristics such as openness to experience or boundary thinness are contributing factors as to whether or not a dreamer will become lucid as a result of the nightmare.

At an alpha of .05, there was a significant relationship between boundary structure and conscientiousness, $r(157) = - 0.385, p < .001$ (two-tailed). Neuroticism was also significantly related with boundary structure $r(157) = 0.190, p = .017$ (two-tailed). Likewise, the openness dimension was found to have a significant relationship with boundary structure, $r(157) = 0.196, p = .013$ (two-tailed). These results indicate that people who endorse characteristics of thinner boundaries also tend to express qualities found in the openness dimension and in neuroticism; however, people with thinner boundaries express fewer characteristics of the conscientiousness personality trait. All other correlations with boundary thinness were not found to be statistically significant.

Partial correlations were conducted between boundary structure and both lucid dreaming frequency and nightmare frequency with dream recall as the control variable. At an alpha level of .05, there was not a significant relationship between boundary thinness and nightmare frequency, $r(149) = -0.022, p = .788$ (two-tailed), nor was there a significant relationship with lucid dreaming frequency, $r(149) = .120, p = .144$ (two-tailed). Boundary thinness accounted for only .048% of the variance in nightmare frequency and 1.44% of the variance in lucid dreaming frequency. Thus, it would seem that the boundary thinness or thickness of participants in this study was unassociated with

lucid dreaming frequency or nightmare frequency. There was a significant relationship between lucid dreaming frequency and nightmare frequency, $r(149) = .263$, $p = .001$ (two-tailed). Lucid dreaming frequency accounted for 7% of the variance in nightmare frequency. People who experience frequent lucid dreams have a tendency experience frequent nightmares, even when dream recall frequency is controlled for as a potentially confounding variable.

Comparing males with females, t-tests for independent means were conducted on lucid dreaming frequencies, nightmare frequencies, dream recall frequencies, and boundary thinness. At an alpha level of .05, results show that males ($M = 3.25$, $SD = 1.97$) did not lucid dream more frequently than did females ($M = 3.52$, $SD = 1.92$), $t(179) = -.88$, $p = .38$ (two-tailed). Boundary thinness of males ($M = 68.76$, $SD = 12.78$) did not differ significantly from the boundary thinness of females ($M = 72.00$, $SD = 13.22$), $t(157) = -1.41$, $p = .159$ (two-tailed). The nightmare frequency of males ($M = 2.65$, $SD = 1.595$) was significantly lower than the nightmare frequencies of females ($M = 2.13$, $SD = 1.603$), $t(179) = 1.99$, $p = .049$ (two-tailed). The dream recall frequency of males ($M = 2.98$, $SD = 1.36$) was significantly lower than the dream recall of females ($M = 2.45$, $SD = 1.27$), $t(175) = 2.45$, $p = .015$ (two-tailed).

T-tests for independent means were also conducted comparing boundary thinness of both high and low frequency nightmare sufferers, and of both high and low frequency lucid dreamers. For the purposes of these analyses, participant were considered to have a high frequency of nightmares or lucid dreams if they reported frequencies that were roughly in the top 25th percentile of the data collected from the sample, and low

frequency if they reported frequencies of either that were roughly in the bottom 25th percentile. Given the nature of the 7-point Likert-type scale scale used to collect the data, it was not possible to divide participants evenly into the highest and lowest quartile, and so the data was divided so that it was as close to the 25th and 75th percentile as possible. As such, participants were considered frequent nightmare sufferers if they experienced nightmares at least once or twice a month (Cutoff = 37.0%, $N = 67$). Likewise, participants were considered frequent lucid dreamers if they experienced lucid dreams at least once or twice a month (Cutoff = 21.0%, $N = 38$). To be included in the calculations as a low frequency nightmare sufferer, participants reported experiencing a nightmare a few times a year or less (Cutoff = 76.8%, $N = 73$). To be considered a low frequency lucid dreamer, participants reported experiencing a lucid dream once a year or less (Cutoff = 61.3%, $N = 86$). At an alpha level of .05, results show that, for low frequency nightmare sufferers, boundary structure ($M = 71.90$, $SD = 13.141$) did not differ significantly from high frequency nightmare sufferers ($M = 71.27$, $SD = 12.916$), $t(93) = .224$, $p = .823$ (two-tailed). Results also show that, for low frequency lucid dreamers, boundary structure ($M = 73.52$, $SD = 14.642$) did not significantly differ from the high frequency lucid dreamers ($M = 69.78$, $SD = 13.518$), $t(95) = 1.253$, $p = .213$ (two-tailed).

Additional t-tests for independent means were conducted to compare the following personality characteristics between males and females: openness, conscientiousness, extraversion, agreeableness, and neuroticism. At al alpha level of .05, results show that females ($M = 3.29$, $SD = .72$) reported significantly higher levels of

neuroticism than did males ($M = 2.84$, $SD = .75$), $t(180) = -3.80$, $p < .001$ (two-tailed). No other comparisons were found to be statistically significant.

Consistent with previous research, 81.2% of those who participated in this study report having experienced a lucid dream at least once in their life, and 7.7% of participants report lucid dreaming once a week or more (see Table 1). Concerning nightmare frequency, 99.4% of participants reported having experienced a nightmare at least once in their life, and 13.8% of the sample in this study reported experiencing nightmares once a week or more (see Table 2). This prevalence rate is higher than previous research would have predicted. Possible reasons for this discrepancy are discussed later. In this sample, 19.8% of participants reported being able to recall a dream almost every night or more (see Table 3).

Because the same items used to assess the lucid dreaming frequency, nightmare frequency, and dream recall frequency, were also used by Gruber (1988), a series of z-tests were implemented in order to compare the results of this study's participants' dreaming styles to the results found by the earlier study. Concerning lucid dreaming frequency and nightmare frequency, analyses focused on the potential changes in prevalence rates of high frequencies lucid dreamers and high frequency nightmare sufferers (whose criteria for inclusion were described in the above section). Concerning dream recall frequency, participants reported recalling a dream almost every night or more frequently (19.8%). At an alpha level of .05 (equivalent to a z-score of 1.96), both lucid dreams ($z = 2.50$, $p < .05$) and dreams recalled ($z = 2.43$, $p < .05$) were found to be less frequently experienced by the participants in this study, and nightmares ($z = -2.36$, p

< .05) were more frequently experienced by the participants of this study. Comparisons were also made between the men and women of each study. When compared to the men and women of Gruber's study, the men ($z = 1.64$, $p > .05$) and women ($z = 1.60$, $p > .05$) in the current study did not significantly differ in their frequency of lucid dreaming experiences; likewise, men ($z = 0.44$, $p > .05$) and women ($z = 1.78$, $p > .05$) of this study did not significantly differ in their frequency of nightmares. The men ($z = 4.56$, $p < .05$) of this study reported recalling dreams significantly less frequently than did the men of the earlier study, but no difference was observed for women ($z = 1.63$, $p > .05$).

A multiple regression analysis was conducted to examine how the following personality traits predicted nightmare frequency: boundary thinness, extraversion, agreeableness, openness, neuroticism, and conscientiousness. Results show that this set of predictors accounted for 7% of the variance in nightmare frequency, $F(6,151) = 2.03$, $p = .065$. Neuroticism accounted for most of the variance (4%), $p = .019$. Extraversion also contributed significantly to the variance (4%), $p = .019$. The more one endorses qualities of neuroticism and extraversion, the more likely he or she is to experience more frequent nightmares. A summary of the results of the multiple regression analysis is found in Table 4. Another multiple regression analysis was conducted to examine how the following personality traits predicted lucid dreaming frequency: boundary thinness, extraversion, agreeableness, openness, neuroticism, and conscientiousness. Results show that this set of predictors accounted for 5% of the variance in nightmare frequency, $F(6,151) = 1.193$, $p = .313$. No predictors accounted for a significant portion of the

variance in lucid dreaming frequency. A summary of the results of the multiple regression analysis is found in Table 5.

Six separate multiple regression analyses evaluating the moderating effects of six different personality characteristics – boundary thinness, extraversion, agreeableness, conscientiousness, neuroticism, and openness – were conducted to predicted lucid dreaming frequency. First, the possible moderating effect of boundary thinness was assessed. At an alpha level of .05, the relationship between the set of effects and lucid dreaming frequency was found to be statistically significant, $R^2 = .117$, $F(3,153) = 6.754$, $p < .001$. The interaction between nightmare frequency and boundary thinness was not statistically significant, accounting for less than 1% of the variance in lucid dreaming frequency, $p = .989$. Second, the possible moderating effect of extraversion was assessed. At an alpha level of .05, the relationship between the set of effects and lucid dreaming frequency was found to be statistically significant, $R^2 = .105$, $F(3,176) = 6.916$, $p < .001$. The interaction between nightmare frequency and extraversion was not statistically significant, accounting for less than 1% of the variance in lucid dreaming frequency, $p = .509$. Third, the possible moderating effect of agreeableness was assessed. At an alpha level of .05, the relationship between the set of effects and lucid dreaming frequency was found to be statistically significant, $R^2 = .105$, $F(3,176) = 6.911$, $p < .001$. The interaction between nightmare frequency and agreeableness was not statistically significant, accounting for less than 1% of the variance in lucid dreaming frequency, $p = .782$. Fourth, the possible moderating effect of conscientiousness was assessed. At an alpha level of .05, the relationship between the set of effects and lucid dreaming frequency was

found to be statistically significant, $R^2 = .106$, $F(3,176) = 6.956$, $p < .001$. The interaction between nightmare frequency and conscientiousness was not statistically significant, accounting for less than 1% of the variance in lucid dreaming frequency, $p = .949$. Fifth, the possible moderating effect of neuroticism was assessed. At an alpha level of .05, the relationship between the set of effects and lucid dreaming frequency was found to be statistically significant, $R^2 = .122$, $F(3,176) = 8.121$, $p < .001$. The interaction between nightmare frequency and neuroticism was not statistically significant, accounting for roughly 1% of the variance in lucid dreaming frequency, $p = .166$. Sixth, the possible moderating effect of openness was assessed. At an alpha level of .05, the relationship between the set of effects and lucid dreaming frequency was found to be statistically significant, $R^2 = .107$, $F(3,176) = 7.018$, $p < .001$. The interaction between nightmare frequency and openness was not statistically significant, accounting for less than 1% of the variance in lucid dreaming frequency, $p = .601$.

Discussion

The results of this study shed light on our understanding of the influence boundary structure plays on frequency of both lucid dreams and nightmares, and about the relationship that other personality traits as measured by the big five inventory have with boundary thinness, lucid dreaming frequency, nightmare frequency, and dream recall. The findings of this study support previous research indicating to a relationship between dream recall frequency and both lucid dreaming frequency (Fingerlin, 2013) and nightmare frequency (Chivers & Blagrove, 1999). Individuals who recall more dreams typically experience nightmares and lucid dreams more often than do individuals who

recall their dreams less frequently. There are multiple interpretations that may be made from these findings. It may be that people with a greater ability to recall their dreams experience the same frequency of lucid dreams and nightmares as do individuals with poor ability to recall their dreams, but they report experiencing more of each type of dream because they can remember them more easily. It is also possible that the unusual experiences of these dreams make them more memorable.

The results of this study indicate that self-reported boundary structure has few relationships with the personality characteristics and types of dreams assessed. Surprisingly, no relationship was found to exist between dream recall frequency and boundary structure. The lack of a correlation may be because the BQ-Sh (Rawlings, 2001-2002) measures fewer types of boundaries than did the original boundary questionnaire developed by Hartman (1989), thus relevant types of boundaries such as boundaries of memory were not included in the measure. As such, the measure may have lacked the proper sensitivity to detect a difference. Comparing a participant's dream recall frequency with boundaries of memory may have yielded a significant relationship. The relationships of boundary thinness with lucid dreaming frequency and nightmare frequency were also not supported, even when dream recall frequency was controlled for as a potentially confounding variable. The t-tests also indicated no differences between the boundary structures of either high frequency and low frequency lucid dreamers or high frequency and low frequency nightmare sufferers. Again, this may be because the correct types of boundaries were not assessed in this study. It is also possible that there may not be a relationship between the constructs.

Sex differences were not found to be significant when the boundary structure and lucid dreaming frequency of males were compared with those of females; however, women were found to recall their dreams more frequently than were males. Our results support the findings of prior studies reporting that women have more nightmares than men (Schredl & Reinhard, 2011). This may be best interpreted in light of other findings of this study: females were found to report higher levels of neuroticism than were males. Schredl (2014) found evidence indicating that neuroticism mediated the gender difference in nightmare frequencies between males and females, and so it is likely that the female participants of this study experienced more nightmares because of their reported neuroticism. Other possibilities exist as to why females report both higher levels of neuroticism and more frequent nightmares, such as the high prevalence rate of sexual assault on school campuses, or the number of school shootings broadcasted in the media. It is likely that women experience higher levels of threat.

Contrary to the first hypothesis of this study, our results demonstrate that boundary thinness did not predict nightmare frequency. Rather, it was found that extraversion and neuroticism were the most significant predictors of nightmare frequency. Previous research has indicated that neuroticism and nightmare frequency are correlated (Li et al., 2010), and so it is not surprising to find that this personality characteristic is predictive of nightmare frequency. Neuroticism is a personality trait associated with distressing emotional states such as anxiety (John et al., 1991), so it lends itself to reason that such a personality trait would be associated with an anxiety-producing type of dream such as nightmares. This writer speculates that extroversion was

significantly predictive of nightmares according to the regression analysis because individuals who socialize more frequently may be more likely to experience violent social situations or events. Such unpleasant experiences may well be reflected in the contents of their dreams. Although the regression analysis showed extraversion as a predictor of nightmare frequency, extraversion was not correlated with nightmares. As such, the regression analysis may have added opaque results that were not truly predictive of nightmare frequency.

The results of this study failed to support the second hypothesis that boundary thinness would be a predictor of lucid dreaming frequency. Unlike the set of predictors for nightmare frequency, no personality traits were found to be predictive of lucid dreaming frequency. Additionally, none of the personality traits were found to be correlated with lucid dreaming frequency. A potential explanation for these findings may be that personality characteristics are not related to lucid dreaming frequency. Lucid dreaming can be a more deliberate and intentional style of dreaming than are nightmares: that is to say, an individual can choose to control their experiences in a lucid dream, but individuals often have little or no influence about what they experience in nightmares. The absence of a relationship between lucid dreaming and personality characteristics may indicate that other factors such as motivation to alter their dream content and awareness of one's potential to control their dreams may serve as better predictors of lucid dreaming experiences than the characteristics of one's personality. Motivation may also explain why the final hypothesis that boundary thinness would moderate the relationship between nightmare frequency and lucid dreaming frequency was not supported. Further, it could

explain why the results of this study show that none of the personality characteristics assessed were moderators of relationship between nightmare frequency and lucid dreaming frequency.

Additional analyses were conducted to compare the results of lucid dreaming frequencies, nightmare frequencies, and dreams recalled, with the results reported by Gruber (1988). Broadly speaking, significant differences were observed between the two studies for each type of dream and number of dreams recalled. Participants of this study reported recalling significantly fewer dreams than did the participants of the study performed by Gruber. This study's participants also reported experiencing fewer lucid dreams. Perhaps individuals possess less positive attitudes towards dreams than was the case during the time of the Gruber study, and fewer lucid dreams were experienced as a result (Doll et al., 2009). The number of nightmares reported to be experienced in this study was significantly higher than what was reported in the other study. The continuity hypothesis may suggest explanations for this increase in the prevalence of nightmares. Compared to how conditions were during the time of the Gruber study, television shows, videogames and media coverage is saturated with graphic violence. Increased exposure to violent images while awake may well predispose viewers to nightmares when asleep.

When the same comparisons between this study and the study by Gruber (1988) were performed after separating participants according to their sex, differences were only observed for the number of dreams recalled by the male participants, and no differences were observed in either lucid dreaming or nightmare frequency. That is to say, the male participants of this study did not experience more or less lucid dreams or nightmares than

did the male participants of Gruber's study, nor were differences observed in the lucid dreaming frequency or nightmare frequency of females. Males reported recalling fewer dreams in the present study. These contrasting results found by comparing the rates of both men and women combined, and then the results obtained by comparing men and women separately, may represent an issue with the sample size of this study. This present study contained only 182 participants, but the results of the Gruber study were calculated using a sample size of 1768 participants. Such a large difference between the two studies could create errors in the calculations.

Limitations

In addition to the potential limitations already discussed, certain methodological shortcomings should be considered when interpreting the results of this study. A discussion of these limitations will include methods of analyzing the data, the participants' potential confusion regarding the constructs assessed, sample size, generalizability of findings, and a discussion on restrictions imposed by the measures themselves. Directions of future research will be discussed.

Because the analyses were correlational, causation cannot be inferred from the results. Thus, the directions of the relationships found to exist remain ambiguous. This limitation complicates matters when one attempts to interpret the results of, say, the correlation between nightmare frequency and neuroticism. It may be that nightmares cause individuals to become distressed and thus their scores on the BFI reflect higher levels of neuroticism. If emotions are continuous between waking and dreaming as some researchers assert (Schredl, 2003a), it is also possible that individuals who are anxious

reflect their emotional state in their dreams, and they experience nightmares as a result of their wake-state emotions. It is also important to note that some correlations that were found to be statistically significant had small R squared values.

Though past literature suggests that 2-5% of the population experiences nightmares once a week or more (Li, Zhang, Li, & Wing, 2010; Schredl, 2010; Stepansky et al., 1998), it was found that 13.7% of the sample in this study reported experiencing nightmares with such frequency. This discrepancy may represent a methodological flaw in this study. Unlike the question assessing the frequency of participants' lucid dreaming experiences, the question assessing nightmare frequency did not contain a definition with which the participants might base their response. Participants might have mistakenly reported unpleasant or bad dreams that did not cause them to wake, thus inflating their responses. This limitation highlights the importance of providing a definition for terms used in the measures. Future studies may benefit either by supplementing measures with appropriate definitions or by using scales such as the one developed by Stumbrys et al. (2013) that already contains definitions.

Sample size as a potential limitation was briefly discussed earlier, but the topic deserves additional attention to elaborate upon how great an effect it may pose on the results of this study. In addition to a notable size difference between the overall samples of both the Gruber (1988) study and the present study, the difference became more pronounced when the samples were compared by the sex of the participants. An example comes from the comparison of dream recall frequencies between the men of both studies. Though the Gruber study boasted 196 men who recall dreams almost every night or more

frequently, there were only 5 males in this study who reported recalling their dreams as often. Other comparisons with the males of each study were similarly limited by the sample size.

The demographic data of the sample may serve to limit the generalizability of the results collected in this study. The majority of participants were undergraduate college students between the ages of 18 and 22 years-old, and so there is a restricted age range represented by this sample. Also, roughly 70% of the participants were women, and so males were underrepresented. The demographic items failed to account for the continuum of gender identity. The LGBTQA community on campus consists of a population whose identities vary from gay and lesbian to bisexual and gender fluid, and it would have been worth studying the relationship between boundary structures, particularly the identity type of boundary, in this community.

It is also possible that the Boundary Questionnaire-Short Form (Rawlings, 2001-2002) that was used for the purposes of this study is not a true measure of boundary structure, or that it measures some other construct that accounts for some of the variance in its measurement. Though Hartman's (1989) original questionnaire was validated with student samples, it was developed in conjunction with his work on a clinical population of nightmare sufferers. As such, it may be possible that the original measure actually assesses psychopathology and not strictly boundary structure. Schredl et al. (2009) worked to develop another item pool from the original boundary questionnaire that did not correlate with neuroticism but maintained correlations with both openness to experience and nightmare frequency. The authors successfully developed a 20-item short

form of the boundary questionnaire with the desired specifications, and so future research may benefit from using this newer form of the boundary questionnaire.

A separate measurement consideration that could serve to increase the reliability and validity of the participants' responses could have been to include the use of a dream journal. An analysis of participants' qualitative information inherent in a dream journal could reveal interesting information that is untapped by self-report measures.

Conclusion

Though no relationships were found to exist between boundary structure and either nightmare frequency, dream recall frequency, or lucid dreaming frequency, important information was gleaned from the results of this study. In spite of a significantly positive relationship between nightmare frequency and dream recall frequency, the results of this study indicate that nightmare frequency has increased in the past 27 years. The numerous, negative correlates of nightmares found by other researchers may indirectly indicate that students are less psychologically sound than was once the case. Researchers might seek to learn more about the reasons influencing a rise in prevalence of students' nightmares over the years. This study failed to determine a personality-based relationship with nightmares while lucid dreaming, and so future research might focus on other possibilities that contribute to the prevalence of nightmares observed in students.

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Table 1

Table 1

Frequency of Lucid Dreams (N = 181)

Categories	Current Study		Gruber (1988)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Once a week or more	14	7.7	176	10
Once or twice a month	24	13.2	358	20.2
Every few months	20	11	299	16.9
A few times a year	37	20.3	254	14.4
Once a year or less	16	8.8	138	7.8
A few times in my life	36	19.8	291	16.5
Never	34	18.7	252	14.3

Table 2

Table 2

Frequency of Nightmares (N = 181)

Categories	Current Study		Gruber (1988)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Once a week or more	25	13.7	137	7.7
Once or twice a month	42	23.1	367	20.8
Every few months	41	22.5	414	23.4
A few times a year	31	17	361	20.4
Once a year or less	15	8.2	163	9.2
A few times in my life	26	14.3	273	15.4
Never	1	.5	53	3

Table 3

Table 3

Frequency of Dream Recall (N = 177)

Categories	Current Study		Gruber (1988)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Once or more a night	8	4.4	81	4.6
Almost every night	27	14.8	420	23.8
Once a week or more	51	28.0	727	41.1
A few times a month	50	27.5	379	21.4
Once a month or less	26	14.3	106	6
A few times a year	12	6.6	52	2.9
Less than once a year	3	1.6	3	.2

Table 4

Table 4

Summary of Multiple Regression Analysis for Variables Predicting Nightmares (N = 158)

Variable	*B*	*SE B*	*β*
Extraversion	-.397	.167	-.189*
Agreeableness	-.204	.226	-.077
Conscientiousness	-.120	.267	-.041
Neuroticism	-.445	.175	-.211*
Openness	-.308	.271	-.092
Thinness	.001	.011	.007

Note. $R^2 = .075$; *adjusted* $R^2 = .038$

* $p < .05$

Table 5

Table 5

Summary of Multiple Regression Analysis for Variables Predicting Lucid Dreaming (N = 158)

Variable	*B*	*SE B*	*β*
Extraversion	-.156	.212	-.060
Agreeableness	-.029	.286	-.009
Conscientiousness	.478	.342	.129
Neuroticism	.181	.224	.068
Openness	-.384	.343	-.092
Thinness	-.008	.013	-.051

Note. $R^2 = .045$; *adjusted* $R^2 = .007$

Appendix A

How I am in general

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

1 Disagree Strongly	2 Disagree a little	3 Neither agree nor disagree	4 Agree a little	5 Agree strongly

I am someone who...

1. _____ Is talkative
2. _____ Tends to find fault with others
3. _____ Does a thorough job
4. _____ Is depressed, blue
5. _____ Is original, comes up with new ideas
6. _____ Is reserved
7. _____ Is helpful and unselfish with others
8. _____ Can be somewhat careless
9. _____ Is relaxed, handles stress well.
10. _____ Is curious about many different things
11. _____ Is full of energy
12. _____ Starts quarrels with others
13. _____ Is a reliable worker

14. _____ Can be tense

15. _____ Is ingenious, a deep thinker

16. _____ Generates a lot of enthusiasm

17. _____ Has a forgiving nature

18. _____ Tends to be disorganized

19. _____ Worries a lot

20. _____ Has an active imagination

21. _____ Tends to be quiet

22. _____ Is generally trusting

23. _____ Tends to be lazy

24. _____ Is emotionally stable, not easily upset

25. _____ Is inventive

26. _____ Has an assertive personality

27. _____ Can be cold and aloof

28. _____ Perseveres until the task is finished

29. _____ Can be moody

30. _____ Values artistic, aesthetic experiences

31. _____ Is sometimes shy, inhibited

32. _____ Is considerate and kind to almost everyone

33. _____ Does things efficiently

34. _____ Remains calm in tense situations

35. _____ Prefers work that is routine

36. _____ Is outgoing, sociable

37. _____ Is sometimes rude to others

38. _____ Makes plans and follows through with them

39. _____ Gets nervous easily

40. _____ Likes to reflect, play with ideas

41. _____ Has few artistic interests

42. _____ Likes to cooperate with others

43. _____ Is easily distracted

44. _____ Is sophisticated in art, music, or literature

Appendix B

PLEASE TRY TO RATE EACH OF THE STATEMENTS FROM 0 TO 4.

0 INDICATES EITHER NOT AT ALL OR NOT AT ALL TRUE OF ME.

4 INDICATES YES OR DEFINITELY OR VERY TRUE OF ME.

PLEASE ANSWER ALL OF THE QUESTIONS AND STATEMENTS AS QUICKLY AS YOU CAN.

82. In my daydreams, people kind of merge into one another or one person turns into another.

113. I wake from one dream into another.

112. I have daymares.

92. In my dreams, people sometimes merge into each other or become other people.

13. I have dreams, daydreams, nightmares in which my body or someone else's body is being stabbed, injured, or torn apart.

73. Things around me seem to change their size and shape.

49. Every time something frightening happens to me, I have nightmares or fantasies or flashbacks involving the frightening event.

120. I have often had the experience of different senses coming together. For example, I have felt that I could smell a color, or see a sound, or hear an odor.

119. My dreams are so vivid that even later I can't tell them from waking reality.

83. My body sometimes seems to change its size and shape.

131. I have had the experience of someone calling me or speaking my name and not being sure whether it was really happening or I was imagining it.

126. I have had the experience of not knowing whether I was imagining something or it was actually happening.

48. There is a place for everything and everything should be in its place.

88. I think children need strict discipline.

10. In an organization, everyone should have a definite place and a specific role.

124. A man is a man and a woman is a woman; it is very important to maintain that distinction.

44. I like stories that have a definite beginning, middle, and end.

79. I cannot imagine living with or marrying a person of another race.

137. I like clear, precise borders

97. The movies and TV shows I like the best are the ones where there are good guys and bad guys and you always know who they are.

87. Good solid frames are very important for a picture or a painting.

23. Being dressed neatly and cleanly is very important.

140. I like houses where rooms have definite walls and each room has a definite function.

90. East is East and West is West, and never the twain shall meet. (Kipling).

103. I am a very open person.

95. I trust people easily.

107. I am always at least a bit on my guard.

116. Sometimes I meet someone and trust him or her so completely that I can share just about everything about myself at the first meeting.

17. I expect other people to keep a certain distance.

5. I am careful about what I say to people until I get to know them really well.

31. I get to appointments right on time.

19. I keep my desk and worktable neat and well organized.

43. I am good at keeping accounts and keeping track of my money.

139. I have a clear and distinct sense of time.

125. I know exactly what parts of town are safe and what parts are unsafe.

52. I have a clear memory of my past. I could tell you pretty well what happened year by year.

108. I am a down-to-earth, no-nonsense kind of person.

18. I think I would be a good psychotherapist.

105. There are no sharp dividing lines between normal people, people with problems, and people who are considered psychotic or crazy.

56. I think a good teacher must remain in part a child.

68. A good parent has to be a bit of a child too.

45. I think an artist must in part remain a child.

21. A good teacher needs to help a child remain special.

33. Children and adults have a lot in common. They should give themselves a chance to be together without any strict roles.

30. I am easily hurt.

54. I am a very sensitive person.

Appendix C

INSTRUCTIONS:

The following questions ask you to think about your dream experiences and rate them on a seven-point scale. The questions will be answered on a scale ranging from (0) = not at all like me through (6) = very much like me. Please think carefully about what you remember of your dreaming experiences and answer the questions by clicking the buttons below each response option. Be careful NOT to answer the questions as you WISH your dreams to be or how you feel while awake, but rather as you ACTUALLY remember them. All questions are to be answered on the separate answer sheet. Please do not write on the questionnaire itself.

Please read each question carefully. Take your time and answer the questions as thoughtfully and honestly as possible. Thank you for the contribution you have made to our knowledge of dreaming by filling out this questionnaire.

43. I make an effort to remember my dreams.

0 (not at all like me) 1 2 3 4 5 6 (very much like me)

46. I sometimes have dreams that seem to come true.

0 (not at all like me) 1 2 3 4 5 6 (very much like me)

47. I have dreams which seem to occur again and again.

0 (not at all like me) 1 2 3 4 5 6 (very much like me)

54. I have had nightmares _____.

0 (once a week or more) 1 (once or twice a month) 2 (every few months) 3 (a few times a year) 4 (once a year or less) 5 (a few times in my life) 6 (never)

57. I remember a dream _____.

0 (once or more per night) 1 (almost every night) 2 (once a week or more) 3 (a few times a month) 4 (once a month or less) 5 (a few times a year) 6 (less than once a year)

A "Lucid dream" is a type of dream that while in progress a person realizes, "This is not really happening. It's only a dream." Here is a short example: "I was sitting and talking to my friend John…all of the sudden I realized this can't be…John is in California…I must be dreaming!! I knew it was a dream and that I was really asleep in bed, but the dream continued and I still talked to John even though I knew he was not real.

59. I have "lucid dreams" _____.

0 (once a week or more) 1 (once or twice a month) 2 (every few months) 3 (a few times a year) 4 (once a year or less) 5 (a few times in my life) 6 (never)