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Neural Correlates of Déjà Vu and Dissociation: the Roles of the Amygdala and Hippocampus in the Prevalence of Deja Vu Used as an Indicator for the Severity of Dissociation and Posttraumatic Stress Disorder

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OF THE AMYGDALA AND HIPPOCAMPUS IN THE PREVALENCE OF
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DISSOCIATION AND POSTTRAUMATIC STRESS DISORDER.

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Bachelor of Arts in Psychology

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ABSTRACT

The phenomenon of déjà vu is one that is poorly understood while posttraumatic stress disorder (PTSD) is a complex diagnosis and presentation of symptoms. Both of these presentations are influenced by amygdala and hippocampus regions of the brain. As such, this study demonstrated through correlational analyses that there are significant relationships between components of each that can be utilized to aid in determining the likely-hood of PTSD and dissociative symptoms. A unique negative relationship was also presented between déjà vu and PTSD and dissociative assessment scores. Discussion of these relationships and future investigations are also discussed.

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CHAPTER I

INTRODUCTION

Throughout history clinicians and researchers have noticed the adverse symptoms that extremely traumatic events have on the people affected. Railroad spine, soldier's heart, shell shock, gross stress reaction, and posttraumatic stress disorder (PTSD); no matter the nomenclature, the definitions were developed to describe the torment one may experience following an unusually physical or psychological trauma. Formally recognized as a psychological disorder in 1980 when it was included in the Diagnostic and Statistical Manual, third edition, revised (DSM-III-R), PTSD includes a collection of symptoms. One of the symptoms that is most misunderstood and bewildering is that of dissociation.

Included in the DSM-IV (1994), the essential feature of dissociation is "a disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment" with an onset that may be "sudden or gradual" and a course that may be "transient or chronic." Friedman (2006) defines dissociation as: "an abnormal cognitive/emotional state in which one's perception of oneself, one's

environment, or the relationship between [the two] is altered significantly.” These disrupted states may take the form of a reduction in awareness, such as being “in a daze”; derealization, which may include an altered sense of time and familiarity with one’s surroundings; and also depersonalization, which is an altered sense of one’s self (Friedman, 2006). It has been suggested that the dissociative state may be a function of the parasympathetic nervous system when faced with a prolonged adverse event (Rothschild, 1998). This function, signaled by the limbic system, allows the body to prepare itself in the event that escape to avoid the situation or strength to protect oneself is not available. When signaled, instead of the “fight or flight” response, the person “freezes”, entering an altered state of time awareness and pain perception in an attempt to insulate the person from the trauma (Rothschild, 1998). While meant to be protective during the traumatic event, the endurance of the dissociative symptom may be one of the most debilitating and greatest consequences of experiencing trauma (Rothschild, 1998). However, dissociative symptoms are not required for the diagnosis of PTSD.

Unlike PTSD, which relies on avoidance and numbing symptomatology, Acute Stress Disorder (ASD) relies heavily on the experience of dissociation (Friedman, 2006). In fact, 3 different dissociative symptoms are required to make the diagnoses. Other than this difference, and the acute onset for ASD as opposed to the chronic course of PTSD, the two diagnoses are similar. Interestingly, despite the absence of dissociation from the diagnostic criteria of PTSD, the experience of dissociation during or immediately following a trauma has been shown to be interrelated with and predictive of subsequent development of PTSD (Bremner, Southwick, Brett, Fontana, Rosenheck, & Charney,

1992; Marmar, Weiss, Schlenger, Fairbank, Jorday, Kulka, & Hough, 1994; van der Kolk, Pelcovitz, Roth, Mandel, McFarlane, & Herman, 1996).

The idea of the déjà vu experience is one that is not unfamiliar to the general public. In fact, these experiences have been described by many well know authors, including Charles Dickens, Leo Tolstoy, and Joseph Heller (Sno & Linszen, 1990). Furthermore, the rate at which it is experienced by the general population has ranged anywhere from between 30% to 90% (Kusumi, 2006; Sno & Linszen, 1990; Sno, Schalken, Jonghe, & Koeter, 1994; Wild, 2005). However, the actual experience and definition may be misconstrued for other similar events or paranormal-type activities. As such, the definition that is agreed upon within the scientific community is “any subjectively inappropriate impression of familiarity of a present experience with an undefined past” (Adachi, Adachi, Kimura, Akanuma, Takekawa, & Kato, 2003; Brown 2003; Wild, 2005), with “inappropriate impression of familiarity” being further defined as “a form of false recognition in which one experiences a strong sense of familiarity with new events or objects” (Kusumi, 2006). Qualitative differences, however, may be present in déjà vu experiences (Neppe, 1983, as cited in Kusumi, 2006).

Using various, self developed questionnaires, Neppe (1983, as cited in Kusumi) found that:

the results indicated that in normal people, there are two kinds of déjà vu, namely, associative déjà vu and subjective paranormal déjà vu. Neppe found that in the average person, associative déjà vu tended to be vague and poorly remembered, was often triggered by the environment, was initially characterized by partial familiarity, lasted for a short duration and lacked outstanding qualitative features.

[T]he second type of déjà vu, which occurred in subjective paranormal experiences, was characterized by time-dissociation and outstanding qualitative features (p. 305).

First referred to as “*falsae memoriae*” by St. Augustine in 400AD (Wild, 2005), déjà vu, was considered to be a psychopathology in the late 19th and early 20th centuries and was studied as such (Brown, 2003). In fact, textbook entries from such groundbreaking mental illness theorists such as James, Angell, Titchener, and Woodworth refer to the etiology and experience of déjà vu (Brown, 2003). Recently though, déjà vu has been looked at in the guiding light of memory and cognition (Kusumi, 2006). However, given previous findings and recent discoveries, it is reasonable to look at the experience of déjà vu as encompassing both paradigms and using the experience of déjà vu (cognitive in nature) as a possible predictor of pathology. The predictive value of the déjà vu experience is based off the fact that neural components believed to be responsible for the experience of déjà vu, the amygdala and hippocampus, have significant overlap with the neural components believed to be responsible for the experience of dissociation and the development of PTSD. Additionally, brain abnormalities that may affect these areas (such as temporal lobe epilepsy) have been associated with increases in both déjà vu and dissociative experiences.

CHAPTER II

LITERATURE REVIEW

It has been well documented that déjà vu experiences are a highly connected with temporal lobe epilepsy (TLE) and other seizure disorders and often precede the onset of a seizure (Bancaud, Brunet-Bourgin, Chauvel, & Halgren, 1994; Brown, 2003; Gloor, 1990; Wild, 2005). Based off this relationship, a course for the development and experience of déjà vu was proposed by Bancaud et al. (1994). This course was proposed to be due from the medial spread of a stimulus from the temporal lobe, to the amygdala and hippocampus.

Using electrical stimulation on the above mentioned brain areas and taking intracranial EEG recordings, they studied 16 TLE patients. Spontaneously occurring states similar to déjà vu were always associated with the activation of the temporal lobe, amygdala, and hippocampus. By stimulating any of these three areas, they found they could evoke the déjà vu-like state. However, they also found that stimulating those areas within the limbic system, the amygdala and hippocampus, were 10 times more likely to evoke the déjà vu-like state. Based on these findings Bancaud et al. determined that the

amygdala and hippocampus were key brain structures in the development of déjà vu experiences. Adding to the theory, researchers at Massachusetts Institute of Technology (MIT) recently developed an animal model that helps shed further light on and confirmation of the neural mechanisms that may be responsible for déjà vu sensations (McHugh, Jones, Quinn, Balthasar, Coppari, Elmquist, Lowell, Fanselow, Wilson, & Tonegawa, 2007).

Using a special breed of mice, McHugh et al. demonstrated that the hippocampus, specifically the dentate gyrus subregion, is, at least in part, responsible for helping an organism rapidly separate similar patterns and/or locations and that deficits in this region may mute its abilities of recognition and separation. The muting of these abilities can then result in an inability to distinguish similar yet distinct environments, resulting in a déjà vu experience.

Within the McHugh et al. study, the mutant mice used were bred to “knock out” (KO) or lack receptors (NR1) corresponding to N-methyl-D-aspartate (NMDA) within the granule cells (GC) of the dentate gyrus (DG). The mutant mice, labeled DG-NR1 KO mice, were chosen based on previous hypotheses of the authors and the demonstrations of previous researchers (Leutgeb, Leutgeb, Barnes, Moser, McNaughton, & Moser, 2005, as cited in McHugh et al., 2007). Specifically, NMDA receptors are thought to be instrumental in learning. Additionally, GC’s are believed to be the place cells of the DG; cells that encode spatial memory and fire when an animal/person is in a particular environment.

Using a group of each DG-NR1 KO and control mice, each group was placed in a chamber with a distinct setup and, over a period of a few days, allowed to become acclimated to the chamber. After the acclimation process the chamber was then wired to

provide a mild foot shock 192 seconds after exposure. Another chamber was then introduced (making chambers A and B) with B looking similar to A but distinctly different. Each group was then split into two groups (2 DG-NR1 KO groups and 2 controls) and freezing behavior, on 2 subsequent days without foot shock exposure in either chamber, was recorded. For the next 12 days each group was exposed to both chambers, always receiving a foot shock in chamber A but never in B. Freezing during the first 3 minutes was collected for all groups. The result was that controls were easily able to distinguish between chambers A and B while the DG-NR1 KO mice exhibited a deficit in this recognition which resulted in significantly elevated freezing in chamber B, when compared to the controls. These findings alone demonstrate that not only may the hypothesized areas correspond to the neural components of déjà vu, but that these finds are robust enough to be maintained within the context of fear conditioning that provokes anxiety, in this case an electric shock to part of the animal's body.

Within the psychiatric and neuroscience communities, it is well believed that the hippocampus regulates memory and equilibration of emotion. However, it has also been contended that the hippocampus may be especially important in the encoding and retrieval of information that is autobiographical or episodic in nature (Kusumi, 2006; Spatt, 2002), such as the experience of a traumatic event. If this idea is indeed true, the findings of McHugh et al. (2007) add strength to the hypothesis that déjà vu experiences can be predictive of dissociation and ,by connection, PTSD due to overlapping neural components and, possibly, similar etiologies. Indeed, Neppe (1983, as cited in Wild, 2005), who is credited with developing the agreed upon definition of déjà vu, suggested that déjà vu is associated with psychiatric disorders that involve the distortion of time

perception. Adding further support to this theory is the anecdotal evidence supplied by Titchener (1924, as cited in Brown, 2003) who reported that déjà vu is linked with stress and mostly likely to occur following extreme mental fatigue or periods of emotional distress. Freud also held this view, believing déjà vu to be triggered by drowsiness or fatigue (Spatt, 2002). Heyman (1904, 1906 as cited in Brown 2003) also concluded, through a prospective study, that déjà vu experiences occur in a state of fatigue and/or following unpleasant or confusing mental activity or physical exertion. Finally, Linn (1954, as cited in Brown, 2003) indicated that a frequent experience of soldiers going into battle was that of déjà vu.

Also possibly experienced by soldiers and others who were involved with a traumatic event is the previously described experience and symptom of dissociation. As with déjà vu, those who experience seizure disorders may also be more prone to experience dissociation (Bowman and Markand, 1996; Dikel, Fennell, & Gilmore, 2003; Schenk and Bear, 1981). Schenk and Bear proposed that the interictal period of TLE (the time between the experiencing of a seizure), characterized by a dystonic affect, may predispose a person to dissociative experiences. Furthermore, Breuer and Freud (as cited in Dikel et al., 2003) held the belief that:

sufficient initial failure of psychological reflex mechanisms can produce later discharge of affect by conversion of excitation into somatic phenomena, such as bypassing of coordinative centers leading to primitive movement, uncoordinated contractions of muscles, and clonic convulsions.

Simply put, if an experience, such as a traumatic event, is not dealt with appropriately, the profusion of psychic energy may be manifested in such a way as to produce seizures.

Dikel et al. (2003) found just this when they studied and found that patients with seizure disorders had elevated base rates of PTSD, dissociation, and childhood sexual abuse when compared to those in the National Comorbidity Study. Bowman and Markand (1996) also found similar results when studying 45 seizure disorders patients. Specifically, 84% reported a history of trauma, of which; 67% reported a sexual abuse, 67% reported physical abuse, and 73% reported “other” for the experienced trauma. Furthermore, 91% had previously received a diagnosis of a dissociative disorder and 49% a diagnosis of PTSD.

Not surprisingly, the temporal region of the brain has also been shown to be directly associated with dissociation as demonstrated by Hopper, Frewen, van der Kolk, and Lanius (2007). Using functional magnetic resonance imaging the team displayed that through script-driven trauma imagery, those that experienced dissociation had an increase in neuronal activity in the right superior temporal cortices. This finding, along with those previously described, further lend support to the indication of congruent neuronal pathways for dissociation and déjà vu as demonstrated by the occurrences of each amongst a population affected by seizure disorders.

As can be seen from the preceding findings, evidence supporting the validity of the proposed study is found in the connection between the affliction of seizure disorders and the increased experiences of déjà vu and dissociation in addition to the congruent brain regions associated with each. However, the most compelling support for the proposed hypothesis is the significant overlap of the proposed neurological components of déjà vu and those proposed for dissociation and PTSD.

As previously described, the amygdala and hippocampus are believed to be the lynchpins in the déjà vu experience. Excitingly, these two cerebral regions are also believed to be involved in the experiences of dissociation and PTSD; prior research even indicates that it is the exact same subregions indicated for the experience of déjà vu that are proposed to be responsible for dissociation and PTSD.

Vouimba and Levin (2005) helped demonstrate this when they were studying the complexity of memory process and consolidation under stressful conditions. Acknowledging that hippocampal subregions “display distinct functional profiles”, they cited previous research that indicates that the DG subregion of the hippocampus has a distinct susceptibility to acute stress. Specifically, they demonstrated that during a stressful event and through stimulation of the amygdala the long term potentiation (LTP) of the DG will be enhanced while other subregions of the hippocampus will have their LTP inhibited. This is important because LTP is “a model of synaptic plasticity believed to underlie memory formation” (Bliss and Collingridge, 1993; Malenka and Nicoll, 1999: as cited in Vouimba and Levin, 2005) and also has a special role in the formation of memories used to avoid or anticipate danger (Whitlock, Heynen, Shuler, & Bear, 2006). Furthermore, stimulation of the amygdala resulted in an increase of GC excitability but not in the excitability of pyramidal cells. These findings indicate, in the words of the authors, “differential amygdalar control of hippocampal memory subsystems”, meaning that depending on the act/environment that is being encoded as a memory, the amygdala will initiate or mute certain hippocampal memory subsystems. This also demonstrates the overlap of neural mechanisms believed to be involved in the experiences of déjà vu and memory formation during and regarding stressful events.

Looking at the proposed neural mechanisms of both dissociation and déjà vu it may be that the stress encountered by victims of trauma enhances the LTP of the DG and, therefore, memory consolidation and also excites the GC's. However, deficits in the DG, as demonstrated by McHugh et al. (2007), that result in déjà vu do not allow the traumatized person to accurately appraise the environment they are in, so entering an environment or experiencing an act similar to the one in which they experienced the trauma may be perceived as experiencing or entering the *exact* act/environment in which they were victimized and lead to dissociation. Given that this will only happen to those with a deficit in the DG may explain why only a portion of those with PTSD develop dissociation while others do not.

Added up, these findings provide sound, reasonable evidence and ample direction for research to be conducted in this area to determine the connection, if any, between these phenomena. By demonstrating that those who more frequently experience déjà vu also more frequently experience dissociation and PTSD will lend support to the proposed neural mechanisms of déjà vu, dissociation, PTSD and improve our scientific understanding of these phenomena. With this evidence in mind, the investigators provide the following proposal to aid in the investigation of this area and contribute to the scientific knowledge of this relationship.

CHAPTER III

METHODS

Specific Aims & Hypothesis

Given the indication of congruent neuronal pathways for the experiences of déjà vu, dissociation, and PTSD the primary objective of this study is to test the hypothesis that those who experience déjà vu, and as the frequency with which one experiences déjà vu increases, so will the likelihood of that person experiencing dissociation during the course of their PTSD diagnosis. Given the relative dearth of information regarding this association, a secondary objective is to assess the feasibility of this relationship for a larger scale study.

Methods and Procedures:

Study Design

The design of the proposed study will be a one-time, face-to-face assessment, consisting of a three group, balanced, correlational comparison of: group 1) those diagnosed with PTSD and history of “high” dissociative symptoms, group 2) those diagnosed with PTSD with a history of “low” dissociative symptoms, and group 3) a control group.

Procedures

Participants in all 3 groups will be rated on the following three self reported measures (see also Table 1):

- PTSD Checklist (PCL) (see appendix 4 for full instrument)
- Peritraumatic Dissociative Experiences Questionnaire (PDEQ) (see appendix 2 for full instrument)
- Inventory for Déjà vu Experiences Assessment (IDEA) (see appendix 3 for full instrument)

The PCL is a 17 item symptom scale of PTSD corresponding to the DSM –IV. Participants are instructed to indicate the degree to which they had been bothered by each symptom in the past month, using a five-point Likert scale ranging from (1) - “not at all” to (5)- “extremely”. Blanchard, Alexander, Buckley, & Forneris (1996), using a sample population of motor vehicle accident victims and sexual assault survivors, indicated that the PCL score has a correlation of 0.92 with the Clinicians Administered PTSD Scale (CAPS), a psychiatric interview considered to be a “gold standard” tool in diagnosing PTSD (Blanchard, et al., 1996). Additionally, when compared to the CAPS, the PCL was determined to have a diagnostic efficacy of 0.90, sensitivity of 0.94, and a specificity of 0.86 when using a cutoff score of 44 (Blanchard, et al., 1996). The use of this tool will therefore allow for an expeditious and accurate assessment of PTSD. All participants will be administered the PCL to confirm a diagnosis of PTSD within the study groups and assess for the absence of PTSD within the control group.

The PDEQ is a 10 item scale assessing the presence of dissociative symptoms during and after experiencing a traumatic event. Participants are instructed to indicate the degree to which they had experienced each symptom, using a five-point Likert scale ranging from (1) - “not at all true” to (5)- “extremely true”. The PDEQ has been shown to be a reliable and valid instrument when compared with the Dissociative Experience Scale (DES) and war zone stress exposure as can be seen in the psychometric properties of .82 for sensitivity, .86 for specificity ($\kappa=0.63$; $\chi^2= 105.95$, $df=3$, $p<0.001$) (Marmar, Weiss, Schlenger, Fairbank, Jordan, Kulka, & Hough, 1994). All study participants in both the study and control groups will be administered this scale to assess the presence and severity of any dissociative symptoms.

Finally, all participants will complete the IDEA. This instrument is the only known, empirically tested, assessment used to capture data regarding déjà vu experiences. Divided into 2 sections, the IDEA captures both quantitative and qualitative data regarding the déjà vu experience. Section A is comprised of 9 items capturing how often a person experiences déjà vu and other related symptoms/experiences, such as remembrance of dreams and frequency of travel. Each item is answered on 5 point nominal scale ranging from “Never”, a midpoint of “sometimes (a few times per year)”, to “more frequently (at least weekly)”. There is also an option for the respondent to chose “I don’t know”. If respondents endorse having had déjà vu experiences they move on to section B, comprised of 14 additional items. These additional items capture qualitative data regarding the déjà vu experiences, such as the environment that the experiences take place, duration of the experiences, time of day experiences usually take place, and time since the last experience. Additionally, items A1 (answered affirmatively) and B2

(answered negatively), specifically determine if the respondent has experienced a déjà vu event based on the agreed upon definition of the experience, as described in Table A (Brown, 2003). Due to the fact that no other instruments are available for empirically capturing déjà vu data, the makers of the IDEA based face validity of the instrument on a comprehensive review of peer evaluation, review of relevant literature, and, finally, the results of a pilot test (Sno et al., 1994). Construct validity of this instrument was determined with a Pearson correlation between the number of déjà vu experiences and age, given the well documented fact that younger individuals, within the general population, are more likely to experience déjà vu than older individuals (Adachi et al., 2003; Brown, 2003; Kusumi, 2006; Sno & Linszen, 1990; Sno et al., 1994). The resultant statistics show the expected negative correlation: $r = -.22$ ($p < .01$, $N = 190$). This instrument will be used as the primary outcome measure for determining the pervasiveness of the participant's déjà vu experiences and their correlation with dissociative symptoms.

Table 1: Definition of Déjà vu
-Any subjectively inappropriate impression of familiarity of a present experience with an undefined past.
References: Adachi, Adachi, Kimura, Akanuma, Takekawa, & Kato, 2003; Brown 2003; Wild, 2005

Additionally, participants will complete a 12 item demographics form which will capture information such as age, gender, education, and marital status. This information will be used to give a description of the characteristics of the research sample population (see appendix 1 for the full instrument).

In reviewing Table 2, it can be seen that all participants, in relation to this study, will complete at least 48 items between all 4 surveys, taking an average of 15 minutes to complete. If a participant does endorse déjà vu experiences, s/he will then complete a

total of 62 items, taking, on average, 25 minutes. It is therefore expected that burden placed on subjects for participating in this study is low.

Instrument	Information captured	Number of items/questions	Psychometric properties	Time of administration (minutes)
PTSD Checklist (PCL)	Presence of PTSD symptoms/diagnosis	17	Cutoff score = 44 Sensitivity = 0.94 Specificity = 0.86	5 minutes
Peritraumatic Dissociative Experiences Questionnaire (PDEQ)	Dissociative experiences during and after the traumatic event	10	Total score = severity Sensitivity = 0.82 Specificity = 0.86	4 minutes
Inventory for Déjà vu Experiences Assessment (IDEA)	Quantitative and qualitative features of déjà vu experiences	Section A =9 Section B=14	r = -.22 (p<.01, N=190)	Section A only = 3 minutes Section A & B = 13 minutes
Demographic form	Age, education, ethnicity, marital status	12	N/A	3 minutes
Totals:		48 items (62 - including section B of the IDEA)		15 minutes (25 – including section B of the IDEA)

Population

The study population will consist of 30 or more total participants of any race, between the ages of 18 and 65; at least 20 in the study groups (those with a diagnosis of PTSD and history of high/low dissociative symptoms) and at least 10 in the control group. All participants will be seen at a mutually agreed upon location determined by the participant and co-investigator. To help maintain confidentiality of participation in this research study, only locations that are deemed secure and private will be used, such as private rooms within local libraries and hotel conference rooms. To further aid in helping to maintain confidentiality, each participant enrolled in the study will be given a unique identification number that de-identifies all of his or her study data from their distinct individuality.

Target Study Population

Inclusion and exclusion criteria: This study will enroll males and females between the ages of 18 and 65, of any race, diagnosed with PTSD with histories of high and low dissociative symptoms.

Inclusion criteria

For inclusion in this study, participants must meet all of the following criteria:

- 1) The ability to provide informed consent
- 2) Be male or female between the ages of 18 and 65
- 3) DSM-IV diagnosis of Posttraumatic Stress Disorder as determined by the PCL
- 4) History of dissociative symptoms as determined by the PDEQ

Exclusion criteria

Participants must not meet any of the following criteria:

- 1) Inability to provide informed consent
- 2) Over the age of 65
- 3) Serious suicidal risk as determined by the investigator

The control group will consist of a non-clinical sample drawn from the general population. They will be selected randomly and not chosen from a specific environment or population.

Recruitment

Participants for this study will be recruited by means of advertisements, community mental health centers, and from community mental health providers.

Consenting Procedures

Informed consent will be obtained and documented using IRB-approved consent procedures by the co-investigator working under supervision of the investigator. The co-investigator of this study has multiple years of experience in conducting interviews and

obtaining informed consent. Additionally, the co-investigator has had Human Subjects Protection training that covers study procedures, elements of informed consent, and procedures for maintaining confidentiality, thus ensuring aptitude in and appreciation of the informed consent process. Finally, the consenting process and study procedures will be conducted at a private secure location determined by the co-investigator and participants, such as hotel conference rooms or local libraries, to ensure that participation remains confidential.

Process for Screening for Capacity to Provide Consent

All study participants will be thoroughly screened for the capacity to provide consent. There will be three layers built into the consenting process. First, the co-investigator will screen participants for capacity to give consent – assessing for static factors (e.g. co-morbid diagnoses such as mental retardation or diminished mental capacity). Additionally, the co-investigator will be present to answer questions (Such as “What is the purpose of the study?”, “Do I have to be in this study if I don’t want to?”, “What makes me want to consider participating?”) and gauge presence of any mitigating symptoms that may interfere with the ability to give consent. Those who are deemed unable to give informed consent will be excluded from the study.

The second layer is addressed by the fact that the co-investigator who will obtain informed consent is trained with 4 years of experience obtaining informed consent, allowing for aptitude and appreciation of the informed consent process.

A third layer is employed by asking subjects questions relevant to the content of the consent form (such as study purpose, procedures, risks and benefits, and their rights as participants) to make sure they have retained vital information and know in what they are

consenting to participate. Only after the subject has had a chance to read the informed consent form thoroughly, discussed the study with the co-investigator, and has had an appropriate amount of time (as determined by the subject) to consider participation, will the consent form be signed.

Risks and Benefits

Risk and Injury

Since this study does not involve the assessment of treatment efficacy no serious adverse events are expected to occur as a result of study participation. However, during the completion of assessments it may be reasonable to expect subjects to become upset or distressed due to the nature of the questioning. This risk is considered minimal and no more than would be expected from other "daily" life situations due to the fact that they will only be answering questions regarding their symptoms and not any specific trauma. However, for subjects in emergent situations, that are considered to be a risk to "self", such as suicidal ideation, the co-investigator will immediately call the appropriate personnel, such as 911 dispatchers, mobile crisis, or other emergency personnel. Additionally, if a participant presents as a risk to others, the person 'at risk' will be notified as required by routine standards of mental health care. Subjects in non-emergent situations will be referred, at the completion of the interview, to community mental health centers or other appropriate services (i.e., outreach workers, chemical dependency clinics), as needed. As stated previously, all information gathered will be collected at private, secure locations such as hotel conference rooms, or private rooms in local libraries. To ensure that participation remains confidential, the interview location will be scheduled in advance. In the event that rooms cannot be reserved anonymously, study

staff will use their name and not the name of the study participant. By implementing the above procedures, the participant's identity will be completely protected and the interview location will be private and secure. Finally, all interviews will be held according to the schedule of the participant and he or she may refuse to answer any question or stop participation at any time.

Benefits

Potential benefits from study participation include a possible alleviation of symptoms by completing the study assessments and discussing their experiences with the co-investigator. Additionally, participants may learn more about the symptoms they experience through way of completion of the assessments. Furthermore, they may receive help in referrals for additional mental health treatment, if needed, at no cost to them. Finally, as an indirect benefit to study participants, an increase in knowledge of the mechanisms of dissociation and PTSD may be obtained. This, in turn, may benefit other people at risk for or already diagnosed with PTSD.

Efficacy & Data Analysis:

Privacy of participant records

The co-investigator will appreciate the need for strict confidentiality of all study records, by virtue of clinical training, previous research experience, and training and certification in research ethics. Additionally, each participant enrolled in the study will be given a unique identification number that de-identifies all of his or her study data from their distinct individuality. This identification number will take the place of a participant's name on all study documents with the exception of the consent form which

will be stored separately from all other study related documents in order to maintain patient confidentiality.

Data Management and Analysis Plan

All data will be initially captured on paper and pencil assessments. The co-investigator, upon completion of each interview, will then transfer the data into a Microsoft Excel file on a Dell Inspiron 1501 model laptop computer. This excel file will be password protected to ensure only the personnel associated with this research project (co-investigator, committee members) will be able to gain access to the data. The paper copies of the data will be housed in a locked filing cabinet within a locked room and maintained for a period of 3 years. After the 3 years period, all study data will be destroyed.

Overall, the data management in this study involves a two-step process. The first step will be to clean the data. Data editing will include the formation of new variables and collapsing variables. Exploratory data analysis (EDA) will be conducted through data editing using SPSS 16.0 (Chicago, IL). EDA will include the calculation of means, medians, percentages, proportions, standard deviations, and skewness/kurtosis as appropriate. Descriptive statistics will be developed as well, such as frequency counts, percentages, means, medians, standard deviations, etc. to fully characterize the sample. Descriptive statistics for sub-samples of interest, such as racial and ethnic groups, and gender groups, will also be developed as appropriate. In the second step, the specific hypothesis presented above will be tested using correlational models to estimate the relationships of key independent variables on the dependent variables of interest. All analyses of the relationships of interest will be tested using a two-tailed α -level of 0.05.

CHAPTER IV

RESULTS

Demographics (see Table 3)

The final sample consisted of 58 participants with a mean age of almost 29 years. Of the participants, 53.4 % were female and 46.6% male. Additionally, Caucasians accounted for 81% of the participants, African-Americans for 12%, Asian for 3.4%, Latino/Spanish for 1.7% and “other” for 1.7%, indicating a fairly-representative sample of the American population with the exception being the Latino/Spanish group, which can be said to be under-represented. The sample can also be best described as moderately educated, averaging about 15 years of education, with 43.1% completing high school, 37.9% obtaining a bachelors degree, and nearly 83% attending educational classes on at least a part-time basis. They can also be described as highly employed with about 75% working on at least a part-time basis, around 3% being retired, and 20% indicating unemployment, of which, nearly 14% report not seeking employment at the time of participation. Further descriptives demonstrate that the majority of participants were never married, accounting for 63.8%, with married individuals ranking as the second highest grouping, representing 19%. Furthermore, nearly 54% of participants indicate

living in a detached house, 36% in an apartment or condo, and 9% in a townhouse or rooming house, with the average time in the respective dwellings being 6.8 years; only 1 person, representing about 1%, indicated being homeless at the time of participation. Finally, the majority of participants, just below 78%, identify with the Christian religion but do not attend religious services/activities on a regular basis.

Table 3: Major Demographics of Study Sample

Major Demographic Variables								
	Age	Gender	Race/Ethnicity	Education	Working Status	Marital Status	Living Situation	Faith-Based Affiliation
Descriptives of Sample	Mean ≈ 29 years	Female = 53.4% Male = 46.6%	Caucasian = 81% African Am. = 12% Asian Am. = 3.4% Latino/Spanish = 1.7% Other = 1.7%	Mean ≈ 15 years H.S. degree = 43.1% Bachelors = 37.9%	Part-time or more = 75% Retired = 3% Unemployed = 20% (14% not seeking employment)	Never Married = 63.8% Married = 19%	Detached house = 54% Apt. or condo = 36% Town or rooming house = 9% ; Mean years in residence = 6.8 years	Christian = 78% ; Doesn't regularly attend services or activities
Am. = American; H.S. = High School; Apt. = Apartment								

Study samples characteristics on study variables

Regarding the variables of most interest to this study, of the 58 participants, 47 (81%) reported experiencing déjà vu that met the definition agreed upon by experts in the field (i.e. any subjectively inappropriate impression of familiarity of a present experience with an undefined past). Of all the participants, 27 (46%) reported at least a sub-syndromal presentation of PTSD symptoms, as indicated by the PCL, with the mean score (standard deviation) for the whole sample being 34.98 (SD = 17.37). The PDEQ had a mean score of 17.62 (SD = 13.50) with 14 participants (24%) meeting or exceeding the cutoff score used to determine “high” dissociation, that being a score of 25. The

scales used to capture the presence and severity of dissociative and PTSD symptoms within the sample population, the PDEQ and PCL, respectively, had Cronbach's Alphas of .925 for the PDEQ and .969 for the PCL, indicating for both, good reliability for addressing the desired characteristics and internal consistency, allowing for capturing the data of interest.

Relationships between déjà vu characteristics and PTSD/dissociative symptoms

Pearson correlations were used to address the strength and direction of the relationships of interest for all variables. Using the full sample, correlations showed that while being characterized as "positive" for, or experiencing, déjà vu did not have a significant relationship with a person's total PCL score, certain elements of experiencing déjà vu did. For instance, Item AI of the IDEA: "Have you ever had the feeling of having experienced a sensation or situation before in exactly the same way when in fact you are experiencing it for the first time?", displayed a correlation of 0.429 ($p < .001$) (see Table 4). This item is then scored on the frequency with which this experienced has happened, indicating that as the frequency with which one experiences this sensation goes up so will the likely-hood of that persons score on the PCL. This significant relationship continues to hold true when controlling for certain characteristics such as having any PTSD symptoms (as indicated by a score ≥ 32 on the PCL) which correlated with item AI at 0.468 ($p < .05$) and also controlling for gender which had a correlation of 0.479 ($p < .05$). Surprisingly, this relationship did not hold up when investigating the relationship amongst those who would likely receive a diagnosis of PTSD if seen clinically, as indicated by a PCL score of ≥ 44 (see Table 4). What is of more interest, however, is all groups were determined to be negatively correlated with a positive déjà vu experience

(see Table 4), although this relationship was only significant when controlling for gender and selecting those participants with a likely PTSD diagnosis, $r = -0.529$ ($p < .10$). Despite the absence of significance amongst the remaining groups for this relationship, the fact that all display negative interactions indicates that there still may be a compelling association amongst these variables.

Table 4: Correlations of the PCL with Déjà vu Characteristics

Variables	Déjà vu item A1: Frequency	Déjà vu item B3: Recency	Déjà vu item B4: Duration	Déjà vu positive
Full Sample	0.429***	-0.126	-0.109	-0.016
PTSD Symptoms (PCL ≥ 32)	0.468**	-0.118	-0.124	-0.215
PTSD Likely (PCL ≥ 44)	0.388	0.349	0.511*	-0.438
PTSD Sub-Syndromal (PCL $\geq 32 \leq 43$)	-0.427	0.448	0.493	-0.563
PTSD Symptoms: controlling for gender	0.479**	-0.160	-0.160	-0.350
PTSD Likely: controlling for gender	0.394	0.366	0.513*	-0.529*

*** = $p < .001$ ** = $p < .05$ * = $p < .10$

The relationships between dissociative symptoms and déjà vu characteristics also displayed equally thought-provoking results. As seen in Table 5, using the entire sample, the PDEQ also displayed a non-significant, negative correlation with a positive déjà vu experience and also a significant correlation with item A1 of the IDEA, with $r = 0.447$

($p < .001$). This indicates that as sample participants PDEQ scores increase so does their frequency of having experienced a repeat sensation of a new situation. This relationship of PDEQ score and déjà vu characteristic A1 holds true, once again, for those with PTSD symptoms, $r = 0.528$ ($p < .01$), and also controlling for gender while selecting participants who have experienced PTSD symptoms, $r = 0.544$ ($p < .05$) (see Table 5). Participants who were classified as receiving a likely PTSD diagnosis also displayed these same relationships with $r = 0.641$ ($p < .01$) and while controlling for gender amongst these same selected cases, $r = 0.646$ ($p < .05$). Added up, the maintenance of this relationship across the selected groups demonstrates the robust connection that appears to be associated with this samples déjà vu characteristic of frequency and PDEQ scores

Although not determined to be significant relationships, when using only cases selected for having sub-syndromal PTSD symptoms as indicated by the PCL (scores of ≥ 32 & ≤ 43), a negative correlation was displayed for item A1 in comparison with both PCL and PDEQ scores (see Tables 4 & 5). These finding may be displaying a unique relationship that will be discussed in later sections and may point towards a component concerning the development of PTSD that is already within the field of traumatology and receiving considerable attention.

The relationships of PTSD and dissociative symptoms with déjà vu characteristics were also investigated in those who were deemed to have high dissociative symptoms and low dissociative symptoms. Modeling the previous research of Zoellner, Alvarez-Conrad, & Foa (2002) which utilized a median split of PDEQ scores for this type of classification, it was decided that any score greater than or equal to 25 would be considered high dissociative characteristics and any score lower than or equal to 24

would be low dissociative characteristics. For the high dissociative group the mean score was 30 (SD = 4) and the low dissociative group mean score was 14 (SD = 4). It should also be noted that for 6 participants PDEQ ratings on certain items were missing. To correct for this missing data, each participant that had missing data also had their average PDEQ score calculated and this mean was used as a surrogate rating for each missing

Table 5: Correlations of the PDEQ with Déjà vu Characteristics Amongst Selected PTSD Severity Groups

Variables	Déjà vu item A1: Frequency	Déjà vu item B3: Recency	Déjà vu item B4: Duration	Déjà vu positive
Full Sample	0.447****	-0.052	-0.038	-0.093
PTSD Symptoms (PCL \geq 32)	0.528***	0.027	0.025	-0.376*
PTSD Likely (PCL \geq 44)	0.641***	0.527**	0.204	-0.517**
PTSD Sub-Syndromal (PCL \geq 32 \leq 43)	-0.149	0.400	0.462	-0.478
PTSD Symptoms: controlling for gender	0.544**	0.049	0.048	-0.415**
PTSD Likely: controlling for gender	0.646**	0.464*	0.183	-0.364

****=p<.001 *** =p<.01 ** =p<.05 * =p<.10

item. This technique allowed for the surrogate ratings to be personalized and unique to the participant, thus avoiding any inflation or deflation of scoring that may have been encountered by using other participant's ratings.

As can be seen in viewing Table 6 there were no significant correlations between PCL score and déjà vu characteristics when selecting for cases based on severity of PTSD

and dissociative symptoms together. This indicates that experiencing déjà vu or characteristics of déjà vu does not interact with a person's PCL scores when utilizing symptom profiles of participants based on severity of PTSD and dissociative symptoms. Of note with these cases, however, is that the negative relationship between positive déjà vu experiences and PCL scores is still maintained.

In Table 7, the same symptom profiles were utilized but relationships between PDEQ scores and déjà vu characteristics were analyzed.

Table 6: PCL Correlations with Déjà vu Characteristics Amongst Selected PTSD and Dissociative Severity Groups

Variables	Déjà vu item A1: Frequency	Déjà vu item B3: Recency	Déjà vu item B4: Duration	Déjà vu positive
PTSD Symptoms & Low dissociation (PDEQ \leq 24)	-0.206	-0.276	0.504	-0.055
PTSD Symptoms & High dissociation (PDEQ \geq 25)	-0.478	0.000	-0.366	-0.141
PTSD Likely & Low dissociation	0.551	0.955	0.551	N/A
PTSD Likely & High dissociation	0.205	0.077	0.510	-0.418

*** =p<.001 ** =p<.05 * =p<.10

Note: N/A within this table is given as there were no participants who were categorized as "PTSD Likely & Low dissociation" that also meet the Déjà vu positive requirement.

These analyses displayed that there were significant correlations between PDEQ scores and item A1 of the IDEA amongst those with high dissociative symptoms in both groups classified as having PTSD symptoms, $r = 0.629$ ($p < .05$) and also likely to receive a PTSD diagnosis, $r = 0.527$ ($p < .10$). These findings demonstrate that as a participant's PDEQ score increases, indicating more severe dissociative symptoms, so will the frequency with

which they experience a sensation of familiarity in a new event, regardless of the severity of PTSD symptoms, as determined by the PCL.

The negative correlation with positive déjà vu experiences that has been seen with the previous analyses held strong amongst these selected cases as well. This relationship reached significance, $r = -0.742$ ($p < .01$), with what may be considered the most severe group within this study; those who would likely receive a PTSD diagnosis if seen clinically with additional inclusion in the high dissociative group.

As supplemental analyses, univariate analyses of variances were conducted with PCL scores (≥ 44 - likely PTSD diagnosis; ≥ 32 – PTSD symptoms; $\geq 32 \leq 43$ - PTSD sub-syndromal) as the dependent variable and a positive déjà vu experience with gender as the fixed factors. These variables were chosen based on the prevailing and well established findings (Fullerton, Ursano, Epstein, Crowley, Vance, & Kao et al., 2001) that indicate a difference in gender in relation to the development of PTSD; specifically that women are more likely than men to develop PTSD following trauma exposure.

ANOVA's indicted that, overall, PCL score was not significantly related to a positive déjà vu experience. However, when comparing men and women it was found that gender did, indeed, affect this relationship. Particularly, the non-significant relationship between PCL score and déjà vu experiences held up when looking at men, but the relationship did reach significance when looking at women. This significance held across both those falling within the PTSD symptom group (mean = 40.22, SD = 8.378) and PTSD likely group (mean = 50.67, SD = 4.041) with findings of $F_{(1,9)} = 27.089$, $p < .001$ and $F_{(1,3)} = 25.652$, $p < .05$, respectively. These findings, along with the findings

previously mentioned, demonstrate unique relationship between dissociative symptoms, PTSD, déjà vu experiences and their related characteristics.

Table 7: PDEQ Correlations with Déjà vu Characteristics Amongst Selected PTSD and Dissociative Severity Groups

Variables	Déjà vu item A1: Frequency	Déjà vu item B3: Recency	Déjà vu item B4: Duration	Déjà vu positive
PTSD Symptoms & Low dissociation	0.053	0.114	-0.052	-0.380
PTSD Symptoms & High dissociation	0.629**	-0.024	-0.331	-0.405
PTSD Likely & Low dissociation	-0.756	0.419	-0.756	N/A
PTSD Likely & High dissociation	0.527*	0.041	0.366	-0.742***

*** =p<.01 ** =p<.05 * =p<.10

Note: N/A within this table is given as there were no participants who were categorized as “PTSD Likely & Low dissociation” that also meet the Déjà vu positive requirement.

CHAPTER V

DISCUSSION

Interpretations of relationships found within the study population

One of the most interesting findings and, subsequent relationships, within this study was the positive correlations that were found between item A1 of the IDEA (indicating frequency of sensations believed to be déjà vu experiences) and the scores of the PCL and PDEQ amongst PTSD populations chosen to have any PTSD symptoms and also likely to receive a PTSD diagnosis; however, the correlation of these variables was negative when chosen for those participants who would be considered sub-syndromal for PTSD, indicating that the more a person experiences déjà vu the less likely they are to rate high on the PCL and PDEQ scales. This negative relationship was also present when comparing PDEQ and PCL scores, high and low dissociative features, and indication of positive déjà vu experiences (e.g. having déjà vu experiences that are in concordance with the agreed upon definition). This unique relationship leads the investigator to think that allostatic load may be affecting the processing of the traumatic events that the participants encountered. Specifically, when a person encounters a traumatic event it is natural for him/her to experience some aversive symptoms, and the brain regions used for

processing these symptoms are the same that allow for the experience of déjà vu (hence the positive correlations/relationships between these two variables). However, when the trauma and processing of it reaches such a level that it can no longer be supported by these brain regions, the load is transferred to other, as yet, unidentified brain region(s), resulting in the negative correlation seen in those with sub-syndromal features. If this taxing of the system continues, however, and the allostatic load becomes too much for these unidentified brain regions, then there is a “spill-over” effect back to the brain regions believed to be involved in the experiences of déjà vu and processing of more benign trauma symptoms. It is at this point that the positive correlation is once again seen, in this case, with item A1 of the IDEA and the more severe PDEQ and PCL scores. However, since these regions were not meant to process such debilitating symptoms, this is also the point where more pronounced and critical symptoms are presented, such as more severe dissociative symptoms and emotional dysregulation.

The steadfast negative relationships between positive déjà vu experiences and PDEQ and PCL scores are interesting and important to understand if the previously theorized relationship is to be understood. Given that a positive déjà vu experience is based on the affirmative answering of item A1 of the IDEA and a negative response concerning item B2 of the IDEA (“While you have this feeling of recognition can you remember exactly where and when you had the same experience of feeling before?”) it is reasonable to believe that it is the synergy of the two proposed brain regions that are responsible for déjà vu experiences, specifically the amygdala (used in emotional processing) and hippocampus (used in memory formation), as mentioned earlier. Given these two separate regions, it may be that the amygdala is responsible for the frequency

with which one experiences déjà vu sensations and, thus, for the positive and negative correlations seen when comparing PTSD symptom severity groups and PCL/PDEQ scores, given its implications in regulating various processing of information. The amygdala would also then be the region responsible for the regulation of processing of traumatic events and symptoms and has been implicated in this type of role, as previously described (Vouimba and Levin, 2005). The hippocampus can then be said to be responsible for the constant negative correlations obtained when looking at positive déjà vu experiences and PCL/PDEQ scores, given its implication in memory formation and the fact that entering item B2 of this IDEA (concerning memory of previous experiences) into the equation results in the negative correlation. This interpretation also then assumes that this region is the main component for maintaining déjà vu experiences and this is confirmed by the previously mentioned study of McHugh et al. (2007).

Based on these findings, it is surmised that the amygdala does play a role in both déjà vu sensations and the development and presentation of PTSD and its associated symptoms. Given this, the frequency with which a person experience déjà vu does lend confirmation to the severity of dissociative and PTSD symptoms. Additionally, while not as strong a relationship, it is presumed that the hippocampus is responsible for the negative correlation seen between PCL/PDEQ score and being positive for déjà vu experiences. While the exact nature of these interactions is unknown, it is believed that the hippocampus may somehow insulate a person from the development of PTSD symptoms.

Finally, as other studies have demonstrated, a gender effect was also present within the study, with the discussed relationships being more pronounced amongst female

participants. This lends further support to the call for the investigation of the role of gender on the development and progression of PTSD and its associated symptoms.

Limitations

As with other studies, this study has limitations that may affect the interpretation and translation of results to other studies and populations. Given the prevalence of déjà vu within the general population, a larger sample would allow for more inclusion of people that do not qualify for a déjà vu experience. This, in turn, would allow for a better comparison of the similarities and differences between these two groups of people and the results on the development and progression of PTSD symptoms.

Furthermore, treatment seeking versus non-treatment seeking behavior was not assessed. This is an important consideration to make given the lack of information of the effect of various treatments on déjà vu experiences. Additionally, given one of the most common treatments for PTSD, that being cognitive behavioral therapy, affecting perceptions and thought patterns, it may be that an as yet unknown effect of this therapy is an increase or decrease of activity in the mechanisms associated with both déjà vu experiences and the development of PTSD. Additional investigations concerning the effect of treatments on these mechanisms would improve our understanding of these relationships and may possibly aid in the development of more effective treatments.

A final limitation of this study is based on the use of a heterogeneous sample of trauma exposed participants. For example, while the trauma event for each participant was not captured for this study, the investigator knew from the nature of the organizations used for recruitment that participants had experienced war zone related trauma, rape, abuse, and other unknown trauma. This, at first, may appear to be a benefit

to the study and allow for translation of the findings across a number of trauma events; however, given the relative unique relationships being investigated, use of a more homogenous sample may elicit different findings, such as more pronounced déjà vu symptoms in a population which consists solely of participants experiencing psychological trauma and not physical. Further investigations using samples consisting of similar trauma exposed participants will help to determine if the relationships found in this study are unique to certain sub-sets of trauma victims or can be generalized to all trauma exposed individuals.

CHAPTER VI

CONCLUSION

This study set out to examine the relationships between déjà vu experiences and the development of PTSD. While the hypothesized relationship was not fully supported there were interesting results that shed light on the complexities of PTSD and the brain regions that may be involved in the development and presentation of PTSD symptoms.

Specifically, simply looking at whether or not a person experiences déjà vu based on the agreed upon definition is not enough to determine if a person may develop PTSD or experience dissociation during the course of their PTSD. Interestingly, however, was that there was a consistent negative correlation between these two phenomena. When breaking déjà vu down into its components, however, it can be seen that there is more to the relationship. The frequency with which ones experiences déjà vu was significantly related to both PDEQ and PCL scores and the brain region believed to be responsible for this, the amygdala, is already receiving considerable attention in the development of PTSD. This finding lends support to the continued investigation of this brain region to determine its full involvement in the development and progression of PTSD.

Additionally, when the memory component of déjà vu experiences is brought into the factor (the hippocampus) it is then that the negative correlation is seen. This lends support to the investigation of the hippocampus and its possible involvement in promoting resiliency to the development of PTSD.

Finally, when looking at different severity groups of PTSD it was found that sub-syndromal participants were negatively correlated with an item concerning frequency of déjà vu sensations, while those with any PTSD symptoms and those who would likely receive a PTSD diagnosis were positively correlated with this item. Based on this relationship a proposal was made for the possible processing of traumatic stimuli that requires further investigating to determine the potential of this theory.

It can be argued that the experiences of déjà vu in this population are simply the expression of dissociative symptoms and all that is being measured with the IDEA is the presence of these symptoms. However, in a study using a Japanese population, Adachi et al. (2003) demonstrated that déjà vu was unlikely to be a form of dissociation and cite other studies that also support different categorizations for déjà vu and dissociative features. While this is only a single study it does demonstrate evidence in support of déjà vu experiences being distinct from those of dissociation and, together with the findings of this study, demonstrates that further investigations of déjà vu's relationship to dissociative features would be informing and encourage investigations in an area lacking solid empirical support.

Posttraumatic stress disorder is a diagnosis made from the complex presentation of a myriad of symptoms. Continued investigation of these complex interactions are required to fully understand the development and treatment of this disorder. While it is

unlikely that PTSD will ever be completely eradicated, through these continued investigation it is likely that developments can be made that will lessen its effects and promote recovery and resiliency.

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APPENDICES

Appendix 1 – Demographic form:

1. What best describes your current residence? (check one)

- Detached house
- Rowhouse or townhouse
- Mobile home
- Apartment or condominium
- Retirement complex or senior housing
- Healthcare facility or nursing home
- Homeless
- Rooming house or hotel

2. How long have you lived at your current residence?

YEARS _ _ _ MONTHS _ _ _

(Specify months only if fewer than 2 years at your current residence)

3. What best describes your ethnicity? (check one)

- Caucasian
- African-American
- Asian
- Spanish or Latino (Please circle)
- Other (Please specify): _____

4. What is your current marital status? (check one)

- Never married
- Cohabiting with partner
- Married
- Separated
- Divorced
- Widowed

5. What is your sex? M or F (Please circle)

6. What is your age? _ _ yrs old

7. How many years of schooling have you completed? _ _ _

(e.g. graduated high school =12)

8. What is the highest degree you have received? (check one)

- None

- High School Diploma
- GED
- Associate Degree/Technical Degree
- College Diploma
- Masters Degree
- Doctorate or Professional Degree (e.g., MD, PhD, Law Degree, JD)

9. Are you currently a student (attending school or in summer recess)?

- No
- Full-time
- Part-time

10. What best describes your current employment status? (check one)

- Unemployed, not looking for employment
- Unemployed, looking for employment
- Full-time employed for pay
- Part-time employed for pay
- Self-employed for pay
- Retired, not working

11. What best describes your faith-based affiliation? (check one)

- Christian
- Jewish
- Muslim
- Other (Please specify): _____

12. What best describes your faith-based practices? (check one)

- Attend services/activities daily
- Attend services/activities weekly
- Attend services/activities monthly
- Attend services/activities about once per year
- Other (Please Specify): _____

Appendix 2 – Peritraumatic Dissociative Experiences Questionnaire:

Peritraumatic Dissociative Experiences Questionnaire— Self-Report Version

Instructions: Please complete the items below by circling the choice that best describes your experiences and reactions *during the _____ and immediately afterward*. If an item does not apply to your experience, please circle "Not at all true."

1. I had moments of losing track of what was going on—I "blanked out" or "spaced out" or in some way felt that I was not part of what was going on.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
2. I found that I was on "automatic pilot"—I ended up doing things that I later realized I hadn't actively decided to do.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
3. My sense of time changed—things seemed to be happening in slow motion.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
4. What was happening seemed unreal to me, like I was in a dream or watching a movie or play.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
5. I felt as though I were a spectator watching what was happening to me, as if I were floating above the scene or observing it as an outsider.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
6. There were moments when my sense of my own body seemed distorted or changed. I felt disconnected from my own body, or that it was unusually large or small.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
7. I felt as though things that were actually happening to others were happening to me—like I was being trapped when I really wasn't.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
8. I was surprised to find out afterward that a lot of things had happened at the time that I was not aware of, especially things I ordinarily would have noticed.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
9. I felt confused; that is, there were moments when I had difficulty making sense of what was happening.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true
10. I felt disoriented; that is, there were moments when I felt uncertain about where I was or what time it was.
1 2 3 4 5
Not at all true Slightly true Somewhat true Very true Extremely true

Appendix III - Inventory for Déjà vu Experiences Assessment (IDEA):

INTRODUCTION

This questionnaire is about a feeling of which we think most people are familiar with. Almost everyone of us at one time or another have had the feeling that we experienced some event, thought or feeling before in exactly the same way, even though in actual fact it is the first time. It seems as if we are recognizing something, even though we know this is impossible.

This feeling of 'recognition' is called '**déjà vu** experience'.
'**Déjà vu**' literally means 'already seen'.

When you answer a question, the important thing is to give your first impression. There is no need to think about it for a long time! Be sure to read the INTRODUCTION before every new set of questions. Please do NOT skip any questions!

To answer a question, please mark the circle before the answer.

For example: If you want to answer 'Yes': Yes

A

- 1. Have you ever had the feeling of having experienced a sensation or situation before in exactly the same way when in fact you are experiencing it for the first time?**

(Note: If you are not sure about it, please answer 'Never'!)

- Never
- Yes, very infrequently (less than once per year)
- Yes, sometimes (a few times per year)
- Yes, often (a few times a month)
- Yes, more frequently (at least weekly)
- Don't know

2. Have you ever had the feeling that it seems as if everything around is not real, as if it is not really happening?

- Never
- Very infrequently (less than once per year)
- Sometimes (a few times a year)
- Often (a few times a month)
- More frequently (at least weekly)
- Don't know

3. *This question is about the opposite of the feeling of 'recognition'!*
Have you ever had the feeling that you had never experienced something before, when in fact you had experienced it before?
For example: You see something or someone you know very well, but you feel as if you have never seen it or him before!

- Never
- Very infrequently (less than once per year)
- Sometimes (a few times a year)
- Often (a few times a month)
- More frequently (at least weekly)
- Don't know

4. Has it ever happened to you that you experienced something that had occurred before in a dream?

- Never
- Very infrequently (less than once per year)
- Sometimes (a few times a year)
- Often (a few times a month)
- More frequently (at least weekly)
- Don't know

5. Have you ever had the feeling while something was happening to you that it was not happening to yourself, but to someone else, as if you were looking at yourself?

- Never
- Very infrequently (less than once per year)
- Sometimes (a few times a year)
- Often (a few times a month)
- More frequently (at least weekly)
- Don't know

- 6. Do you consider yourself a person with paranormal qualities?**
(*'Paranormal qualities' includes clairvoyance, telepathic or psychic abilities and so forth.*)
- No
 - No, but I am not sure
 - Yes, but I am not sure
 - Yes
 - Don't know
- 7. How often can you remember a dream so well that you can tell someone about it?**
- Never
 - Very infrequently (less than once per year)
 - Sometimes (a few times a year)
 - Often (a few times a month)
 - More frequently (at least weekly)
 - Don't know
- 8. How many times a year do you travel a distance of about a hundred miles or more from your home locality?**
- Never
 - Very infrequently (less than once per year)
 - Sometimes (a few times a year)
 - Often (a few times a month)
 - More frequently (at least weekly)
 - Don't know
- 9. Do you ever experience daydreaming?**
- Never
 - Very infrequently (less than once per year)
 - Sometimes (a few times a year)
 - Often (a few times a month)
 - More frequently (at least weekly)
 - Don't know

Only answer the following questions if you answered 'Yes,...' to the first question on page 1. These questions are about the feeling of '*recognition*'. '*Recognition*' means the feeling that we have experienced something before in exactly the same way, although in fact it is now the first time it has ever happened to us.

B

INTRODUCTION

If you answered '**Never**' or '**Don't know**' to the first question on page 1, there is no need for you to answer the following questions.

Please **check** to see whether you have answered all the questions.

Thank you very much for your co-operation!

If you answered '**Yes,..**' to the first question on page 2, please continue to the next page.

1. A person can have a feeling of '*recognition*' in many different ways. It can have to do with a specific place, a situation, an activity, an event, meeting someone, a conversation, a thought, reading a book or a newspaper...
Have you ever had this feeling of '*recognition*' in one or more of the following ways?

(Note: You can answer 'Yes' to more than one topic of this question. Please answer all the topics, including the ones you answer 'No' to. If you are *not sure* whether something is applicable to you, answer "No.")

- | | |
|---|------------|
| a. In a certain place | O Yes O No |
| b. In a certain situation | O Yes O No |
| c. Engaging in a certain activity | O Yes O No |
| d. At a certain event | O Yes O No |
| e. When meeting someone..... | O Yes O No |
| f. While telling someone about something..... | O Yes O No |
| g. While listening to a conversation, music, or a statement..... | O Yes O No |
| h. While having a certain thought | O Yes O No |
| i. While reading something..... | O Yes O No |
| j. In some other way than in question a – i..... | O Yes O No |

2. While you have this feeling of 'recognition', can you remember exactly where and when you had the same experience or feeling before?

- No
- I vaguely remember
- Yes, I can remember exactly
- Don't know

3. When did this feeling of 'recognition' occur for the last time?

- More than 5 years ago
- 1 to 5 years ago
- 6 months to 1 year ago
- 2 to 6 months ago
- 1 to 2 months ago
- Last month
- Don't know

4. How long does this feeling of 'recognition' usually last?

- One second or less
- A few seconds
- One minute or a couple of minutes
- Half an hour to one hour
- A few hours
- More than a few hours
- Don't know

5. **Is the feeling of '*recognition*' usually related to some part of an experience or situation, or to the whole thing?**
- Total
 - Some part of it
 - It depends
 - Don't know
6. **Do you usually have this feeling of '*recognition*' at a certain time of day?**
- No
 - In the morning shortly after awakening
 - In the Daytime
 - When it gets dark
 - In the evening (with the lights on)
 - Just before or after going to bed
 - Don't know
7. **While having this feeling of '*recognition*', did you ever have the idea you could predict what was going to happen in the next few minutes?**
- Never
 - Very infrequently (less than once per year)
 - Sometimes (a few times a year)
 - Often (a few times a month)
 - More frequently (at least weekly)
 - Don't know
8. **While having this feeling of '*recognition*', did you ever have the feeling it was not happening to you but to someone else, as if you were looking at yourself?**
- No
 - Vague feeling it was not happening to me
 - Clear feeling it was not happening to me
 - Vague feeling I was looking at myself
 - Clear feeling I was looking at myself
 - Don't know
9. **Does this feeling of '*recognition*' usually pertain to an exact repetition of the past or to approximately the same thing?**
- Exactly the same
 - Almost exactly the same
 - The same
 - Approximately the same
 - Vaguely the same
 - Don't know

10. While having this feeling of 'recognition' have you also ever felt that it looked as if everything around you was not real, as if it was not really happening?

- Never
- Yes, a little unreal
- Yes, vaguely unreal
- Yes, unreal
- Yes, totally unreal
- Don't know

INTRODUCTION

You can answer 'Yes' to more than one topic of the following questions.
If you are *not sure*, answer 'No'.
Please answer all the topics of the questions, including the ones you answer 'No' to.

11. In general, how does this feeling of 'recognition' affect you? (check all that apply)

- | | | |
|--|---------------------------|--------------------------|
| a. It leaves me indifferent | <input type="radio"/> Yes | <input type="radio"/> No |
| b. It frightens me..... | <input type="radio"/> Yes | <input type="radio"/> No |
| c. It is reassuring..... | <input type="radio"/> Yes | <input type="radio"/> No |
| d. It is nice and pleasant..... | <input type="radio"/> Yes | <input type="radio"/> No |
| e. It is uncomfortable or oppressive | <input type="radio"/> Yes | <input type="radio"/> No |
| f. It is surprising, amazing..... | <input type="radio"/> Yes | <input type="radio"/> No |
| g. It interrupts whatever I am doing | <input type="radio"/> Yes | <input type="radio"/> No |

12. What do you feel is the main explanation of this feeling of 'recognition' ?

a. Anxiety or tension	<input type="radio"/> Yes	<input type="radio"/> No
b. Poor memory	<input type="radio"/> Yes	<input type="radio"/> No
c. Unconscious memories	<input type="radio"/> Yes	<input type="radio"/> No
d. Reincarnation	<input type="radio"/> Yes	<input type="radio"/> No
e. Concentration problems	<input type="radio"/> Yes	<input type="radio"/> No
f. Paranormal qualities	<input type="radio"/> Yes	<input type="radio"/> No
g. Desire to escape from reality	<input type="radio"/> Yes	<input type="radio"/> No

13. How do you usually feel before you have this feeling of 'recognition' ? (check all that apply)

a. Mentally fatigued.....	<input type="radio"/> Yes	<input type="radio"/> No
b. Gloomy or depressed	<input type="radio"/> Yes	<input type="radio"/> No
c. Nervous or under stress	<input type="radio"/> Yes	<input type="radio"/> No
d. Physically fatigued	<input type="radio"/> Yes	<input type="radio"/> No
e. Cheerful and happy.....	<input type="radio"/> Yes	<input type="radio"/> No
f. Confused or absent-minded	<input type="radio"/> Yes	<input type="radio"/> No
g. Relaxed	<input type="radio"/> Yes	<input type="radio"/> No
h. Angry	<input type="radio"/> Yes	<input type="radio"/> No
i. Frightened	<input type="radio"/> Yes	<input type="radio"/> No
j. Drowsy.....	<input type="radio"/> Yes	<input type="radio"/> No
k. Physically ill	<input type="radio"/> Yes	<input type="radio"/> No

14. Have you ever had this feeling of '*recognition*' in one of the following conditions? (Check all that apply)

- | | | |
|--------------------------------|------------------------------|-----------------------------|
| a. Headache..... | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| b. 'Black out'..... | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| c. Epileptic seizure | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| d. Concentrated activity | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| e. Drinking alcohol | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Question 14 was the last question.
Would you please **check** and see whether you have answered all the questions?
Thank you for your co-operation!

Appendix IV – PTSD Checklist, Civilian Version (PCL-C):

Instructions: Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, put an “X” in the box to indicate how much you have been bothered by that problem *in the last month*.

No.	Response:	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories, thoughts, or images</i> of a stressful experience from the past?					
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?					
3.	Suddenly <i>acting or feeling</i> as if a stressful experience were <i>happening again</i> (as if you were reliving it)?					
4.	Feeling <i>very upset</i> when <i>something reminded</i> you of a stressful experience from the past?					
5.	Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, or sweating) when <i>something reminded</i> you of a stressful experience from the past?					
6.	Avoid <i>thinking about or talking about</i> a stressful experience from the past or avoid <i>having feelings</i> related to it?					
7.	Avoid <i>activities or situations</i> because <i>they remind you</i> of a stressful experience from the past?					
8.	Trouble <i>remembering important parts</i> of a stressful experience from the past?					
9.	Loss of <i>interest in things that you used to enjoy</i> ?					
10.	Feeling <i>distant or cut off</i> from other people?					

11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?					
No.	Response:	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
12.	Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?					
13.	Trouble <i>falling</i> or <i>staying asleep</i> ?					
14.	Feeling <i>irritable</i> or having <i>angry outbursts</i> ?					
15.	Having <i>difficulty concentrating</i> ?					
16.	Being " <i>super alert</i> " or watchful on guard?					
17.	Feeling <i>jumpy</i> or easily startled?					

Appendix V – Consent Form:

PURPOSE OF THE STUDY

I am being asked to participate in a research study being conducted to see if there is any connection between the experiences of déjà vu, dissociation, and posttraumatic stress disorder (PTSD). Déjà vu is the experience of being in an unfamiliar place but feeling as if you had been in the place before. Dissociation is the experience of a change in the way a person views them self or their environment.

DESCRIPTION OF THE STUDY

The survey will involve enrollment of participants who have been diagnosed with PTSD and also people who have not been diagnosed with PTSD.

I am aware that the survey will last for only 1 visit and will take from 15 to 25 minutes to complete.

The survey will include 4 different questionnaires and include demographic questions include my gender, age, and education; questions about the symptoms of PTSD that I have experienced including distressing dreams and unwanted thoughts; questions about my experiences of déjà vu including the number of times I have experienced it and how long they lasted; and questions about experiences of dissociation include distortions of time and loss of awareness.

Upon determination of my eligibility to participate in the survey, I will be given the questionnaires to complete. I will be able to skip any questions that I do not want to answer and will be able to stop my participation at any time.

RISKS AND DISCOMFORTS

During the completion of the questions it may be possible for me to become upset or distressed due to the questioning. I may request information from study personnel about community services if I feel the need to do so.

BENEFITS OF STUDY PARTICIPATION

As an indirect benefit, my participation in this survey will provide additional information about the relationship between the experiences of déjà vu, dissociation, and PTSD which may help people at risk of developing PTSD. Additionally, I may learn about the symptoms I experience and feel better about them through completion of the survey questions.

COSTS ASSOCIATED WITH STUDY PARTICIPATION

I understand that I will not be compensated for my participation in this survey and that there is no cost to me for participating in this research study.

ALTERNATIVE TO PARTICIPATION

Since this study is a survey of my experiences the only alternative is not to participate.

SUMMARY OF MY RIGHTS AS A PARTICIPANT IN A RESEARCH STUDY

My participation in this research study is voluntary. If I decide to join the study, I may withdraw at any time and for any reason without penalty. If information generated from this survey is published or presented, my identity will not be revealed.

I understand that if I have any questions about my rights as a research subject I can contact CSU Institutional Review Board at (216)-687-3630

DISCLOSURE OF MY STUDY RECORDS

Efforts have been made to keep the personal information in my research record private and confidential. These efforts include using a study ID number in place of my name on all surveys that are completed. These surveys will be stored separately from my consent form so my ID number and personal identity cannot be connected by any person other than the study investigators.

CONTACT INFORMATION

James Pontau has described to me what is going to be done, the risks, and benefits involved, and can be contacted at 216-287-####. Further information regarding the study can be obtained from Professor John P. Wilson at 216-687-####

SIGNATURE

Signing below indicates that I have been informed about the research study in which I voluntarily agree to participate; that I have asked any questions about the study that I may have; and that the information given to me has permitted me to make a fully informed and free decision about my participation in the study. By signing this consent form, I agree to participate.

Printed Name of Participant

_____ **Date** _____

Signature of Participant

_____ **Date** _____

Signature of Person Obtaining Consent

Printed Name of Person Obtaining Consent