Lucid Dreaming and Prefrontal Task Performance

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Abstract
Activity in the prefrontal cortex may distinguish the meta-awareness experienced during lucid dreams from its absence in normal dreams. However, no study has associated lucid dreaming with neuroanatomical function. The objective of the study was to test the hypothesis that the ability to have lucid dreams is related to the functions of the prefrontal cortex – a brain region implicated in the conscious process. To test this hypothesis, 28 high school students performed cognitive tasks that engage the prefrontal cortex and underwent one week of lucid dream induction training and assessment. Participants who exhibited a greater degree of lucidity performed significantly better on a task that engages the ventromedial prefrontal cortex (the Iowa Gambling Task). However, the degree of lucidity achieved did not distinguish performance on a task that engages the dorsolateral prefrontal cortex (the Wisconsin Card Sorting Task), nor did it associate with differences in reported sleep quality or baseline participant characteristics. The association between performance on the Iowa Gambling Task and lucidity is consistent with the higher activity of the ventromedial prefrontal cortex during rapid-eye movement sleep, and suggests a connection between lucid dreaming and other ventromedial functions, like emotion regulation.

Introduction

Dreaming is a state of consciousness that shares some characteristics with waking consciousness. In both states, there is an awareness of objects and events, and an awareness of oneself (Cicogna and Bosinelli, 2001). This similarity of awareness may reflect similar brain activation. In particular, forebrain activation by ascending arousal systems of the brainstem, diencephalon and basal forebrain promote consciousness in both waking and dreaming through distinct means (Hobson, 1988, Hobson et al., 2000, Muzur et al., 2002). A key difference in the conscious experience of waking, however, is the presence of meta-awareness or insight into ones mental state. For example, in waking but not in dreaming there is an awareness of being awake, and an ability to differentiate the waking state from different mental states such as dreaming (Rechtschaffen, 1978, Pace-Schott, 2009).

A notable exception to this generality, however, is the phenomenon of lucid dreaming -- the explicit awareness, while dreaming, that one is dreaming (LaBerge, 1990, 1992, 2000, 2007). In this type of dream, one can dictate some or all of the events that occur. (Blagrove & Hartnell 1998). Lucid dreaming was first mentioned in the west by

Aristotle. They were important to the shamanistic practices of tribal societies, where they were induced and guided. Lucid dreaming was used by these people as a form of meditation during sleep (Chang 1963).

Lucid dreams are vivid and are associated with a sense of control and other positive emotions (Blagrove & Hartnell 1998). Many people report having experienced a lucid dream in their lives, often in childhood. Although lucid dreaming is a conditioned skill, training has been used to increase the frequency of lucid dreams and the degree of lucidity achieved (Purcell et al., 1986, LaBerge, 1990). This induction training has been used as a potential treatment for nightmares (Spoormaker & van den Bout 2006) such as the recurrent nightmares that are a symptom of posttraumatic stress disorder. Frequent lucid dreamers have thinner boundaries than ordinary dreamers (Galvin 1990). Despite the rarity of spontaneous lucidity, metacognition in dreams, or a degree of self-reflection about dream thoughts, intentions and feelings, may be more common than previously thought (Kahan and LaBerge, 1994, Kahan et al., 1997). 58% of the population has experienced a lucid dream once in their lifetime and 21% have them more frequently (Snyder & Gackenbach 1988).

Individuals who train themselves to have lucid dreams report that they do so for the adventure and fantasy, to overcome nightmares, to explore creativity, to help with problem solving, for emotional self-healing, and achieve a sense of transcendence (LaBerge 1980). People also train themselves because dream characters sometimes give the impression of having a consciousness of their own, which is an appealing characteristic (Tholey 1989). In addition, dreamers find it comforting to take an active hand in resolving the dream’s conflict and bringing the plot to a satisfactory conclusion (LaBerge 1992). Lucid dreamers have a significantly higher need for cognition and self-assessed creativity than non-lucid dreamers (Blagrove 2000).

Lucid dreams occur during rapid eye-movement (REM) sleep, the stage of sleep when most non-lucid dreams occur (Hobson et al., 2000, LaBerge, 1990, 1992, 2000, 2007, Nielsen, 2000). Lucid dreams typically begin two to five minutes after the onset of a REM sleep period, and are more likely after a brief awakening and during periods of heightened cerebral activation (e.g. during rapid eye movement bursts or brief muscle twitching). They are associated with signs of autonomic arousal such as increased heart rate, respiratory rate, and skin conductance. (LaBerge, Levitan, Gordon, & Dement, 1983). Lucid dreams tend to occur in the early morning because more REM periods show intense rapid eye movement activity (LaBerge 1985). A lucid dream can begin in two ways. More commonly, a dream-initiated lucid dream starts as a normal dream, but the dreamer eventually figures out that he or she is actually dreaming. A wake-initiated lucid dream happens when the dreamer goes from a normal waking state directly into a dream state, with no apparent lapse in consciousness (LaBerge 1990). There are different levels of lucidity that are recognized during lucid dreams. In a low-level lucid dream, the dreamer knows that they are dreaming, but lacks control. High levels of lucid dreams include the sense of control over some part of the dream with distinctions made based on the level and breadth of control (LaBerge 1980).

In addition to possible clinical applications, lucid dreaming has been explored as a window onto consciousness and the brain functions that underlie it (Cicogna & Bosinelli 2001). The lack of explicit awareness that one is dreaming during ordinary dreams has been attributed to deactivation of lateral frontal executive areas relative to waking during REM sleep (Muzur et al., 2002, Hobson et al., 2000). Positron emission tomography (PET) studies have shown that these frontolateral regions remain deactivated relative to waking throughout sleep, including REM (Maquet et al., 2005, Braun et al., 1997, Maquet et al., 1996, Braun et al., 1998). If lack of lucidity in typical dreams reflects deactivation of frontal executive areas, it follows that lucid dreams may be characterized by relatively preserved elevated frontal activity with associated elevation of cognitive abilities that support executive function. If so, then performance on the Wisconsin Card Sorting Task (WCST), a task known to engage the dorsolateral prefrontal cortex (DLPFC-a region associated with executive function and working memory (Stuss et al., 2002)) may be better in persons who more easily achieve lucidity in their dreams.

Unlike the lateral frontal cortex, the ventromedial prefrontal cortex (VMPFC), which is associated with measuring risk and reward in decision making (Kringelbach, 2005, Kringelbach and Rolls, 2004) (along with other associated brain regions) reactivates during REM sleep to levels that may exceed that during waking (Nofzinger et al., 1997, 2004). Therefore, it is possible that ventromedial function could be related to lucid dreaming. In waking, these ventromedial prefrontal areas support not only the self-related, social and emotional cognition that is ubiquitous in dream phenomenology (Pace-Schott, 2009), but also support the affective guidance hypothesized to facilitate decision making in the Somatic Marker Hypothesis (Bechara et al., 2000a, Damasio, 2003). If ventromedial function is related to lucid dreaming, then performance on the Iowa Gambling Task (IGT), a task known to engage the ventromedial prefrontal cortex, may be better in persons who more easily achieve lucidity in their dreams.

The present study is the first study to associate performance on different prefrontal tasks with the ability to have lucid dreams, and so could provide valuable insight into the brain processes underlying lucid dreams and consciousness. In addition, this research can provide useful information on the trainability of lucid dreaming in a high school population and hence inform possible clinical applications that involve lucid dream training.

Research Question and Hypothesis

The objective was to determine whether frontal executive function differed in persons who were able to develop lucid dreams and those who were not.

Research Hypothesis (H_o): Performance on cognitive tasks that engage prefrontal cortical areas would differ between lucid and non-lucid dreamers. There is an existing relationship between the ability to have lucid dreams and levels of cognitive function so, therefore, frontal executive function is relevant to lucidity. One will have a higher ability to lucid dream if they have a high level of cognitive function. The dorsolateral and ventromedial prefrontal cortical function as measured by standardized tasks will predict the ability to learn to have lucid dreams.

Null Hypothesis (H_a): There is not an existing relationship between the ability to have lucid dreams and the level of cognitive function. The dorsolateral and ventromedial function measured by standardized tasks will not predict the ability to learn to have lucid dreams.

Methods

Description of Participants:

Population Characteristics:

28 participants successfully completed this study. They were recruited from the student-body of a public high school in Westchester County, New York. Subjects were recruited by word of mouth and/or flyers on school grounds. High school students were chosen because there is anecdotal evidence that it is easier for younger persons to train themselves to have lucid dreams (Armstrong-Hickey, 1988). The inclusion criteria were that the participant be enrolled in the high school and that they keep a regular bedtime within a 2-hour window for 6 nights out of 7. The exclusion criteria included inability to conform to the requirements of the study protocol, having smoked 1 or more cigarettes in the past week or 5 or more in the past month, or currently taking medications that affect

sleep or cognitive performance. Only one potential participant was excluded from participation (for use of psychotropic medication). The protocol and its assent and consent forms were approved by both the Yale University Investigational Review Board and the high school IRB.

Consent/Assent:

All participants gave written assent or written consent (for those 18 years of age) for their participation; written parental consent was also obtained for all participants regardless of age.

Confidentiality:

Only subject age, grade level, sex and outcome data are associated with the subject numbers. The link between subject number and name are present only on the consent forms, which are now stored in a locked file cabinet.

Payments:

All subjects who completed the entire study were given a $30 gift card to either ITunes, Starbucks, or Barnes and Noble.

Study Design:

Participants first completed baseline assessments and executed two computer-based cognitive tasks. Then they completed 7 consecutive days of lucid dream induction self-training, daily dream journal entries, and daily sleep/dream assessments.

*Baseline Assessments**:***

Age, sex, grade level, race/ethnicity, and handedness were recorded as demographic variables.

Pittsburgh Sleep Quality Index (PSQI):

It is a proven measure of self-reported sleep quality and quantity over the past month that takes about 5 minutes to complete (Buysse 1989). It discriminates between good and poor sleepers. The global score ranges from 0 to 21. The lower numbers generally reflect better sleep, and scores of 6 or more are associated with sleep problems in adults (Buysse et al from Rush J Handbook of Psychiatric Measures APA Washington DC 2000).

Baseline Lucidity Assessment (BLA):

This assessment is a five-item scale of lucid dreaming in the past year created for this study and takes about 1-2 minutes to complete. It assesses dream awareness and dream lucidity. Lower scores (range 5-25) indicate a greater amount of dream awareness and lucidity. The BLA consists of 5 questions answered on a 5-point Likert scale. [See Appendix]

Cognitive Computer Tasks

A session of the computer tasks was scheduled prior to the Lucid Dream Induction Training. The Psychological Corporation version of these tasks ran on a laptop PC.

Iowa Gambling Computer Task (IGT):

The Iowa Gambling Task (IGT; Psychological Assessment Resources, Inc.) (Bechura et al. 1994) was given in its standard form. It requires subjects to pick cards from four different decks of cards. After selecting a card, the subject is told that they win a certain amount of money, and perhaps also lose a certain amount of money. Subjects are instructed to try to win as much virtual money as possible, and are shown a tally of their winnings/losses. Subjects are not aware that two of the decks are favorable and two are unfavorable. The unfavorable decks (A&B) have cards with large winnings but with occasional very large losses (high-risk/high-reward) so they produce a net loss. The favorable decks have cards

(C&D) with smaller winnings but relatively inconsequential, occasional losses (low-risk/low-reward) so they eventually produce a net gain. Participants pick 100 cards in total, and performance is measured by the difference between the amount of cards picked from decks C&D and the number of cards selected from decks A&B. IGT net score is measured for each 20 cards selected (reported as the 1st through 5th quintiles) and for all 100 card (total). The task is generally viewed as a test of impulsivity in decision-making and engages the VMPFC. Note: One male participant didn't correctly complete the IGT so his data was excluded from the analysis.

*Wisconsin Card Sort Computer Task (WCST)***:**

In the Wisconsin Card Sort Task (WCST: Psychological Assessment resources, Inc.) subjects are required to sort cards into four piles, and subjects are given feedback indicating a correct or incorrect placement after each attempt. However, participants are not instructed on how to sort them. Cards are distinguished by having different shapes, different colors of the shapes, different numbers of the shapes, and different sizes of the shapes. Any of these attributes may be the rule for correct sorting, and the rule changes during the task so the subjects must adjust their strategy. Participants are tested until they correctly master all the possible sorting rules. Variables reported are the total number of trials required, and the percent of all trials that were perseverative errors, or errors where an already mastered rule was followed by the subject to sort a card after the rule had been changed. This task is generally accepted as a measure of executive function and engages the DLPFC.

Lucid Dream Induction Technique:

For seven days, students engaged in lucid dream induction training. They were given a lucid dreaming information sheet, which included instructions on how to lucid dream [See Appendix]. They then attempted to lucid dream and were supplied with a dream journal where they had to write all of their dreams down. It was suggested that they focus on the dream experience before falling asleep, by self-suggestion, and by maintaining basic sleep hygiene practices as much as possible.

Lucid Dream Assessments:

Morning/Evening Sleep Questionnaire:

This questionnaire is filled out before going to sleep, as well as after waking up in the morning. The questionnaire asks about the subject's daytime activity: level of alertness, amount of exercise, amount of napping, amount of coffee or caffeine-containing beverages, and total number of cigarettes. No participant reported smoking cigarettes during the study and all participated recorded drinking 3 caffeinated beverages or fewer per day on average during the study. It also asks for the time the subjects tried to go to sleep, the time they woke up, how long it took to get to sleep, how many times they woke up during the night, and how long they were awake during the night. It also asked for certain difficulties sleeping during the night such as waking up unnaturally or having difficulty falling back asleep. Then, the subjects were asked to rate overall sleep, how deep the sleep was, how well rested the subjects felt when they woke up, and how mentally alert they felt when they got up for the day. Nightly sleep quality was measured on a 0-100, visual analog scale based on the well-validated St. Mary's Sleep Questionnaire (Leigh et al., 1988, Ellis et al., 1981), and was averaged over the 7 days. This questionnaire has been used before in research studies to evaluate qualitative sleep quality as well as other sleep related data.

Morning Lucidity Assessment:

This assessment is identical to the Baseline Lucidity Assessment, except it is referring to the past night's sleep, not the past year. It is scored from 5-25 with lower scores indicating a higher degree of dream awareness and lucidity. Due to the outcome that participants had one or more nights in which they didn't remember their dreams and because the objective of the study was to assess the ability to have lucid dreams, peak lucidity on the MLA over the 7 days was used as the main lucidity outcome variable. Participants were separated into "lucid" and "non-lucid" categories by a median split of their peak lucidity.

Statistical Method

At first, independent t-tests were used to compare differences in baseline characteristics (e.g., age, grade, PSQI) and performance on the WCST task between lucid and non-lucid dreamers. Performance on the IGT was analyzed across trials using a linear mixed model with group (lucid vs. non-lucid dreamers) as a between-subjects factor and trial (1-5) as a within-subjects explanatory factor. The interaction between group and trial was also modeled. In the above model, the best-fitting variance-covariance structure was determined by information criteria and subject was the clustering factor. Baseline characteristics such as age, grade, and measures of sleep quality were considered as covariates but were not significant and therefore, dropped. Potential associations between IGT and WCST task performance were assessed using correlation analysis.

RESULTS

During the 7 days of lucid dream induction training, subjects reported smoking no cigarettes, taking no medications, and drinking an average of less than one caffeinated beverage per day [0-3 beverages]. Mean and median peak lucidity, which was measured by the Morning Lucidity Assessment were 12.7±4.6 and 12 (range: 5-22). Division of the participants into the "lucid" and "non-lucid" groups by peak lucidity showed differences in the responses to 4 of the 5 questions of the MLA (Figure 2), with the greatest contributions coming from questions 3 and 4 (Q3: "I thought or knew that I was dreaming during my dreams"; Q4: "I was able to control some or all of what happened in my dreams"). There were no statistically significant differences in age, grade, PSQI, nightly sleep quality, or the Wisconsin Card Sorting Task measures (Table 1) when dividing the participants into the "lucid" and "non-lucid" groups by a median split of peak lucidity. There were a higher percentage of females (85%) that were non-lucid dreamers compared to lucid dreamers (53%) (p=.08) (Table 1)

Table 1. Lucid Group vs. Non-Lucid Group and Statistics

	Lucid Group Peak lucidity ≤11 (N=13)		Non-Lucid Group Peak lucidity >11 (N=15)*		Statistics	
	mean	*s.d.*	Mean	*s.d.*	t(26)*	*P-value*
Age (years)	16.1	*1.1*	16.2	*0.9*	-0.32	*0.75*
Grade	10.5	*0.8*	10.5	*0.9*	0.02	*0.99*
PSQI	4.9	*0.8*	4.3	*2.0*	1.02	*0.32*
BLA	13.3	*3.6*	15.9	*3.7*	-1.91	*0.07*
Nightly Sleep Quality	57	*13*	58	*7*	-0.32	*0.75*
WCST Raw Score	93	*20*	98	*21*	-0.58	*0.56*
WCST Errors %perseverative	10.8	*4.4*	14.4	*10.5*	-1.15	*0.26*
Females/Males (N)	11/2		8/7		-	*0.11***

PSQI = Pittsburgh Sleep Quality Index, BLA = Baseline Lucidity Assessment, WCST = Wisconsin Card Sort Task, IGT = Iowa Gambling Task; *, For the IGT, N=14 for peak lucidity > 11 [see methods] with a corresponding loss of 1 degree of freedom, **Fisher's Exact test

However, performance on the IGT was differentiated by peak lucidity. Analysis of IGT throughout the trials showed a significant main effect of trial (F[4,100] = 5.3, P = 0.0006) and a trend effect for group (F[1,25]=3.5, P= 0.07). The interaction between trial and group was significant (F[4,100] = 2.8, P=0.03), explained by significantly greater IGT scores among non-lucid dreamers compared to their lucid dreamer counterparts during trials 3 (p=.03), 4 (p=.02), and 5 (p=.015)(Figure 1).

Total and individual trial IGT scores did not correlate with WCST performance as measured by WCST raw scores and % perseverative errors (all $R^2 < 0.08$, $P > 0.16$).

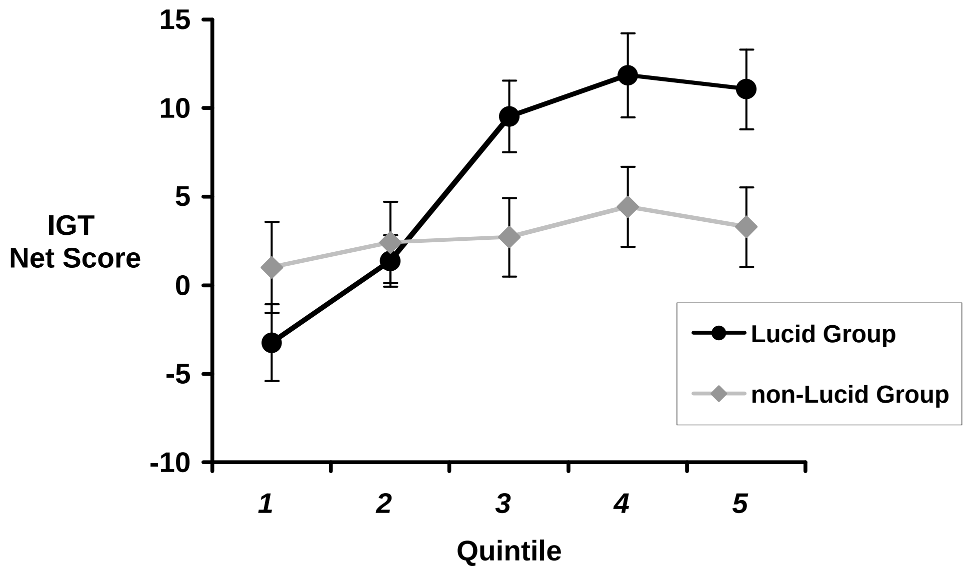

Figure 1. Lucid dreamers exhibit better learning on the Iowa Gambling Task, with statistically better performance in the 3rd, 4th, and 5th quintiles of trials (all p < 0.05; see text).

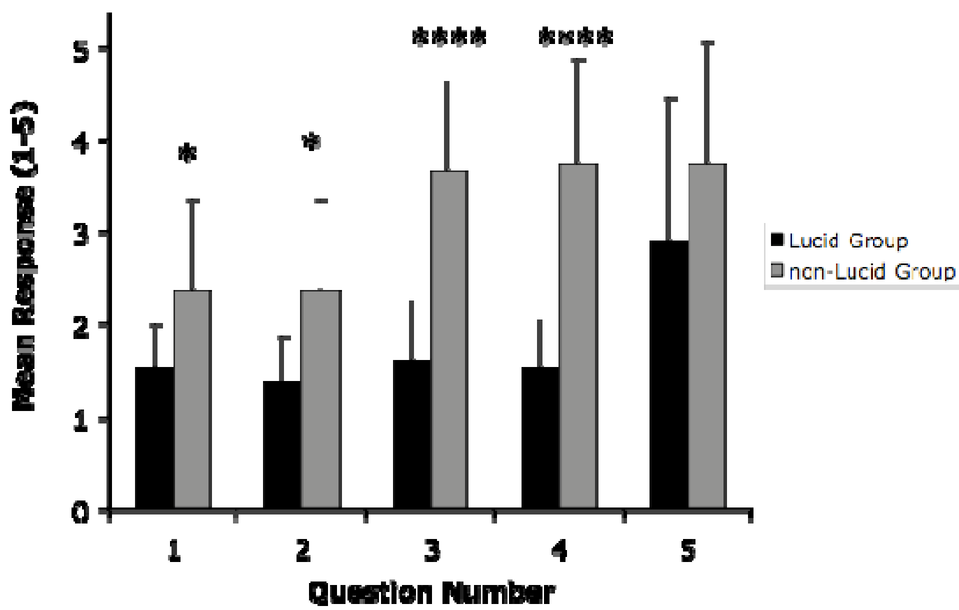

Figure 2. Morning Lucidity Assessment responses. The lucid and non-lucid groups were distinguished by 4 of the 5 questions on the MLA, with the greatest differences between groups seen in questions 3 and 4 (error bars indicate standard deviation; *, p<0.05; **, p<0.005; ***, p<10^{-5}; ****, p<10^{-6})

DISCUSSION

The key finding of this research is that in high school students undergoing lucid dream induction training, those who achieved greater lucidity revealed better performance on the Iowa Gambling Task. However, achieving lucidity did not affect performance on the Wisconsin Card Sorting Task. Also, other possible relevant characteristics like self-reported sleep quality before or during the study, age, and grade were not distinguished by peak lucidity. Peak lucidity achieved during the study was related to baseline, retrospective lucidity, but only as a statistical trend, which was not a surprise whatsoever. The high lucidity group had more girls than the low lucidity group, but this difference was also not significant. Therefore, the difference in IGT performance between high and low lucidity groups was unique between the observed variables, and along with the absence of a difference in WCST performance, it still has potential relevance to understanding brain function.

The IGT was made to evaluate affectively guided decision making under conditions of doubt (Bechara et al., 1997, Wagar and Dixon, 2006) whereas the WCST measures what is typically described as mental flexibility and set shifting ability (Lezak et al., 2004). Therefore, the ability to achieve dream lucidity may be associated with psychological traits related to the IGT and not the WCST. For example, the ability to use emotions from previous decisions to make future decisions is required to a greater extent by the rewards and losses in the IGT than by the set shifting of the WCST. Also, consideration of emotions may differentiate both the ability to have lucid dreams and perform well on the IGT. Dreaming is characterized by its narrative themes and experiences of dream emotions (Hobson et al., 2000, Pace-Schott, 2009, Kahn et al., 2002, Schredl and Doll, 1998, Merritt et al., 1994). Young people who are more observant of their emotions in dreams may have an advantage in achieving self-reflective awareness of their current state of consciousness. Particularly, lucid dreamers are characterized by “thin boundaries” (Galvin, 1990), which includes a tendency toward better dream recall of more emotional dreams (Schredl et al., 1999). Similarly, young people who are aware of their self-analyzing aspects of their responses to wins and losses – the “somatic markers” believed to underlie IGT performance (Bechara et al., 1997) – might perform better on the IGT.

The practical anatomy of REM sleep and neurodevelopmental characteristics of IGT performance may also support the current finding. In young people, differences in the performance and age-related changes in performance on the IGT seem to mirror development of the VMPFC and are independent from the performance of working memory and behavioral inhibition tasks thought to reveal activity of other brain regions (e.g. DLPFC; Hooper et al. 2004). Lateral areas of the PFC stay somewhat deactivated in REM sleep, while VMPFC regions reactivate as well as other subcortical parts of the anterior paralimbic REM activation area (Maquet et al., 2005, Nofzinger et al., 1997, 2004). Therefore, the VMPFC physiological substrate thought to support IGT performance (Bechara et al., 1994, 1999, 2000b) is being selectively activated during REM — the expected physiological substrate of lucid dreaming (LaBerge, 1990, 1992) —regions that support WCST performance stay fairly inactive. As a result, it makes sense to think that the developing ability for emotion regulation and its combination with cognition, associated with prefrontal cortical development across adolescence (Yurgelun-Todd and Killgore, 2006, Whittle et al., 2008), underlies capacity for both lucid dream induction and affectively guided decision making. For lucid dreamers, a higher activation within the anterior paralimbic REM activation area may increase within densely interconnected prefrontal areas (Petrides and Pandya, 2002) to a degree adequate enough to set off awareness of state without exceeding waking thresholds.

Thus, the ability to achieve lucidity, during adolescence, a period of significant brain myelination and re-organization (Tamnes et al., 2009), may be related to the level that frontal systems have become combined and receive logical input from many sources, including emotional information. It is possible that REM sleep, a sleep stage that is linked with normal emotional memory (Wagner et al., 2001, Hu et al., 2006), may contribute to the normal development of emotionally guided decision making during adolescence. If REM sleep does in fact influence development of the brain substrate of emotion regulation in adolescence, both IGT performance and success with lucidity training may vary with cross-sectional individual differences in this developmental course. It would be recommended to compare, in adolescents, the ability to achieve lucidity with additional validated measures of emotion regulation and its interaction with decision-making.

Acknowledgements

I would like to thank my mentor Dr. Peter Morgan and the Yale University Department of Psychiatry for guiding me and funding me with my research. I would also like to thank Mr. Inglis and Ms. Dyer for their guidance and support. Finally, I would like to thank my parents for their support and encouragement.

Appendices:

Lucid Dreaming Instructions.

INSTRUCTIONS

1. I will give you a dream journal in which to write all your dreams for the next 7 days. Keep the journal and a pen within reach of your bed, perhaps on a night table or under your pillow. Everytime you wake up from sleep, even in the middle of the night, write down everything that you dreamed as best as you can remember. Sometimes it is difficult to remember things in the beginning but it will get easier. Don't wait to write your dreams later as this does not work well.

2. Try to go to bed at the same time each night (within an hour). Make sure you have 8 hours to sleep each night or more. So if you have to wake up at 6:45am, make sure you are in bed by 10:45pm.

3. When you lie down to sleep (both the first time and each time after you wake up at night), spend a minute or two thinking about these things, telling them to yourself:
    a. I am going to remember all of my dreams that I dream tonight
    b. When I dream, I will know that I am dreaming
    c. When I dream, I will be in control of my dreams, able to do what I want to
    d. After I dream, I will wake up and write my dreams in my dream journal

4. Don't forget to write all of your dreams down as soon as you wake up and include descriptions of being aware that you were dreaming and/or being in control of dream if that happened.

Subject #______________ Date: _________________

Baseline Lucidity Assessment

Instruction: Consider the past year in answering the following questions about your dreaming. Please circle your answers.

1. I can usually remember my dreams.

1	2	3	4	5
Strongly Agree				Strongly Disagree

2. My dreams have a lot of detail that I can often remember.

1 2 3 4 5
Strongly Agree Strongly Disagree

3. Sometimes I can tell that I am dreaming during a dream.

1 2 3 4 5
Strongly Agree Strongly Disagree

4. Sometimes I can control what happens in my dreams.

1 2 3 4 5
Strongly Agree Strongly Disagree

5. Sometimes I can dream about things that I have decided I want to dream about.

1 2 3 4 5
Strongly Agree Strongly Disagree

Subject #______________ Date: _________________

Morning Lucidity Assessment

Instruction: Consider the past night in answering the following questions about your dreaming. Please circle your answers.

1. It was easy to remember my dreams.

1 2 3 4 5
Strongly Agree Strongly Disagree

2. I could recall most or all of the detail in my dreams.

1 2 3 4 5
Strongly Agree Strongly Disagree

3. I thought or knew that I was dreaming during my dreams.

1 2 3 4 5

Strongly Agree Strongly Disagree

4. I was able to control some or all of what happened in my dreams.

1 2 3 4 5
Strongly Agree Strongly Disagree

5. I dreamed about things I had decided I wanted to dream about.

1 2 3 4 5
Strongly Agree Strongly Disagree

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