

Investigating the Effects of Fantasy Proneness and Instructions to Fantasize
on Sustained Attention and Mood during a Laboratory Task

by

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Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor
of Philosophy in the Department of
Psychology and Neuroscience in the Graduate School
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ABSTRACT

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Abstract

Fantasy prone individuals spend much of their time fantasizing, focusing on a rich internal world of imaginary people or stories, vivid memories, or dreams. Fantasy proneness has been linked to psychological distress and psychiatric disorders. However, few experimental studies have been conducted with fantasy prone individuals; therefore, little is known about the behavioral correlates of fantasy proneness. The current study investigated associations between self-reported fantasy proneness, as measured by a frequently used questionnaire, the CEQ, and behavior during a laboratory task of attention, the SART. A potential mood regulating function of fantasy also was explored. Results of the study support the assertion that fantasy proneness is associated with variations in behavior that can be observed in the context of the laboratory. Specifically, fantasy proneness correlated with fewer instances of on-task thought and more frequent instances of mind wandering without meta-awareness during the attention task. It also correlated with more task errors and higher levels of self-reported fantasy thought during the task (though not with higher levels of other types of off-task thought). Finally, fantasy thought was found to have a protective effect on positive affect during the mundane task. There was no relationship between fantasy thought and negative affect.

Dedication

This work is dedicated to my partner, Kelly Eppley, for all of the steady patience and support that she has provided throughout my graduate school career. It is also dedicated to my parents, Zenon and Prudence Cuper, and to my brothers, Marcus and William Cuper. My family members have inspired me with their disciplined approaches to their own academic and creative pursuits, and they have helped me to keep everything in perspective with their wonderful senses of humor.

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Introduction

Fantasies have been defined as voluntary thoughts that are composed of elaborate imaginary storylines and that may function to amuse, distract, or entertain (Butler, 2006). Engaging in fantasy thought appears to be a common activity for many individuals. Recent studies utilizing both a laboratory task and ecological momentary assessment techniques found that fantasies were among the more frequently reported types of off-task thought (McVay & Kane, 2009; McVay, Kane, & Kwapil, 2009). Many adaptive functions of fantasy have been proposed. For example, various authors have suggested that fantasy may help to regulate mood, provide information about the self, and facilitate problem-solving and decision making (Rauschenberger & Lynn, 2002/2003; Klinger, 1990). Fantasies and daydreams may be particularly common in adolescents and younger adults (Giambra, 1977/1978; 1989; 1999/2000; Singer, 1966; Singer & McCraven, 1961). Whereas some amount of fantasy is normal for most people, there exists a subgroup of individuals who fantasize more than others, spending at least half of their time engaged in fantasy thought. These individuals have been described as “fantasy prone” (Wilson & Barber, 1981; 1983) and research suggests that they experience higher rates of psychological distress and psychiatric disorders.

Symptoms of psychological distress that are higher in fantasy prone individuals include: dissociative experiences (Merckelbach, Horselenberg, & Schmidt, 2002; Rauschenberger & Lynn, 1995; Waldo & Merritt, 2000; Merckelbach, à Campo, Hardy, &

Giesbrecht, 2005; Pekala, Angelini, & Kumar, 2001; Pekala et al., 1999/2000); poor attentional, cognitive, and affective control (Rauschenberger & Lynn, 2002/2003); nightmare prevalence and nightmare distress (Levin & Fireman, 2001/2002); and elevations on the scales of the Minnesota Multiphasic Personality Inventory (MMPI) that suggest heightened risk for eccentric thinking, Cluster A and B personality disorders, and schizophrenia spectrum disorders (Merritt & Waldo, 2000). Higher rates of Axis I psychiatric disorders have also been seen in fantasy prone individuals, when compared to healthy controls. In Rauschenberger and Lynn's (2002/2003) study of two groups of undergraduate students, members of the fantasy prone group were significantly more likely (76%) than participants in the control group (30%) to meet criteria for a current or past Axis I disorder, as measured by the *Structured Clinical Interview for DSM-IV Axis I Disorders - Non-Patient Edition* (SCID-I; First, Spitzer, Gibbon, & Williams, 1990). These findings replicate those of an earlier study by Rauschenberger and Lynn (1995), in which 67% of the fantasy prone participants met criteria for an Axis I disorder, versus 31% of the controls scoring in the average range on the measure of fantasy proneness. In both studies, the most common Axis I disorder among the fantasy prone group was major depressive disorder. Highly fantasy prone individuals have also been diagnosed with dissociative disorders (e.g., depersonalization disorder) more often than low or medium fantasy prone individuals (Levin, Sirof, Simeon, & Guralnick, 2004; Rauschenberger &

Lynn, 2002/2003), although this association may be due, in part, to overlap between the constructs of fantasy proneness and dissociation (Rauschenberger & Lynn, 2002/2003).

In addition to the studies linking fantasy proneness to Axis I disorders, a few studies have found correlations between fantasy proneness and Axis II disorders. In one such study, investigators found evidence to support an association between fantasy proneness, as measured by the Creative Experiences Questionnaire (CEQ; Merckelbach, Horselenberg, & Muris, 2001), and the cognitive-perceptual components of schizotypy, though they did not find a relationship between fantasy proneness and the interpersonal aspects of schizotypy (Sanchez-Bernardos & Avia, 2004). In another study, Waldo and Merritt (2000) interviewed both high fantasy prone and low fantasy prone participants, who were chosen from a pool of 1,932 undergraduates, based on their scores on the Inventory of Memories and Imaginings, Wilson and Barber's (1983) self-report measure of fantasy proneness. Using the Structured Interview for Personality Disorders (SIPD-IV; Pfohl, Blum, & Zimmerman, 1997), they found that high fantasy prone participants showed higher prevalence rates for the Cluster A (odd/eccentric) and Cluster B (erratic/dramatic) personality disorders. Rates of Cluster C disorders (the anxious/avoidant disorders) were similar across groups. A third study compared groups of patients with schizophrenia, major depressive disorder, and borderline personality disorder (BPD), and found that those with BPD scored significantly higher

than the other groups on the CEQ (Merckelbach, à Campo, Hardy, and Giesbrecht, 2005).

Some authors have included fantasy thought in a larger category of off-task thinking called daydreaming or mind wandering. One might question whether it is not fantasy proneness *per se*, but rather this superordinate class of behavior, that correlates with psychological distress. Giambra and Traynor (1978) found that certain sub-scales of the Imaginal Processes Inventory (IPI; Singer & Antrobus, 1970), an inventory of daydreaming, correlated positively with depression scores obtained on three self-report scales. The sub-scales correlating with depression were: Daydreaming Frequency, Absorption in Daydreaming, Frightened Reactions to Daydreams, Mindwandering, Fear of Failure Daydreams, Hostile Daydreams, Guilt Daydreams, Boredom, and Distractibility. The authors found that the Acceptance of Daydreams sub-scale of the IPI showed an inverse correlation with depression scores, suggesting that only some aspects of daydreaming predict poorer mental health. More recently, a series of studies by Smallwood and his colleagues has shown evidence of increased mind wandering by participants with greater levels of dysphoria, during tasks that required learning words (Smallwood, Obonsawin, Baracaia, Reid, O'Connor, & Heim, 2002/2003), sustained attention (Smallwood et al., 2004), and completion of word fragments (Smallwood, O'Connor, & Heim, 2005).

Taken together, the daydreaming and mind wandering studies provide some data on attentional differences seen in individuals who are experiencing dysphoria. However, only one study (Starker and Singer, 1975) sheds light on how positively-toned, voluntary daydreams (i.e., fantasies) might be related to symptoms of distress. In this study, depressed male patients at a VA hospital endorsed fewer positive daydream items than non-depressed patients. In a study that used measures of both fantasy proneness and daydreaming styles, Rauschenberger and Lynn (2002/2003) found that fantasy prone individuals scored higher on SIPI sub-scales measuring positive daydreams, and that negative affectivity had no effect on the scores. These results, as well as earlier work on the positive nature of fantasy for fantasy prone individuals, leads to a question: If fantasy prone people experience more positive daydreams, and if positive daydreams are inversely related to distress, then why do fantasy prone individuals experience more distress and disorders?

The extant data linking mental health and fantasy proneness is correlational; therefore, a question remains as to whether or not fantasizing is problematic. It may be that excessive fantasizing contributes to the onset or maintenance of psychological dysfunction, or it may be that fantasizing is a harmless activity or helpful coping mechanism used by individuals with other risk factors for psychological disorders. For example, fantasy may be harmful if it inhibits goal pursuit and serves as an avoidant coping style. Feldman and Hayes (2005) found some evidence for this when they

discovered significant associations between outcome fantasy and worry, rumination, avoidance measures, impulsive problem-solving, substance use for coping, and greater distress. On the other hand, fantasies containing positive images about the future could serve as a means of engendering hope for people who are currently distressed. In one pair of studies, positive future thinking was found to mediate the relationship between stress and hopelessness (O'Connor, O'Connor, O'Connor, Smallwood, & Miles, 2004). The question of whether fantasy serves as a relatively adaptive coping strategy or an avoidant behavior that exacerbates distress has clinical significance: Mental health providers treating individuals who engage in excessive fantasy must decide whether or not to make that behavior a target for intervention (e.g., Schupak & Rosenthal, 2009).

To begin to understand the link between fantasy proneness and mental health outcomes, one needs first to consider the nature of fantasy proneness itself. The term "fantasy proneness" was put forth by Wilson and Barber (1981, 1983), who spent several years studying a small sample of "excellent hypnotic subjects," using both qualitative and quantitative methods. They discovered somewhat serendipitously that their subjects shared many characteristics relating to their frequent use of fantasy. For example, all subjects said that as children, they lived in a make-believe world much or most of the time. Other shared childhood experiences included believing in fairies or elves, spending much time with imaginary companions, and pretending to be someone other than who they were. They also shared many experiences as adults: All found the

idea of life without fantasy to be distressing, and all but one spent at least half of their time in fantasy. They also reported that the quality of their fantasies was unusually realistic. They claimed to have exceptionally vivid memories and fantasies that seemed lifelike, and they said that they were able to sensually experience what another person described in conversation. Their fantasies also impacted them physically; for example, most described feeling ill after seeing TV violence, and more than half reported having experienced “false pregnancies,” with attendant physical features (i.e., morning sickness).

Wilson and Barber hypothesized that there were multiple paths to fantasy prone behavior and focused specifically on two of these paths: (1) childhood experiences of neglect or abuse, and (2) encouragement to fantasize by a significant adult. To illustrate the first path, Wilson and Barber pointed out that nine of their 19 fantasy-prone subjects reported being lonely and isolated as children, and seven of the 19 described being reared in difficult environments. These subjects often hid to fantasize. When Lynn and Rhue (1988) later tested Wilson and Barber’s hypotheses using a larger and more diverse sample, they too found evidence of such developmental antecedents in many of their subjects. The fantasy prone group in Lynn and Rhue’s study reported more frequent and severe punishment than the comparison group, though the two groups did not rate the positivity of their family environments differently. Literature on childhood trauma and dissociation may provide further evidence for this relationship, as studies have

shown that fantasy proneness correlates with dissociation (Rauschenberger & Lynn, 1995; Merckelbach, Horselenberg, & Muris, 2001) and some authors count fantasy use as a form of non-pathological dissociation (e.g. Butler, 2006).

Dissociation is commonly considered to be a survival strategy that allows one to endure a traumatic experience; the strategy then outlives its usefulness, occurring in circumstances that do not warrant such a reaction. Several studies using the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986) have found a relationship between childhood trauma and dissociative experiences. In a sample of 98 female psychiatric inpatients with a range of diagnoses, Chu and Dill (1990) found that patients who reported childhood physical and/or sexual abuse scored higher on the DES than did patients without abuse histories. In a non-patient sample composed of female health care providers, Ferguson and Dacey (1997) found that women who had experienced psychological abuse as children endorsed more dissociative experiences. Other studies utilizing the DES have split that measure into its pathological dissociation sub-scale (DES-T; Waller, Putnam, and Carlson, 1996) and the remaining items. Several studies utilizing the DES-T found that some forms of childhood trauma (e.g., physical abuse and neglect) predicted pathological dissociation (Banyard et al., 2001; Irwin, 1999).

The other path to fantasy proneness proposed by Wilson and Barber occurs when significant adults encourage a child to engage in fantasy play. In the authors' original sample, 84% of the participants had encountered such encouragement as

children. Lynn and Rhue (1988), however, found less evidence of this relationship. Their fantasy prone group and comparison group did not differ on most of the items they used to measure encouragement to fantasize, such as direct encouragement to imagine or enrollment in fine arts activities, such as dance, music, or acting lessons. The one measure on which the two groups differed was encouragement to read, and the difference was in the expected direction: Fantasy prone participants were encouraged to read more frequently than participants in the comparison group.

In many ways, fantasy proneness has proven to be a useful construct, predicting a range of psychological symptoms and psychiatric disorders, and, according to some authors, providing a possible explanation for the association between trauma and dissociation (Merckelbach, Muris, Horselenberg, and Stougie, 2000). On the other hand, some authors have questioned whether fantasy proneness is actually a unitary construct, citing evidence that Wilson and Barber's measure of fantasy proneness, the ICMI (1981; 1983) taps multiple dimensions, only one of which relates to pathology (Klinger, Henning, & Janssen, 2009). Further, all studies of fantasy proneness to date have relied solely on self-report questionnaires, calling into question whether the mental behavior of self-identified fantasy prone individuals differs from the mental behavior of others.

One reason that behavioral studies of fantasy proneness may be lacking is the difficulty that exists in measuring a behavior that cannot be directly observed. Fortunately, two bodies of research show that measurement of such behaviors is

possible. The first line of research consists of older studies of daydreaming. The second consists of the numerous studies of mind wandering conducted in recent years. Early daydreaming studies employed vigilance tasks and thought probes to examine differences in responding between groups of “high daydreamers” and “low daydreamers,” as determined by self-report questionnaires. For example, Antrobus, Coleman, and Singer (1967) asked participants to sit in a darkened, quiet room and wear headphones through which two tones would be played. Each participant listened to 100 15-second trials. Each trial contained one tone per second, and the participant was instructed to press a button *only* if she or he heard the lower of two tones. At the end of each 15-second trial, the participant indicated whether or not she or he had experienced any task-irrelevant thoughts during that trial, by pressing a second button. They found that the high daydreamer group reported more task-irrelevant thoughts throughout the task and that their accuracy in responding decreased at a significantly greater rate than the accuracy of the low daydreamer group. The authors attributed their results to high daydreamers’ preference for internal stimulation, suggesting that these individuals chose to attend to internal rather than external stimuli once the novelty of the task wore off.

Other studies have measured daydreaming using similar combinations of vigilance tasks and thought probes. Giambra (1989) used such a design to study the differences in daydreaming across the life span, and he found an inverse relationship

between age and task-unrelated thoughts. He and his colleagues have also found associations between task-unrelated thought frequency and both circadian rhythms and body temperature, the latter of which they assumed to be an indicator of arousal and activity (Giambra et al., 1988/1989). In 1995, Giambra reviewed the state of task-unrelated imagery and thought (TUIT) procedures, describing numerous experiments that have used such a task. He points out that TUIT might take the form of automatic or intrusive thoughts or obsessions; rumination; or thoughts, images or inferences of a non-pathological variety; and that shifts of attention toward such internal stimuli may be either uncontrolled or deliberate. Giambra concludes that TUIT procedures are reliable measures that can be used in conjunction with other experimental manipulations to understand how various endogenous and exogenous factors affect daydreaming.

Recent years have brought about a surge in research on mind wandering. Smallwood and Schooler (2006) define mind wandering as an automatic shift of executive control from the primary task to personal goals and state that this shift often is enabled by a lack of meta-awareness. Citing evidence from a series of studies utilizing attention and memory tests, they claim that: (1) mind wandering decreases when the primary task involves controlled processing or working memory; (2) mind wandering increases as practice on a task increases and performance becomes skilled; and (3) this is not true when the task is sufficiently difficult. Smallwood, Baracaia, Lowe, and Obonsawin (2003) point out that one challenge when studying mind wandering is

finding a task that is difficult enough to show differences in performance (i.e., there is no ceiling effect), but mundane enough to induce task unrelated thoughts. One such task used by these researchers and others is the Sustained Attention to Response Task (SART; Robertson, Manly, Andrade, Baddeley, & Yiend, 1997), a vigilance task that requires participants to press a space bar in response to all non-targets and to withhold a key press when presented with low-frequency targets.

Smallwood and colleagues employed the SART in a series of three studies, finding that reaction times decreased as the task progressed and that faster reaction times were associated with more errors; the authors interpreted the faster reaction times as automatic or thoughtless responding (Smallwood, Davies, Heim, Finnigan, Sudberry, O'Connor, et al., 2004). In later studies, they found that mind wandering with meta-awareness ("tune outs," in their terminology) were not as detrimental to task performance as mind wandering without meta-awareness ("zone outs") (Smallwood, McSpadden, & Schooler, 2007). They also supported the efficacy of the SART as an indicator of mind wandering by showing that event-related potential (ERP) amplitudes were higher for correct responses to the task stimuli, that ERP amplitudes were significantly different for self-reports of being on task vs. tuned out, and that there was a high correlation between ERP amplitudes measured during behavioral off-task periods and those measured during self-reported off-task periods (Smallwood, Beach, Schooler, & Handy, 2008).

McVay and Kane (2009) also used the SART to study task-unrelated thought (TUT), focusing on the relationship between TUTs, SART performance, and working memory capacity. As in other studies using the SART, they found that reaction times were significantly faster in the four non-target trials leading up to an error, indicating that automatic responding was occurring. Also similar to other studies, they found that a lower rate of TUTs predicted better SART performance. A novel aspect of this study was the authors' use of thought content questions at the time of the thought probes. At each probe, they asked their participants, "What were you just thinking about?" and gave them seven options from which to choose: the task; their task performance; "everyday stuff"; personal worries; their current state of being (i.e., sleepiness, hunger); daydreams; or other. "Daydreams," in this study, were defined as "fantasies disconnected from reality." Their participants reported having task-related thoughts on 21% of the trials, task-related interference (thinking about task performance) on 24% of trials, and task-unrelated thoughts on 55% of trials. The most common TUTs were thoughts about current state of being (28.4%), followed by daydreams (8.6%), everyday stuff (8.2%), worries (4.7%), and other thoughts (5.5%).

To explore the effects of task-unrelated thoughts in everyday life, McVay, Kane, and Kwapil (2009) used experience sampling techniques with a subset of their original sample. For a period of one week, 72 undergraduates carried devices that signaled them eight times daily between noon and midnight. At the signal, the participants answered

a variety of questions about their current activity, performance on that activity, thought content, and mood. The authors found that most TUTs were related to personal concerns; the next most common TUTs were fantasies and worries. Mood and environmental factors affected the rate of TUTs: mind wandering (i.e., frequency of TUTs) increased with stress, boredom, sleepiness, and a chaotic environment, and they decreased with concentration, effort, enjoyable tasks, and happiness. These findings align with those of other studies in which TUTs decreased with happy moods and enjoyable activities (Kane et al., 2007) and increased with dysphoric mood (Smallwood et al., 2004). The authors also found that mind wandering predicted poorer performance on daily life tasks, but only when the content of the mind wandering was worry or fantasy; “purposeful” mind wandering and mind wandering related to personal concerns had no effect.

These studies begin to shed some light on fantasy behavior, finding that fantasizing is a relatively common form of mind wandering. They also begin to suggest how mood and fantasy interact and the conditions under which fantasy becomes problematic, such when it affects performance on everyday tasks. Perhaps more importantly, these studies show that the investigation of fantasy and its effects is possible with the use of laboratory techniques. Still, many questions remain, particularly regarding the behavior of individuals high on self-reported fantasy proneness, the construct introduced by Wilson and Barber and linked to problematic

outcomes. One might expect these individuals to experience more difficulty with a task of attention such as the SART; on the other hand, the voluntary nature of many fantasies and the reports by fantasy prone individuals that they are able to fantasize while simultaneously carrying out other activities would suggest that task impairment could be minimal, particularly if the fantasy prone individuals were more prone to tune-outs (mind wandering with meta-awareness) than zone-outs (mind wandering without meta-awareness). Finally, behavioral experiments of the effects of fantasy thought on mood could help illuminate the mood regulating properties of the behavior and provide one possible function for the activity.

The current study had three aims: (1) to investigate the extent to which a popular self-report measure of fantasy proneness, the CEQ, would predict engagement in fantasy during a mundane laboratory task; (2) to ascertain whether those high in fantasy proneness would show deficits in their performance on a task of sustained attention; and (3) to explore the relationship between pre- to post-task changes in mood and engagement in fantasy thought. Participants completed a self-report measure of fantasy proneness, the CEQ, and the SART, the vigilance measure employed in recent studies of mind wandering. The SART provides not only a behavioral measure of task engagement, but also a mundane activity during which mind wandering is likely to occur. The SART was presented in two sections, with mood checks before and after each section and thought content questions after each section. During the first presentation of

the SART, participants answered periodic thought probe questions, to indicate whether their minds were on task, tuned out, or zoned out. During the second presentation of the SART, half of the participants were instructed to fantasize, so that effects of fantasy on mood could be examined. More details of the experimental design can be found below. I hypothesized the following:

1. Higher fantasy proneness (CEQ score) will be associated with fewer reports of on task thought and more reports of tuning out and zoning out.
2. Higher fantasy proneness will be associated with more reports of fantasy thought as measured by the thought content questions.
3. Higher fantasy proneness will be associated with more errors on the SART.
4. Higher levels of self-reported fantasy thought during the SART task will predict greater increases in positive affect and greater decreases in negative affect from pre- to post-task.

Methods

Participants

Participants in this study were 75 adults recruited from the community. They responded to online postings at <http://raleigh.craigslist.com> and <http://dukelist.duke.edu> and to flyers posted around Duke University, Duke Medical Center, and the Durham Public Library. All respondents were directed to complete an online version of the Creative Experiences Questionnaire (CEQ; Merckelbach, Horselenberg, & Muris, 2001), and then they were called for a short phone screen and to schedule an appointment. Potential participants were excluded from the study if they were not between the ages of 18 and 55 or if they answered “yes” to screening questions for recent manic episode, symptoms of psychosis, or symptoms of a current substance use disorder.

Sixty-five percent of the participants were female. The mean age for the sample was 29.93 (SD = 10.82). Sixty-three percent reported their race as White/Caucasian, 20 percent reported it as Black/African American, and 17 percent reported that they were Asian. Sixty-five percent of the sample had a four-year degree or higher, and 28 percent of the sample was married or living with a partner.

Measures

Adult ADHD Self-Report Scale

The Adult ADHD Self-Report Scale (ASRS; Kessler, et al., 2005) – Version 1.1 is an 18-item self report scale designed to provide an efficient means of diagnosing adult ADHD. Respondents use a 0-4 scale (“Never” to “Very Often”) to rate the frequency with which they experience the 18 Criterion A symptoms of ADHD found in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994)*. The authors of the scale discovered that optimal sensitivity, specificity, and classification accuracy were achieved by using a 6-item screening version of the measure. In the screening version, the six items are dichotomized for maximum classification accuracy, and then a total score of 0-6 is calculated. Total scores of 4 or higher suggest a high likelihood of ADHD.

Center for Epidemiological Studies Depression Scale

The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item self-report questionnaire that was designed to measure current depressive symptomatology in community samples. Respondents use a four-point scale to rate the frequency with which they experienced symptoms during the past week. Response options range from “Rarely or None of the Time (Less than 1 Day)” to “Most or All of the Time (5-7 Days).” Sample items include, “I was bothered by things that usually don’t bother me” and “I did not feel like eating; my appetite was poor.” Scores of 16 and

higher are generally considered to be indicative of clinical depression (McDowell & Newell, 1996). The measure has been shown to have adequate internal consistency ($\alpha=.85$) in a sample from the general population.

Creative Experiences Questionnaire

The Creative Experiences Questionnaire (CEQ; Merckelbach, Horselenberg, & Muris, 2001) is a self-report measure of fantasy proneness that is based on the longer ICMI (Wilson & Barber, 1983). It consists of 25 yes-no items, each of which corresponds with a characteristic of fantasy proneness identified by Wilson and Barber. A sample item reads: "I spend more than half the day (daytime) fantasizing or daydreaming." The CEQ shows strong test-retest reliability ($r=.95$ for a period of six weeks) and good internal consistency (Cronbach's alpha was $.72$ in a sample of undergraduates and $.76$ in a more general sample). Mean scores for all samples tested ranged from 7.1 to 9.2 (possible scores range from 0 to 25). Concurrent validity was tested with a series of studies (all results reported in Merckelbach, Horselenberg & Muris, 2001), in which CEQ scores correlated with scores on the Tellegen Absorption Scale (Tellegen & Atkinson, 1974) ($r=.70$), a 44-item version of the ICMI (Wilson & Barber, 1981; 1983) ($r=.77$), the Claridge Schizotypal Personality Scale (Claridge & Broks, 1984) ($r=.61$), and the Dissociative Experiences Scale (Bernstein & Putnam, 1986) ($r=.47$ to $.63$).

Positive and Negative Affect Schedule

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a self-report measure containing two scales: Positive Affect (PA) and Negative Affect (NA). The scales represent the two dominant dimensions of affect. High positive affect is characterized by feelings of energy, engagement, and concentration; low positive affect is characterized by feelings of lethargy and sadness. High negative affect encompasses a variety of unpleasant moods, such as anger, disgust, and fear; low negative affect is generally equates to a feeling of serenity. Each PANAS scale contains 10 mood descriptors (e.g., “enthusiastic,” “scared”). Respondents use a 5-point scale to rate the extent to which they have experienced each of the feelings for a specified period of time. For this study, ratings were made for the current moment. When used in this way, the PANAS scales have internal consistency reliabilities of .89 (PA) and .85 (NA).

Sustained Attention to Response Task

Robertson, Manly, Andrade, Baddeley, and Yiend (1997) designed the Sustained Attention to Response Task (SART) to measure *action slips*, lapses from controlled processing into automatic responding, in patients with traumatic brain injury. The paradigm requires respondents to withhold key presses to low-probability targets. Errors of commission on the SART can be predicted by shorter reaction times (RTs) to preceding stimuli, suggesting that automatic processing is responsible for attentional lapses. Robertson and colleagues found the measure to correlate with other measures of

sustained attention, such as the Triplets Test, and not with age or intelligence. Since its development, the SART has been used in numerous studies of mind wandering.

In the current study, participants completed two sections of the SART, the first of which lasted approximately 20 minutes and included thought probes throughout, and the second of which lasted approximately 5 minutes and included no thought probes. Prior to beginning the SART task, participants read the following set of instructions that explained the difference between “tuning out” (mind wandering with awareness) and “zoning out” (mind wandering without awareness). The terms “tune out” and “zone out” were introduced by Smallwood, McSpadden and Schooler in their 2007 study examining the effects of meta-awareness of mind wandering on task performance. The instructions given for the current study were based on those given to participants by Smallwood, McSpadden, and Schooler.

After reading the instructions, participants completed a short practice round of the SART, and then they began the first of two administrations of the SART. In line with previous studies using this experimental task (e.g., Smallwood, Beach, Schooler, and Handy, 2008), the stimuli used in the present study were the numbers 0 through 9 (non-targets) and the letter X (target). Each stimulus was presented for a maximum of 500 milliseconds (msec), with interstimulus intervals of 1900 or 2100 msec. The stimuli were presented in 15 blocks: eight long blocks containing 36 trials and seven shorter blocks containing 12 trials. Each block contained either one or two targets and terminated with

a thought probe question asking whether the participant was on task, tuned out, or zoned out. The shorter and longer blocks were presented randomly, so that presentation of the thought probe would not become predictable. The second administration of the SART was similar to the first, with the following exceptions: (1) it included no thought probes; (2) it ran for 120 trials; and (3) it included three targets. For both administrations of the SART, two types of errors were possible: errors of commission (pressing the space bar for the target stimuli) or errors of omission (failing to press the space bar for a non-target).

Thought Questions

Mind wandering can take many forms, and the types of thoughts a participant engages in while off-task cannot be inferred from the SART and thought probe questions alone. To better identify the degree to which participants engaged in fantasy thought versus other types of off-task thoughts, five “thought questions” were created for this study. After each section of the SART, participants were asked to rate the degree to which they found themselves planning, worrying, reminiscing, ruminating, and fantasizing. The questions were phrased in the following format: “While working on the perception task, I thought about the rest of my day or upcoming plans.” Responses were chosen from a 5-point scale, which ranged from “1 – Not at all” to “5 – Much of the time.” Table 1 shows all of the questions.

Procedure

Participants were scheduled for individual appointments at the time of the phone screen. On the designated appointment day, each participant met with an experimenter and was shown to a private room and seated in front of a computer. The experimenter led the participant through the informed consent process and then gave directions for the tasks, which included an explanation of “tune outs” versus “zone outs,” to ensure that the participant understood the terminology. The participant then began the experiment by completing a series of questionnaires presented on the computer. The questionnaire battery included a second administration of the CEQ, the ASRS, the CES-D, and several other measures that will not be reported in this study. The CEQ was administered for a second time to address concerns that participants might over-endorse items on the screening administration of the CEQ in order to be chosen for the study. The task-day administration (CEQ_t2) was used for all analyses.

After the participant completed the questionnaires, he or she rated current mood using the PANAS (PANAS t1) and then started the first section of the SART (SART-1). The first administration of the SART lasted approximately 20 minutes and contained thought probe questions that appeared every 30 to 90 seconds. Following SART-1, the participant completed a second PANAS (PANAS t2) and the thought questions described above. Next, the participant completed a second administration of the SART (SART-2). This administration of the SART was shorter than SART-1, lasting only five

minutes, and it was uninterrupted by thought probes. Prior to the SART-2, half of all participants were given instructions to fantasize, which read as follows:

“The perception task is rather simple, and we would like to know how well people can do on it while thinking about other things. During the perception task, please use your imagination to entertain yourself. If there are topics that you often fantasize about, please use this time to fully immerse yourself in those fantasies, while still responding to the perception task as necessary.”

Following the SART-2, participants completed a final PANAS (PANAS t3), the thought questions, and one more questionnaire. The experimenter then debriefed the participant and paid him or her \$20. The experiment took most participants about 2 hours to complete.

Data Analytic Plan

The data analytic plan included five steps: (1) data cleaning and removal of outliers; (2) testing of assumptions; (3) preliminary analyses, including descriptive analyses; (4) tests of the hypotheses; and (5) post-hoc analyses. Data cleaning involved removing those cases in which the participant failed to follow directions for the experimental task. Univariate outliers were identified by creating box plots and examining cases falling above the 95th percentile. The assumptions tested were those underlying statistical inference with correlation and regression analyses. These include

the assumptions of: a linear relationship between each IV and DV; constant variance of residuals (homoscedasticity); independence of residuals; and normality of residuals. Although correlation and regression are relatively robust to violations of assumptions, knowing that deviation from these assumptions is moderate, at most, increases the confidence with which one can make inferences from the available data (Cohen, Cohen, West & Aiken, 2003). Descriptive analyses were run to better characterize the sample; these analyses included frequency distributions and measures of central tendency for demographic variables, IVs, and DVs. Where demographic variables might influence outcomes, appropriate tests were run to detect that influence, so that planned analyses could be adjusted as necessary. Finally, the planned analyses were run. These included standard parametric and non-parametric tests.

Results

Data Cleaning and Removal of Univariate Outliers

The original sample included 86 cases. I began the process of data cleaning by examining the variable Total Number of SART-1 Errors (*err_tot*), because I knew from observing participants that some of them failed to complete the task as instructed. I removed six cases *a priori*, for reasons such as the participant falling asleep, the participant tapping the keyboard repetitively, and the participant getting up and walking out of the room during the experiment. All six cases included a remarkably high number of errors. Next, I examined the data for other outliers and removed two

more cases with scores above the 95th percentile. Finally, I ran this analysis one more time, and removed one additional case. This left a sample of 77 cases with a mean of 7.82 errors and a standard deviation of 6.07. A histogram of the results can be seen in Figure 1. It is notable that the shape of the curve is relatively normal, with a small number of cases clustering at the upper end of the range. I was left with a difficult decision regarding these cases. They were not statistical outliers; however, it appeared that participants in this group were not responding to the task in the same way as most. Therefore, I took the final step of examining the raw data from all cases with 20 or more errors, to look for any patterns in the data that might explain the higher error rates. Only two cases contained two or three errors of omission in a row. Since there was no way to confirm that these series of errors were not due to mind wandering, I made the decision to retain all cases. Next, I looked for missing data and univariate outliers in the remaining variables. One participant was missing a score for CEQ_t2. His CEQ_t1 score was substituted. No other data were removed or altered.

Testing of Assumptions

I began testing the assumptions of linear regression by creating two scatterplot matrices. Visual inspection of the plots yielded no obvious outliers, but I continued with diagnostic tests. A regression equation predicting CEQ_t2 from the four task variables (on_task, tune_out, zone_out, and err_tot) showed a normal distribution of residuals. Next I reran the residual analysis requesting the studentized deleted residual and a list

of those cases for which the studentized deleted residual was greater than two. Three cases met that criterion. I looked at the leverage of these cases; none was high in leverage. However, three other cases were high in leverage. Finally, I looked at the influence of the individual cases using Cook's D. Two of the three cases identified as outliers based on their residuals were determined to have extreme influence (Cook's distance $> .05$ for a sample of 77 participants). Therefore, these cases were removed from further analyses. I then examined the remaining residuals for normality and homoscedasticity. A histogram of residuals looked relatively normal and skewness and kurtosis were within acceptable limits (.311 and -.147, respectively), although the Kolmogorov-Smirnov test was significant ($p=.024$). Finally, I looked at a scatterplot of the predicted values and residuals to evaluate homoscedasticity. The plot showed slightly more variance at the lower end of the distribution than at the higher end.

I tested the collinearity of the independent variables. I suspected that I might find multicollinearity among three of my predictors, *tune_out*, *zone_out*, and *on_task*, because the three variables represented the three choices presented to participants at each thought probe. I checked the tolerance for each of these predictors, as well as for *err_tot*. As expected, *tune_out*, *zone_out*, and *on_task* showed very low tolerance values, indicating multicollinearity; *err_tot*, however, predicted unique variance. The results of this test can be seen in Table 2. Due to the multicollinearity, I decided that I

would not enter these variables into a single equation, but that I would instead run bivariate correlations to test the predictions of my first hypothesis.

Preliminary Analyses

Descriptive statistics for all variables can be found in Table 3. The mean CEQ score on the day of the lab task was 9.97 (SD = 5.24), out of a possible 25 points. This mean is slightly higher than the means established by Merckelbach and colleagues (2001) in their normative samples. It is slightly lower than the mean for the current sample at screening (mean for CEQ_t1 = 10.43, SD = 5.25). The test-retest reliability of the CEQ in this sample was $r = .82$ ($p < .01$) for time periods ranging from one day to approximately one month. The average number of errors during the SART-1 task was 7.61 (SD = 5.89), and reports of being on task or tuned out were far more common than reports of being zoned out. Positive affect was greater than negative affect across all time points, although positive affect showed a notable drop from pre- to post-SART-1. This is not surprising, given the boring nature of the task. Negative affect also dropped following the completion of SART-1, but this drop was not as dramatic.

After examining the means, standard deviations, and frequencies for the independent and dependent variables, I checked to see whether any of these variables was associated with gender or age, so that I could enter age or gender as covariates in the equation if appropriate. T-tests yielded no significant differences for gender, and age did not correlate with any of the outcome variables. I also conducted a

manipulation check, comparing the experimental group (i.e., those instructed to fantasize) to the control group (those given no instructions) on level of self-reported fantasy during SART-2. The difference was significant, $t(73) = 4.43$, $p < .01$. The means for the experimental and control groups were 3.11 (SD= 1.39) and 2.11 (SD=1.31), respectively.

Finally, I tested whether the results of this experiment would align with those of other studies that found associations between dysphoric mood and mind wandering (McVay, Kane, & Kwapil, 2009; Smallwood et al., 2004). I looked at associations between two measures of dysphoric mood, pre-task negative affect (PANAS-NA score) and CES-D score, and two measures of mind wandering during the task, reports of being tuned out or zoned out during SART-1 thought probes. I also looked at the associations between the measures of dysphoric mood and the thought content questions. Unlike in other studies, neither measure of dysphoric mood predicted reports of tune outs or zone outs during the SART-1. However, both correlated significantly with level of worry and level of fantasy during the task. Pre-task negative affect also showed a significant correlation with level of rumination. The correlations between measures of dysphoria and thought content questions are show in Table 4.

Planned Analyses

Hypothesis 1 stated that higher fantasy proneness would be associated with fewer reports of on task thought and more reports of tuning out and zoning out during

the SART-1 thought probes. Kolmogorov-Smirnov (K-S) tests indicated that two of the four variables, *on_task* and *zone_out*, had non-normal distributions. The K-S test for the variable *tune_out* approached significance as well ($p = .06$). Therefore, Spearman's rank-order correlation was used in place of a standard parametric correlation. Results partially supported the hypothesis: Fantasy proneness showed a significant negative correlation with reports of being on task ($\rho = -.33, p < .01$) and a significant positive correlation with reports of zone outs ($\rho = .29, p < .05$). Fantasy proneness was not significantly related to reports of tune outs. Table 5 shows the results of this analysis.

To test Hypothesis 2, which stated that higher fantasy proneness would be associated with more reports of fantasy thought as measured by the thought content questions following SART-1, I examined the bivariate correlation between fantasy proneness (*CEQ_t2*) and the non-normally distributed variable level of fantasy thought during SART-1 (*t1_fanta*). The two variables were significantly correlated ($\rho = .35, p < .01$), supporting the hypothesis. I was curious to know whether fantasy proneness would predict off-task thoughts more generally, and so in a post-hoc analysis I examined the relationship between CEQ score and the other thought variables measured after SART-1, which included self-reported levels of planning, worrying, ruminating, and reminiscing. Additionally, I examined the relationship between CEQ score and a self-report measure of ADHD symptomatology. More details about those analyses can be found in the "Post-Hoc Analyses" section, below.

I used Spearman's rho to test Hypothesis 3, which stated that higher fantasy proneness would be associated with more errors on the SART task. Fantasy proneness was found to correlate with number of task errors ($\rho = .31, p < .01$), and so this hypothesis was supported. In a post-hoc analysis, I examined whether this was true only for errors of commission, the more common type of error in a task of this sort, or whether it would also be the case for errors of omission. Results are reported below.

Finally, I tested the Hypothesis 4, which stated that higher levels of fantasy thought during the SART-2 task would be associated with a greater increase in positive affect and a greater decrease in negative affect from pre- to post-task. I tested the correlations between $t2_fanta$ (self-reported level of fantasy thought during the SART-2 task) and PA_t3t2 (change in positive affect) and NA_t3t2 (change in negative affect). Results showed that level of fantasy during the task correlated with a change in positive affect ($\rho = .38, p < .01$), but not with change in negative affect ($\rho = .10, ns$). To better understand these effects, I looked at mean pre- and post-task PANAS scores for two groups: those who reported little to no fantasy thought during SART-2 (scores of 1 or 2 on the fantasy thought question), and those who reported fantasizing at least "some of the time" (scores of 3, 4, or 5). As seen in Figure 2, the group that reported little to no fantasy thought during the SART-2 showed a decrease in positive affect scores; on the other hand, the group that fantasized showed no change in positive affect. Figure 3 shows that negative affect remained stable for both groups across time. Therefore,

although some change in mood was associated with fantasy thought, the effect was not as hypothesized.

Post-Hoc Analyses

Based on the results of the planned analyses, I decided to conduct exploratory analyses with the hope of better understanding some of the associations between the variables in my study and stimulating ideas for future research. In testing Hypothesis 2, I learned that in the current sample, fantasy proneness, as measured by the CEQ, correlated with self-reported levels of fantasy thought during the first block of the SART (SART-1). To investigate whether fantasy proneness might predict more general mind wandering, as evidenced by other types of off-task thought, I looked at the relationships between CEQ score and responses to the other thought content questions. The only significant correlation was between CEQ score and self-reported worry; the negative relationship indicates that within this sample, fantasy prone individuals reported experiencing fewer worry thoughts during the SART. Results can be seen in Table 6.

To further explore the extent to which fantasy proneness is associated with more general problems with attention, I looked at the relationship between fantasy proneness and likelihood of meeting criteria for ADHD, based on the six screening items in the ASRS (Kessler et al., 2005; Kessler et al., 2007). For this analysis, the variable was coded as "0" for ADHD unlikely (score of 0-3) and "1" for ADHD likely (score of 4-6). Fantasy proneness correlated with self-reported ADHD characteristics ($r = .31, p < .01$).

However, as seen in Table 7, a regression equation including both ADHD and fantasy proneness as predictors shows that each variable contributes unique variance in predicting frequency of on-task thought.

Finally, in testing Hypothesis 3, I learned that higher fantasy proneness scores predicted more frequent errors on the SART-1. I was curious to know whether this would be true specifically for errors of commission, which previous studies have shown to be indicative of automatic responding. To test this, I analyzed the relationship between fantasy proneness, errors of commission (err_com), and errors of omission (err_om). In this sample, fantasy proneness was associated with a greater number of errors of commission; fantasy proneness was not significantly related to errors of omission, though there was a trend in that direction. Results can be seen in Table 8.

Discussion

The study presented here was intended to further probe the construct of fantasy proneness by investigating the extent to which a popular questionnaire measuring fantasy proneness correlates with behavioral measures of attention difficulties and reports of fantasy thought during a mundane laboratory task, the SART. Further, the study aimed to explore a potential mood regulating function of fantasy thought. The first hypothesis to be tested stated that fantasy proneness, as measured by a self-report questionnaire, would correlate with reports of task-unrelated thoughts given at thought probes throughout the SART. Analyses indicated that in this sample, fantasy proneness

was associated with fewer reports of on-task thought, and more reports of “zoning out,” or mind wandering without meta-awareness. Fantasy proneness was not significantly related to “tuning out,” or mind wandering with awareness. This test and a post-hoc test showing associations between fantasy proneness and self-reported characteristics of ADHD suggest that fantasy prone individuals experience more frequent failures of attention. However, these tests do not provide any information as to the type of thought that fantasy prone individuals engaged in when not on task. That question was answered, in part, by tests of the second hypothesis and post-hoc analyses.

The second hypothesis, which stated that fantasy prone individuals would spend more time fantasizing during the SART, was confirmed. A test of that hypothesis plus post-hoc analyses indicated that fantasy prone individuals were more likely to engage in fantasy thought during the SART, but no more likely to engage in the other types of thought measured. Interestingly, similar associations were seen between ADHD self-report ratings and thought content reports: Self-reports of ADHD characteristics correlated with fantasy thought, but not with other types of off-task thought, during the SART. Taken together, the findings above begin to paint a rough sketch of the mental behavior of fantasy prone individuals. These individuals are less likely to pay close attention to external demands, and more likely to get lost in thought, with no meta-awareness that they are doing so. It appears that fantasy proneness and ADHD, as measured by a brief self-report measure, overlap a great deal. Some caveats are in order

for this finding. The rate of “likely ADHD” as measured in this study was 25% of the sample; this is far higher than the estimated prevalence of 4.1% in the adult population (Kessler, Chiu, Demler, & Walters, 2005). This may be due, in part, to the recruitment materials used for this study, which called it a study of “emotion, perception, and daydreaming.” Nevertheless, the association merits further investigation. A regression equation done as a post-hoc analysis in this study showed that characteristics of ADHD and fantasy proneness each predicted unique variance in reported mind wandering, as measured by reports of on-task vs. off-task thoughts during the SART-1. This finding suggests that fantasy proneness and ADHD, while sharing some similarities, are separate phenomena. Future studies should seek to elucidate the similarities and differences between symptoms of ADHD and fantasy proneness.

The third hypothesis, which stated that fantasy proneness would be associated with more errors on the attention task, was also supported. The finding that those who are more fantasy prone are unable to perform a task as well as those who are not as fantasy prone runs counter to some of the early literature on fantasy proneness (e.g., Wilson & Barber, 1981; 1983), in which fantasy prone individuals claimed to be able to simultaneously fantasize and attend to life’s demands. However, whether or not the types of errors seen in this study would correlate with problems in daily life is difficult to determine, because the behavioral context in the current study was somewhat artificial. McVay, Kane, and Kwapil’s (2009) EMA study provides some insight into the

impact of fantasy in a natural context, and these authors found that fantasizing during daily life did predict poorer performance on life tasks. However, they did not measure fantasy proneness per se, and it may be that fantasy prone individuals know when it is acceptable to “zone out” and when it is important to stay tuned in to ongoing events; they may have made a conscious decision to zone out during the arbitrary task of the current study. A future study could test this by increasing the motivation for a strong performance on the SART. If a monetary reward were dependent upon the SART score, all participants might be expected to increase their effort on the task.

Finally, in testing the fourth hypothesis, I found that participants who engaged in fantasy thought during the second section of the SART maintained positive affect from pre- to post-task, whereas those who did not report fantasy thought showed a slight drop in positive affect. Engaging in fantasy thought was not associated with changes in negative affect. These findings were unexpected. I had hypothesized that engaging in fantasy would result in a decrease in negative affect, as well as an increase in positive affect. It appears from this study that fantasy’s effects are confined to the dimension of positive affect. According to Watson, Clark, and Tellegen (1988), high positive affect is characterized by “high concentration, full concentration, and pleasurable energy,” and low positive affect is characterized by “sadness and lethargy.” These definitions may shed some light on why positive affect did not increase during the SART, a boring and repetitive task. On the other hand, fantasizing may have helped

participants from slipping into lethargic feelings by occupying their minds and/or precluding negative thoughts. High negative affect is defined as “subjective distress and unpleasurable engagement” that subsumes numerous states such as anger and fear; low negative affect, on the other hand, is a state of “calmness and serenity.” It may be the case that in the current study, the conditions were not aversive enough to induce high negative affect. Indeed, both pre- and post-task negative affect scores were, on average, lower than the means for Watson, Clark, and Tellegen’s normative sample. The effects of fantasy on mood therefore merit further study, preferably in more naturalistic environments.

The current study had several limitations. First, the small sample size and subsequently lower power may have obscured some relationships. This problem was exacerbated by non-normally distributed variables, which required the use of non-parametric statistics, further decreasing the power to detect significant associations. Therefore, several associations that approached significance in this study, such as the relationship between fantasy proneness and reminiscing during the SART-1, might be statistically significant in a larger sample. Another limitation of the study was its low ecological validity. The attention task shared few characteristics with real-life tasks during which fantasy prone individuals might or might not be impacted by their tendency to lose focus and/or their vivid imaginations. Future studies could further this line of research by employing EMA methods with fantasy prone individuals or using

other naturalistic situations or laboratory tasks that better mirror real-life tasks (e.g., reading or studying). Finally, although the current study increased the number of data sources over the usual self-report-only methods of other fantasy proneness studies, it could have been improved with the addition of psychophysiological data, which has been used effectively in past studies of mind wandering (e.g., Smallwood, J., O'Connor, R. C., Sudberry, M. V., Haskell, C., & Ballantyne, C., 2004).

In summary, the current study applied new techniques for understanding mind wandering to investigate the mental behaviors associated with self-reported fantasy proneness. Several hypotheses were supported, providing evidence that self-reported fantasy proneness is a characteristic that impacts observable behavior and can be studied in a laboratory setting. Future studies investigating the behavior of fantasy prone individuals in other contexts are advisable. These studies would be particularly enlightening if they furthered understanding of the links between fantasy proneness, mental health, and psychiatric disorders.

Tables

Table 1: Thought Content Questions

1.	While working on the perception task, I thought about the rest of my day or upcoming plans.
2.	While working on the perception task, I worried about something that might happen in the immediate or distant future.
3.	While working on the perception task, I thought about happy memories from my past.
4.	While working on the perception task, I thought about something in the past that I wish had gone differently.
5.	While working on the perception task, I was entertained by my imagination, thinking about fantasies.

Table 2: Multicollinearity among thought probe variables

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	36.08	24.09		1.46	.15		
Total Tune Out	-1.72	1.65	-1.17	-1.04	.30	.01	107.18
Total Zone Out	-1.66	1.66	-.92	-1.00	.32	.01	70.64
Total On Task	-2.07	1.67	-1.64	-1.24	.22	.01	146.92
Total Errors	.21	.10	.24	2.09	.04	.90	1.11

Table 3: Descriptive Statistics

Variable	Range	Mean	SD
CEQ_t2 (CEQ score, day of task)	0-23	9.97	5.24
err_tot (Total SART-1 errors)	0-23	7.61	5.89
on_task ("On Task" probe responses, SART-1)	0-15	6.05	4.14
tune_out ("Tuned Out" probe responses, SART-1)	0-15	6.65	3.57
zone_out ("Zoned Out" probe responses, SART-1)	0-11	2.25	2.89
PA_t1 (Positive Affect, Time 1 – Before SART-1)	13-50	26.19	8.24
PA_t2 (Positive Affect, Time 2 – After SART-1)	10-50	21.07	9.16
PA_t3 (Positive Affect, Time 3 – After SART-2)	10-50	20.00	9.03
NA_t1 (Negative Affect, Time 1 – Before SART-1)	10-31	13.67	4.83
NA_t2 (Negative Affect, Time 2 – After SART-1)	10-29	12.35	3.52
NA_t3 (Negative Affect, Time 3 – After SART-2)	10-30	12.40	3.61
t1_fanta (Fantasy Thought during SART-1)	1-5	2.01	1.28
t2_fanta (Fantasy Thought during SART-2)	1-5	2.79	1.51

Table 4: Spearman's correlation coefficients between measures of dysphoria and thought content during SART-1

	NA_t1	CES-D	t1_plan	t1_worry	t1_memor	t1_rumin	t1_fanta
NA_t1	--						
CES-D	.43**	--					
t1_plan	.00	-.05	--				
t1_worry	.24*	.28*	.22	--			
t1_memor	.16	.02	.18	.10	--		
t1_rumin	.37**	.19	.26*	.37*	.41**	--	
t1_fanta	.28*	.27*	.19	.21	.48**	.27*	--

* $p < .05$; ** $p < .01$

Table 5: Spearman's correlation coefficients for fantasy proneness and thought probe variables

	CEQ_t2	on_task	tune_out	zone_out
CEQ_t2	--			
on_task	-.33**	--		
tune_out	.14	-.69**	--	
zone_out	.29*	-.54**	-.08	--

* $p < .05$; ** $p < .01$

Table 6: Spearman's correlation coefficients for fantasy proneness and thought content questions during SART-1

	t1_plan	t1_worry	t1_memor	t1_rumin	t1_fanta
CEQ_t2	.06	-.23*	.18	.02	.35**

* p < .05; ** p < .01

Table 7: Linear regression equation with IVs likelihood of ADHD diagnosis (yes / no) and fantasy proneness and DV frequency of on task thoughts

	B	SE B	β	t	Sig.
(Constant)	8.56	.91			
ADHD_yn	-3.05	1.04	-.32	-2.93	.005
CEQ_t2	-.19	.09	-.25	-2.21	.030

Note: $R^2 = .21$, $p < .01$

Table 8: Spearman's correlation coefficients for fantasy proneness, total SART-1 errors, errors of commission, and errors of omission.

	CEQ_t2	err_tot	err_com	err_om
CEQ_t2	--			
err_tot	.31**	--		
err_com	.26*	.82**	--	
err_om	.20	.61**		--

Figures

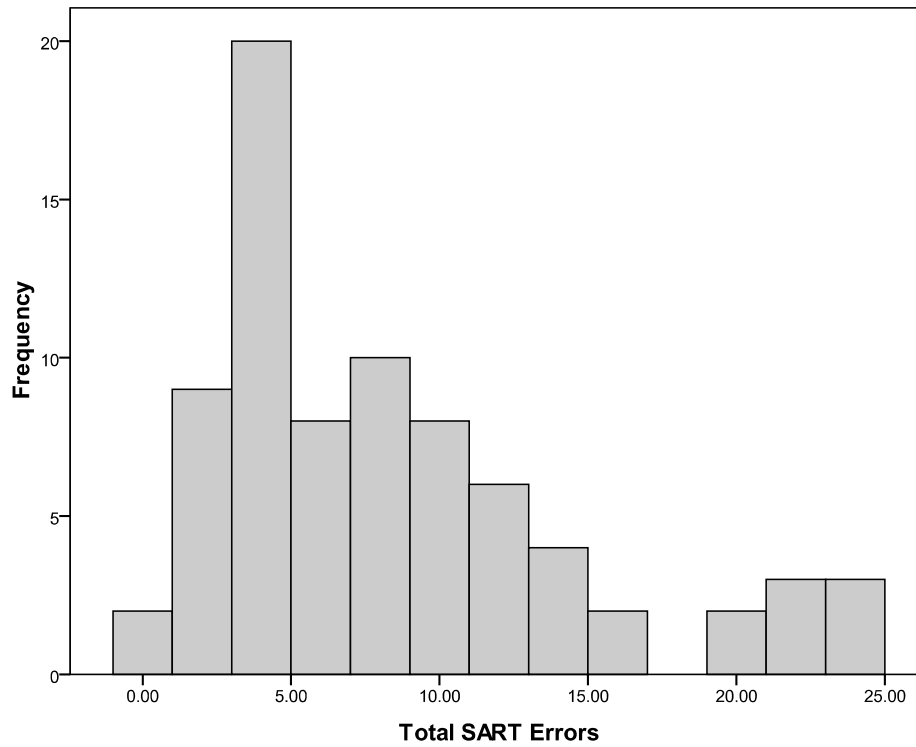


Figure 1: Distribution of the variable SART-1 Errors.

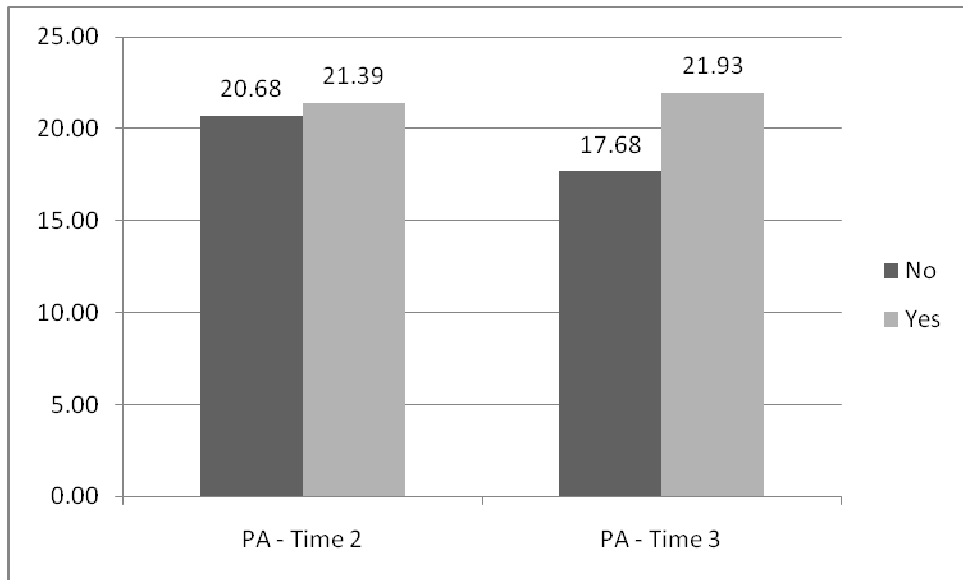


Figure 2: Mean positive affect scores before and after the SART-2 for groups who did and did not report fantasy thought.

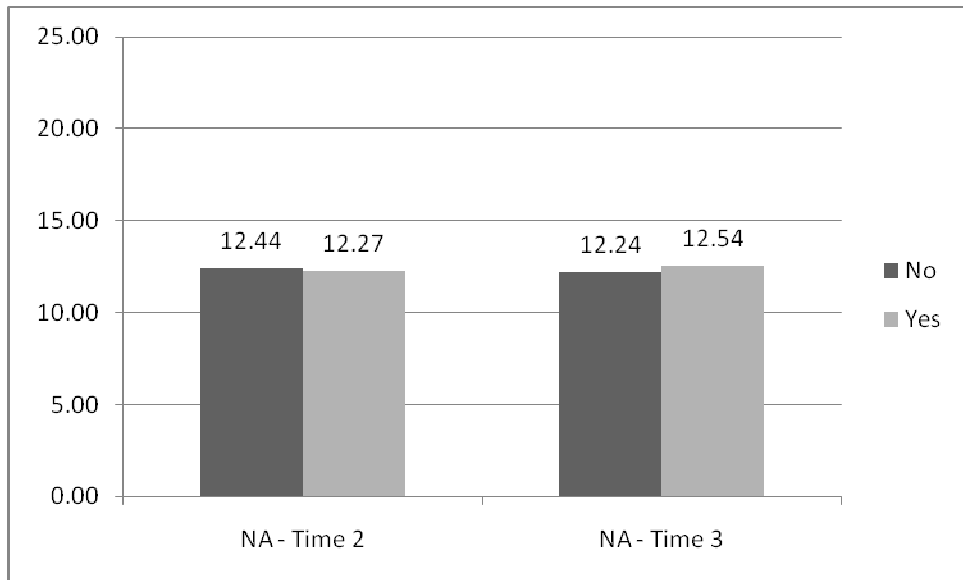


Figure 3: Mean negative affect scores before and after the SART-2 for groups who did and did not report fantasy thought.

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Biography

Prudence Frances Cuper was born in Somerville, New Jersey, in 1971. In 1993 she received a Bachelor of Arts degree in English from James Madison University. Upon completing her degree, Prue moved to Seattle, Washington, where she worked in marketing for several high tech companies and as a senior web producer for a graphic design firm. An interest in psychology led her to enroll in post-baccalaureate courses at the University of Washington and to volunteer as a research assistant. Convinced that she wanted to make a career change, Prue took a job at a training company for mental health professionals and applied to doctoral programs in clinical psychology. She matriculated at Duke University in 2004 and received her Master's Degree in 2008. While at Duke, Prue received conference travel awards, a summer research fellowship, and a subject payment grant from the Duke Interdisciplinary Institute in Social Psychology. She has co-authored one paper in a peer-reviewed journal and several book chapters, and she has presented numerous posters at the annual conventions of the Association for Behavioral and Cognitive Therapies. Prue will complete her clinical internship at Duke University Medical Center in 2011.