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Correlates of dream recall: Implications for confabulation

Running Head: Dream recall and confabulation

Caroline L. Horton PhD

Psychology, Faculty of Health and Social Sciences, Leeds Metropolitan University, Leeds,

UK

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Address for correspondence:

Dr Caroline Horton  
Psychology, Faculty of Health and Social Sciences, D803  
Civic Quarter, Leeds Metropolitan University  
Calverley Street  
Leeds  
England  
LS1 3HE  
Tel: +44 (0) 113 81 24928  
Fax : +44 (0) 113 81 23440  
[c.l.horton@leedsmet.ac.uk](mailto:c.l.horton@leedsmet.ac.uk)

## Abstract

This investigation aimed to characterise the personality profile of dream-recallers using a psychometrically-validated measure of dream remembering (the MED-Q, Horton & Conway, 2009), and considered these relationships in terms of confabulation: the tendency to confuse reality with imaginings and thus create false memories. In Experiment 1, 221 participants completed the MED-Q and a battery of personality measures online. The MED-Q significantly correlated with personality dimensions such as openness, thin boundaries and fantasy-proneness, reinforcing previous findings. Experiment 2 involved participants (N=45) recalling a previously-read story, providing measures of true recall and confabulation. A significant relationship was found between the MED-Q (“Awareness of dreaming” factor) and confabulation, but not with other memory scores. Thus the personality profile described in Experiment 1 gives rise to a tendency to confabulate, reflect upon or rehearse personal memories, as opposed to improving the recall of autobiographical memories, which in turn may lead to an increased awareness of dreaming (Experiment 2). This not only reinforces the overlap between dreaming and constructive autobiographical memory processes, but also acts as a warning to interpret freely recalled dreams with substantial caution.

Keywords:

Autobiographical memory, personality, dreaming, dream recall, confabulation

The extent to which dreams are recallable has been documented in a number of empirical studies. Generally, some individuals are more likely to recall dreams than others, and some dreams rich in a particular kind of characteristic detail, such as emotionality or bizarreness, are also more recallable than others. The variable “dream recall” tends to be adopted as a conceptualisation of the frequency of retrieving an accurate memory for a dream experience. This is measured by either single item scores or by a composite score taken from a few items (Schredl & Montasser, 1996-7a).

An alternative conceptualisation of dream recallability is that of appreciating the memory abilities involved in the retrieval of an autobiographical experience, as opposed to identifying the amount of detail within a dream that is available to memory. This places emphasis upon the cognitive processes of recall. The Memory Experiences and Dreaming Questionnaire (MED-Q; Horton & Conway, 2009) is a psychometrically validated tool for measuring memory experiences and dream recall. That is, it conceptualises dream recall as an ability to retrieve an autobiographical experience involving the cognitive self and autobiographical knowledge, as with any autobiographical memory (Conway, 2005, 2009; Conway & Pleydell-Pearce, 2000; Conway, Singer & Tagini, 2004). The MED-Q is a thirty item tool comprising six constituent factors: 1- “awareness of dreaming”; 2- “daydreaming”; 3- “comprehensibility of dream sensations upon waking”; 4- “déjà-states”; 5- “comprehensibility of dream content”; and 6- “senses”. Factor 1 can be considered to be a general measure of dream recall. The other factors relate to characteristics of dream remembering, for instance the “senses” in factor 6 refer to experiences of smell, taste, touch and emotions within dream memories.

Autobiographical memory has been posited to relate to dreams (Botman & Crovitz, 1989-90; Cappeliez, 2008; Grenier et al., 2005; Horton, 2008) and thus dreaming forms part of autobiographical remembering, both in terms of memory trends over the lifespan and content, with dreams being experiences only accessible to one's own memory. These relationships are complex and bi-directional, however dreaming can be considered to be intricately related to memory systems and functioning in terms of self-focus (Cappeliez, 2008; Horton, Moulin & Conway, 2009), recall (Horton, 2011), content (Grenier et al., 2005; Horton & Malinowski, 2011a) and reflective of consolidation processes in sleep (Horton & Malinowski, 2011b).

This cognitive approach to dream recall posits that various memory processes can influence dream report generation, resulting in a potentially invalid memory. There is great variability in both the amount recalled in a dream (dream detail) and the reported occurrence of remembering a dream (dream recall frequency). This is supported by individual differences studies of dream recall and implies that some dream memories may be enhanced or even entirely falsely created. The present study aimed to see if the MED-Q correlated with personality traits that have been found to relate previously to other dream memory indices.

Many investigations of dream recallability have focused upon the correlates of dream recall (see Schredl & Montasser, 1996-7 a and b for a review, ranging from the psychodynamic (e.g. Hartmann's "thin boundaries", 1991) to the more biologically oriented (e.g. rapid-eye-movement sleep; Hobson, Pace-Schott & Stickgold, 2000). Such correlates included openness to experience (e.g. Kothe & Pietrowsky, 2001), gender (Blagrove & Akehurst, 2000; Schredl & Reinhard, 2008; Spanos *et al.*, 1980), fantasy proneness (Giesbrecht & Merckelbach, 2006), morningness-eveningness (Blagrove & Akehurst, 2000), absorption in imaginings (Beaulieu-Prevost & Zadra, 2007), thin boundaries (Hartmann, 1991), stress

(Duke & Davidson, 2002), anxiety (Schonbar, 1965), arousal (Hicks, Fortin & Brassington, 2002), and attitudes towards dreams (Beaulieu-Prevost & Zadra, 2005 and 2007; Schredl *et al.*, 2003).

Indeed there is a wealth of research investigating the relationships between state and trait factors, and dream recall. However the findings are far from clear. With almost all the personality and cognitive traits described above, there are as many studies unable to replicate the relationships as there are proposing them. Schredl and Montasser (1996-7 a and b) note that the only traits seemingly stable in their relation with dream recall are fantasy proneness, thin boundaries and creativity. In addition Blagrove and Akehurst (2000) report that dream recall correlates with interrogative suggestibility, hypochondriasis and confabulation of narrative memory. Such findings indicate that those individuals likely to recall dreams also feature, as part of their personality profile, a tendency to report experiences in a particularly sensory-perceptual or verbose manner. The idea of a willingness to recall dreams as an influence upon dream recall has received support (Beaulieu-Prevost & Zadra, 2005; 2007; Green, 1999; Wolcott & Strapp, 2002). Put more directly, those likely to recall dreams frequently may be as likely to elaborate, in some cases unnecessarily, upon their experiences as they are to experience particularly lengthy or frequent dreams. Such confabulations may be present as distortions (major changes in detail of a memory) or fabrications (completely new additional material reported) (Gudjonsson & Clare, 1995).

The present paper therefore aimed to iron out the discrepancies between the individual differences correlates of dream recall as well as investigating relationships with memory experiences. Dream recall has been found to have small correlations with a number of individual differences traits and cognitive measures. The MED-Q (Horton & Conway, 2009)

allows for such relationships to be assessed beyond merely dream recall and into the realm of memory experiences more generally by producing one score reflecting a likelihood of recalling memory experiences as well as component factors, which can also be correlated with the traits described above. It was hypothesized that all these measures would correlate significantly with the MED-Q, with scores relating to openness to experience, morningness (as opposed to eveningness), absorption in imaginings, stress, anxiety, arousal, “Q” scores (see below), fantasy proneness, thin boundaries, thought suppression and a positive attitude towards dreams. As a lower score on the MED-Q indicates a higher propensity to recall memory experiences such as dreams, some of the predicted relationships were negative, such as thought suppression. In addition dream recall, as indicated by Factor 1 of the MED-Q (“awareness of dreaming” - a measure of both dream recall and dream detail as a general assessment of dream recallability), would relate to a general personality profile encompassing the traits measuring a proximity to the sensations of dreaming such as thin boundaries, openness to experience and arousal.

## Experiment 1

### *Method*

#### *Participants.*

221 respondents completed the questionnaires, which were available online. However certain parts of each task were not completed so the mean N for the final scores was 170 (see Table 1 for sample sizes for each questionnaire). The weblink was circulated selectively and respondents had to enter a student ID number for clarification of their student status. The

sample mainly comprised undergraduate Psychology students from the University of Leeds (78%), who were rewarded with a course credit upon successful completion. 21 participants (10%) were Psychology students from Leeds Metropolitan University. The remainder of the sample was gathered opportunistically from other courses. Demographics indicate that the sample was predominantly female (166 compared to 33 males; 22 participants did not disclose their gender), with a median age of 19 years. 81% of the overall sample were or had been students of psychology at the time of completing the questionnaires. Due to the predominantly female and young sample, scores were not compared across males and females, or age groups. 14% of the sample had a sleeping routine whereby everyday was largely the same, 35% had a consistent routine whereby most days were the same, 25% had a reasonably consistent routine, but it was not strict, 15% had a more inconsistent routine, but they felt that they likely slept for a similar amount of time each night, and 11% felt that their sleeping routine varied considerably. When asked to report for how long participants slept on average each night, 11% slept for less than 5 hours, 29% between 5 and 7 hours, almost half the sample (47%) slept between 7 and 9 hours, and just 3% slept for more than 9 hours. 10% of the sample felt that their routine was too varied to report an average sleep time.

### *Materials.*

The group of questionnaires were administered over the internet. It consisted of a number of measures, comprising (in order of appearance online): the MED-Q (see Appendix A); Big Five Inventory (BFI; John, Donahue & Kentle, 1991) measuring five personality traits (openness to experience, extraversion, agreeableness, conscientiousness and neuroticism), with openness to experience being the main trait of interest; Composite Scale of Morningness (CSM; Smith, Reilly & Midkiff, 1989) measuring morningness-eveningness; Dissociative

Experiences Scale (DES; Ellason, Ross, Mayran, & Sainton, 1994); Tellegan Absorption Scale (TES; Tellegan & Atkinson, 1974) measuring absorption in imaginings; Perceived Stress Scale (PSS; Cohen, Kamarck & Mermelstein, 1983); State Trait Anxiety Index (Spielberger, 1983); Stress and Arousal Checklist (Duckro, Korytnyk & Vandenberg, 1989) measuring stress, arousal and a “Q” score, measuring an ability to identify and express emotion; Creative Experiences Questionnaire (CEQ; Merckelbach, Horselenberg, & Muris, 2001) measuring fantasy proneness; Hartmann’s Boundaries Questionnaire (Hartmann, 1991) measuring thin boundaries; White Bear Suppression Index (WBSI; Wegner & Zanakos, 1994) measuring thought suppression; and Attitudes Towards Dreams (Beaulieu-Prevost & Zadra, 2005). The six factors of the MED-Q were scored and included as individual variables within the analyses. Similarly, the twelve composite factors of Hartmann’s Boundary Questionnaire were analysed, although full results have been omitted here, for brevity.

The entire questionnaire took approximately 45 minutes to complete, and consisted entirely of multiple choice responses, with the exception of the DES, in which participants submitted the percentage of time that they experienced or engaged in particular behaviours.

## *Results*

### *Descriptive Statistics and Reliability.*

Each questionnaire produced scores that could be summed or average in order to produce at least one overall measurement. These were subsequently correlated with scores from the MED-Q and its constituent factors. Table 1 shows the descriptive statistics across the traits measured. A large range of MED-Q scores were found (130 out of a possible 150), indicating

great variance in memory experience and dream recall trends in the sample. MED-Q scores were similar to those obtained by Horton & Conway (2009). The means (and SDs) for the total scores from Horton & Conway and the present study were 80.2 (15.8) and 80.5 (16.8), respectively. These do not differ significantly:  $t(388) = -.18, n.s.$  In fact, the means are almost identical and the variances are comparable. This indicates a high degree of reliability of the MED-Q scale when administered in a predominantly female student sample.

*Insert Table 1 about here.*

### *Correlations.*

Three tests of normality of data were conducted before correlation analyses were carried out; the Kolmogorov-Smirnov test, histograms depicting normality distributions and P-P plots. If at least 2 of the tests implied normality for each variable, that variable would be subjected to parametric tests (Pearson's correlations). If normality was not assumed, Spearman's rho correlations were conducted. Normally distributed variables were: MED-Q factor 6, openness to experience, agreeableness, conscientiousness, neuroticism, CSM, absorption, STAI, CEQ, thin boundaries factors 1-3 and 5-12, and attitude towards dreams. Non-normal variables were: MED-Q factors 1-5, extraversion, DES, PSS, SACL stress, SACL arousal, and SACL "Q" score. The MED-Q total variable was normally distributed, however it was included in both the parametric and non-parametric analyses in order that appropriate relationships could be compared.

As can be seen from Table 2, the MED-Q significantly correlated with a number of the personality variables. Specifically, the total MED-Q score was significantly correlated with

high scores on the DES, openness to experience, absorption in imaginings, attitudes towards dreams, and thin boundaries (total). In addition there were significant correlations between the MED-Q and the factors of Hartmann's Boundary Questionnaire as follows: factors 1 ("sleep/wake/dream"),  $r = -.31, p < .05$ , 2 ("unusual experiences"),  $r = -.21, p < .05$ , 3 ("thoughts, feelings, moods"),  $r = -.18, p < .05$ , 4 ("childhood, adolescence, adulthood"),  $r = -.27, p < .01$ , 6 ("sensitivity"),  $r = -.15, p < .05$ , 7 ("neat, exact, precise"),  $r = -.22, p < .01$ , 8 ("edges, lines, clothing"),  $r = -.20, p < .01$ , 9 ("opinions about children"),  $r = -.21, p < .01$ , and 11 ("opinions about peoples, nations, groups"),  $r = -.20, p < .01$ .<sup>1</sup>

Whilst the MED-Q was related to a number of traits, some of the factors within the MED-Q showed a slightly different profile. The coefficients significant at the Bonferroni corrected alpha levels (see Table 2 for specific values) have been adopted as significant in all these analyses. Generally the traits correlating with the total MED-Q score also tended to correlate with the factors of the MED-Q as well. Factors 1 ("awareness of dreaming") and 3 ("comprehensibility of dream states upon waking") displayed an identical profile to the total MED-Q scores. However Factors 2 ("daydreaming") and 5 ("comprehensibility of dream content") correlated with neuroticism. Factors 4 ("déjà-states") did not relate to Attitude Towards Dreams. Similarly Factor 5 ("comprehensibility of dream content") correlated with the stress measure of the SACL but not with openness or absorption in imaginings, and Factor 6 ("senses") did not share relationships with Thin Boundaries, the DES or absorption.

*Insert Table 2 about here.*

## Experiment 2

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<sup>1</sup> Those correlations reportedly significant at the  $p < .01$  alpha level were also significant at the Bonferroni correlated level of  $p < .0007$ .

In order to extend these findings, a second study was undertaken that aimed to investigate specifically the relationship between autobiographical and dream remembering, again employing the MED-Q, and confabulation. It was proposed that dream remembering, as measured by the MED-Q Awareness of Dreaming factor, would correlate significantly with confabulation scores. Furthermore the WBSI was used to explore possible relationships – predicted to be negative - between thought suppression and confabulation.

### *Method*

#### *Participants.*

45 participants (15 males and 30 females) were recruited opportunistically from Leeds Metropolitan University's Psychology Participant Credit scheme, whereby students participate for course credit. Participants were all aged between 18 and 27.

#### *Design and materials.*

The MED-Q (Horton & Conway, 2009) was again administered, this time in a paper format, as a measure of dream remembering. Here the eight items pertaining to Factor 1, "Awareness of dreaming", were administered only, as they related most directly to the investigation in question. Further, participants were asked to report their most recent dream in as much detail as they could recall. The most recent dream method of sampling dreams was developed by Hartmann (Hartmann, Elkin & Garg, 1991) and has been used in a variety of empirical studies. The word count of these sampled dream reports was collected as an additional and alternative measure of dream recall detail.

Confabulation was measured experimentally with a story, “The Wooden Bowl” (taken from <http://www.turnbacktogo.com/story-the-godfathers-table-and-the-wooden-bowl/>) being read and later recalled by participants. Recalled reports were audio recorded for subsequent analysis. Confabulation and recall were measured from the recalled reports. The story was divided into 70 idea units, such that each unit conveyed just one piece of information. The overall number of correct idea units of information recalled (“No items correct”), the number of units forgotten (“No. items forgot”), and the number of units reported to have been recalled but that did not feature in the original story (“confabulations”) were counted.

#### *Procedure.*

Participants were recruited to take part in a study of memory. Participants were tested individually in a laboratory in the presence of one assistant researcher. Once informed consent had been gained, participants were given two minutes to read to themselves a printed copy of the Wooden Bowl story. Participants then completed the WBSI and the MED-Q (Factor 1 items only) using pen and paper. Next participants reported their most recent dream. Participants were allocated fifteen minutes for these tasks, which was ample and standardised. Finally, participants were asked to report the Wooden Bowl story back to the researcher, being given a maximum of five minutes to do this (although no participants required such an amount of time), and were fully debriefed.

#### *Results*

Table 3 conveys the descriptive statistics for the MED-Q and confabulation measures and Table 4 displays the relationships between the variables. All participants reported a most recent dream, the length of which is comparable with comparably sampled reports from other

studies (e.g. Horton, 2011). Confabulation, the number of correct items and number forgotten were counted by a research assistant. 22% sample of these were also analysed by the author and high reliability was found ( $r = .84, p < 0.0001$ ).

*Insert Tables 3 and 4 about here.*

The MED-Q (“Awareness of dreaming”) factor scores correlated significantly with confabulation scores, but with no other scores. Similarly confabulation scores did not correlate with any scores other than the MED-Q (at a level that remained significant once Bonferroni correction had been applied). Relationships were found between confabulation, number of items correct and number forgotten at the  $p < 0.05$  level of significance.

No statistically significant relationship was found between the word count measures and any other measure ( $p > 0.05$ ), most notably with the MED-Q, indicating that these two measures did not both tap into the same dream-memory aspects.

## Discussion

In Experiment 1 the MED-Q was found to correlate with openness to experience, absorption in imaginings, fantasy proneness, attitudes towards dreams, a number of components of thin boundariness, and dissociative experiences. It was not related to thought suppression (although this almost reached significance), the Big Five personality traits excluding openness to experience or any of the stress, anxiety and arousal measures (PSS, STAI, SACL (stress), SACL (arousal), “Q” scores and morningness-eveningness). The traits that related to

the MED-Q tended to relate to the MED-Q's component factors, showing stability across the range of questions.

All the traits measured in this study found to relate to dream recall may be essentially measuring the same construct - that of a general awareness of one's own experiences. Indeed, the many traits discussed here seem similar in terms of their component measurements. This is evidenced by high inter-item correlations with an overall mean of .26, which increased to .27 when only those variables significantly relating to the MED-Q total were included. (The direction of the relationship was ignored in these calculations, as the mixture of positive and negative relationships would have lowered the mean inter item correlation and detracted from the overall strength of relationship.)

These statistics encourage the consideration of the similarities between these variables. John and Srivastava (1999) note that the Big Five personality traits were so called because they were generic traits that encompassed many facets of each personality trait. Whilst each trait's independence has been reinforced in numerous studies and factor analyses, the "openness to experience" trait has itself been termed "intellectance", "imagination" and "culture", to name but a few (John & Srivastava, 1999). Considering that the traits described above are indeed highly similar, they may relate to dream recall via a mediator such as attitude towards dreams. That is, being generally aware of one's own experiences, such as dreams, may increase a positive attitude towards dreams, and vice versa. A positive attitude towards dreams may encourage rumination or rehearsal of dream experiences, thus relating both cognitive and individual differences explanations for the relationships between certain personality traits and dream recallability. Statistical support for a cognitive profile of dreaming (Cohen & MacNeilage, 1974; Cohen & Wolfe, 1973; Cory, Ormiston, Simmel &

Dainoff, 1975; Okada, Matsuoka & Hatakeyama, 2000; Schredl, Frauscher & Shendi, 1995; Schwartz, 2004; Waterman, 1991) implies that the profile of traits and abilities relating to dream recall may be best represented by one general underlying individual typology, perhaps incorporating both personality traits and cognitive abilities. Furthermore the present study's use of the MED-Q as a measure of autobiographical dream remembering supports such a cognitive approach.

In Experiment 2 the MED-Q ("Awareness of dreaming" factor) was found to correlate significantly with confabulation. However it did not correlate with the other scores of remembering. That is, an awareness of dreaming may be, in part, a result of a confabulation or elaboration of the reported dream experience. That the awareness of dreaming scores did not relate to the other memory scores indicates there to be some independence between these autobiographical experiences. Furthermore and perhaps more pertinently confabulation seems to account for some unique variance within awareness of dreaming scores.

Thus it can be inferred that individuals fitting the personality profile described in Experiment 1, also have a tendency to confabulate their dream experiences. Recalling dreams may well form part of that individual's routine as influenced by their general personality profile, rather than their scores on just one or two independent trait measures. Thus this profile may increase the likelihood of attending to dreams, being aroused enough to encode them upon waking, rehearsing them and ruminating on them in waking life. Indeed this general personality profile, best considered more as a type than a trait, seems to describe the tendency to dwell upon memories, thus increasing the likelihood of distorting and fabricating them (Gudjonsson & Clare, 1995). Such confabulations need to be further investigated in a large sample in terms of relationships with dream recall.

One pertinent methodological note concerns the relationships between the MED-Q “awareness of dreaming” measure in Experiment 2, and confabulation (and also the other memory measures, though to a lesser degree that lost significance once Bonferonni-corrected), but not between the word count measure of dream recall and confabulation or any other measures. The word count measure adopted here could be heavily criticised for being an invalid measure of dream recall, as dreams were not sampled systematically, and Experiment 1 demonstrates the vast individual differences variability in such recall. The MED-Q measure could therefore be considered much more valid and reliable, as detailed in Horton and Conway (2009). However investigating further the relationships between confabulation and systematically sampled dream characteristics would be insightful.

The present study offers convincing evidence that dream recall and memory experiences generally are related to a number of personality traits, including openness to experience, dissociative experiences, absorption in imaginings, fantasy proneness, thin boundaries and having a positive attitude towards dreams. It is proposed that these traits are largely similar and relate to a personality style involving awareness of ones own experiences in life. Such a style may lead to an increased positive attitude towards dreams, which may result in rehearsal of dream experiences, thus consolidating them in long term memory. A further extension of the personality profile may include a tendency to confabulate, thus raising questions concerning the validity of one’s recalled dream experience.

## References

- Beaulieu-Prevost, D., & Zadra, A. (2005) Dream recall frequency and attitude towards dreams: A reinterpretation of the relation. *Personality and Individual Differences*, **38**, 919-927.
- Beaulieu-Prevost, D., & Zadra, A. (2007). Absorption, psychological boundaries and attitudes towards dreams as correlates of dream recall: two decades of research seen through a meta-analysis. *Journal of Sleep Research*, **16**, 51-99.
- Blagrove, M., & Akehurst, L. (2000). Personality and dream recall frequency: further negative findings. *Dreaming*, **10**(3), 139-148.
- Botman, H. I., & Crovitz, H. F. (1989-1990). Dream reports and autobiographical memory. *Perceptual and Motor Skills*, **9**(3), 213-224.
- Cappeliez, P. (2008) An explanation of the reminiscence bump in the dreams of older adults in terms of life goals and identity. *Self and Identity*, **7**(1), 25-33.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983) A global measure of perceived stress. *Journal of Health and Social Behavior*, **24**, 385-396.
- Cohen, D. B., & MacNeilage, P.F. (1974). A test of the salience hypothesis of dream recall. *Journal of Consulting and Clinical Psychology*, **42**(5), 699-703.

Cohen, D. B., & Wolfe, G. (1973). Dream recall and repression: evidence for an alternative hypothesis. *Journal of Consulting and Clinical Psychology*, **41**(3), 349-355.

Conway, M.A. (2005) Memory and the self. *Journal of Memory and Language*, **53**(4), 594-628.

Conway, M. A. (2009). Episodic memories. *Neuropsychologia*, **47**(11), 2305–2313.

Conway, M. A. & Pleydell-Pearce, C. W. (2000) The construction of autobiographical memories in the self-memory system, *Psychological Review*, **107**, 261-288.

Conway, M.A., Singer, J.A., & Tagini, A. (2004) The self and autobiographical memory: Correspondence and Coherence, *Social Cognition*, **22**(5), 491-529.

Cory, T. L., Ormiston, E., Simmel, E. & Dainoff, M. (1975). Predicting the frequency of dream recall. *Journal of Abnormal Psychology*, **84**, 261-266.

Duckro, P.N., Korytnyk, N.X., and Vandenberg, B.R. (1989) The Stress-Arousal Checklist as a measure of situational stress versus simple arousal. *Psychological Reports*, **64**(1), 239-42

Duke, T., & Davidson, J. (2002). Ordinary and recurrent dream recall of active, past and non-recurrent dreamers during and after academic stress. *Dreaming*, **12**(4), 185.

Ellason, J.W., Ross, L.W., Mayran, L.W., & Sainton, K. (1994) Convergent validity of the new form of the DES. *Dissociation*, **7** (2), 101-103.

Green, J.P. (1999) Hypnosis, context effects, and the recall of early autobiographical memories. *International Journal of Clinical and Experimental Hypnosis*, **47**(4), 284-300.

Grenier, J., Cappeliez, P., St-onge, M., Vachon, J, Vinette, S., Roussy, F., Mercier, P., Lortie-Lussier, M., & de Koninck, J. (2005). Temporal references in dreams and autobiographical memory. *Memory and Cognition*, **33**(2), 280-288.

Gudjonsson, G.H., & Clare, C.H. (1995) The relationship between confabulation and intellectual ability, memory, interrogative suggestibility and acquiescence. *Personality and Individual Differences*, **19**(3), 333-338.

Hartmann, E. (1991) *Boundaries in the Mind*, New York: Basic Books.

Hartmann, E., Elkin, R., & Garg, M. (1991). Personality and dreaming: The dreams of people with very thick or very thin boundaries. *Dreaming*, **1** (4), 311–324.

Hartmann, E., Rosen, R., and Rand, W. (1998). Personality and dreaming: Boundary structure and dream content. *Dreaming*, **8**(1), 31-39.

Hicks, R. A., Fortin, E., & Brassington, G.S. (2002). Arousability and dreaming. *Dreaming*, **12**(3), 135-139.

Hobson, J., Pace-Schott, E., & Stickgold, R. (2000). Dreaming and the brain: Towards a cognitive neuroscience of conscious states. *Behavioral and Brain Sciences*, 23 (6), 793-1121.

Horton, C.L. (2008) Applying memory theory to dream recall: Are dreams and waking memories the same? In Kelley, M. R. (Ed). (2008). *Applied Memory*. New York: Nova Science.

Horton, C.L. (2011) Recall and Recognition of Dreams and Waking Events: A Diary Paradigm. *International Journal of Dream Research*, 4(1), 8-16.

Horton, C.L., & Conway, M.A. (2009) The Memory Experiences and Dreams Questionnaire (MED-Q): A Validated Measure of Dream Recall. *Imagination, Cognition and Personality*, 29(1), 3-29.

Horton, C.L., & Malinowski, J. (2011a) Autobiographical and episodic memory sources of dreams. *International Journal of Dream Research*, 4(1), S44-45.

Horton, C.L. & Malinowski, J. (2011b) Re-defining discontinuity: Implications for the functions of dreaming. *International Journal of Dream Research*, 4(2), 34-36.

Horton, C.L., Moulin, C.J.A., & Conway, M.A. (2009) The self and dreams during a period of transition. *Consciousness and Cognition*, 18(3), 710-717.

John, O.P., Donahue, E.M., & Kentle, R.L. (1991) The Big Five Inventory – Versions 4a and 54. Berkeley: University of California, Berkeley, Institute of Personality and Social Research.

(Cited in John, O.P., & Srivastava, S. (1999) The Big-Five trait taxonomy: History, measurement and theoretical perspectives. To appear in L. Pervin & O.P. John (Eds.), *Handbook of personality: Theory and research* (2nd edition). New York: Guilford (in press).

Kothe, M. & Pietrowsky, R. (2001) Behavioral effects of nightmares and their correlations to personality patterns. *Dreaming*, **11**(1), 43-52.

Merckelbach, H., Horselenberg, R., & Muris, P. (2001) The creative experiences questionnaire (CEQ): A brief self-report measure of fantasy proneness. *Personality and Individual Differences*, **31**, 987-995.

Okada, H., Matsuoka, K., and Hatakeyama, T. (2000). Dream-recall frequency and waking imagery. *Perceptual and Motor Skills*, **91**, 759-766.

Schonbar, R. A. (1965). Differential dream recall frequency as a component of "Life Style". *Journal of Consulting Psychology*, **41**, 468-474.

Schredl, M., Frauscher, S., & Shendi, A. (1995). Dream recall and visual memory. *Perceptual and Motor Skills*, **81**, 256-258.

Schredl, M., & Montasser, A. (1996-7a). Dream recall: State or trait variable? Part I: Model, Theories, Methodology and Trait Factors. *Imagination, Cognition and Personality*, **16**(2), 181-210.

Schredl, M., & Montasser, A. (1996-7b). Dream recall: State or trait variable? Part II: State factors, Investigations and Final Conclusions. *Imagination, Cognition and Personality*, **16**(2), 239-261.

Schredl, M., & Reinhard, I. (2008) gender differences in dream recall: A meta-analysis. *Journal of Sleep Research*, **17**, 125-131.

Schredl, M., Wittmann, L., Ciric, P., & Gotz, S. (2003). Factors of home dream recall: a structural equation model. *Journal of Sleep Research*, **12**, 133-141.

Schwartz, S. (2004). What dreaming can reveal about cognitive and brain functions during sleep? A lexico-statistical analysis of dream reports. *Psychologica Belgica*, **44**(1-2), 5-42.

Smith, C.S., Reilly, C., & Midkiff, K. (1989) Evaluation of three circadian rhythm questionnaires with suggestions for an improved measure of morningness. *Journal of Applied Psychology*, **74** (5), 728-738.

Spanos, N. P., Stam., H.J., Radtke, H.L., & Nightingale, M.E. (1980). Absorption in imaginings, sex-role orientation, and the recall of dreams by males and females. *Journal of Personality Assessment*, **44**(3), 277-282.

Spielberger, C. D. (1983). *State-Trait Anxiety Inventory for Adults*. Palo Alto: Mind Garden.

Sutin, A.R., & Robins, R.W. (2007) Phenomenology of autobiographical memories: The Memory Experiences Questionnaire. *Memory*, **15**(4), 390-411.

Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, **83**, 268-277.

Waterman, D. (1991). Aging and memory for dreams. *Perceptual and Motor Skills*, **73**, 355-365.

Watson, D. (2001) Dissociation of the night: Individual differences in sleep-related experiences and their relation to dissociation and schizotypy. *Journal of Abnormal Psychology*, **110**, 526–535.

Wegner, D.M., & Zanakos, S. (1994) Chronic thought Suppression. *Journal of Personality*, **62**, 615-640.

Wolcott, S., & Strapp, C.M. (2002). Dream recall frequency and dream detail as mediated by personality, behaviour and attitude. *Dreaming*, **12**(1), 27-44.

**Table 1 Descriptive statistics for trait scores**

	N	Minimum	Maximum	Mean	Std. Deviation
MED-Q total	186	5	135	80.48	16.84
MED-Q factor 1	188	1	36	15.20	5.49
MED-Q factor 2	188	1	30	15.81	6.07
MED-Q factor 3	188	2	30	21.18	5.07
MED-Q factor 4	188	1	19	8.53	3.04
MED-Q factor 5	188	1	15	9.17	3.22
MED-Q factor 6	188	1	15	10.37	2.26
BFI openness	186	21	46	35.02	5.64
BFI extraversion	186	3	40	27.13	6.41
BFI agreeableness	186	3	44	32.34	7.52
BFI conscientiousness	186	3	43	30.18	7.05
BFI neuroticism	186	10	40	24.95	6.06
CSM	185	14	49	31.14	6.92
DES	179	0.72	50	15.63	10.48
absorption	181	6	135	84.09	23.65
PSS	182	2	50	28.34	6.67
STAI	182	5	73	44.17	11.33
SACL stress	178	0	18	5.16	4.57
SACL arousal	181	0	12	5.20	3.52
SACL "Q" score	180	0	22	4.88	4.50
CEQ	182	1	22	9.43	4.52
Thin Boundaries total	178	11	362	230.50	63.64
WBSI	174	6	74	51.52	11.47
ATDs	174	1	6.67	4.05	1.29

**Table 2 Spearman’s correlations between the MED-Q and its factors, and all other measures**

	MED-Q Total	MED-Q factor1*	MED-Q factor2*	MED-Q factor3*	MED-Q factor4*	MED-Q factor5*	MED-Q factor6
Openness	<b>-0.33</b>	<b>-0.25</b>	<b>-0.19</b>	<b>-0.25</b>	<b>-0.27</b>	-0.10	<b>-0.21</b>
Extraversion*	<b>-0.15</b>	<b>-0.15</b>	0.00	<b>-0.18</b>	<b>-0.13</b>	-0.02	-0.06
Agreeableness	-0.09	<b>-0.15</b>	0.01	-0.03	0.04	-0.03	-0.09
Conscientiousness	-0.05	-0.11	<b>0.17</b>	0.00	-0.09	<b>-0.15</b>	-0.02
Neuroticism	<b>-0.13</b>	<b>-0.15</b>	<b>-0.20</b>	-0.06	-0.02	<b>-0.19</b>	0.06
CSM	-0.03	-0.08	0.09	0.00	-0.06	-0.04	-0.07
DES*	<b>-0.36</b>	-0.11	<b>-0.33</b>	<b>-0.36</b>	<b>-0.34</b>	<b>-0.21</b>	-0.05
Absorption	<b>-0.39</b>	<b>-0.26</b>	<b>-0.31</b>	<b>-0.32</b>	<b>-0.26</b>	<b>-0.16</b>	-0.08
PSS*	-0.06	-0.01	<b>-0.16</b>	-0.04	0.04	<b>-0.14</b>	0.08
STAI	-0.05	0.01	<b>-0.19</b>	-0.02	-0.03	-0.12	<b>0.16</b>
SACL stress*	-0.09	-0.02	-0.11	-0.05	-0.10	<b>-0.25</b>	0.04
SACL arousal*	-0.04	-0.06	0.09	-0.07	0.03	-0.04	-0.10
“Q” score*	0.08	<b>0.21</b>	-0.06	0.06	-0.12	0.07	0.10
CEQ	<b>-0.50</b>	<b>-0.34</b>	<b>-0.45</b>	<b>-0.42</b>	<b>-0.27</b>	<b>-0.21</b>	<b>-0.18</b>
WBSI	<b>-0.14</b>	-0.07	<b>-0.22</b>	-0.12	-0.03	-0.07	0.11
ATDs	<b>-0.47</b>	<b>-0.44</b>	-0.10	<b>-0.41</b>	<b>-0.30</b>	<b>-0.44</b>	<b>-0.16</b>
Thin Boundaries	<b>-0.29</b>	<b>-0.18</b>	<b>-0.20</b>	<b>-0.24</b>	<b>-0.17</b>	<b>-0.23</b>	0.01

**Bold type** indicates coefficients significant at  $p < 0.05$

**Bold and italicized type** indicates coefficients significant at  $p < 0.01$  (also significant at the Bonferroni corrected level of 0.0007).

\* Measures marked with an asterisk (\*) denote non-parametric variables and corresponding values reflect Spearman's rho correlation coefficients. For all other variables, parametric assumptions were met and Pearson's correlations were used.

**Table 3 Descriptive statistics for Experiment 2 (N=45)**

	Mean	SD
MED-Q ("Awareness of dreaming")	21.26	7.97
Confabulations	9.55	3.04
No. items correct	23.15	7.89
No. items forgotten	52.42	7.83
Dream word count	103.77	68.04
WBSI	35.82	15.16

**Table 4 Pearson correlation coefficient matrix for Experiment 2 (N=45)**

	MED-Q Factor 1	Dream Word count	No. items correct	No. items forgot	WBSI
Confabulations	<b>-.59**</b>	-.12	<b>.39</b>	<b>-.38</b>	<b>-.32</b>
MED-Q Factor 1	-	.24	-.11	.13	.14
Dream Word count	-	-	.35	.029	0.42
No. items correct	-	-	-	<b>-.97</b>	<b>-.252</b>
No. items forgot	-	-	-	-	.27

**Bold type** indicates coefficients significant at  $p < 0.05$

***Bold and italicized type*** indicates coefficients significant (2-tailed) at  $p < 0.01$  (also significant at the Bonferroni corrected level of 0.003).