Information Processing Deficits in Nonclinical Compulsive Hoarding

Kristin E. Fitch
INFORMATION PROCESSING DEFICITS IN NONCLINICAL COMPULSIVE HOARDING

By

KRISTIN E. FITCH

A Thesis submitted to the Department of Psychology in partial fulfillment of the requirements for the degree of Master of Science

Degree Awarded:
Spring Semester, 2011
The members of the committee approve the thesis of Kristin E. Fitch defended on February 9, 2011.

Jesse R. Cougle
Professor Directing Thesis

Colleen M. Kelley
Committee Member

Norman B. Schmidt
Committee Member

Approved:

Janet Kistner, Chair, Department of Psychology

Joseph Travis, Dean, College of Arts and Sciences

The Graduate School has verified and approved the above-named committee members.
I dedicate this to
my husband, family, and friends
for their support and encouragement.
ACKNOWLEDGEMENTS

I would like to acknowledge my major professor, Dr. Jesse Cougle for his continued support and advice, and my thesis committee members, Dr. Colleen Kelley and Dr. Brad Schmidt for their contributions to this project. I would also like to thank my study experimenters, Beth Gill, Amy Goetz, Bailey Scott, and Sarah Turner for their invaluable help on this study.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables</td>
<td>vi</td>
</tr>
<tr>
<td>Abstract</td>
<td>vii</td>
</tr>
<tr>
<td>1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>2. METHOD</td>
<td>6</td>
</tr>
<tr>
<td>2.1 Participants</td>
<td>6</td>
</tr>
<tr>
<td>2.2 Procedure</td>
<td>6</td>
</tr>
<tr>
<td>2.3 Materials</td>
<td>7</td>
</tr>
<tr>
<td>2.3.1 Clinical interview</td>
<td>7</td>
</tr>
<tr>
<td>2.3.2 Neuropsychological tests</td>
<td>7</td>
</tr>
<tr>
<td>2.3.3 Self-report questionnaires</td>
<td>8</td>
</tr>
<tr>
<td>2.4 Power Analysis</td>
<td>11</td>
</tr>
<tr>
<td>2.5 Data Analytic Strategy</td>
<td>11</td>
</tr>
<tr>
<td>3. RESULTS</td>
<td>12</td>
</tr>
<tr>
<td>3.1 Sample Characteristics</td>
<td>12</td>
</tr>
<tr>
<td>3.2 Self-Report Questionnaires of Cognitive Functioning</td>
<td>13</td>
</tr>
<tr>
<td>3.3 Neuropsychological Tests</td>
<td>14</td>
</tr>
<tr>
<td>4. DISCUSSION</td>
<td>16</td>
</tr>
<tr>
<td>4.1 Limitations and Future Directions</td>
<td>17</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>22</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>26</td>
</tr>
<tr>
<td>BIOGRAPHICAL SKETCH</td>
<td>30</td>
</tr>
</tbody>
</table>
LIST OF TABLES

1. Means (Standard Deviation) of Sample Characteristics ................................................. 19

2. Means (Standard Deviation), Group Differences, and Group Differences when Controlling for Depression, Anxiety, and non-hoarding OCD on Self-report Questionnaires of Cognitive Functioning .......................................................... 20

3. Means (Standard Deviation) Neuropsychological Test Scores for Nonclinical Hoarding and Healthy Control Groups ................................................................. 21
ABSTRACT

Cognitive-behavioral models of compulsive hoarding have identified information processing deficits of categorization and organization, decision-making and indecisiveness, memory, and attention as areas that may contribute to compulsive hoarding symptoms. The purpose of the current study was to determine whether deficits of memory, attention, and indecisiveness found in hoarders are also present in nonclinical hoarders. Participants included 41 nonclinical hoarders (“packrats”) and 50 controls without hoarding symptoms. Participants completed neuropsychological tests of memory, sustained attention, and intelligence as well as a battery of questionnaires assessing various symptoms related to the study hypotheses, including compulsive hoarding, obsessive-compulsive disorder, and attention-deficit/hyperactivity disorder (ADHD). Nonclinical hoarders reported higher levels of indecisiveness, more concern about memory, more ADHD symptoms, and higher levels of impulsiveness on self-report questionnaires; however, they did not display impairments in memory, sustained attention, or impulsiveness on neuropsychological tests. The current study highlights potential risk factors of perceived cognitive deficits in the development of compulsive hoarding.
CHAPTER ONE
INTRODUCTION

Compulsive hoarding is defined as, “(1) the acquisition of, and failure to discard a large number of possessions that appear to be useless or of limited value; (2) living spaces sufficiently cluttered so as to preclude activities for which those spaces were designed; and (3) significant distress or impairment in functioning caused by the hoarding” (Frost & Hartl, 1996). Once thought to be a relatively rare disorder, present only within a subset of individuals with obsessive-compulsive disorder (OCD), current prevalence rates estimate that compulsive hoarding is present in approximately 2 - 5% of the population (Iervolino et al., 2009; Samuels et al., 2008). In addition, it is associated with a significant economic and social burden (Tolin, Frost, Steketee, Gray, & Fitch, 2008), underscoring the necessity for further research in this area.

The cognitive-behavioral model of compulsive hoarding describes hoarding problems as stemming from four main problem areas: exaggerated emotional attachment to possessions, behavioral avoidance of decision-making regarding possessions, erroneous beliefs about possessions, and information processing deficits (Frost & Hartl, 1996; Frost & Steketee, 1999). Emotional attachment to possessions is thought to contribute to avoidance of making decisions regarding discarding and organizing possessions and avoidance of related negative emotions. Erroneous beliefs include a need to maintain control of possessions, excessive responsibility for possessions, and a need for perfection, specifically in making mistakes about possessions. Information processing deficits hypothesized to contribute to hoarding include categorization and organization deficits, decision-making deficits or indecisiveness, memory difficulties, and attention difficulties.

Several aspects of information processing have been examined in compulsive hoarding samples, including categorization and organization, decision-making and indecisiveness, memory, and attention (Grisham, Brown, Savage, Steketee, & Barlow, 2007; Grisham, Norberg, Williams, Certoma, & Kadib, 2010; Hartl, Duffany, Allen, Steketee, & Frost, 2005; Hartl et al., 2004; Lawrence et al., 2006; Tolin & Villavicencio, 2010; Tolin, Villavicencio, Umbach, & Kurtz, 2010; Wincze, Steketee, & Frost, 2007). Underinclusive categorization is thought to contribute to clutter and saving behavior (Frost & Hartl, 1996). That is, compulsive hoarders
may feel that objects cannot be sorted into broad categories due to the unique qualities and importance of each item. This often results in many small categories (piles) of items that are not put away because the hoarder has difficulty determining where the pile should go. Additionally, an item’s unique attributes increase its value, making the discarding process more difficult because the hoarder must first closely examine and consider the irreplaceability of the item before discarding. Hoarders and nonclinical hoarders (packrats) have been found to take longer sorting objects into categories and group objects into many categories, particularly when sorting personal items. (Grisham et al., 2010; Luchian, McNally, & Hooley, 2007; Wincze et al., 2007). This pattern of sorting behavior is suggestive of underinclusive categorization.

Planning and organizational difficulties are also thought to contribute to clutter and saving behavior (Frost & Hartl, 1996). Hoarders have been found to have visual planning and organization difficulties as assessed by the Rey-Osterrieth Complex Figure Test (Osterrieth, 1944) in comparison to psychiatrically healthy individuals, though they do not differ from individuals with OCD in this regard (Hartl et al., 2004; Tolin, Villavicencio et al., 2010). However, when using another test of visual organization, the Hooper Visual Organization Test (Hooper, 1958), Tolin, Villavicencio et al. (2010) found that hoarders were more impaired than individuals with OCD, but no worse than psychiatrically healthy individuals. Recent studies have also found mixed results on tests of planning ability (Grisham et al., 2010; Tolin, Villavicencio et al., 2010). In addition, no deficits have been found in hoarders in semantic clustering on verbal tasks (Hartl et al., 2004). Taken together, it appears that hoarders may be impaired on tests of visual planning and organization but not on verbal tasks.

Decision-making deficits and indecisiveness are hypothesized to contribute to clutter and saving behavior due to difficulties deciding which objects to keep or discard. Decision-making deficits may be related to avoidance of making decisions about discarding due to fear of mistakes and consequences of discarding (Frost & Hartl, 1996). In addition, these deficits may be related to excessive indecisiveness, which has also been found in hoarders (Frost & Gross, 1993; Grisham et al., 2010) and nonclinical hoarders (Luchian et al., 2007). Research on decision-making has produced mixed results. Lawrence et al. (2006) found impairments in decision-making in patients with OCD with hoarding compared to OCD patients without hoarding; however, Grisham et al. (2007; 2010) found no group differences on decision-making tasks between hoarding participants and clinical and psychiatrically healthy participants. These
equivocal results may be due to diagnostic differences in the samples as both studies conducted by Grisham included individuals who reported hoarding as their primary symptom, whereas Lawrence et al. selected a subgroup of individuals with OCD who also reported hoarding symptoms. Grisham et al. (2010) proposed that the discrepancy between reported indecisiveness and unimpaired performance on tests of decision-making may be due to minimal emotional salience or personal relevance evoked by tests of decision-making. Similarly, it is possible that difficulties in decision-making are influenced by emotional responses to possessions and not due to neuropsychological deficits (Tolin, Villavicencio et al., 2010).

Perceived and actual memory problems are hypothesized to influence clutter and saving behaviors as well (Frost & Hartl, 1996). Hoarders may have a lack of confidence in their memory that results in a need for visual cues, preventing hoarders from putting items away. In addition, hoarders may overestimate the importance of remembering information and worry about an inability to recall information if they cannot refer to the item once it has been discarded. Hartl et al. (2004) found that compulsive hoarders recall less information on spatial and verbal tasks; however, these results were not replicated in a recent study by Tolin, Villavicencio et al. (2010). In addition to actual deficits, Hartl et al. found that hoarders have less confidence in their memory, more catastrophic assessments of the consequences of forgetting where they placed possessions, and a stronger desire to keep possessions in their sight than psychiatrically healthy controls. Hartl and colleagues indicated that spatial memory deficits are not explained by memory confidence; however, poor memory confidence may contribute to verbal recall deficits. They speculated that these actual spatial memory deficits might lead to broad concerns regarding the adequacy of memory, which in turn negatively impacts verbal memory. To our knowledge, this hypothesis has not been empirically tested and it is possible that poor memory confidence could be a consequence of verbal memory deficits.

The last proposed deficit in the cognitive-behavioral model of compulsive hoarding concerns attention difficulties. Frequent shifting of attention may result in indecision about discarding items or difficulty in following through with organization and discarding (Grisham & Barlow, 2005). Hoarders have been found to have more attention-deficit/hyperactivity disorder (ADHD) symptoms than community controls (Grisham et al., 2007; Grisham et al., 2010; Hartl et al., 2005; Tolin, Villavicencio et al., 2010) and worse spatial attention than clinical and psychiatrically healthy participants (Grisham et al., 2007). Also, hoarders have been found to
have difficulties with sustained attention and impulsivity on continuous performance tests (CPT). Grisham et al. (2007) found that hoarders had more difficulty initiating response (slow and variable reaction time), difficulty inhibiting pre-potent responses (more errors of commission, which suggests impulsivity), and greater difficulty distinguishing targets and nontargets than clinical and psychiatrically healthy participants on the CPT. Tolin, Villavicencio et al. (2010) found similar results such that hoarders had slower response time for correct responses than psychiatrically healthy individuals; however, their response time did not differ from that of individuals with OCD. They determined that 23% of hoarders, compared to 11% of individuals with OCD and 4% of healthy controls, scored in the impaired range on CPT hit response time (Odds Ratio = 5.14 for hoarding vs. non-hoarding participants). In addition, Tolin, Villavicencio et al. did not replicate the findings of Grisham et al. (2007) on errors of commission. These apparent difficulties in sustained attention are consistent with clinical observations suggesting hoarders have difficulty staying focused on tasks and are easily distracted.

If information processing deficits found in compulsive hoarders are related to the etiology of hoarding, these deficits may be detectible in nonclinical hoarders. The presence of such deficits in a younger sample of nonclinical hoarders may implicate them as risk factors for the development of compulsive hoarding later on in life. In addition, if information processing deficits are found in nonclinical hoarders, this would provide researchers with more confidence in the use of such populations for gaining insight into compulsive hoarding.

The current study sought to assess for the presence of information processing deficits of memory, attention, and indecisiveness in an undergraduate sample of nonclinical hoarders. We thought the use of this sample was appropriate, given recent research demonstrating the dimensionality of hoarding symptoms (Timpano, Broman-Fulks, Olatunji, Schmidt, & Wilhelm, 2010). In addition, although recognition of hoarding symptoms as problematic does not typically occur until age 30 - 40, mild symptoms are often reported during teenage years and moderate symptoms are reported in the early-to mid-20s (Grisham, Frost, Steketee, Kim, & Hood, 2006). Mild to moderate hoarding symptoms are likely to be present in a subsample of undergraduate students. We hypothesized that nonclinical hoarders would exhibit similar deficits as hoarders. Specifically, we proposed that: (a) despite demonstrating comparable levels of intelligence, nonclinical hoarders would have more difficulties with sustained attention, impulsivity, memory, and indecisiveness, and more ADHD symptoms than a control group with no hoarding
symptoms; and (b) severity of hoarding would be correlated with poor performance on neuropsychological tasks. Support for these hypotheses would provide further evidence for the cognitive-behavioral model of compulsive hoarding.
CHAPTER TWO

METHOD

2.1 Participants

Participants were recruited from the General Psychology class (PSY 2012) and advanced undergraduate psychology courses at Florida State University from Fall 2009 to Fall 2010 semesters. Students completed three items from the Hoarding Rating Scale-Self-Report (HRS-SR, Tolin, Frost, Steketee, & Fitch, 2008) at the beginning of each semester as part of a general prescreening questionnaire battery. The HRS-SR consists of 5 Likert-type ratings from 0 (none) to 8 (extreme) of clutter, difficulty discarding, excessive acquisition, distress, and impairment used to determine diagnosis and severity of compulsive hoarding. The HRS-SR has shown high internal consistency (Tolin, Frost, Steketee, & Fitch, 2008). The current study used items on clutter, difficulty discarding, and excessive acquisition as screening items. Severity of hoarding was determined by calculating the mean of all items, with 0 = no hoarding symptoms, 2 = mild hoarding, 4 = moderate hoarding, 6 = severe hoarding, and 8 = extreme hoarding.

Participants were recruited for two different groups: a nonclinical hoarding group (N = 41) and a control group (N = 50). Students who scored an average of 4 (moderate) or greater or 0 (none) on the HRS-SR screening items were recruited for the nonclinical hoarding group and the control group, respectively. Students were contacted via email to participate in a study that assesses memory, attention, and intelligence, for which they were eligible to receive two course credit hours for participating. Interested participants were instructed to sign up for an available study slot on the departmental website.

2.2 Procedure

Upon arrival to the lab, participants completed the informed consent process. Participants were then asked to complete additional screening items and were excluded from participation if they reported a history of (a) a head injury resulting in a loss of consciousness of more than 30 minutes, (b) a neurological disorder or medical condition likely to impact neuropsychological test performance (i.e. stroke, multiple sclerosis, epilepsy), or (c) mental retardation, a pervasive
developmental disorder, bipolar disorder, or schizophrenia. In order to confirm appropriate placement in either the nonclinical hoarding or control group, participants were interviewed using the Hoarding Rating Scale-Interview (HRS-I, Tolin, Frost, & Steketee, 2010) by the principal investigator. Next, participants completed a neuropsychological test battery administered by an undergraduate research assistant trained by the principal investigator. This battery included the California Verbal Learning Test-2nd edition (CVLT-II, Delis, Kramer, Kaplan, & Ober, 2000), followed by the PEBL Continuous Performance Test (PCPT, Mueller, S. T., 2008) during the delay interval of the CVLT-II. The Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV, Wechsler, 2008) Matrix Reasoning and Vocabulary subtests were administered next. A computerized questionnaire battery was completed after the neuropsychological test battery to minimize fatigue during the neuropsychological tests.

2.3 Materials

2.3.1 Clinical interview

Hoarding Rating Scale-Interview (HRS-I, Tolin, Frost et al., 2010): The HRS-I is a semi-structured interview used to determine diagnosis and severity of compulsive hoarding. It consists of 5 Likert-type ratings from 0 (none) to 8 (extreme) of difficulty using living spaces due to clutter, difficulty discarding possessions, excessive acquisition of objects, emotional distress due to hoarding behaviors, and impairment in functioning due to hoarding behaviors. A total score is derived by summing the five items. The HRS-I has been shown to have excellent internal consistency and test-retest reliability varied by time and context (α=.96 – .97). The principal investigator conducted the HRS-I in the current study to confirm appropriate group placement and to ensure the experimenter remained blind to group placement.

2.3.2 Neuropsychological tests

California Verbal Learning Test-2nd edition (CVLT-II, Delis et al., 2000): The CVLT-II is a list learning task that assesses ability to learn words over successive learning trials and ability to recall words immediately and after a 20 minute delay. It has been found to have good internal consistency (Delis et al., 2000). Previous research with compulsive hoarders and healthy controls has reported a total score of words recall from trials 1 to 5 of 63 and 58, respectively (Tolin, Villavicencio et al., 2010). It was included in the current study to assess memory, which is thought to be deficient in compulsive hoarding.
The PEBL Continuous Performance Test (PCPT, Mueller, S. T., 2008): The PCPT is a computer-based measure of sustained attention that measures consistency of performance and ability to suppress impulsive responses. Participants press a button for each letter presented to them except for X. The test measures errors of omission (failure to press button for a letter except for X), errors of commission (press button when presented with X), and hit reaction time. It was included in the current study to assess specific information processing deficits thought to be found in individuals with compulsive hoarding, including sustained attention and impulsivity.

Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV, Wechsler, 2008): WAIS-IV Matrix Reasoning and Vocabulary subtests were included to provide estimates of nonverbal and verbal intelligence, respectively. The Matrix Reasoning subtest is a measure of perceptual reasoning, during which participants are shown an incomplete matrix or series and are asked to select the response which completes the matrix or series. Participants are shown up to 26 items. This subtest has been found to have reliability coefficients ranging from .86 to .94 (Wechsler, 2008). The WAIS-IV Vocabulary subtest measures verbal comprehension. Participants are asked to define the words presented visually and orally (e.g. curious). Participants are asked to define up to 30 words. It has been found to have reliability coefficients ranging from .93 to.96 (Wechsler, 2008). We did not expect differences in intelligence between the nonclinical hoarding and control groups, so these measures were included in the current study to demonstrate the specificity of the expected information processing deficits.

2.3.3 Self-report questionnaires

Frost Indecisiveness Scale (FIS, Frost & Shows, 1993): The FIS is a 15-item self-report questionnaire that measures fears about making the wrong decision and positive attitudes about decision-making. It has been found to have good internal reliability (Frost & Shows, 1993). Internal consistency in the current sample was good (α = .91). Previous research has demonstrated overall mean scores of 50.12 and 35.53 for hoarding and healthy control samples, respectively (Steketee, Frost, & Kyrios, 2003). It was included in the current study to assess whether the nonclinical hoarding group has more difficulty with decision-making than the control group.

Memory and Cognitive Confidence Scale (MACCS, Nedeljkovic & Kyrios, 2007): The MACCS is a 28-item self-report questionnaire assessing perceptions and beliefs about memory and other cognitive processes. It has four subscales assessing confidence in general memory
(MACCS-GEN), confidence in decision-making and planning abilities (MACCS-DEC), confidence in concentration and attention (MACCS-CON), and perfectionistic beliefs about cognitive performance (MACCS-PER). The MACCS total scale and subscales have demonstrated adequate to good internal consistency (Nedeljkovic & Kyrios, 2007; Nedeljkovic, Moulding, Kyrios, & Doron, 2009). Internal consistency in the current study was adequate to excellent (MACCS-total $\alpha = .94$, MACCS-GEN $\alpha = .95$, MACCS-DEC $\alpha = .89$, MACCS-CON $\alpha = .88$, and MACCS-PER $\alpha = .74$). We are unaware of the use of the MACCS in hoarding sample; however, it has been previously used with individuals with OCD (Nedeljkovic & Kyrios, 2007). Mean scores of 96.06, 48.00, 17.56, 14.19, and 16.31 have been found on the MACCS-total, MACCS-GEN, MACCS-DEC, MACCS-CON, and MACCS-PER, respectively in samples of OCD patients and mean scores of 61.35, 30.71, 11.03, 8.61, and 11.00 have been found on the MACCS-total, MACCS-GEN, MACCS-DEC, MACCS-CON, and MACCS-PER, respectively in samples of healthy controls (Nedeljkovic & Kyrios, 2007). It was included in the current study to determine whether the nonclinical hoarding group has more concerns about memory and cognitive processes than the control group.

Attention deficit/hyperactivity disorder symptoms scale (ADHDSS, Barkley & Murphy, 1998): The ADHDSS is a 36-item self-report questionnaire with four subscales: Adult Inattention, Adult Hyperactivity/Impulsivity, Child Inattention, and Child Hyperactivity/Impulsivity. The ADHDSS has shown excellent internal consistency ($\alpha = .97$) (Barkley & Murphy, 1998). Internal consistency for the subscales in the current study was good (Adult Inattention $\alpha = .88$, Adult Hyperactivity/Impulsivity $\alpha = .81$, Child Inattention $\alpha = .89$, Child Hyperactivity/Impulsivity $\alpha = .85$). Overall means for the Adult Inattention and Hyperactivity/Impulsivity subscales ranging from 19.06 to 23.46 and 3.47 to 8.80 have been found in hoarding and healthy control samples, respectively (Grisham et al., 2010; Hartl et al., 2005; Tolin & Villavicencio, 2010). In addition, overall means for the Child Inattention and Hyperactivity/Impulsivity subscales of 12.27 and 3.68 have been found in hoarding and healthy control samples, respectively (Hartl et al., 2005). It was included in the current study to determine whether the nonclinical hoarding group has more ADHD symptoms than the control group.

The Barratt Impulsiveness Scale Version 11 (BIS-11, Patton, Stanford, & Barratt, 1995): The BIS-11 is a 30-item self-report questionnaire with three subscales: non-planning impulsivity,
motor impulsivity, and attentional impulsivity. It has been found to have good internal reliability (Patton et al., 1995). Internal consistency for the current study was adequate (Non-planning impulsivity $\alpha = .68$, Motor Impulsivity $\alpha = .68$, Attentional Impulsivity $\alpha = .79$). We are unaware of the use of the BIS-11 in a pure hoarding sample; however, in a sample of compulsive buyers with hoarding symptoms, A. Mueller et al. (2007) found an overall mean score of 85.8. In addition, an overall mean score of 62.3 has been found for community controls (Stanford et al., 2009). Individuals scoring lower than 52 are typically over-controlled, between 52 and 71 are in the normal range, and 72 or higher are highly impulsive (Stanford et al., 2009). The BIS-11 was included in the current study to supplement the findings from the PCPT on motor and attentional impulsivity.

**Saving Inventory-Revised (SI-R, Frost, Steketee, & Grisham, 2004):** The SI-R is a 23-item self-report questionnaire that measures excessive clutter, difficulty discarding, and excessive acquisition. It has been found to have good internal consistency and test-retest reliability, as well as concurrent and divergent validity in both hoarding and nonhoarding samples (Frost et al., 2004). Internal consistency for the current sample was excellent ($\alpha = .92$). Overall means ranging from 60.10 to 64.10 and 5.41 to 19.80 have been found in hoarding and healthy control samples, respectively (Grisham et al., 2010; Tolin & Villavicencio, 2010). It was included in the current study to assess hoarding severity.

**Depression Anxiety Stress Scales (DASS-21, Lovibond & Lovibond, 1995):** The DASS-21 is a 21-item self-report questionnaire with three subscales: depression, anxiety, and stress. It has been found to have good discriminant validity, concurrent validity, and internal consistency (Antony, Bieling, Cox, Enns, & Swinson, 1998). Internal consistency in the current sample was adequate to good (Depression $\alpha = .85$, Anxiety $\alpha = .79$). Scores of 13 and lower on the Depression subscale and 9 and lower on the Anxiety subscale are considered to be in the mild to normal range (Lovibond & Lovibond, 1995). The Depression and Anxiety subscales were included in the current study to control for general distress in group comparisons.

**Obsessive-Compulsive Inventory-Revised (OCI-R, Foa et al., 2002):** The OCI-R is a 18-item self-report questionnaire of severity of OCD symptoms with six subscales: washing, checking, obsessing, hoarding, neutralizing, and ordering. It has been found to have good internal consistency, test-retest reliability, and convergent and divergent validity with clinical and nonclinical samples (Foa et al., 2002). In the current study, the washing, checking,
obsessing, neutralizing and ordering subscales were used to control for non-hoarding OCD symptoms in group comparisons. Internal consistency was excellent in the current study for total score omitting hoarding items (α = .91). Tolin & Villavicencio (2010) found total scores omitting hoarding items of 10.13 and 1.50 for hoarding and healthy control participants, respectively.

Sheehan Disability Scale (SDS, Sheehan, D. V., Harnett-Sheehan, & Raj, 1996): The SDS is a three item self-report questionnaire that assesses current impairment in the following areas: work and schoolwork, social life and leisure activities, and family life and home responsibilities on a scale from 0 (not at all) to 10 (very severely). Internal consistency has been found to be adequate in previous research (Sheehan, K. H. & Sheehan, 2008); however, it was found to be good (α = .87) in the current study. The current study phrased the questions as related to symptoms of hoarding (e.g. “Because of my problems with clutter, problems discarding, or problems with buying or acquiring things, my work/schoolwork is impaired;”). In previous research, compulsive hoarders have been found to have an overall mean score of 17, which is in the moderate range of impairment (Ayers, Saxena, Golshan, & Wetherell, 2010).

2.4 Power Analysis

Effect sizes in past research of memory and attention in compulsive hoarding samples (Grisham et al., 2007; Hartl et al., 2005; Hartl et al., 2004) have mainly been medium-large to large. Using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), we conducted a priori power analyses, which estimated a sample size of 80 participants total (40 in each group) as sufficient to detect medium-large (f = 0.32) effects (α = 0.05, power = 0.80)

2.5 Data Analytic Strategy

ANOVA were conducted to assess for differences between the nonclinical hoarding group and the control group on neuropsychological tests. In addition, in order to assess the specificity of the relationships between hoarding symptoms and information processing deficits, a series of ANCOVA were carried out that covaried for anxiety, depressive, and obsessive-compulsive symptoms. Further, correlational analyses were conducted to assess the potential relationship between hoarding severity and performance on neuropsychological tasks.
CHAPTER THREE

RESULTS

3.1 Sample Characteristics

The nonclinical hoarding and control groups did not differ on age, gender, race, handedness, or number of semesters of college completed (see Table 1). The mean age of the overall sample was 19.11 ($SD = 2.04$) and 50 participants (55%) were female. As expected, the nonclinical hoarding group reported a SI-R score that was somewhat lower than scores reported for compulsive hoarders in previous studies (Grisham et al., 2010; Tolin & Villavicencio, 2010). In addition, the SI-R score for the nonclinical hoarding group was significantly higher than those of the control group. The nonclinical hoarding group also scored significantly higher than the control group on DASS depression and DASS anxiety subscales, although scores for both groups fell in the mild to normal range on these measures. Similarly, the nonclinical hoarding group scored higher than the control group on the (non-hoarding) OCI-R. Of note, scores on this measure were somewhat higher than scores reported for hoarding and healthy control groups in prior research (Tolin & Villavicencio, 2010). Further examination of descriptive statistics of (non-hoarding) OCI-R indicated that the variable was leptokurtic (2.13). A log transformation of the (non-hoarding) OCI-R total score was conducted to adjust for kurtosis. Group differences in non-hoarding OCD symptoms remained significant when using the transformed variable, $F (1, 89) = 41.54, p < 0.001$.

The nonclinical hoarding group also reported significantly higher impairment due to hoarding symptoms than the control group on the SDS, and as expected, impairment scores for the nonclinical hoarding group fell in the mild range, which is notably lower than impairment scores reported by compulsive hoarders in previous research (Ayers et al., 2010). Further examination of descriptive statistics of SDS indicated that the variable had positive skew (2.25) and was leptokurtic (4.44). A log transformation of the SDS total score was conducted to adjust for skewness and kurtosis. Group differences in impairment due to hoarding symptoms remained significant when using the transformed SDS variable, $F (1, 86) = 64.79, p < 0.001$. Analyses of SI-R, DASS subscales, OCI-R, and SDS were complicated by heterogeneity of variance. We ran
additional t-tests with equal variance not assumed and the direction and significance of findings did not change.

### 3.2 Self-Report Questionnaires of Cognitive Functioning

The two groups were also compared on self-report questionnaires of indecisiveness, confidence in memory and cognitive functioning, ADHD symptoms, and impulsiveness (see Table 2). As expected, the nonclinical hoarding group reported significantly higher levels of indecisiveness than the control group and had notably similar scores to those found among compulsive hoarders (Steketee et al., 2003). On a measure of confidence in memory and cognitive functioning, the nonclinical hoarding group reported more concerns regarding confidence in general memory, confidence in decision-making and planning abilities, confidence in concentration and attention, and cognitive perfectionism, in comparison to controls. Subscale scores on the MACCS were slightly lower for the nonclinical hoarding group and similar for the control group in comparison to samples of OCD patients and healthy controls, respectively (Nedeljkovic & Kyrios, 2007).

With regards to ADHD symptoms, the nonclinical hoarding group reported more inattention and hyperactivity/impulsivity symptoms both as an adult and child. Total scores for the adult subscales for the nonclinical hoarding and control groups were similar to scores reported in previous research in compulsive hoarding and healthy control samples, respectively (Grisham et al., 2010; Hartl et al., 2005; Tolin & Villavicencio, 2010). Total scores for the childhood subscales for the nonclinical hoarding and control groups were higher than scores reported in previous research in these samples (Hartl et al., 2005). Similarly, the nonclinical hoarding group scored higher than the control group on scales of nonplanning, motor, and attentional impulsivity; however, scores for both groups fell within the normal range (Stanford et al., 2009). Analyses of FIS, MACCS- GEN, MACCS- DEC, and ADHDSS adult subscales were complicated by heterogeneity of variance. We ran additional t-tests with equal variance not assumed and the direction and significance of findings did not change.

In order to determine whether group differences in self-reported cognitive deficits were better accounted for by general distress and non-hoarding OCD symptoms, additional sets of group comparisons were conducted to assess for group differences on the FIS, MACCS, ADHDSS, and BIS while covarying for depression, anxiety, and non-hoarding OCD symptoms.
(Table 2). After controlling for general distress and non-hoarding OCD symptoms, the nonclinical hoarding group was found to have significantly higher levels of indecisiveness, more concerns about confidence in decision-making and planning abilities, more concerns about confidence in concentration and attention, greater adult inattention and hyperactivity/impulsivity symptoms, and higher scores of nonplanning and attentional impulsivity. Group differences no longer remained significant on measures of confidence in general memory, cognitive perfectionism, childhood inattention and hyperactivity/impulsivity, and motor impulsivity; however, there were non-significant trends that the nonclinical hoarding group had lower confidence in general memory ($p = 0.07$) and more symptoms of childhood hyperactivity/impulsivity ($p = 0.08$) after covarying for general distress and non-hoarding OCD symptoms.

### 3.3 Neuropsychological Tests

Groups were also compared on performance on neuropsychological tests, which is displayed in Table 3. WAIS-IV Matrix Reasoning subtest data was excluded for two participants due to participant colorblindness ($N = 1$) and administration error ($N = 1$). WAIS-IV Vocabulary subtest data was excluded for eight participants due to administration error. PCPT data were excluded for four participants due to technical difficulties resulting in lost data ($N = 1$), duration of task completion exceeded 20 minutes ($N = 1$), and failure to respond to all stimuli ($N = 2$). As expected, there were no group differences on estimates of nonverbal and verbal intelligence (WAIS-IV Matrix Reasoning or Vocabulary subtests).

Contrary to predictions, there were no significant group differences on tests of sustained attention (PCPT HRT) and impulsivity (PCPT commission errors); however, there was a non-significant trend such that the hoarding group had more errors of omission on the PCPT, $F(1, 85) = 3.41, p = .07$. Further examination of descriptive statistics for total errors of omission indicated that the variable had positive skew (2.40) and was leptokurtic (7.37). A log transformation of this variable was conducted to adjust for skewness and kurtosis. A non-significant trend of the hoarding group making more errors of omission remained when using the transformed variable; however, the magnitude of the difference decreased, $F (1, 85) = 2.87, p = 0.09$). No group differences emerged on a test of verbal memory (CVLT-II indices). Of note, participants in both the nonclinical hoarding and control groups in the current study recalled fewer words ($M = 53.61$)
and $M = 50.62$, respectively) than in previous research with compulsive hoarders and healthy controls ($M = 63$ and $M = 58$, respectively) (Tolin, Villavicencio et al., 2010). Non-significant findings on the PCPT and CVLT-II indices did not change when covarying for anxiety, depression, and non-hoarding OCD.

We also examined whether severity of hoarding symptoms, assessed using the SI-R total and subscales scores, was correlated with neuropsychological task performance on the CVLT-II and the PCPT. We conducted these analyses by collapsing both groups together and by examining correlations within the nonclinical hoarding group. When examining the nonclinical hoarding group alone, we found a significant negative correlation ($r = -0.33, p < 0.05$) between errors of commission on the PCPT and clutter symptoms, indicating that increased clutter was associated with fewer errors of commission; this was the opposite of what we hypothesized. We found several additional non-significant trends. Specifically, when examining the nonclinical hoarding group, we found a positive correlation ($r = 0.28, p = 0.09$) between hit reaction time on the PCPT and clutter symptoms in the expected direction. In addition, when examining the overall sample, we found several non-significant trending correlations that were contrary to our hypotheses such that more words recalled on the CVLT-II were associated with greater hoarding symptoms. Specifically, acquisition symptoms were positively associated with indices of the CVLT-II including trial 1 recall ($r = 0.19, p = 0.07$), trials 1 – 5 total free recall ($r = 0.20, p = 0.06$), and short delay free recall ($r = 0.19, p = 0.07$). Similarly, saving symptoms were positively associated with CVLT trial 1 free recall ($r = 0.18, p = 0.09$). Neither SI-R total nor subscale scores were significantly correlated with other indices of performance on neuropsychological tasks, $ps > .10$. 
CHAPTER FOUR

DISCUSSION

The hypothesis that actual information processing deficits of attention and memory, found previously in compulsive hoarders, would be evident among nonclinical hoarders was not supported by the current study. However, the current study demonstrates that nonclinical hoarders perceive themselves as having deficits in decision-making, attention, and memory in comparison to control participants without hoarding symptoms.

Consistent with previous research (Frost & Gross, 1993; Grisham et al., 2007; Grisham et al., 2010; Hartl et al., 2005; Hartl et al., 2004; Luchian et al., 2007; Tolin & Villavicencio, 2010) and the cognitive behavioral model of compulsive hoarding (Frost & Hartl, 1996; Frost & Steketee, 1999), the nonclinical hoarding group reported higher levels of indecisiveness, more concerns about memory, more symptoms of ADHD, and higher impulsivity, in comparison to a nonhoarding control group. Although members of this group reported symptoms of compulsive hoarding that were not in the clinical range, scores on measures of indecisiveness and current ADHD symptoms were comparable to levels reported in previous research with compulsive hoarding samples (Grisham et al., 2010; Hartl et al., 2005; Steketee et al., 2003; Tolin & Villavicencio, 2010). With the exception of ADHD symptoms experienced as children, cognitive perfectionism, and concerns about general memory, group differences found on self-report measures were not attributable to group differences in general distress and non-hoarding OCD symptoms.

Consistent with our hypothesis, the nonclinical hoarding and control groups did not display differences in estimated verbal and nonverbal intelligence. In contrast, expected group differences on tests of memory and attention were not supported by the current study. Previous research (Hartl et al., 2004) demonstrated that compulsive hoarders have more difficulty on tests of spatial and verbal memory, but recently, Tolin, Villavicencio et al. (2010) were not able to replicate these findings. The current study utilized the same measure of verbal memory as Tolin, Villavicencio et al., which is a later version of the test used by Hartl. (2004). Also in contrast to previous research (Grisham et al., 2007; Tolin, Villavicencio et al., 2010), the nonclinical hoarding group did not display slower reaction time on a continuous performance test than the
control group, which would have been indicative of deficits of sustained attention. Similarly, we did not find group differences on errors of commission, which are indicative of impulsivity and have been found in previous research (Grisham et al., 2007). Of note, this finding was not replicated in the recent study by Tolin, Villavicencio et al.

Previous research suggests that compulsive hoarders have difficulty with sustained attention, which is consistent with clinical observations that they have difficulty staying focused on tasks; however, it does not appear that this deficit is evident in nonclinical groups. It is unclear at this time whether verbal memory deficits are present among compulsive hoarders and it appears to be unlikely that they are present among nonclinical groups. Self-reported perceptions of indecisiveness and ADHD symptoms appear to be present in both compulsive hoarding and nonclinical hoarding samples at similar levels of perceived impairment. Similarly, both compulsive hoarders and nonclinical hoarders have reported concerns with memory. The presence of similarities between compulsive hoarders and nonclinical hoarders on perceptions of indecisiveness, ADHD symptoms, and memory implicate these perceptions as possible risk factors for the development of compulsive hoarding.

As discussed by Grisham (2010) and Tolin, Villavicencio et al. (2010), actual difficulties in making decisions about discarding possessions may be influenced by emotional responses to possessions rather than a deficit in decision-making. Similarly, perceptions of poor memory may itself contribute to clutter and difficulty discarding as this may result in a need to keep possessions in view, even if actual memory deficits are not present. It is also possible that neuropsychological deficits in memory and attention, previously found in compulsive hoarding samples, emerge later in life potentially as part of normal declines in cognitive functioning. The presence of these deficits, in combination with vulnerabilities identified among nonclinical hoarders in the current study, including perceptions of indecisiveness, poor memory, ADHD symptoms, and impulsiveness, may contribute to the emergence of clinically significant hoarding symptoms.

4.1 Limitations and Future Directions

One limitation of the current study was that we did not conduct structured diagnostic interviews to confirm that the control group had no psychiatric diagnoses; however, we did conduct interviews to evaluate the presence of hoarding symptoms. If psychiatric conditions
were present in the control group, this could have minimized group differences in information processing deficits that may be related to other psychiatric conditions. However, we did statistically control for depression, anxiety, and non-hoarding OCD symptoms in subsequent analyses of self-report measures, which indicated that the nonclinical hoarding group had significantly higher levels of indecisiveness, more concerns about confidence in decision-making and planning abilities, more concerns about confidence in concentration and attention, greater adult inattention and hyperactivity/impulsivity symptoms, and higher scores of nonplanning and attentional impulsivity after controlling for general distress and non-hoarding OCD symptoms.

A second limitation was that we did not inquire about medications participants had recently taken that could have enhanced or diminished performance on neuropsychological tests; however, participants had not consumed alcohol or illicit substances within 24 hours prior to participating in the study. Although recent research has demonstrated the dimensionality of hoarding symptoms (Timpano et al., 2010) and mild hoarding symptoms are often reported during teenage years, it is possible that the sample utilized in the current study was too young to experience mild to moderate hoarding symptoms.

Future research should utilize a broader battery of neuropsychological tests that assess the presence of deficits in nonverbal memory, categorization, planning, organization and decision-making among nonclinical hoarders in addition to tasks that are particularly relevant to hoarding symptoms. Additionally, longitudinal research should be conducted to track the development of hoarding symptoms and to identify potential risk factors for hoarding.

Currently, there is little known about the etiology of compulsive hoarding and potential risk factors for the development of the disorder. This is the first study that we are aware of that evaluated information processing deficits of memory and attention in nonclinical hoarding samples. Research of this nature is instrumental in developing prevention programs for compulsive hoarding and in gaining insight into the development of hoarding symptoms.
### Table 1

**Means (Standard Deviation) of Sample Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Nonclinical Hoarding (N = 41)</th>
<th>Healthy Control (N = 50)</th>
<th>F</th>
<th>Partial $\eta^2$</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18.73 (1.12)</td>
<td>19.42 (2.53)</td>
<td>2.61</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Female [N (%)]</td>
<td>25 (61.0)</td>
<td>25 (50.0)</td>
<td>1.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White [N (%)]</td>
<td>24 (58.5)</td>
<td>36 (72.0)</td>
<td>1.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right-handed [N (%)]</td>
<td>40 (97.6)</td>
<td>46 (92.0)</td>
<td>1.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semesters of college completed</td>
<td>1.70 (2.55)</td>
<td>2.39 (3.07)</td>
<td>1.28</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>SI-R Total</td>
<td>36.22 (13.46)</td>
<td>7.16 (4.20)</td>
<td>208.72*</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>DASS Depression</td>
<td>5.37 (3.88)</td>
<td>1.80 (2.65)</td>
<td>26.91*</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>DASS Anxiety</td>
<td>4.95 (4.09)</td>
<td>1.64 (2.27)</td>
<td>23.91*</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>OCI- R (without hoarding)</td>
<td>17.51 (12.09)</td>
<td>5.68 (5.72)</td>
<td>37.70*</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>SDS</td>
<td>5.69 (6.41)</td>
<td>0.12 (0.48)</td>
<td>36.82*</td>
<td>0.30</td>
<td></td>
</tr>
</tbody>
</table>

*Note. SI-R = Saving Inventory-Revised; DASS = Depression Anxiety Stress Scales; OCI – R = Obsessive-Compulsive Inventory-Revised; SDS = Sheehan Disability Scale.*

* $p < .001.$
Table 2  
Means (Standard Deviation), Group Differences, and Group Differences when Controlling for Depression, Anxiety, and non-hoarding OCD on Self-report Questionnaires of Cognitive Functioning

<table>
<thead>
<tr>
<th></th>
<th>Nonclinical Hoarding (N = 41)</th>
<th>Healthy Control (N = 50)</th>
<th>F</th>
<th>Partial ( \eta^2 )</th>
<th>F Control for Depression, Anxiety, non-hoarding OCD symptoms</th>
<th>Partial ( \eta^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost Indecisiveness Scale</td>
<td></td>
<td></td>
<td>50.95***</td>
<td>0.36</td>
<td>14.33***</td>
<td>0.14</td>
</tr>
<tr>
<td>MACCS – GEN</td>
<td>39.44 (15.44)</td>
<td>27.78 (8.29)</td>
<td>21.13***</td>
<td>0.19</td>
<td>3.33</td>
<td>0.04</td>
</tr>
<tr>
<td>MACCS – DEC</td>
<td>14.59 (5.14)</td>
<td>9.24 (2.74)</td>
<td>40.14***</td>
<td>0.31</td>
<td>7.65**</td>
<td>0.08</td>
</tr>
<tr>
<td>MACCS – CON</td>
<td>12.68 (3.79)</td>
<td>8.10 (3.23)</td>
<td>38.80***</td>
<td>0.30</td>
<td>6.05*</td>
<td>0.07</td>
</tr>
<tr>
<td>MACCS – PER</td>
<td>13.93 (3.72)</td>
<td>11.14 (3.60)</td>
<td>13.08***</td>
<td>0.13</td>
<td>1.78</td>
<td>0.02</td>
</tr>
<tr>
<td>ADHDSS – Adult – IN</td>
<td>10.12 (5.07)</td>
<td>3.58 (3.32)</td>
<td>54.70***</td>
<td>0.38</td>
<td>18.65***</td>
<td>0.18</td>
</tr>
<tr>
<td>ADHDSS – Adult – H/I</td>
<td>9.93 (4.36)</td>
<td>4.72 (3.26)</td>
<td>42.44***</td>
<td>0.32</td>
<td>7.34**</td>
<td>0.08</td>
</tr>
<tr>
<td>ADHDSS – Child – IN</td>
<td>9.22 (6.10)</td>
<td>6.50 (5.85)</td>
<td>4.68*</td>
<td>0.05</td>
<td>2.09</td>
<td>0.02</td>
</tr>
<tr>
<td>ADHDSS – Child – H/I</td>
<td>9.37 (5.65)</td>
<td>6.12 (4.89)</td>
<td>8.63**</td>
<td>0.09</td>
<td>3.16</td>
<td>0.04</td>
</tr>
<tr>
<td>BIS Nonplanning impulsivity</td>
<td>25.78 (4.60)</td>
<td>22.46 (4.60)</td>
<td>11.75**</td>
<td>0.12</td>
<td>6.07*</td>
<td>0.07</td>
</tr>
<tr>
<td>BIS Motor Impulsivity</td>
<td>22.66 (4.54)</td>
<td>20.04 (4.15)</td>
<td>8.24**</td>
<td>0.09</td>
<td>2.61</td>
<td>0.03</td>
</tr>
<tr>
<td>BIS Attentional Impulsivity</td>
<td>19.54 (4.09)</td>
<td>13.68 (3.44)</td>
<td>54.97***</td>
<td>0.38</td>
<td>11.49**</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Note. MACCS = Memory and Cognitive Confidence Scale; GEN = Confidence in General Memory; DEC = Confidence in Decision-Making/Planning Abilities; CON = Confidence in Concentration; PER = Cognitive Perfectionism; ADHDSS = Attention deficit/hyperactivity disorder symptoms scale; IN = Inattention; H/I = Hyperactivity/Impulsivity; BIS = Barratt Impulsiveness Scale.  
*p < .05, **p < .01, ***p < .001.
Table 3
Means (Standard Deviation) Neuropsychological Test Scores for Nonclinical Hoarding and Healthy Control Groups.

<table>
<thead>
<tr>
<th>Test</th>
<th>Nonclinical Hoarding</th>
<th>Healthy Control</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAIS-IV Matrix Reasoning</td>
<td>19.02 (4.15)(^1)</td>
<td>19.88 (3.77)(^2)</td>
<td>1.03</td>
</tr>
<tr>
<td>WAIS-IV Vocabulary</td>
<td>39.63 (6.61)(^1)</td>
<td>38.1 (6.72)(^3)</td>
<td>1.16</td>
</tr>
<tr>
<td>CVLT-II trial 1</td>
<td>6.80 (1.69)</td>
<td>6.32 (1.45)</td>
<td>2.17</td>
</tr>
<tr>
<td>CVLT-II trial 5</td>
<td>12.98 (2.14)</td>
<td>12.14 (2.28)</td>
<td>3.20</td>
</tr>
<tr>
<td>CVLT-II trials 1-5 total score</td>
<td>53.61 (8.29)</td>
<td>50.62 (8.48)</td>
<td>2.86</td>
</tr>
<tr>
<td>CVLT-II short delay free recall</td>
<td>11.24 (3.04)</td>
<td>10.38 (3.13)</td>
<td>1.76</td>
</tr>
<tr>
<td>CVLT-II long delay free recall</td>
<td>11.73 (2.69)</td>
<td>11.12 (2.71)</td>
<td>1.16</td>
</tr>
<tr>
<td>PCPT HRT</td>
<td>374.70 (35.48)(^4)</td>
<td>368.25 (43.99)(^5)</td>
<td>0.55</td>
</tr>
<tr>
<td>PCPT commission errors</td>
<td>13.26 (7.38)(^4)</td>
<td>12.58 (6.84)(^5)</td>
<td>0.19</td>
</tr>
<tr>
<td>PCPT omission errors</td>
<td>1.05 (1.50)(^4)</td>
<td>0.58 (0.82)(^5)</td>
<td>3.41</td>
</tr>
</tbody>
</table>

Note. \(^1\)N = 40; \(^2\)N = 49; \(^3\)N = 43; \(^4\)N = 39; \(^5\)N = 48; WAIS = Wechsler Adult Intelligence Scale-Fourth Edition; CVLT-II = California Verbal Learning Test-2nd edition; PCPT = PEBL Continuous Performance Test; HRT = hit reaction time. No results were significant at \(p < 0.05\) level.
APPENDIX

HUMAN SUBJECTS RESEARCH APPROVAL LETTER AND CONSENT FORM

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

RE-APPROVAL MEMORANDUM

Date: 11/16/2010

To: Kristin Fitch

Address: 4301
Dept.: PSYCHOLOGY DEPARTMENT

From: Thomas L. Jacobson, Chair

Re: Re-approval of Use of Human subjects in Research
Cognitive Functioning and Clutter

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by 11/9/2011, you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the committee.

If you submitted a proposed consent form with your renewal request, the approved stamped consent form is attached to this re-approval notice. Only the stamped version of the consent form may be used in recruiting of research subjects. You are reminded that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report in writing, any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols as often as
necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

Cc:
HSC No. 2010.5239
INFORMED CONSENT FORM
COGNITIVE FUNCTIONING AND CLUTTER

I, _________________________________, being 18 years of age or older, freely and voluntarily and without undue inducement or any element of force, fraud, deceit, duress, or other form of constraint or coercion, consent to be a participant in the above named research project, to be conducted at the Florida State University by undergraduate research assistants supervised by Kristin E. Fitch, B.A., a graduate student in Psychology and Jesse Cougle, Ph.D., an Assistant Professor of Psychology. Listed below are the procedures to be followed in this research and their purposes, any risks, discomfort, and benefits associated with participation in this study, and the measures which will be taken to ensure confidentiality of the information obtained.

Procedures for the research: This study is designed to examine the relationship between cognitive functioning, like attention, memory, and intelligence, and difficulty with excessive clutter, discarding, and excessive acquiring. I understand that if I participate in the project I will be asked to fill out questionnaires about illegal drug use, current mood and behaviors, etc. If I should reveal that I am a threat either to myself or others, I understand that the experimenter will approach me to ensure my safety and may provide me with referral information. I may also complete a series of tasks examining attention, memory, and intelligence. One of these tasks is a computerized task during which I will be asked to press a button on the keyboard when I see certain letters on the computer screen. During other tasks, I will be asked to recall a list of words that are read to me and define other words that are presented to me. Additionally, I will be asked to select pictures that complete series presented to me. I understand that during these tasks, I will be audio recorded by the experimenter. This recording will allow the experimenter to refer back to my responses while scoring the test battery and will enable the principal investigator in checking that the experimenter administered the test protocol properly. In total, I will participate in one experimental session. The total time commitment would be approximately two hours. If I participate I will receive two hours of PSY2012 credit for my time. If I am a student in another Psychology class, I will receive extra credit at a rate determined by my instructor.

I understand that presence of certain medical conditions may impact the results of this study. I understand that for this reason, I will be withdrawn from the study if do not pass the health screening requirements; however I will still receive the full two hours of PSY2012 credit for my participation or extra credit at a rate determined by my instructor.

Potential risks or discomforts: I understand there is minimal risk involved in this study, although some individuals may be uncomfortable describing their thoughts and behaviors. I understand I may experience feelings of frustration and boredom during the experimental procedures. However, such situations should not be any more distressing than situations commonly experienced in day-to-day life. I have the right to refuse or discontinue participation at any time. If I decide to stop participation, I will still be entitled to the two hours of PSY2012 credit for my time or extra credit at a rate determined by my instructor if I am a student in another Psychology class.
Potential benefits to you or others: I have not been given any guarantee that I will benefit from my participation in this study. I may derive benefit from the self-assessment as it may increase my awareness of my thoughts, feelings, and behaviors. I will also be provided referrals to appropriate clinical services, if I seek them. I may also develop a better understanding of research methodology and will be providing researchers with valuable insight.

Confidentiality: I understand my participation is totally voluntary and I may stop participation at any time. All my answers to the questions will be kept confidential, and my confidentiality will be protected to the full extent allowed by law. My name will not appear on any of the results and only group findings will be reported. I understand that, because this is a confidential study, the experimenter will not be able to link my responses to me and initiate counseling, if needed. I may, however, inquire about referral sources if I wish, and the experimenter will be able to provide me with that information. Digital audio files and all other data will be kept by the researcher on a password-protected computer or in a locked filing cabinet behind the locked doors of the Cougle lab. I understand that only the researcher will have access to these audio files and other data. All audio files will be destroyed upon completion of scoring the test protocol. All other data will be destroyed on or before January 31, 2019.

I understand that this consent may be withdrawn at any time without prejudice, penalty or loss of benefits to which I am otherwise entitled. I have been given the right to ask any inquiry concerning the study. Questions, if any, have been answered to my satisfaction. I understand that I may contact Kristin E. Fitch, Florida State University, Department of Psychology, [email protected] for answers to questions about this research or my rights. Group results will be sent to me upon my request. I understand that if I have any questions about my rights as a participant in this research, or if I feel I have been placed at risk, I can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633, humansubjects@magnet.fsu.edu.

I have read and understand this consent form. By choosing freely and voluntarily to participate in the study as described here I indicate my informed consent:

_________________________________      _____________________________________
(Participant Signature)        (Date)
REFERENCES


28


Kristin Fitch received her Bachelor’s degree in Psychology in 2004 from Boston University. She then worked as a research assistant at Boston University and at the Anxiety Disorders Center at the Institute of Living/Hartford Hospital. During her time as a research assistant, she evaluated cognitive decline among Vietnam Era veterans and psychiatric comorbidity and neurobiology of compulsive hoarding and obsessive compulsive disorder. Ms. Fitch subsequently entered a doctoral program in clinical psychology at Florida State University in 2008. Her research interests include the etiology, maintenance, and treatment of anxiety disorders, particularly obsessive compulsive disorder and compulsive hoarding.