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A PTSD analogue study : investigating the roles of memory and metamemory in trauma-related outcomes

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ABSTRACT

A PTSD ANALOGUE STUDY: INVESTIGATING THE ROLES OF MEMORY AND METAMEMORY IN TRAUMA-RELATED OUTCOMES

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Trauma survivors who develop posttraumatic stress disorder (PTSD) often display symptoms of memory fragmentation such as an impaired ability to recall trauma memories. These observations are consistent with prominent theories of PTSD, which consider memory fragmentation as a central feature of PTSD. Correspondingly, most empirically supported interventions for PTSD focus on addressing dysfunctional thoughts and behaviors and integrating fragmented memories of the event. More recently, this assumption has been challenged by research indicating that metamemory – one's subjective beliefs about one's memory functioning and quality – may partially account for reported memory fragmentation among individuals with PTSD. Memory underconfidence, regardless of whether or not it is founded or wholly accurate, may lead to feelings of anxiety, especially in the process of recalling and making sense of one's trauma memory. Despite the intertwined nature of their relationship, the association between memory and metamemory has been understudied in the trauma literature.

This dissertation investigated whether PTSD is a disorder of memory fragmentation, perceived memory fragmentation, or both by examining the association between memory and metamemory. A trauma analogue between-subjects experimental design was employed. Eighty-four healthy participants were randomly assigned to receive either positive feedback or negative feedback after completing a standardized memory assessment. Despite the use of randomization,

the manipulation groups systematically differed on both baseline memory ability and baseline memory confidence. Contrary to the first hypothesis, after controlling for the effect of baseline metamemory beliefs, the groups did not differ on their recall task performance, $F(1,80) = .34$, $p = .56$. The second hypothesis was partially supported, suggesting that both memory ability and subjective memory beliefs contribute to participants' subsequent performance on a verbal recall task. Controlling for significant covariate variables (baseline metamemory beliefs and metamemory group), memory ability negatively predicted objective memory fragmentation, $\beta = -.02$, $t = -2.20$, $p = .03$. Lastly manipulating participants to believe their memory abilities are poor did not adversely impact their subjective memory fragmentation scores. Subjective memory fragmentation was predicted by baseline metamemory beliefs ($\beta = .004$, $t = 2.86$, $p = .003$) and memory ability ($\beta = .001$, $p = .04$) but not metamemory group ($\beta = .007$, $p = .83$). Further, all post hoc analyses examining possible interaction effects between metamemory and memory fragmentation (objective and subjective) were non-significant.

Overall, manipulating participants' memory confidence failed to produce anticipated outcomes. The effects of memory ability did not trump the effects of other important covariates in predicting objective memory fragmentation. Likewise, metamemory group failed to predict subjective memory fragmentation. Although the hypothesized role of low memory confidence in PTSD symptoms was not consistently supported in the current trauma analogue study, there were reservations regarding the criterion validity of various paradigms and measurements (i.e., trauma analogue, manipulation checks, and objective memory fragmentation). Most notably, the failed randomization may have led to reduced potency of the manipulation paradigm and subsequently reduced statistical power in detecting the treatment effect. To date, this study is the first known experimental study aimed at testing the hypothesized role of low memory confidence in PTSD

directly using a memory confidence manipulation paradigm. The current findings reflect ongoing challenges in accurately quantifying memory impairments among trauma survivors in both research and clinical settings.

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A PTSD ANALOGUE STUDY: INVESTIGATING THE ROLES OF MEMORY AND METAMEMORY IN TRAUMA-RELATED OUTCOMES

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CHAPTER 1

INTRODUCTION

Posttraumatic stress disorder (PTSD) remains one of the most prevalent diagnoses among individuals who have been exposed to immensely stressful events (Ehlers & Clark, 2000). According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed. [DSM-V], American Psychiatric Association, 2013), these events range from, but are not limited to, actual or threatened physical violence, actual or threatened sexual assault, natural disasters, war experience, terrorist attacks, and motor vehicle accidents. The individual could be exposed to the adversity through direct infliction, in-person witnessing, or indirect exposure via professional duties, as well as learning about violent events inflicted upon a close relative or close friend. To be diagnosed with PTSD, the following characteristics must be present for more than one month after the event has occurred: (a) persistent and unwanted re-experiencing of the traumatic event, (b) persistent avoidance of trauma-related stimuli and numbing in the presence of distressing trauma-related stimuli, (c) negative alterations in cognitions and mood, and (d) persistent symptoms of hyperarousal (APA, 2013).

Symptoms specific to memory impairment are implicated across the symptom categories of PTSD. In particular, the *DSM-V* specifies that individuals diagnosed with PTSD may experience recurrent, involuntary, and highly emotional intrusive recollections of the adversity (criterion B1) and/or an inability to remember critical details of the event (criterion D1; APA, 2013). Given the distressing nature of trauma-related thoughts and memories,

these individuals may also seek to suppress external cues (e.g., people, situation, and places) as well as internal cues (e.g., cognitions) that remind them of the distressing event (criteria C; APA, 2013).

Memory Impairments in PTSD

PTSD has often been regarded as a "disorder of memory." Indeed, altered memory functioning has been found to be critical in the development and maintenance of PTSD (Brewin & Holmes, 2003; Ehlers & Clark, 2000; Golier & Yehuda, 2002). Whereas clinical interventions for trauma survivors with PTSD predominantly address deficits or biases in trauma-related memory and cognition, research has shown that individuals with PTSD also frequently struggle with other general memory deficits.

Trauma Memory Impairments in PTSD

Consistent with prevailing PTSD theories and *DSM-V* PTSD classification (APA, 2013), a substantial body of research has detected biases and/or deficits in trauma memory recollection among individuals diagnosed with PTSD. Nonetheless, as summarized by Brewin and Holmes (2003), it remains an enigma which specific trauma memory mechanisms are implicated in the onset and maintenance of PTSD. Two splitting viewpoints have emerged in the field: one characterizes traumatic memories as "impaired and fragmented representations of the event" (Meg ás, Ryan, Vaquero, & Frese, 2007, p. 118); the other argues that traumatic memories are "long lasting" and "crucial in organizing autobiographical memory" (Megías et al., 2007, p. 118).

More consistent empirical evidence has been demonstrated for the former perspective. As predicted, trauma survivors diagnosed with PTSD tend to report fragmented memories that lack

narrative coherence and/or important details or are presented in an inaccurate and confusing temporal order (e.g., Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa, Molnar, & Cashman, 1995; van der Kolk & Fisler, 1995). Different theories of PTSD have attempted to offer speculation for this phenomenon. According to the dual representation theory by Brewin (2008), traumatic memories are stored in two different formats: verbally accessible memories (VAM) and situationally accessible memories (SAM). The VAM system comprises written or oral narratives of the adversity, which can be deliberately retrieved but require high cognitive resources. Examples of information stored within this system include retrospective cognitive and emotional appraisals of the trauma (e.g., negative beliefs about self and world). Conversely, the SAM system operates through a lower level, automatic perceptual processing system, rendering information encoded in this system (e.g., trauma-related images and sensory information) unavailable to consciousness (Jelinek, Randjbar, Seifert, Kellner, & Moritz, 2009). For example, flashbacks, which are a common symptom of PTSD, can be understood using the SAM system. This experience is typically only triggered by perceptual situational cues such as thoughts, sights, sounds, or smells (Brewin & Holmes, 2003).

The dual representation theory does not necessarily view trauma memory fragmentation as a vulnerability factor for developing PTSD (Brewin & Holmes, 2003). Rather, the model conceptualizes PTSD as a hybrid disorder resulting from a lack of integration and prolonged imbalance between verbally (impoverished and impaired) and situationally (intact or enhanced) accessible memories (Brewin, 2008). This assertion is in line with van der Kolk and Fisler (1995), who postulated that disorganized trauma memories are stored as sensory fragments without a coherent semantic component. Therefore, based on the dual representation model, it is

critical to resolve both dysfunctional memory formats in order to achieve recovery. This entails restructuring cognitive distortions and their accompanying negative affect as well as reducing symptoms of hyperarousal and flashbacks.

Ehlers and Clark's (20\00) cognitive processing model views the function of memory fragmentation in PTSD through a somewhat different lens. Based on this model, the shallow processing of the traumatic experience not only prevents integration of the memory into one's autobiographical database but also leads to inaccurate or fragmented narrative recall, especially as it relates to specific details or the temporal order of the event. All of these factors in turn contribute to the development of PTSD. To properly integrate the trauma memory with one's autobiographical database, Ehlers and Clark (2000) recommend conceptual processing of the adversity, which involves making meaning of the event and organizing the information within its context.

Research evidence favoring these theories has been plentiful. For example, in Halligan, Michael, Clark, and Ehlers (2003), disorganization in trauma narrative was found to be predictive of PTSD symptoms concurrently and prospectively, after controlling for distress and avoidance during narrative recall. This finding was replicated using several memory measurements, including self-report and narrative assessments of memory disorganization (Halligan et al., 2003). Likewise, Jones, Harvey, and Brewin (2007) discovered that significant memory disorganization one week after trauma, including repetition, non-consecutive chunking, and incoherence in narrative, prospectively predicted PTSD severity.

Non-Trauma Memory Impairments in PTSD

Nonetheless, others have argued that adverse memory effects seen in PTSD may be more global than previously noted. Apart from trauma-related memory impairment, many individuals diagnosed with PTSD also display deficits in other memory processes, including verbal memory, working memory, autobiographical memory, and retroactive recalling (e.g., Bremner et al., 1993; Brewin & Holmes, 2003; Bryant, Sutherhand, & Guthrie, 2007). For instance, among subsamples of rape victims with PTSD, rape victims without PTSD, and a matched non-traumatized control group, it was found that victims with PTSD performed significantly worse than the latter groups on delayed free recall (Jenkins, Langlais, Delis, & Cohen, 1998). Further, individuals with PTSD have been shown to require a significantly longer time than individuals without PTSD to retrieve unrelated non-traumatic autobiographical information (e.g., the name of the street where they grew up), when presented with the worst moment of their traumatic event (Kleim, Wallot, & Ehlers, 2008). Yet, this discrepancy was not observed when participants performed the same autobiographical retrieval task while being presented with the worst moment of a less significant adverse life event. In line with previous research, Kleim et al. (2008) interpreted their findings as indicating that PTSD is associated with a lack of integration between the trauma memory and other autobiographical memory that is unrelated to the traumatic event.

Likewise, in a sample of Vietnam combat veterans with and without PTSD, McNally, Lasko, Macklin, and Pitman (1995) found that the former group had more difficulties retrieving specific autobiographical memories than the latter group. Veterans with PTSD were inclined to recall overgeneral memories, especially when presented with positive retrieval cues. Such memory predisposition – also often observed among depressed individuals – reflects diminished

accessibility of positive autobiographical material and heightened accessibility of aversive autobiographical material (McNally et al., 1995).

Brewin, Kleiner, Vasterling, and Field (2007) conducted a meta-analysis of 27 studies to investigate non-trauma-related memory impairments among a group of individuals who met criteria for PTSD and a group of healthy controls. The meta-analysis revealed a significant association between PTSD and general memory impairment. When broken down into types of memory impairment, PTSD was more strongly associated with verbal memory deficits (r = .30) than visual memory deficits (r = .10). This study illustrates that not all types of memory impairment contribute equally to risk for PTSD; in this study, verbal memory deficits appeared to have the greatest implications in the maintenance of posttraumatic stress symptomatology, as compared to visual memory deficits. Buckley, Blanchard, and Neill (2000) corroborated this finding – impaired verbal memory functioning was related to PTSD in nearly every study that the authors reviewed.

In addition, there has been evidence of low working memory capacity among individuals diagnosed with PTSD (Brewin & Holmes, 2003; Vasterling et al., 2002). Working memory refers to the ability to hold and manipulate information in mind. Using standardized testing instruments, Vasterling and colleagues (2002) examined whether PTSD-positive Vietnam veterans and healthy controls differed in their cognitive performances in the domains of attention, learning, and memory. They found that veterans with PTSD performed poorly on measures that assess working memory, sustained attention, and initial learning, independent of intellectual level. Likewise, several experimental studies led by Brewin and colleagues have exemplified the importance of working memory aptitude in preventing intrusive material from entering one's

consciousness and affecting tasks at hand. As summarized by Brewin and Holmes (2003), PTSD may be associated with impairments in working memory that result in failure to inhibit intrusive or obsessional thoughts.

Although most research in this area has employed self-report methodology, consistent findings have also been obtained in studies that utilized objective measurement of memory. For example, in a sample of participants with PTSD and a control group, Moradi, Doost, Taghavi, Yule, and Dalgleish (2003) found participants with PTSD performed poorer than a control group on the Rivermead Behavioral Memory Test (RBMT; Wilson, Cockburn, & Baddeley, 1986), particularly on Orientation and Prospective Memory. This is a test of everyday memory that requires examinees to perform a planned action at an intended time. Likewise, in a sample of rape victims, of which 92% qualified for a PTSD diagnosis, the magnitude of prior trauma exposure was predictive of their performance on a test of verbal memory (Nixon, Nishith, & Resick, 2004). Their performance was assessed using the Logical Memory component of the Wechsler Memory Scale—Revised (WMS-R; Wechsler, 1987). Once again, this line of research supports the notion that more global verbal memory deficits may be particularly associated with PTSD.

Lastly research studies using functional neuroimaging techniques have produced comparable findings. Following a mining accident, workers who developed acute PTSD and workers who did not develop acute PTSD underwent functional magnetic resonance imaging (fMRI) while completing trauma-related short-term memory recall paradigms (Hou et al., 2007). Notably, participants with PTSD showed diminished responses in the inferior frontal gyrus and

middle frontal occipital gyrus, which are localities within the brain associated with the ability to verbalize trauma memories.

Clinical Implications

In the field of psychology, both theory and empirical evidence play a vital role in constructing therapeutic interventions. Interventions that incorporate memory exposure, in which integration and elaboration of trauma memory are viewed as indispensable to trauma recovery, have been considered the gold standard for treatment of PTSD (Ehlers, Hackmann, & Michael, 2004). As such, memory-based exposures such as Prolonged Exposure (Foa, Hembree, & Rothbaum, 2007) and components of Cognitive Processing Therapy (Resick, & Schnicke, 1996) are widely regarded as first-line treatments for PTSD (Departments of Veterans Affairs and Defense, 2010). Such interventions are purported to promote trauma memory integration through change in memory structures, reduction in anxiety, and more realistic appraisals of traumatic events (Brewin & Holmes, 2003).

Yet, as stated earlier, the specific mechanisms underlying PTSD exposure treatment may not be as clear-cut. Intrigued by this subject matter, van Minnen, Wessel, Dijkstra, and Roelofs (2002) explored narrative changes from the first to the final exposure session among a group of patients who met criteria for PTSD and underwent PE therapy. Compared to individuals who failed to improve following treatment, individuals who improved had fewer disorganized thoughts (i.e., confusion or disjointed thinking) during treatment. The groups, however, did not differ in the amount of fragmentation or organized thoughts (i.e., indications of realization, decision making, or planning) in their narratives. Further, regardless of improvement status, both groups showed a similar reduction in expressing disorganized thoughts and details, as well as an

increase in emotional expression (van Minnen et al., 2002). As such, it is hard to verify specific mechanisms of PTSD exposure treatments that promote emotional and memory improvements.

Research Challenges

Prominent theories and research on PTSD have assigned a central role to memory impairment in maintaining PTSD symptoms. Nonetheless, this line of research is not without dispute. A recent article by Berntsen and Rubin (2014) challenged key tenets of the PTSD field, one of which relates to whether dissociative amnesia is an integral feature of PTSD. The researchers evaluated whether the actual *DSM-V* PTSD C3 symptom (i.e., trouble remembering important aspects of the trauma) or its reversal (i.e., trouble forgetting important aspects of the trauma) is more strongly associated with the remaining PTSD symptoms. It was found that both criteria were positively inter-correlated, but the reversed criterion was more strongly related to the other PTSD symptoms. This finding contradicts the widely established assumption that poor recall of traumatic memory is critical in the onset and maintenance of PTSD (Berntsen & Rubin, 2014). This study lends support to the aims of the current dissertation, namely, to explore whether PTSD stems from objective memory impairment or whether it may be attributed more strongly to factors such as impairments in metamemory.

In addition, research supporting memory fragmentation in PTSD is not exempt from methodological shortcomings, especially in regard to the measurement of memory deficits. In particular, Jelinek et al. (2009) drew attention to the frequent use of poor measures in testing memory and the poor operationalization of memory disorganization, which may diminish the credibility of previous findings. For example, research studies frequently utilize self-reports in assessing retrospective accounts of traumatic experience and memory disorganization. However,

as put forth by Kindt and van den Hout (2003), because self-report relies heavily on subjective retrospection, the frequently observed memory disorganization among individuals with PTSD may well reflect subjective beliefs about their memory functioning, rather than actual memory performance.

Gray and Lombardo (2001) evaluated the FDTM (fragmented and disorganized trauma memories) hypothesis by comparing written trauma narratives of two undergraduate samples, one of which met criteria for a PTSD diagnosis. Regardless of whether they qualified for the diagnosis, all participants produced a lengthier narrative of their traumatic experience in comparison to other autobiographical events, both negative and positive in valence. Once again, this result is inconsistent with commonly held assumptions about memory disorganization in PTSD, leading Gray and Lombardo (2001) to suggest that the discrepancy in findings may be attributed to the use of different methodologies. The authors argued that the act of writing may induce a lower level of anxiety when compared to an oral narration, the method of choice in previous research.

As reflected in an earlier section of this dissertation, clinical populations diagnosed with PTSD also appear at risk for memory deficits that are unrelated to trauma memory. Berntsen and Rubin (2014) argued that a general memory deficit, as well as other individual differences (e.g., intelligence level), may better account for the lack of coherence in traumatic memory. This may be particularly so because some research studies have failed to include a comparison to non-traumatic control memories. Likewise, McNally (2003) asserted that incomplete encoding may also involve autobiographical memory more generally, rather than the specified traumatic

experience. Therefore, it may be useful to test memory functioning not only related to unpleasant memories but also in terms of emotionally neutral memories.

Additionally, Brewin and Holmes (2003) pointed out that disorganization in a trauma narrative may very well reflect concerns in retrieval or verbal expression, as it is an issue of underlying memory problems. Further, memory fragmentation may occur at different levels of the memory content (individual image, sequence of images, or a complete narrative). Thus, it is recommended that researchers use multiple measures of memory functioning, preferably diverging methods (self-report and objective measures), as well as different levels of assessment to produce reliable and converging evidence of memory deficits in PTSD.

The Interplay Between Memory and Metamemory

Memory researchers have long been interested yet also puzzled by the paradoxical findings related to memory. In 1990, Nelson and Narens observed two such findings that would stimulate their research on memory and metamemory. First, individuals could successfully forecast whether or not they would remember a currently nonrecallable item at a later time. Second, individuals could, in a speedy and accurate fashion, deny the presence of specific information in their memory. Researchers found it intriguing that this form of feeling-of-knowing (FOK) judgment is quicker than completing a search of memory for the information. It is these paradoxical phenomena that have resulted in an increasing interest in the "metamemory" construct. Per Dunlosky and Bjork (2008), the term was first coined by John Flavell and is defined as "people's knowledge of, monitoring of, and control of their own learning and memory processes" (p. 11).

Investigation of metamemory drew the attention of cognitive psychologists several decades before it began to gradually inform trauma research more recently. This line of research was first inspired by the recognition that self-reflective processes (i.e., people's knowledge about their memory and cognitive processes) are crucial in understanding human learning (Dunlosky & Bjork, 2008). For example, due to burgeoning metacognitive research in the late 1970s, educationists began to attribute poor learning to the absence of self-regulatory processes (Zimmerman, 2002). In fact, learning can be enhanced by increasing metacognitive awareness via organizing and elaborating contents, which can help establish internal links (i.e., generate meaningful associations of the learning materials) and external links (i.e., relate the learning content to prior knowledge) (Hübner, Nückles, & Renkl, 2006). For instance, high metacognitive awareness allows one to quickly learn the Spanish word *pan* for "bread" by associating the word to an image of "bread pan" (Zimmerman, 2002).

The metamemory field was seemingly disjointed when it first began – and even in current times – because the metamemory construct was mostly studied in isolation from research on memory and other research on metamemory (Dunlosky & Bjork, 2008). This segregation has, unfortunately, resulted in a lack of knowledge on how these two distinct yet interrelated processes inform each other. Tulving and Madigan (1970) noted, "… if there is ever going to be genuine breakthrough in the psychological study of memory … it will, among other things, relate the knowledge stored in the individual's memory to his knowledge of that knowledge" (cited in Dunlosky & Bjork, 2008, p.13). Van Oorsouw and Merckelbach (2004) also shared a similar sentiment: metamemory may not represent a mere artifact of memory work, it may also affect memory directly. Recent research further determined that the two constructs, autobiographical

memories and *beliefs* about autobiographical memories, are not identical (Scoboria, Mazzoni, Kirsch, & Relyea, 2004). As such, it is important to note that albeit closely connected, memory and metamemory are distinct phenomena.

The symbiotic nature of metamemory and memory processes was highlighted in an early metamemory framework proposed by Nelson and Narens (1990) indicating "metamemory itself involves monitoring an underlying memory system, but then metamemory processes in turn can act on the memory system" (Dunlosky & Bjork, 2008, p. 17). According to the model by Nelson and Narens (1990), the monitoring and control of human memory occurs at all three stages of the memory process: acquisition, retention, and retrieval. Specifically, these memory processes are influenced by an assortment of metamemory judgments such as judgments related to ease-of-learning (EOL; i.e., predictions of the difficulty level of new learning content), feeling-of-knowing (FOK; i.e., judgments of whether presently nonrecallable information will be recalled later), and confidence judgments after recall (Nelson & Narens, 1990).

As noted, memory and metamemory processes share an intricately intertwined nature. Thus, it is possible that memory errors – while previously understood from an entirely memory-based standpoint – may actually be a byproduct of faulty metamemory judgment (Dunlosky & Bjork, 2008). One such example is cryptomnesia, which refers to the erroneous reproduction of memories or ideas when the individual forgets they have previously encountered such material. Perfect and Stark (cited in Dunlosky & Bjork, 2008) claimed it is the monitoring of output memory – as opposed to actual memory deficit – that underlies the phenomenon of cryptomnesia. Additionally, source monitoring, which involves tracing the source of a specific memory, is another indicator of metamemory judgment that aids the retrieval process (Batchelder &

Batchelder, cited in Dunlosky & Bjork, 2008). When it becomes faulty or fuzzy, source monitoring can cause flawed decision making. For example, individuals are inclined to rate greater credibility for the same healthcare message when they thought it was provided by a physician than when it was provided by one's mother. Another alleged memory error is the fabrication of fictitious memories. Empirical evidence demonstrated that two metamemory factors are specifically involved in this supposedly memory-based process: evaluations of event plausibility and the availability of relevant memory (Mazzoni, 2008). For example, individuals were especially likely to endorse having experienced a highly improbable event (e.g., witnessing spiritual possession) when they perceive the event as plausible and also consider such an event as pertinent to their past memories.

A specific facet of metamemory judgment that is germane to the current dissertation is perceived memory confidence. It has been described as "an individual's internal subjective estimation of the accuracy of his or her recollection" (Roebers, 2002, p. 1052). Memory confidence is often described as a "calibration" process, which reflects the degree of convergence between reported confidence and recall accuracy of one's memory. When an individual miscalibrates, underconfidence or overconfidence can result. Specifically, individuals who report greater confidence than their recall accuracy are classified as overconfident, whereas individuals who report lower confidence than their recall accuracy are perceived as underconfident. Notably, miscalibration is not uncommon, as research has shown that both children and adults are universally overoptimistic about their performance across a variety of cognitive tasks (e.g., Roebers, 2002). In general, individuals tend to report a level of confidence that exceeds recall accuracy. Such confidence rating is fairly sound for information individuals

have accurately retrieved (i.e., information they know); however, individuals are usually less perceptive to when they lack knowledge (Schneider & Laurion, 1993).

On the other hand, with respect to trauma research and PTSD, the phenomenon of memory underconfidence and its empirical evidence is informative. Specifically, several studies have shown that individuals judged their memory to be poor – for a number of reasons – when in fact they showed adequate or excellent performance on objective memory measures. Empirical evidence in support of this phenomenon has been generated across multiple studies. Winkielman, Schwarx, and Belli (1998), for instance, found that even though participants who were tasked to retrieve a dozen childhood events technically recalled more events than participants who were asked to retrieve only four events, they were more likely to judge their childhood memories as being incomplete. This simple manipulation – which revealed a tendency to rate the quality of one's memory based on how challenging the recall task was – illustrates the pliability of memory confidence (Winkielman et al., 1998). In another study, elderly participants rated their memory ability to be worse than younger adults; however, such discrepancy was not captured in objective memory assessment (Ponds, Van Boxtel, & Jolles, 2000). Collectively, the paradoxical effect of memory underscores the crucial role of memory confidence in perceived memory ability.

Implications of perceived memory confidence are noteworthy, as reflected by the widespread attention focused on the authenticity of recalled memories. Misinformation effects, as corroborated by Loftus's long-standing program of research, demonstrated the malleability and suggestibility of memory (see Loftus, 2005, for an extensive review). Loftus (2005) specifies that a misinformation effect can occur when one's recollection of an event is affected by the receipt of misleading information. For example, Assefi and Garry (2002, cited in Loftus, 2005)

found that participants were especially susceptible to misinformation effects when they were misled to believe that they were under the influence of alcohol. Moreover, as demonstrated by De Carvalho Filho and Yuzawa (2001), metamemory judgments were susceptible to the receipt of social cues (i.e., information about task performances of other participants). This finding was especially relevant for participants with lower levels of metacognitive ability. Interestingly, participants' actual memory performance nonetheless remained unaffected by the misinformation received. Another consistent finding regarding the misinformation effect is related to the impact of delay (typically at a 2-week delay) on suggestibility and memory confidence (Paz-Alonso & Goodman, 2008). The researchers speculated that the delay increased participants' susceptibility to misinformation, which was more recently received, because of the fading of their true memory over time.

Other studies revealed that metamemory is not only inducible but can have significant adverse effects on memory performance. In Kvavilashvili and Ellis (1999), participants who received "memory-enhancing" placebo capsules reported the training improved their recollection for an emotional film fragment viewed earlier, whereas participants who received "memory-impairing" placebo capsules reported worsened memory for the film fragment. Although both placebo conditions significantly affected self-report changes in perceived memory, only "memory-impairing" placebo was found to undermine participants' actual performance in free recall. Likewise, in Greenwald, Spangenberg, Pratkanis, and Eskenazi (1991), participants who received subliminal self-help tapes on memory training reported improved recall even though it was not reflected in their actual performance. Findings from both studies indicated that

metamemory manipulated in the positive direction does not seem to enhance actual memory performance.

In sum, empirical evidence points to the malleability of human memory as well as the role of metamemory in subsequent memory performance on both objective and self-report assessments. This line of observation gives rise to queries concerning memory deficits in emotional disorders, including PTSD. Despite a large number of research studies showing memory impairment in trauma survivors with PTSD, some researchers have begun to question if the observed memory impairments could be partially attributable to deficits in the metamemory system.

Metamemory of Traumatic Experiences

The notion that poor memory confidence may mislead one's perception of their memory functioning arguably challenges the validity of self-reported amnesia found in studies of adverse childhood memories (e.g., Bremner, Shobe, & Kihlstrom, 2000; Williams, 1994). In fact, research repeatedly showed that highly valenced, emotional memories are susceptible to inaccurate and suggestive manipulations (Paz-Alonso & Goodman, 2008). Correspondingly, findings suggesting that trauma survivors tend to second guess their memory functioning are not completely novel. As stated, several studies have demonstrated a paradoxical effect of retrieval on perceived memory completeness (e.g., Belli, Winkielman, Read, Schwarz, & Lynn, 1988; Winkielman, Schwarz, & Belli, 1998). Merckelbach, Wiers, Horselenberg, and Wessel (2001) extended this line of research to investigate completeness of adverse memories. Findings showed that retrieving childhood adverse life events induced perceived memory disorganization. More specifically, individuals who were instructed to retrieve a greater number of negative childhood

events (nine adverse events) rated their memory performance less favorably, as compared to individuals who were instructed to retrieve fewer events (three adverse events). The first group was also less likely than the second group to endorse potential repression of childhood memories.

A metamemory effect was also observed in a study conducted by Bennett and Wells (2010). Participants included a sample of student nurses and midwives who had experienced a distressing, placement-related event. Participants were instructed to recall and narrate their placement-related traumatic experience prior to completing a battery of questionnaires that assessed their beliefs about the trauma memory (i.e., whether or not they thought their trauma memory was complete). Participants' beliefs about the trauma memory (metamemory) predicted variance in posttraumatic stress symptoms above and beyond memory disorganization during the narrative (actual memory), even after controlling for potentially confounding variables such as number of previous traumatic events experienced.

To examine whether or not memory disorganization of a traumatic event exceeds general impairment of verbal memory, Jelinek et al. (2009) conducted an experiment using both autobiographical and nonautobiographical memories in a sample of trauma survivors with PTSD, trauma survivors without PTSD, and a control group with no trauma exposure. The researchers proposed if the ability to remember and process verbal information is generally weakened in PTSD, poor performance on verbal content memory tasks (to assess verbal memory for information) and verbal sequence memory (to assess information order) should be observed. Jelinek et al.'s (2009) result was in line with previous research – participants with PTSD generally displayed more disorganized trauma recollections than participants without PTSD. However, participants with PTSD also rated their memory as disorganized across all indices,

even though their performance on some tasks was in fact comparable to that of other participants. For example, participants with PTSD tended to rate their nonautobiographical memory as disorganized even though no impairment was detected in the actual assessment. This finding highlights that this diagnosis may impact a person's confidence in one's memory ability, yet the temporal sequencing of this association is still largely unknown.

Another memory-related pathogenesis through which PTSD develops in trauma survivors is dissociation. Symptoms of dissociation (e.g., depersonalization, derealisation, out-of-body experience, altered time perception, and numbing) are theorized to inhibit memory elaboration and/or processing during and following the traumatic incident, thereby resulting in fragmentation of traumatic memories (van der Kolk & Fisler, 1995). Yet, a recent review article by Bedard-Gilligan and Zoellner (2012) suggests this "dissociative encoding hypothesis" may be confined to only subjective memories and not actual memory performance. For example, even though participants with a higher state dissociation score self-reported greater memory disorganization of an aversive film they watched, state dissociation was not associated with their actual memory performance (Kindt & van den Hout, 2003). This finding represents another piece of growing evidence that illustrates the discrepancy between actual memory and metamemory.

One source of inquiry pertinent to metamemory has stemmed from the metacognitive theory of emotional disorders (Wells, 2000). According to this model, metacognition – the appraisal and monitoring of one's own mental processes and thinking – is susceptible to biases and threat monitoring. In turn, this type of information processing often results in pathological worry, attentional bias to threat, and maladaptive self-regulation in the form of suppression (Wells, 2000). One facet of metacognition that is important to memory beliefs is metamemory.

Metamemory encompasses one's subjective belief about the fallibility of one's memory functioning and quality (e.g., Nedeljkovic & Kyrios, 2007), which may very well be discrepant from objective deficits in memory functioning. Metamemory, including perceived memory confidence, has been implicated in the onset and persistence of a myriad of emotional disorders, such as generalized anxiety disorder (Wells, 2006), obsessive-compulsive disorder (Alcolado & Radomsky, 2011; Nedeljkovic & Kyrios, 2007), and hoarding (Frost & Hartl, 1996). For example, findings presented by Karadag, Oguzhanoglu, Ozdel, Atesci, and Amuk (2005) support the view that obsessive-compulsive disorder stems from low memory confidence related to anxiety, rather than true memory deficits.

In fact, Wells (2000) proposed a metacognitive model specific to PTSD. The basic tenet of the metacognitive model of PTSD posits that it is not atypical to experience PTSD symptoms immediately following a traumatic event. However, PTSD symptoms tend to persist when trauma survivors continue to be trapped in threat-related modes, which entail a pattern of responding with Cognitive-Attentional Syndrome (CAS). CAS is characterized by responding to perceived threats with cognitions and cognitive processes that include worry, rumination, and threat monitoring as well as problematic coping strategies such as thought suppression and avoidance. According to the model, this pattern of maladaptive reaction is bolstered by underlying positive metacognitions regarding the importance of memory (e.g., "Only when I have a complete memory of what happened will I recover") and negative metacognitions regarding the importance of memory ("Thinking about the event could make me go crazy") (Wells & Colbear, 2012).

Bennett and Wells (2010) also assert that an individual's metamemory or negative appraisals concerning traumatic recollection, such as, "Having gaps in my memory for the event means I am not normal," as opposed to memory fragmentation per se, may cause PTSD symptoms to persist. Consequently, individuals may employ maladaptive thinking patterns such as, "I must go over events to make sense of them," or the other extreme, "I must stop thinking about the trauma," in coping with their adverse experiences. Based on the metacognitive model, it is imperative for trauma survivors to differentiate their internal cognitive processes from actual external events (Wells, 2000). This theory has begun to garner empirical support. Specifically, in a preliminary randomized controlled trial for chronic PTSD, 70% to 80% of the participants who underwent metacognitive therapy displayed significant reduction in symptoms of PTSD, depression, and anxiety, whereas 80% of wait-list participants still met criteria for PTSD (Wells & Colbear, 2012).

Summary

To summarize, diverging perspectives concerning the operation of memory impairment in PTSD have been offered in the literature. On one hand, a long-standing, established line of research asserts that trauma survivors who meet criteria for the diagnosis of PTSD tend to display memory impairments. Prominent theories further assign an integral role to memory impairments in the onset and maintenance of PTSD, which directly informs current treatments for PTSD. Yet, on the other hand, some researchers have begun to contest this predominant view by presenting preliminary empirical evidence of a pronounced metamemory phenomenon in PTSD. This emerging framework gives rise to the question of whether or not alleged memory impairments in PTSD truly reflect actual memory disruptions or low confidence in one's

memory, namely, a metamemory phenomenon. Budding findings in relation to metamemory in PTSD are provocative and warrant further exploration.

Nevertheless, much of the available research has been limited by reliance on either retrospective, self-report methodology or coded assessment. In fact, out of the 16 studies Bedard-Gilligan and Zoellner (2012) examined, only two studies included components of both objective and subjective memory assessment. This limitation prevents the direct comparison between objective and subjective memory fragmentation. In addition, previous research has been largely restricted to retrospective studies, preventing researchers from making causal statements regarding the implications of memory and metamemory in PTSD. By and large, the paucity of experimental research in the area of metamemory renders this speculation inconclusive. An experimental design may also be beneficial in overcoming previous limitations and allowing researchers to examine potential causal relations among the variables.

Clinical Implications of Metamemory in PTSD

Hinging on the proposition that PTSD is a disorder of memory, mainstream therapeutic interventions for trauma and PTSD generally involve systematic exposure to the trauma memory for the purposes of elaboration and subsequent integration of the memory (Ehlers, Hackmann, & Michael, 2004). Repeated re-exposure to the trauma memory prevents incessant avoidance of the trauma memory, reintroduces safety information into the trauma memory, and enhances recollection of trauma memory, all of which serve to habituate the fear response (Foa & Rothbaum, 1998). Existing empirically supported treatments such as Prolonged Exposure therapy (Foa, Hembree, & Rothbaum, 2007) and Cognitive Processing Therapy (Resick, &

Schnicke, 1996) have demonstrated success in symptom remission among a wide range of trauma survivors.

Alas, due to the structured and intrusive nature of trauma exposure treatments, clinical implementation of such interventions may be hindered. A number of concerns have been raised: the high frequency of comorbid presenting concerns such as personality disorders and substance use disorders, client ambivalence, and lower treatment completion rate in clinical settings compared to randomized controlled trials (Zayfert et al., 2005). Another common apprehension among psychologists regarding the use of exposure treatment for PTSD is that such intervention, due to its intrusive nature, may cause clients to decompensate and experience increased psychological symptoms (Becker, Zayfert, & Anderson, 2004).

In light of these concerns, alternative treatment choices should be made available to clinicians and trauma survivors. If metamemory processes were deemed crucial to the onset and maintenance of PTSD, this would shift treatment focus considerably to address trauma-related metamemory concerns in lieu of trauma memory fragmentation. By showing one's metamemory (or memory confidence) of adverse events is malleable using experimental manipulation, and that such manipulation may result in different levels of distress or anxiety, advances are made possible in our clinical understanding and treatment for the disorder. Such findings would also provide empirical support for using non-intrusive treatments such as metacognitive therapy for PTSD (Wells & Colbear, 2012). In short, to gain a comprehensive understanding of the mechanisms through which memory impairment contributes to the development and persistence of PTSD, a methodical investigation and comparison of both memory and metamemory is necessary.

The Current Study

This dissertation sought to investigate whether PTSD is a disorder of memory fragmentation, perceived memory fragmentation, or both by examining the associations between memory and metamemory in relation to an analogue trauma. This research question was investigated using a between-subjects design (for metamemory manipulation). Participants were randomly assigned to receive either negative or positive feedback regarding their performance on a brief standardized memory assessment. Next, participants watched an aversive film and completed a self-report measure on peritraumatic dissociation. Following a five-minute distracter task, participants resumed the experiment and completed a free recall task of the aversive film, followed by self-reports on their memory of the film and level of negative affect. Refer to Appendix A for procedural flow chart.

Aims and Hypotheses

For ease of understanding, refer to Appendix B for a full list of measures and their respective operational definition. Hypothesis 1 was generated to examine the impact of metamemory on objective trauma memory fragmentation. Previous literature has shown placebo effects affected not only metamemory beliefs (e.g., Greenwald et al., 1991) but also actual memory performance in "memory-impairing" placebo conditions (Kvavilashvili & Ellis, 1999). It was hypothesized that manipulating an individual to believe that one's memory abilities are poor will adversely impact his or her objective memory fragmentation scores. Specifically, it was predicted that the High Feedback group will show greater objective memory fragmentation than the Low Feedback group.

Hypothesis 2 was generated to examine effects of memory ability and metamemory belief on trauma memory fragmentation (objective and subjective). Consistent with emerging research evidence indicating discrepancy between objective memory fragmentation and subjective memory fragmentation while recalling adverse memories (e.g., Bennett & Wells, 2010; Gray & Lombardo, 2001; Jelinek et al., 2009; Kindt & van den Hout, 2003), Hypothesis 2 was proposed to test whether memory ability is a better predictor of objective memory fragmentation or if metamemory belief is a better predictor of subjective memory fragmentation.

Hypothesis 2.1 stated memory ability will negatively predict objective memory fragmentation above and beyond metamemory belief (i.e., WMS-IV feedback). Specifically, it was predicted that after controlling for metamemory group, memory ability will account for additional variance in objective memory fragmentation scores. Hypothesis 2.2 stated metamemory belief will predict subjective memory fragmentation above and beyond memory ability. Specifically, it was predicted that after controlling for memory ability, metamemory group will account for additional variance in subjective memory fragmentation.

CHAPTER 2

PROJECT METHODS

Participants

The present study was comprised of 84 undergraduate students aged eighteen and above enrolled in an introductory psychology course at Northern Illinois University. Participants were selected from the subject pool based on their responses to a pre-screening questionnaire (see Appendix C) that was administered during the PSYC 102 mass testing. Only students who did not meet the cut-off for probable PTSD diagnosis were sent an email invitation (see Appendix D) to participate in the current study.

A total of 105 participants completed the study but only 84 were retained in the present dataset. Eighteen participants (17%) were removed due to failure in passing the manipulation check (i.e., their response to the post-WMS feedback question, "Based on this feedback, I believe my memory is…," contradicted the feedback that was provided to them). One participant was removed due to an unstable internet network that prevented completion of the online measures. One participant withdrew from the experiment due to feeling frustrated with the WMS-IV task. One participant was removed due to language difficulty, as English was not her native language. Participants who were removed from the dataset did not differ from the retained group in regard to age (t [98] = -.65, p = .52), gender (χ^2 [1] = .09, p = .77), ethnicity (χ^2 [5] = 5.42, p = .37), or year in school (χ^2 [4] = 1.60, p = .81). In the present sample, participants ranged in age from 18 to 40 (M = 19.85, SD = 3.68). Gender composition was roughly equal, 51.2% of

participants identified as female (n = 43), whereas 48.8% of participants identified as male (n = 41). Most participants were European American (63.1%, n = 53), 13.1% were African American (n = 11), 11.9% were Hispanic (n = 10), 3.6% were Asian (n = 3), and 8.3% identified as Biracial or Other (n = 7). The sample was comprised of mostly freshmen (58.3%, n = 49) and sophomores (22.6%, n = 19). Participants were randomly assigned to the High Feedback group (n = 43) or the Low Feedback group (n = 41). The two groups did not differ in regard to age (t [80] = .82, p = .41), gender (χ^2 [1] = .75, p = .39), ethnicity (χ^2 [5] = 4.12, p = .39), year in school (χ^2 [4] = 1.25, p = .87), or whether they have previously viewed the trauma film (χ^2 [4) = 4.29, p = .37).[1]

Measures

Pre-Screening Questionnaire

The PTSD Checklist for *DSM-V* (PCL-5; Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013; see Appendix C) was used to screen out individuals who would likely met criteria for a PTSD diagnosis. The PCL-5 is a 20-item self-report measure to assess PTSD symptoms corresponding to the newly published *DSM-V* diagnostic criteria. It encompasses subscales that assess the four symptom categories of PTSD (*DSM-V*): intrusion, avoidance, negative alternations in cognitions and mood, and alterations in arousal and activity. Respondents rated how much they were bothered by each PTSD symptom over the past month, using a 5-point scale ranging from 0 *(not at all)* to 4 *(extremely)*. It yielded a total symptom severity score ranging from 0 to 80, with higher scores indicating greater symptomalogy. A cut-off score of 38

[1] Eighteen participants (21.5%) reported that they have previously seen at least parts of the trauma film, mostly during driver's education course.

is recommended to denote a PTSD diagnosis among civilians (Weathers et al., 2013). Psychometric properties of the newly developed PCL-5 have received preliminary empirical support. The PCL-5 demonstrated strong internal consistency (α ranging from .94 to .97) and adequate temporal stability across a three-month study in a sample of veterans who endorsed problematic drinking (Keane et al., 2014).

Despite having limited validation studies available for the newly developed PCL-5, the measure correlated highly (r = .87 to .95 in two separate studies; Keane et al., 2014) with the original PCL (i.e., PCL-C, PCL-M, PCL-S; Weathers, Litz, Herman, Huska, & Keane, 1993). The widely used PCL had shown excellent psychometric properties in a variety of trauma-exposed populations (e.g., traffic accident survivors, sexual assault survivors, and college students with mixed civilian trauma exposure), including good internal consistency (α = .91), good test-retest reliability (α = .89), as well as good convergent validity with other PTSD measures, such as the Clinician-Administered PTSD Scale (CAPS), the Posttraumatic Stress Diagnostic Scale (PDS), and the Davidson Trauma Scale (DTS) (Adkins, Weathers, McDevitt-Murphy, & Daniels, 2008; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996).

Demographic Questionnaire

Participants were asked a number of demographic questions, including age, gender, ethnicity, education level, sexual orientation, and current relationship status (see Appendix E).

Preference for Distressing Films

Participants were asked to indicate their preference for different types of film genres (i.e., action, comedy, crime, disaster, drama, fantasy, horror, and romance) on a brief questionnaire

(see Appendix F). Each of the eight items was rated on a 7-point scale ranging from 1 *(completely uninterested)* to 7 *(completely interested)*. This form served two purposes. First, buffer items other than disaster and horror film genres were included to bolster the credibility of the cover story for the present study. Second, an analysis was conducted to examine whether the manipulation groups (High Memory Feedback and Low Memory Feedback) differed on their preference for horror or disaster film genres.

Trait Dissociation

The Multiscale Dissociation Inventory (MDI; Briere, 2002; see Appendix G) is a 30-item multidimensional questionnaire measuring six types of dissociative symptoms, including disruptions in consciousness, memory, emotion, perception, identity, and behavior. Correspondingly, the MDI yields six indices: Disengagement, Depersonalization, Derealization, Emotional Constriction, Memory Disturbance, and Identity Dissociation. Respondents are instructed to rate each of the 30 items based on its frequency of occurrence in the past month, using a 5-point scale ranging from 1 (*Never*) to 5 (*Very Often*). Sample items include: "Your body feeling like it was someone else's" (Depersonalization scale) and "People telling you that you said or did something that you don't remember saying or doing" (Memory Disturbance scale). A *t* score of 50 represents an average level of dissociation, whereas a *t* score of 80 denotes clinically significant dissociation.

Scale validation studies were conducted in various samples for the MDI, including a general population sample, university student sample, clinical sample, and community sample (Briere, 2002). The author reported that mean alphas of the MDI scales ranged between .77 and .92, showing that the scales demonstrate adequate internal consistency in diverse samples.

The scales were significantly associated with relevant theoretical constructs that assess trauma (e.g., interpersonal trauma and PTSD) but not non-interpersonal trauma (Briere, 2002). Further, Briere (2002) reported convergent validity between the MDI and other similar measures, including the Dissociative Experiences Scale (Bernstein & Putnam, 1986) and the Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar, Weiss, & Metzler, 1997). In a mixed clinical and community sample, the MDI also showed 92% specificity and 93% sensitivity in identifying respondents with a dissociative identity disorder diagnosis (Briere, 2002). In the present study, Cronbach's alpha for the MDI scale was .92.

Metamemory Beliefs

The Memory and Cognitive Confidence Scale—Confidence in General Memory (MACCS; Nedeljkovic & Kyrios, 2007; see Appendix H) is a 28-item multifaceted measure of perceived confidence in general memory and cognitive abilities. Specifically, the MACCS contains four subscales: beliefs about general memory abilities, confidence in decision-making abilities, confidence in one's ability to focus or concentrate, and high standards about one's cognitive performance. Only the "confidence in general memory" subscale, which comprises 15 items, was used in this study. The subscale taps into beliefs about one's overall memory ability as well as memory confidence in a range of tasks. Items on this subscale (e.g., "I have little confidence in my memory generally") are rated on a 5-point scale ranging from 1 *(Strongly Disagree)* to 5 *(Strongly Agree).* A higher score indicates poorer confidence in one's general memory.

Nedeljkovic and Kyrios (2007) reported strong internal consistencies for the overall scale (α = .92) and the confidence in general memory subscale (α = .93). Test-retest reliability was

found to range between .74 and .94 after two to three months. Construct validity of the subscale has been demonstrated, as low confidence in general memory was found to be associated with anxiety and mood symptoms (Nedeljkovic & Kyrios, 2007). In the present study, Cronbach's alpha for the confidence in general memory subscale was .95.

Standardized Memory Test

The Wechsler Memory Scales-IV (WMS-IV; Wechsler, 2009a) is a comprehensive assessment tool of learning, memory, and working memory functioning designed for the general adult population of 16 to 89 years. It is a commonly used test in clinical settings to evaluate possible neurological, psychiatric, and developmental disorders. The standard WMS-IV encompasses seven subtests that can be used to yield an Adult battery (ages 16 to 69) and an Older Adult battery (ages 65 to 90). The Adult battery requires administration of all but one optional subtest (i.e., Brief Cognitive Status Exam), whereas the Older Adult battery excludes the Visual Working Memory Index (Drozdick, Holdnack, & Hilsabeck, 2011). The WMS-IV yields five primary index scores that reflect one's auditory memory, visual memory, visual working memory, immediate memory, and delayed memory. The present study replicated partially the memory task paradigm used in Alcolado and Radomsky (2011), where participants were administered three subtests of the WMS-III (Faces, Letter-Number Sequencing, and Spatial Span) and provided false feedback of their memory abilities. In this study, the WMS-IV served as a pretext for the bogus feedback and provided objective baseline information for participants' general memory abilities.

The WMS-IV was used in the current study, considering the memory battery has been revised since Alcolado and Radomsky's (2011) study. In light of empirical findings suggesting

verbal and visual memory deficits in PTSD, the Immediate Memory Index (IMI) was administered in this study. The IMI is comprised of four subtests: Logical Memory I, Verbal Paired Associates I, Designs I, and Visual Reproduction I. These subtests were selected as they likely employ similar memory processes that would be online during the analogue trauma sequential memory task. There were no discontinue rules for the four subtests of interest, which ensured that all participants received a comparable amount of exposure to the memory battery. The Logical Memory I subtest and the Verbal Paired I subtest assess immediate verbal auditory memory. In the Logical Memory I subtest, participants were instructed to recount two short stories under a free recall condition immediately after hearing them. In the Verbal Paired I subtest, participants were first orally presented with 14 word pairs. Next, participants were instructed to provide the corresponding word upon hearing the first word of each pair. The list of word pairs was repeated in different orders in each of the four trials. The Designs I subtest and the Visual Reproduction I subtest assess immediate visual memory. The Designs I subtest required participants to recall designs and their locations in a grid immediately after seeing the designs, without any visual cues. Lastly during the Visual Reproduction I subtest, participants were first presented, one at a time, with a series of five designs. After the designs were removed from their view (i.e., after ten seconds), participants were instructed to draw the design.

The WMS-IV has demonstrated adequate psychometric properties across studies. The four subtests of interest have demonstrated good split-half internal consistency across all age groups in a scale validation study (r = .82 to .86 for Logical Memory I, r = .93 to .94 for Verbal Paired Associates I, r = .85 for Designs I, and r = .93 for Visual Reproduction I; Wechsler, 2009b). A comparison study of the WMS-IV and its predecessor, the WMS-III, showed the

revised battery has significantly improved construct validity, clearly reflecting domains of auditory memory (C1 = .97) and visual memory (C2 = .96) (Hoelzle, Nelson, & Smith, 2011). The IMI constructs of both versions are also highly correlated (r = .74) (Wechsler, 2009b). In the WMS-IV, the IMI showed excellent inter-item reliability (r = .95) for both adult and older samples. This index is also highly correlated with other measures of memory: the General Memory Index of the Children's Memory Scale (r = .74), the Immediate Memory Index of the RBANS (r = .64), and the Working Memory Index of the Wechsler Adult Intelligence Scale—Fourth Edition (r = .57) (Wechsler, 2009b). In the present study, Cronbach's alpha for the WMS-IV total index score was .62.

Post-Feedback Questionnaire

This measure was used with permission from Alcolado and Radomsky (2011; see Appendix I). To conceal the true nature of the study, participants were told that the purpose of the post-feedback questionnaire was to elicit their feedback on the examiner's skills during the memory assessment and the feedback delivery. The true intention of the questionnaire was to evaluate the quality of the memory confidence manipulation. The item of interest (i.e., "Based on this feedback, I believe my memory is…") was embedded within seven other buffer items. Sample buffer items included, "Would you recommend this test to others?" and "Did the assessor explain the feedback in a way that was clear and understandable?" There were five response options for each item: *Excellent, Good, Average, Fair,* and *Poor*. On the item of interest, it was anticipated that participants in the high memory confidence manipulation group would endorse either *Excellent* or *Good*, and participants in the low memory confidence manipulation

group would endorse either *Fair* or *Poor*. Eighteen participants who responded otherwise were eliminated from the dataset.

Affect Measure

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; see Appendix J) is a self-report inventory comprised of two 10-item mood scales that assess positive affect and negative affect. Respondents were provided a list of feeling words (e.g., *excited, attentive, inspired, irritable, distressed,* and *afraid)* and asked to indicate if they have felt this way in a specific time frame, which in this study referred to their emotion "at this moment." Each of the 20 items was rated on a 5-point scale ranging from 1 *(very slightly or not at all)* to 5 *(extremely)*. The ten items corresponding to the negative affect subscale were totaled and used in this study, with higher scores indicating a higher level of negative affect. The PANAS was administered twice throughout the experiment. The first PANAS served as a manipulation check following WMS-IV bogus feedback. The second PANAS represented posttrauma negative affect as an analogue for PTSD (assessed upon completion of trauma narration and self-rating of trauma narration). Contrary to expectations, the manipulation groups did not differ on their level of negative affect at Time 1 ($t(82) = 1.66$, $p = .10$) or Time 2 ($t(82) = -.52$, $p = .61$). In the present study, Cronbach's alphas for the PANAS negative affect subscale at Time 1 and Time 2 were .75 and .81, respectively.

The PANAS has demonstrated strong psychometric properties, making it a popular research tool. In their validation study of the PANAS, Watson et al. (1988) found that it showed good internal consistencies for both the Positive Affect scale ($\alpha = .86$ to .90) and the Negative Affect scale ($\alpha = .84$ to .87) for the numerous time reference periods. The PANAS has also

displayed adequate construct validity, as its subscales have been found to be associated with general distress, anxiety, and depression (Crawford & Henry, 2004; Watson et al., 1988). The instrument has also displayed measurement invariance across demographic subgroups.

Trauma Video Stimulus

A five-minute traffic accident safety video was used to represent an analogue trauma (see Appendix K). It was projected on a 20 x 10-inch laptop screen. The video portrayed a fictional traffic accident unfolding from start to finish (moments before the accident, accident, aftermath of the accident). It contained distressing graphic scenes such as close-up images of severe injuries and dead bodies. See Appendix K for an overview of important scenes, which was also used to score participants' recall of the video. Similar distressing footage was shown to be effective in inducing short-term distress in previous research (e.g., Olsen & Beck, 2012).

Peritraumatic Dissociation

The Peritraumatic Dissociation Experience Questionnaire (PDEQ; Marmar et al., 1997; see Appendix L) is a widely used measure of peritraumatic dissociation (e.g., time distortion, derealization). The PDEQ is a 10-item self-report measure used to elicit participants' emotional, cognitive, and physical reactions during and immediately after they watched the trauma film. Research (e.g., Olsen & Beck, 2012; van der Kolk & Fisler, 1995) revealed the role of peritraumatic dissociation in trauma memory elaboration and the onset and persistence of posttraumatic stress symptomatology.

Consistent with Kindt and van den Hout (2003), only seven items were administered in this project. Sample items included, "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." Three items ("I found that I was on 'automatic pilot'; I ended up doing things that I later realized I hadn't actively decided to do"; "What was happening seemed unreal to me, like I was in a dream or watching a movie or play"; "I was surprised to find out afterwards that a lot of things had happened at the time that I was not aware of, especially things I ordinarily would have noticed") were omitted due to their lack of relevance to the experience of film watching. All remaining seven items were rated on a 5-point scale, with 1 indicating *Not At All True* and 5 indicating *Extremely True*. Higher aggregated PDEQ scores represented greater evidence of peritraumatic dissociation. Numerous clinical and research studies have shown evidence of strong psychometric properties, including strong convergent and predictive validity with posttraumatic stress symptoms, as well as good reliabilities (Kindt & van den Hout, 2003; Marmar, Weiss, & Metzler, 1998). In the present study, Cronbach's alpha for the adapted PDEQ was .71.

Objective Trauma Memory Fragmentation

A verbal free recall task (e.g., Halligan, Clark, & Ehlers, 2003; Olsen & Beck, 2012) was administered to assess participants' memory of the trauma film following a five-minute arithmetic distracter task. Specifically, participants were given eight minutes to narrate their memories of the film, which were audio recorded. They were reminded to describe events in the correct sequence and to provide as much detail as possible. To ensure standardization, all participants were required to complete this task for eight minutes. If there was remaining time after they completed their narration, they were instructed to restart the narration by describing the events and providing more detail in the subsequent iteration. However, the instructions for

the second narrative slightly departed from standardization for a handful of participants (n =10), who were cued to provide fine details (e.g., color, people) instead of a sequential narrative. For most participants (n = 68), at least two "chunks" of narratives were yielded. Sixteen participants had one "chunk" of narrative, as they took the full eight minutes to complete their first narration.

Participants' narratives were transcribed by undergraduate research assistants who were blind to participant condition. Next, the transcribed narratives were examined and broken into "chunks," which are clauses that contain "only one thought, action, or speech utterance" (Foa, Molnar, & Cashman, 1995, p. 681). This step was completed by the principal investigator following consultation with the dissertation director. In order to assess narratives for objective memory fragmentation, a number of scoring rules developed by Foa and colleagues (1995), Halligan and colleagues (2003), Olsen and Beck (2012), as well as Wegner, Quillian, and Houston (1996), were consulted. Narratives were coded based on the following criteria: (a) individual chunks were evaluated for fragmentation such as memory uncertainty, confusion, or nonconsecutive chunks, as well as repetition errors; (b) completion of events (reverse-scored); and (c) correct sequence of events (reverse-scored). The research assistants also provided ratings of memory coherence for each transcript. See Appendix M for the coding rubric.

The undergraduate research assistants were first trained on the scoring rules and practiced scoring on ten mock transcripts before proceeding to scoring actual participant transcripts. Next, the research assistants gathered and compared their individual ratings over the course of six weeks. Any disagreement was discussed to achieve consensus. Whenever a discrepancy was not resolved, the scoring decision was deferred to the principal investigator, who was present during all coding meetings. Further consultation with the dissertation director was conducted when

necessary. Examination of individual coder ratings revealed high agreement among undergraduate research assistants in the scoring of completion of events (category b), *r*s ranging between .81 and .86, and in the scoring of correct sequence of events (category c), *r*s ranging between .74 and .93. A similar level of agreement was observed during coding meetings for narrative fragmentation coding (category a) though a formal consensus rating was not available given the nature of the coding procedure. As stated, all disagreements on this category were deliberated with the intent of achieving consensus. After the narrative scores were finalized, each score was z-transformed based on its sample distribution. A final memory fragmentation score was computed as z(a) + z(b)+ z(c) for each narrative. Scores from the narrative(s) were computed to yield an average total score that represents the narrative(s) that were completed within the time limit.

Fragmentation in Narratives (a)

This rating was coded based on scoring rules developed by Foa, Molnar, and Cashman (1995) and Halligan et al. (2003). Fragmentation in narratives included repetitions, uncertainty, confusion, and nonconsecutive chunks. Additionally, following Halligan et al. (2003), clauses of repetitions were also examined. An utterance repeated within the same clause was considered a word repetition error and an utterance repeated within five lines was considered an error of content repetition. Sample fragmented clauses include, “I know something didn’t, at least, they were broken” (Halligan et al., 2003). In this study, example fragmented clauses included, “I couldn’t- I couldn’t- I don’t really remember”; “and it was (pause) it was- I don’t know. It was, it was like, I don’t know”; “and they strapped her down, strapped her down, and then she she was crying”; “um, the car they hit was I think either silver car or black car.”

Completion of Events (b)

This score refers to the total percentage of correct details recalled by participants. The percentage of recalling completeness was computed by dividing total number of correct events by total events in the film. Total events in the film was pre-determined by the principal investigator and the dissertation director. Total number of correct events was scored based on Olsen and Beck's (2012) scoring rules. Specifically, accurate events were defined by the correct description of actual scenes from the film. In this scoring category, participants were not penalized for reporting inaccurate events as defined by mistaken description of actual film scenes or description of scenes that were unrepresented. Rather, inaccurate reporting was captured as an error in the category above: fragmentation in narratives. See Appendix K for a list of accurate events that were used for scoring.

Correct Sequence of Events (c)

This score refers to the proportion of sequential accuracies (item to item) made by participants. The percentage of events recalled in the correct order was calculated by dividing total recall events in the correct order by total correct sequences in film (Wegner, Quillian, & Houston, 1996). Total correct sequences in film, which means chronological listings of all events that took place in the film, was pre-determined by the principal investigator and the dissertation director. Given that sequential accuracies are determined from item to item, recalling the order of one event incorrectly may result in more than one error. For example, two points were missed if events 1, 2, and 3 were recalled in the order of 1, 3, and 2.

Subjective Trauma Memory Fragmentation

The Trauma Memory Questionnaire (TMQ; Halligan, Michael, Clark, & Ehlers, 2003; see Appendix N) is a recently developed research tool that examines respondents' adverse memories. For the purpose of this study, only one of the two subscales, the Disorganization scale, was used to assess deficits in intentional recall that reflect primarily subjective memory disorganization. In the current study, the Disorganization scale of the TMQ served as self-reported (hence subjective) memory fragmentation.

The Disorganization scale contains five items, including "I cannot get what happened during the stressful event/unpleasant event/the stories straight in mind." Wording of the measure was adapted to relate specifically to the video stimulus. Items were rated on a 5-point scale, ranging from 0 *(Strongly Disagree)* to 4 *(Strongly Agree)*. Higher mean scores indicated higher levels of subjective memory disorganization. The scale has demonstrated good internal consistency, ranging from .80 to .90, in previous studies (e.g., Halligan et al., 2003; Jelinek et al., 2009). Further, Halligan and colleagues (2003) also reported that the Disorganization scale is associated with deficits in cognitive processing and PTSD symptomatology. In the present study, Cronbach's alpha for the TMQ Disorganization subscale was .86.

Trauma Exposure

The Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake, Schnurr, Kaloupek, Marx, & Keane, 2013; see Appendix O) is a self-report measure designed to assess lifetime exposure to potentially traumatic events. The instrument listed 16 events that may potentially result in PTSD (corresponding to *DSM-V* criteria of PTSD) and a final item assessing any other

distressing events that were otherwise not captured. Types of traumatic events that were listed include natural disaster, sexual assault, physical abuse, war or combat exposure, and motor vehicle accidents. A total of six response options were available in the LEC-5. It asked respondents to indicate how they were exposed to these events: whether the event(s) had happened to them personally, whether they witnessed it, whether they learned about it happening to a family or friend, or whether they were exposed to it as part of their job. As relevant, participants could also indicate *not sure* or *doesn't apply* as their response.

As it was only recently revised, psychometric study for the LEC-5 has not been made available. Weathers and colleagues (2013), however, anticipated few psychometric discrepancies from the original LEC, considering only slight revisions between the two forms. The original LEC has demonstrated adequate psychometric properties: adequate temporal stability and good convergent validity with other measures of trauma history as well as measures of PTSD such as structured interviews (Gray, Litz, Hsu, & Lombardo, 2004). The measure was validated in different study samples, including college undergraduates and combat veterans. Considering the nature of the present study, a history of trauma exposure was assessed as a variable potential covariate.

Procedures

Pre-Screening Phase Procedure

The PSYC 102 mass testing procedure was conducted during the first week of class to identify eligible participants. Students who met criteria for PTSD were screened out to protect these individuals from elements in the study (i.e., trauma film and bogus memory ability

feedback) that may potentially retraumatize them. Students who did not meet the cut-off for probable PTSD diagnosis were sent an email invitation to participate in the current study. The invitation email included brief information regarding the study and directions to sign up for the experiment via the SONA system, the NIU experiment management system. Participants received three course credits upon completion of the experiment.

Laboratory Phase Procedure

The experiment was conducted in a standard psychology laboratory and took approximately 90 minutes to complete. First, participants provided consent to participate in the experiment. Next, they completed a demographic questionnaire, a series of baseline measures, and a standardized memory assessment, followed by the receipt of bogus evaluation on their memory performance. Then, participants viewed the trauma video and completed measures assessing their viewing experience. Following that, participants were given a five-minute distracter task (simple arithmetic problems) before completing memory tasks on the film they viewed, as well as a measure assessing their trauma history. Finally, participants were fully debriefed and provided local counseling resources at the conclusion of the experiment.

Informed Consent and Cover Story

Participants arrived individually at the laboratory. Once seated, participants received an informed consent document (Appendix P). Using the following cover story in the document, participants were informed that the experiment ostensibly examined gender, personality, cognitive processing style, and the selection of media genre:

> This study is interested in examining individual differences in film preferences. Research shows that personality traits influence the type of movies an individual prefers to watch. Further, a recent nationwide survey involving frequent theater-goers showed that individual traits such as gender, cognitive processing style, and mental health state may also affect preference for media genre. This experiment will involve a number of different portions: completing a series of questionnaires, completing a standardized memory assessment, and watching a video clip that is randomly selected using a computer algorithm. You may also receive feedback regarding your performance during the experiment. Please review the consent document carefully and let me know if you have any questions.

During the consent procedure, participants were also warned of potential graphic content in the video clip. They were informed that they could terminate the experiment at any point without penalty. Participants were assured anonymity of their responses. After providing consent, participants were told that the experiment would officially begin with a battery of questionnaires.

Initial Questionnaire Battery

The initial questionnaire package included the demographic questionnaire, preference for film genre questionnaire, MDI, and MACCS.

Standardized Memory Assessments

The memory confidence manipulation paradigm was a partial replication of the procedure used by Alcolado and Radomsky (2011). The paradigm involved WMS-IV memory assessment, memory confidence manipulation, and a manipulation check. Following the initial questionnaire

set, participants completed the Logical Memory I, Verbal Paired Associates I, Designs I, and Visual Reproduction I subtests from the WMS-IV. Prior to the test administration, the experimenter stated the following to introduce the memory test and to ensure credibility of the WMS-IV:

> Alright, so let's get started with the memory tasks. We are going to assess your memory by conducting tasks from the Wechsler Memory Scale. This test was developed by the same people who make IQ tests. The name might sound familiar if you're a psychology student, because the Wechsler Adult Intelligence Scale or WAIS is a very common IQ scale. So think of this test as an IQ test that focuses on your memory.

The administration of the WMS-IV served as a pretext for the memory confidence manipulation, as well as to ensure that participants did not differ, on average, in their baseline memory functioning.

Memory Confidence Manipulation

Depending on the randomly assigned experimental condition, participants either received a positive or a negative evaluation of their WMS-IV performance. To ensure experimenter blindness during the WMS-IV administration, the condition each participant was assigned to was only revealed to the experimenter at this point in the study procedure. To transition into WMS-IV evaluation scoring, participants were told the following preamble:

> Alright, so let's see how you did. Just as a thank you for doing the tasks and to give you a break before we start the final task, I'm going to go calculate your score. This won't take too long since we have computer software in the other room that calculates results. It will compare your scores against the standardized and normalized scores of other women/men

your age in order to be able to give you your percentile rank for how you performed. Are you familiar with percentile ranks? (If yes: Good. If no: I'll explain when I'm back with your scores). Here are some magazines for you to look at while you wait (give magazines from shelf).

At this point, the experimenter excused him or herself to a separate laboratory space, pretending to tabulate the participant's WMS-IV scores. Approximately five minutes later, the experimenter returned with a mock evaluation output and a figure of a normal curve (see Figure 1) to be used to indicate where the participant's scores fell along the population distribution.

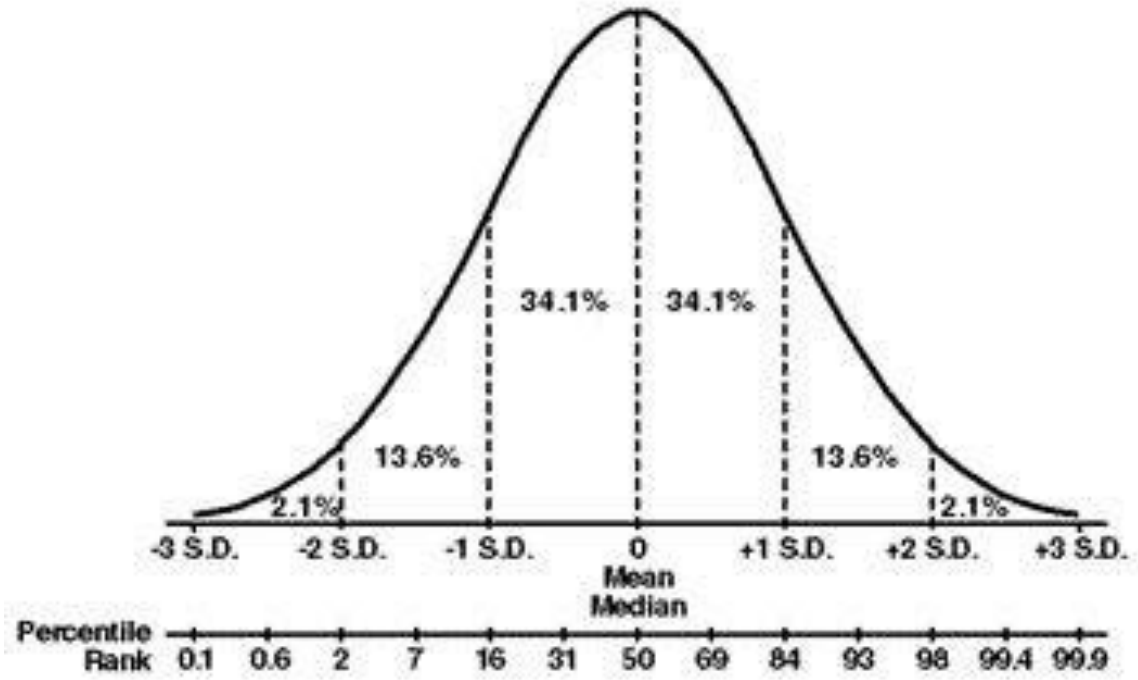

Figure 1. Normal distribution curve.

The experimenter said the following to begin the feedback process, followed by specific feedback for each condition:

> Alright, so the scores we report to you are in percentile ranks. Are you familiar with percentile ranking? What it means is that we have a database of scores of thousands of men and women in North America across all the age ranges, and that's what we compare your scores to. Each age range is comprised of a representative sample of the different ethnicities that exist in North America, as well as a range of students, blue-collar and white-collar workers who took the test. All of that is just to say that as much as possible we are trying to compare your scores to the real population that is out there. So it is technically possible to have scored very highly on the test but to still get a low ranking, or vice versa, to score very low but still get a high ranking. The range of scores on this test is also normally distributed, meaning that we expect most people to fall at about the mid-point (or 50th percentile). Where do you think your score will fall in this curve?

The experimenter tracked and recorded participants' responses to this question. Following the introduction, the experimenter continued the process by providing WMS-IV feedback that was specific to the levels of manipulation (positive versus negative). Participants in the low memory confidence manipulation group received the following feedback:

> …but, as you can see, your scores were actually between the 35th and 40th percentile, which is very low. Your scores were significantly lower compared to the standard scores of people your age on this test, so most people your age would have performed better than you on average across these three tasks. This means you may not be able to rely on your memory to tell you how well you've done. You may already be aware of this. For

example, think about how many times you've been sure you know where your keys are, only to find out that you don't. If you're interested, at the end of the study, I can give you a resource list that we have in the lab that contains information about how to improve your memory and resources that you can get more information about this form.

Participants in the high memory confidence manipulation group received the following feedback:

…but, as you can see, your scores were actually between the 85th and 90th percentile, which is very high. Your scores were significantly higher compared to the standard scores of people your age on this test, so most people your age would have performed worse than you on average across these three tasks. This means you may be able to rely on your memory to tell you how well you've done. You may already be aware of this. For example, think about all the times you haven't been sure you know where your keys are, but then they are in the first place you looked. If you're interested, at the end of the study, I'd like to talk to you about getting your permission to contact you for future studies because we are interested in testing people like you who do have really good memory.

Manipulation Check

To assess the effectiveness of the memory confidence manipulation, participants completed the PFQ followed by the T1 PANAS. The T1 PANAS provided a baseline mood rating prior to watching the video clip. Participants were informed that data generated from the PFQ would be used as part of the evaluation process of the experimenter. To assure anonymity

of their responses, participants were handed the PFQ inside an envelope that was labeled "Confidential." Below was the introduction of the PFQ:

> So following feedback, we always ask people to fill out this questionnaire on the quality of the feedback you have just received as part of our periodic evaluation of our research assistants. You'll be answering questions about your experience with me. When you're done, please put it in this envelope, which will go directly to our lab coordinator and not be seen by myself.

Video Task

Following the PFQ, participants proceeded to watch the trauma video. Consistent with the cover story, participants were reminded that in order to preserve the integrity of the experiment, the video clip was randomly selected out of a pool of eight using a computer algorithm. In actuality, there was only one video stimulus available in this study. Prior to playing the video clip, the experimenter reminded participants to pay attention during the video by saying, "Be sure to pay attention during the video. We are going to ask you a few simple questions about the video after it is over." After watching the video, participants completed the PDEQ in relation to the viewing experience.

Distracter Task

Following the completion of the tasks above, participants were instructed to complete a simple arithmetic task (see sample in Figure 2), which took approximately five minutes. This brief task was intended to provide both a distraction from the trauma film and an opportunity for memory consolidation to take place.

All Operations (D)

Find each sum, difference, product, or quotient.

6	27	2	12	16	5	8	8	40	4
+ 8	÷ 9	× 9	÷ 3	÷ 4	× 6	+ 2	+ 4	÷ 10	+ 6
13	40	7	16	7	20	2	5	8	10
- 5	÷ 5	- 5	- 10	+ 2	- 10	+ 1	× 9	- 1	+ 4
12	1	5	9	7	6	7	2	1	2
- 10	× 3	- 1	- 7	- 2	+ 10	× 3	+ 9	÷ 1	× 6
10	6	1	11	3	15	9	5	11	7
- 9	- 4	÷ 1	- 6	+ 4	- 7	× 5	+ 10	- 7	+ 7
50	10	17	12	8	2	6	4	9	50
÷ 10	÷ 1	- 10	- 10	÷ 8	× 7	÷ 6	× 1	× 3	÷ 10
7	2	10	5	14	6	2	11	5	2
× 6	+ 4	× 6	+ 3	- 10	× 8	+ 10	- 10	× 7	× 9
1	12	7	9	10	10	3	5	10	7
× 4	- 5	- 2	× 9	- 7	× 7	× 4	× 9	× 1	+ 10
42	5	6	90	13	15	14	9	5	30
÷ 6	+ 3	+ 9	÷ 9	- 9	- 9	- 7	+ 1	+ 10	÷ 6
60	2	14	9	8	20	12	1	14	5
÷ 10	+ 1	- 6	- 5	× 8	÷ 4	- 10	+ 10	÷ 2	÷ 5
5	9	81	6	1	1	9	4	3	30
- 3	+ 1	÷ 9	+ 2	+ 2	× 8	× 7	× 8	+ 3	÷ 6

Figure 2. Sample arithmetic task.

Trauma Film Memory Recall

The memory tasks were administered following the five-minute distracter task. During this phase, participants completed a sequential memory task related to the trauma film, followed by the TMQ to assess their subjective fragmentation.

Posttraumatic Negative Affect

Following the completion of delayed memory recall tasks, participants completed the T2 PANAS. It served to measure level of negative affect as a result of having to recall the trauma memory.

Trauma History Assessment

Prior to the end of the experiment, participants completed the LEC-5 to provide information regarding their history of trauma exposure. The LEC-5 was not administered earlier to prevent priming participants regarding the true nature of this study.

Debriefing

At the conclusion of the experiment, participants were questioned regarding any suspicion they might have had about the experiment to ensure the manipulation (bogus feedback on their WMS-IV performance) was convincing. Refer to Appendix Q for sample questions. No participant reported any substantial doubt about the purported intent of the experiment or the feedback they received. However, as stated previously, eighteen participants were eliminated

from the dataset due to failure in passing the manipulation check question ("Based on this feedback, I believe my memory is…").

Next, a brief assessment of rumination was conducted to gauge whether participants were mentally occupied by their WMS-IV test results and therefore did not pay attention to the trauma film. Each participant was asked, "From a scale of 1 *(not at all)* to 5 *(extremely)*, how much were you thinking about the memory results during the video?" This response was recorded. Finally, using a standardized debriefing script (Appendix R), the experimenter thoroughly debriefed each participant regarding the true nature of the study and the rationale behind the use of deception. Following debriefing, the experimenter provided each participant with referral information for mental health services (Appendix S) in the DeKalb area, in case they remained distressed due to participation in the study.

CHAPTER 3

RESULTS

Pre-Analyses (Data Screening)

Data screening and pre-analyses were conducted using SPSS Statistics 23.0. First, manipulation check was conducted to determine whether the experimental manipulation was effective in manipulating participants' memory confidence. To do so, participants' responses to the third item on the PFQ ("Based on this feedback, I believe my memory is…") were inspected. It was anticipated that participants in the high memory confidence manipulation group would endorse either "Excellent" or "Good" and participants in the low memory confidence manipulation group would endorse either "Fair" or "Poor." Of the 105 participants, 18 responded otherwise and were eliminated from the dataset. This was consistent with manipulation check findings in Alcolado and Radomsky (2011), which reported that 17.6% of participants were not affected by the memory manipulation and 0.01% was completely skeptical of the bogus memory feedback. No participant reported any substantial suspicion of the experimental manipulation during the debriefing in the current study.

Next, each primary variable of interest was screened for outliers (univariate and multivariate) and missing data by examining its boxplot, histogram, and descriptive statistics. Dependent variables were also inspected using Mahalanobis distance. At this stage, two

participants were eliminated due to incomplete data as a result of unstable internet connection and premature termination. One participant's WMS-IV Designs I score was missing due to administration error and was treated with pairwise deletion. No other missing data was present for the variables of primary interest. Outliers were examined on a case-by-case basis in order to determine whether the windsorizing technique was necessary to deal with extreme values. At this stage, one participant was eliminated due to relatively low language ability (observed during the experiment and throughout the trauma narrative task), which significantly skewed his/her scores on several measures (e.g., MDI, APDEQ, T1 negative affect, T2 negative affect, TMQ, and objective memory fragmentation score). A total of six (univariate and multivariate) outliers were observed for the following scales: T1 negative affect, T2 negative affect, MDI, MACCS, and TMQ. These extreme scores were replaced with the next highest value in order to fit the distribution.

Lastly the data, comprised of the remaining 84 participants, was assessed to ensure that statistical assumptions were met, which included multivariate normality, linearity, and homoscedasticity. To evaluate the multivariate normality assumptions, the skewness, kurtosis, and histogram of standardized residuals were examined. Scores for the MDI, PDEQ, T1 negative affect, and TMQ were found to be positively skewed, exceeding the cut-off z-score of 3.3. All other variables were normally distributed. Log transformation was applied to the four skewed variables, which only improved distribution for the TMQ and the MDI. Thus, the log-transformed TMQ and MDI scores were used in subsequent analyses, but original scores on the PDEQ and T1 negative affect were retained. To evaluate linearity and homoscedasticity of the variables, scatterplots between predicted and residual values for each variable were examined.

Except for PDEQ and T1 negative affect, all primary variables of interest were found to meet both assumptions. An inverse transformation was applied to PDEQ and T1 negative affect, which significantly improved the distribution for the variables. The transformed scores were used in subsequent analyses.

Preliminary Analyses

An independent-samples *t* test was performed to determine whether the High Feedback group and the Low Feedback group were qualitatively distinct in any primary variables (see Table 1). Despite the use of randomization, the manipulation groups significantly differed in their WMS-IV performance on all indices. The High Feedback group performed better than the Low Feedback group on Logical Memory I ($t[82] = -2.57$, $p = .01$), Visual Processing I ($t[60.36] = -3.29$, $p = .002$), Verbal-Paired Associates I ($t[82] = -2.17$, $p = .03$), and Designs I ($t[69.81] = -3.37$, $p = .001$). Further, the two groups also differed on self-reported metamemory beliefs (MACCS; $t[82] = 2.11$, $p = .04$), negative affect change score from Time 1 to Time 2 ($t[82] = -2.11$, $p = .04$), and preference for the horror film genre ($t[82] = 2.032$, $p = .045$). Cohen's *d* (Cohen, 1988) was used to examine effect sizes of significant results. These differences had medium to large effect sizes, with the largest effect size noted for the WMS total score. In the present study, the manipulation groups did not differ on trait dissociation, peritraumatic dissociation, preference for disaster film genre, or history of trauma exposure.

A correlation matrix of the primary variables can be seen in Table 2. Baseline belief about metamemory difficulty was positively related to both objective and subjective memory fragmentation, as well as T1 negative affect. Conversely, baseline memory ability was positively related to subjective memory fragmentation (albeit in a positive direction) and negative affect

Table 1. *Comparisons Between High Feedback Group (n = 43) and Low Feedback Group (n = 41) on Primary Variables of Interest*

	High Feedback Group	Low Feedback Group			
	Mean (SD)	*Mean (SD)*	t	*p*	*Cohen's d*
Trauma History	12.79 (8.41)	12.88 (7.64)	.05	.96	-.01
Trait dissociation	43.84 (11.06)	45.29 (10.55)	.62	.54	-.13
Peritraumatic dissociation	9.32 (2.46)	10.35 (4.19)	-1.38	.17	-.30
Baseline metamemory beliefs	26.81 (10.27)	31.76 (11.22)	2.11	.04*	-.46
WMS total score	214.37 (19.10)	195.41 (24.69)	-3.95	<.00***	.85
T1 negative affect	12.49 (3.24)	13.78 (3.86)	1.66	.10	-.36
T2 negative affect	14.77 (4.20)	14.29 (4.23)	-.52	.61	.11
Negative affect change score	2.28 (3.92)	.51 (3.74)	-2.11	.04*	.46
Rumination	2.15 (1.26)	2.22 (1.19)	.26	.80	-.06
Subjective memory fragmentation	1.64 (.69)	1.55 (.52)	-.67	.50	.15
Objective memory fragmentation	.22 (2.29)	-.23 (2.25)	-.92	.36	.20
Narrativity	1.14 (.45)	1.20 (.47)	.39	.70	-.16

* $p<.05$, ** $p<.01$, *** $p<.001$

Table 2. *Correlation Matrix Between Primary Variables of Interest*

	1	2	3	4	5	6	7	8	9	10	11
1. Trait dissociation	--	--	--	--	--	--	--	--	--	--	--
2. Dissociation during film	.37**	--	--	--	--	--	--	--	--	--	--
3. Baseline metamemory beliefs	.54***	.25*	--	--	--	--	--	--	--	--	--
4. WMS total score	-.03	-.02	-.08	--	--	--	--	--	--	--	--
5. T1 negative affect	.22*	.22*	.26*	-.18	--	--	--	--	--	--	--
6. T2 negative affect	.23*	.55***	.16	.10	.51***	--	--	--	--	--	--
7. Negative affect change score	.04	.39***	-.07	.27*	-.38***	.61***	--	--	--	--	--
8. Rumination	-.27*	-.14	-.24*	.11	.04	.03	-.06	--	--	--	--
9. Subjective memory fragmentation	.14	.24*	.28*	.24*	.08	.23*	.17	-.04	--	--	--
10. Objective memory fragmentation	.06	-.03	.24*	-.17	.09	.06	-.02	-.19	.06	--	--
11. Narrativity	.12	.11	.02	-.27*	-.05	.02	.06	-.09	-.18	-.06	--
M	44.55	9.85	29.23	205.12	13.12	14.54	1.42	2.18	1.50	0.00	1.17
SD	10.77	3.47	10.97	23.86	3.60	4.20	3.91	1.22	0.62	2.27	0.47
Min	31.00	7.00	15.00	136.00	10.00	10.00	-10.00	1.00	1.00	-5.10	- 0.15
Max	80.00	21.00	61.00	244.00	24.00	25.00	15.00	5.00	3.75	5.43	2.27
N	84	84	84	84	84	84	84	84	84	84	84

* $p<.05$, ** $p<.01$, *** $p<.001$

change score; however, the variable was not related to objective memory fragmentation. As anticipated, objective memory fragmentation was not correlated with subjective memory fragmentation.

Hypothesis Testing

Prior to hypothesis testing, the interrelations between potential covariates and outcome variables (i.e., objective and subjective memory fragmentation) were inspected. Potential covariates included demographic variables (i.e., age, gender, ethnicity, and level of education), preference for distressing films, baseline memory ability (WMS-IV), trait dissociation (MDI), baseline metamemory beliefs (MACCS), and trauma history (LEC-5). Objective memory fragmentation was positively related to baseline metamemory beliefs (r = .24, p = .03), whereas subjective memory fragmentation was positively related to baseline metamemory beliefs (r = .28, p = .01) and baseline memory ability (r = .24, p = .03). As such, both objective and subjective measurements of baseline memory ability were included as covariates for all remaining analyses.

The first hypothesis sought to examine the impact of metamemory on objective trauma memory fragmentation. It was hypothesized that manipulating an individual to believe one's memory abilities are poor would adversely impact objective memory fragmentation scores. To test this hypothesis, an analysis of covariance (ANCOVA) was conducted to compare the means on objective memory fragmentation between the WMS-IV High Feedback group and the WMS-IV Low Feedback group. It was predicted that the Low Feedback group would show greater objective memory fragmentation than the High Feedback group once their means had been adjusted for baseline metamemory beliefs. However, there was no significant difference between adjusted means of the manipulation groups on objective memory fragmentation after controlling

for the effect of baseline metamemory beliefs, $F(1,80) = .34$, $p = .56$. Nor did the manipulation groups differ on subjective memory fragmentation after controlling for the effect of baseline metamemory beliefs, $F(1,80) = .02$, $p = .89$, nor after controlling for the effect of baseline memory ability, $F(1,80) = .39$, $p = .54$.

The second set of hypotheses investigated the effects of memory ability and metamemory belief on memory fragmentation (objective and subjective). Hypothesis 2.1 proposed that after controlling for metamemory group, memory ability would account for additional variance in objective memory fragmentation scores. To test Hypothesis 2.1, a hierarchical linear regression analysis was conducted in which objective memory fragmentation (outcome variable) was regressed on metamemory group (covariate), baseline metamemory beliefs (covariate), and memory ability as determined by the WMS (predictor) (see Table 3). In step 1, metamemory group was entered into the model. The covariate variable did not significantly predict objective memory fragmentation ($\beta = .45$, $t = .92$, $p = .36$). In step 2, baseline metamemory belief was entered into the model. This covariate variable explained an additional 7.4% of the variation in objective memory fragmentation and this change in R^2 was significant, $F(2,81) = 3.72$, $p = .03$. In step 3, memory ability was added to the model. The final model significantly accounted for more variance ($\Delta R^2 = .06$ or 6%) in objective memory fragmentation, $F(3,80) = 4.20$, $p = .008$. All three variables emerged as significant predictors: WMS total ($\beta = -.02$, $t = -2.20$, $p = .03$), baseline metamemory beliefs ($\beta = .06$, $t = 2.63$, $p = .01$), and metamemory group ($\beta = 1.19$, $t = 2.27$, $p = .03$). Consistent with Hypothesis 2.1, controlling for significant covariate variables, memory ability negatively predicted objective memory fragmentation.

Table 3. *Hierarchical Linear Regression Analyses Testing Predictors of Objective Memory Fragmentation (N = 84)*

	B (SE B)	t	R	R^2	ΔR^2
Regression 1:					
Outcome: Objective memory fragmentation			.10	.01	.01
Predictor: Metamemory group	.45 (.50)	.92			
Regression 2:					
Outcome: Objective memory fragmentation			.29*	.08	.07
Predictor: Metamemory group	.74 (.49)	1.50			
Predictor: Baseline metamemory beliefs	.06 (.02)	2.56*			
Regression 3:					
Outcome: Objective memory fragmentation			.37**	.14	.06
Predictor: Metamemory group	1.19 (.52)	.26*			
Predictor: Baseline metamemory beliefs	.06 (.02)	.28*			
Predictor: Memory ability	-.02 (.01)	-.25*			

* $p<.05$, ** $p<.01$

Hierarchical linear regression was also used to test Hypothesis 2.2, which stated that after controlling for memory ability, metamemory group would account for additional variance in subjective memory fragmentation. In this regression analysis, subjective memory fragmentation (outcome variable) was regressed on baseline metamemory beliefs (covariate), memory ability as determined by the WMS (covariate), and metamemory group (predictor) (see Table 4). In step 1, baseline baseline metamemory belief was entered into the model. The covariate variable emerged as a significant predictor (β = .004, t = 2.86, p = .005) and accounted for 9% of variance in subjective memory fragmentation. In step 2, memory ability was entered into the model. This covariate variable explained an additional 6% of the variation in subjective memory fragmentation and this change in R^2 was significant, $F(2,81) = 7.15$, p = .001. In step 3, metamemory group was added to the model. In the final model, subjective memory fragmentation was predicted by baseline metamemory beliefs (β = .004, t = 2.86, p = .003) and memory ability (β = .001, p = .04), but not metamemory group (β = .007, p = .83). Even though the overall model was significant, $F(3,80) = 4.72$, p = .004, metamemory group did not contribute additional variance in explaining subjective memory fragmentation (ΔR^2 = .00 or 0%) above and beyond baseline metamemory beliefs (covariate) and memory ability as determined by the WMS (covariate). As such, Hypothesis 2.2 was not supported.

Post Hoc/Additional Analyse

Objective memory fragmentation was also coded using the Coh-Metrix online tool, which produces information regarding linguistic characteristics of a text (McNamara, Louwerse, Cai, &

Table 4. *Hierarchical Linear Regression Analyses Testing Predictors of Subjective Memory Fragmentation (N = 84)*

	B (SE B)	t	R	R^2	ΔR^2
Regression 1:					
Outcome: Subjective memory fragmentation		.30**	.09	.09	
Predictor: Baseline metamemory beliefs	.004 (.001)	2.86**			
Regression 2:					
Outcome: Subjective memory fragmentation		.39**	.15	.06	
Predictor: Baseline metamemory beliefs	.004 (.001)	2.13**			
Predictor: Memory ability	.001 (.001)	2.38*			
Regression 3:					
Outcome: Subjective memory fragmentation		.39**	.15	.00	
Predictor: Baseline metamemory beliefs	.004 (.001)	3.09**			
Predictor: Memory ability	.001 (.001)	2.09*			
Predictor: Metamemory group	.007 (.033)	.21			

* $p<.05$, ** $p<.01$

Graesser, 2005). One particular index of interest was the Narrativity index, which assesses familiarity of a story including its characters, events, and places. The main hypotheses were re-evaluated using Narrativity as another indicator of objective memory fragmentation. Specifically, the first hypothesis was re-examined to investigate the impact of metamemory on objective memory fragmentation. An analysis of covariance (ANCOVA) was conducted to compare the means on objective memory fragmentation between the WMS-IV High Feedback group and the WMS-IV Low Feedback group. It was predicted that the High Feedback group would show greater narrativity (hence less memory fragmentation) than the Low Feedback group once their means had been adjusted for baseline metamemory beliefs. However, there was no significant difference between adjusted means of the manipulation groups after controlling for the effect of baseline metamemory beliefs, $F(1,79) = .26$, $p = .62$.

To re-examine the second hypothesis, a hierarchical linear regression analysis was conducted to investigate whether memory ability would account for additional variance in objective memory fragmentation after controlling for metamemory group. Objective memory fragmentation as determined by narrativity (outcome variable) was regressed on metamemory group (covariate), baseline metamemory beliefs (covariate), and memory ability as determined by the WMS (predictor). In step 1, metamemory group was entered into the model but it did not significantly predict objective memory fragmentation ($\beta = -1.25$, $t = -.54$, $p = .59$). In step 2, baseline metamemory beliefs was entered into the model. This predictor variable also did not significantly predict objective memory fragmentation ($\beta = .005$, $t = .05$, $p = .96$). In the final step, memory ability was added to the model and emerged as the only significant predictor of

narrativity (β = -.11, t = -2.19, p = .03). However, change in R^2 (ΔR^2 = .06 or 6%) was non-significant, $F(3,79) = 1.69$, p = .18.

To test whether memory fragmentation (objective and subjective) was a function of multiple factors, additional moderation analyses were conducted. Prior to the analyses, manipulation group conditions were dummy coded. The Low Feedback group was coded as "0" (reference group) and the High Feedback group was coded as "1." Interaction terms were manually created by multiplying the predictor variable and the moderator variable. The variables were not centered prior to the analyses. Hierarchical regression models were tested to examine whether memory ability (WMS) moderates the relationship between metamemory group and memory fragmentation (objective and subjective). The first analysis investigated memory ability as a moderator of the relation between metamemory group and objective memory fragmentation. Memory ability and metamemory group were entered in the first step of the regression analysis. In this step, only memory ability significantly predicted objective memory fragmentation (β = -.02, p = .04). The interaction term was entered in the second step but was non-significant in predicting objective memory fragmentation (β = -.01, p = .55). Further, it did not explain additional variance in objective memory fragmentation, ΔR^2 = .004, $F(1, 80) = .37$, p = .55. Therefore, memory ability did not moderate the relationship between metamemory group and objective memory fragmentation.

A multiple regression model was estimated to investigate whether memory ability moderates the relationship between metamemory group and subjective memory fragmentation. Memory ability and metamemory group were entered in the first step of the regression analysis. In this step, only memory ability significantly predicted subjective memory fragmentation (β

= .001, p = .048). The interaction term was entered in the second step but was non-significant in predicting subjective memory fragmentation (β = .001, p = .57). Further, it did not explain additional variance in subjective memory fragmentation, ΔR^2 = .004, $F(1, 80)$ = .33, p = .57. Therefore, memory ability was not a significant moderator of the relationship between metamemory group and subjective memory fragmentation.

Next, hierarchical regression analyses were conducted to assess whether baseline metamemory beliefs (MACCS) moderated the relationship between metamemory group and memory fragmentation (objective and subjective). A multiple regression model was tested to examine whether baseline metamemory beliefs moderates the relationship between metamemory group and objective memory fragmentation. Baseline metamemory beliefs and metamemory group were entered in the first step of the regression analysis. In this step, only baseline metamemory beliefs significantly predicted objective memory fragmentation (β = .06, p = .01). The interaction term was entered in the second step but was non-significant in predicting objective memory fragmentation (β = -.003, p = .95). Further, it did not explain additional variance in objective memory fragmentation, ΔR^2 = .000, $F(1, 80)$ = .004, p = .95. Therefore, baseline metamemory beliefs did not moderate the relationship between metamemory group and objective memory fragmentation.

Lastly a multiple regression model was conducted to investigate whether baseline metamemory beliefs moderates the relationship between metamemory group and subjective memory fragmentation. In the first step, baseline metamemory beliefs and metamemory group were entered in the regression analysis. Only baseline metamemory beliefs significantly predicted subjective memory fragmentation in this step (β = .004, p = .003). In the second step,

the interaction term was entered in the regression analysis. Even though the overall model explained additional variance in subjective memory fragmentation, $F(3, 80) = 3.13$, $p = .03$, the additional variance was negligible, $\Delta R^2 = .001$, $F(1, 80) = .07$, $p = .80$, and the interaction between baseline metamemory beliefs and metamemory group was non-significant in predicting subjective memory fragmentation ($\beta = .01$, $p = .89$). Therefore, baseline metamemory belief was not a significant moderator of the relationship between metamemory group and subjective memory fragmentation.

CHAPTER 4

DISCUSSION

A myriad of theories and empirical studies have been developed and conducted to explicate the nature of PTSD. Such undertaking is crucial in informing and designing clinical interventions offered to individuals who develop posttraumatic stress symptoms following adverse events. To summarize, difficulty recalling one's traumatic event has been frequently implicated as a key feature of PTSD – not only in influencing the onset but also the persistence of the disorder. Most empirically based mainstream treatments including Prolonged Exposure (Foa et al., 2007) and Cognitive Processing Therapy (Resick & Schnicke, 1996) operate under such an assumption. Broadly speaking, these interventions focus on decreasing anxiety symptoms by addressing dysfunctional thoughts and behaviors and integrating fragmented memories of the event.

Nonetheless, a burgeoning line of research in metamemory has begun to question the importance of trauma memory deficits, especially in view of unaddressed methodological concerns in the PTSD and memory literature. A recent dismantling study for Cognitive Processing Therapy further corroborated that memory-based exposures may not be crucial to trauma recovery, as previously considered (Resick, Uhlmansiek, Clum, Galovski, Scher, & Young-Xu, 2008). Among a group of adult women with a history of sexual or physical victimization, it was discovered that individuals who underwent Cognitive Processing Therapy—Cognitive (which excludes memory-based exposure exercises) displayed quicker, more favorable

treatment outcomes compared to individuals who underwent the full Cognitive Processing Therapy protocol, which includes both cognitive therapy and a written trauma account (i.e., memory-based exposure exercises) (Resick et al., 2008).

Furthermore, metamemory researchers purport that perceived confidence of one's trauma memory may also contribute to the development and maintenance of PTSD (e.g., Bennett & Wells, 2010; Jelinek et al., 2009). Dunlosky and Bjork (2008), for instance, specified that memory errors may be a reflection of inaccurate metamemory judgment. Memory underconfidence, regardless of whether or not it is founded or wholly accurate, may lead to feelings of anxiety, especially in the process of recalling and making sense of one's trauma memory. Despite the intertwined nature of their association, memory and metamemory have mostly been studied separately. The current dissertation sought to extend previous research by exploring the nature of this relationship. In this study, a trauma analogue between-subjects experimental design was employed to investigate whether symptoms of PTSD are maintained by memory fragmentation, perceived memory fragmentation, or both.

The Current Hypotheses

Consistent with previous research (e.g., Bennett & Wells, 2010; Jelinek et al., 2009; Kindt & van den Hout, 2003), the current findings indicate that poorer memory confidence was associated with greater fragmentation on the recall task (objective memory fragmentation) as well as subjective rating of one's performance. This finding provides partial support for the notion that lack of confidence in one's general memory may be associated with actual memory performance, in addition to perceived memory performance on a subsequent memory task. Further, the present findings indicate that baseline memory ability (WMS) was positively

correlated with participants' self-rated trauma narrative fragmentation, but it was not related to participants' actual performance on the recall task (objective memory fragmentation). This means that the better individuals performed on the WMS-IV, the higher perceived fragmentation they reported on the trauma recall task. However, their WMS-IV performance was unrelated to their actual performance on the recall task.

Taken together, both findings indicate that participants were generally inaccurate when judging their objective and subjective memory performance, resulting in "miscalibration" between perceived performance and actual performance. That individuals tend to misjudge their memory performance is not uncommon (e.g., Roebers, 2002; Winkielman et al., 1998). In various experimental studies, participants believed their subsequent performance on memory tasks was poor in spite of their average performance on an objective memory test (Ponds et al., 2000; Winkielman et al., 1998), calling into question the use of only self-report measures in assessing memory recall. Further, these findings are especially prevalent when the memory task is perceived as challenging (Winkielman et al., 1998), when one generally believes one's memory functioning to be poor (Ponds et al., 2000), and when one received misleading information that convinced the participant of the possibility that she or he may have impaired memory (Loftus, 2005). The miscalibration between perceived performance and actual performance remains a fascinating yet puzzling phenomenon. Several explanations have been made in an attempt to explicate this counterintuitive occurrence. For example, Winkielman and colleagues (1998) explained that individuals may arrive at different conclusions regarding their task performance depending on how they attributed the experienced difficulty – whether they attributed it to the recalled content (i.e., the task demands) or the difficulty in retrieving the

content (i.e., poor quality of their memory). Such miscalibration is similarly common in other fields of cognitive psychology. Research showed that metacognitive biases such as relying on past experiences of and subjective beliefs about one's processing fluency may affect confidence in one's knowledge (Finn & Tauber, 2015).

Next, in order to determine whether poor memory confidence would result in further deterioration in recall task performance (both perceived and actual performance), a memory confidence paradigm was used to manipulate participants' confidence regarding their general memory functioning. The first hypothesis sought to examine the impact of metamemory on objective memory fragmentation. Specifically, it was hypothesized that manipulating an individual to believe his or her memory abilities are poor would adversely affect their objective memory fragmentation scores. This hypothesis was not supported by the present findings. After controlling for the effect of baseline metamemory beliefs (MACCS), groups did not differ on their recall task performance.

The second hypothesis investigated whether memory ability is a better predictor of objective memory fragmentation as compared to metamemory group. It was hypothesized that after controlling for metamemory group (WMS-IV feedback), memory ability (WMS) would negatively predict objective memory fragmentation (recall task). This hypothesis was partially supported by the current findings. In this study, memory ability negatively predicted objective memory fragmentation, but so did metamemory group and metamemory beliefs (MACCS). In other words, the effects of memory ability did not trump the effects of other important factors, which remained significant after considering memory ability. Taken together, this finding suggests that both memory ability and subjective memory beliefs (as indicated by participants'

baseline metamemory beliefs and bogus WMS-IV feedback) contribute to participants' subsequent performance on the verbal recall task. This finding further demonstrates the importance of examining the interplay between metamemory and memory constructs (Dunlosky & Bjork, 2008; Nelson & Narens, 1990), which has been understudied in the trauma literature.

The final hypothesis sought to examine whether metamemory group is a better predictor of subjective memory fragmentation as compared to memory ability. It was hypothesized that after controlling for memory ability (WMS-IV), metamemory group would predict subjective memory fragmentation (TMQ). This hypothesis was not supported by the current findings. In this study, manipulating an individual to believe that his or her memory abilities are poor did not adversely impact subjective memory fragmentation scores (TMQ). In other words, groups are not different after controlling for the effect of baseline metamemory beliefs (MACCS) or after controlling for the effect of baseline memory ability (WMS). As such, metamemory group failed to emerge as a predictor of subjective memory fragmentation. Notably, all post hoc analyses examining possible interaction effects between metamemory and memory fragmentation (objective and perceived) were non-significant.

Overall, it appears that manipulating participants' memory confidence failed to produce anticipated outcomes. We anticipated that participants who received negative WMS-IV feedback would rate their recall task performance especially poorly, though their actual performance may not differ from participants who received positive WMS-IV feedback. Further, the effects of memory ability did not trump the effects of other important factors in predicting objective memory fragmentation, as the covariate variables remained significant after considering memory ability. In addition, metamemory group failed to predict subjective memory fragmentation.

Unfortunately, the hypothesized role of low memory confidence in PTSD symptoms was not supported in this trauma analogue study, which contradicted budding research in this area. Instead, only baseline memory ability reliably predicted recall task performance.

Several explanations may explicate the current null findings. First, it is important to consider the potential impact of failed randomization in this study. Equality between experimental groups is an important prerequisite in any experimental design. Establishing the equivalence of pretreatment experimental conditions is critical to ensure internal validity (Cook & Campbell, 1979). Use of such designs should eliminate the possibility that third factor(s) (e.g., pre-existing attribute of participants) other than the experimental factor may explain the finding. Statistically, random assignment can increase the power to detect the effect of treatment condition (if it is present). In the current study, participants were randomly assigned to the High Memory Feedback group or the Low Memory Feedback group to ensure they had an equal chance of being placed in any group. However, despite the use of random assignment and a double-blind design, the manipulation groups systematically differed on both baseline memory ability and baseline memory confidence. The High Feedback group outperformed the Low Feedback group on all measures assessing baseline memory ability (WMS) and also reported higher confidence in their general memory (MACCS) than the Low Feedback group. This introduces confounding variables (in this case, WMS and MACCS), which constitutes a serious threat to the internal validity of the experimental study. If the groups differ on these variables, it is difficult to determine whether differences in subsequent recall task and self-rating could be attributed to the treatment effect. Given the violation of randomization, WMS and MACCS were included as covariate variables in statistical analyses. However, when both independent and

covariate variables are included simultaneously to predict the dependent variable, the distribution of variance in the dependent variable may become less precise (Mutz & Pemantle, 2011). This issue is especially problematic given that the WMS and MACCS are also key predictors in this study, and both have an important relationship to the dependent variables (subjective and objective memory fragmentation). Therefore, it is unclear whether the current null findings result from the lack of relationship between the predictor and dependent variables or the loss of statistical power. Future studies may consider a larger sample to increase the effectiveness of randomization and enhance statistical power.

Further, in the present study, there is evidence suggesting that the operationalization of several main constructs of interest (trauma analogue, experimental manipulation, objective memory fragmentation) may have been problematic. In any study, particularly experimental studies whereby latent constructs are often manipulated indirectly, it is crucial to ensure an instrument or paradigm is truly measuring the construct that it purports to assess, as opposed to potential third variable(s) (Cronbach & Meehl, 1955). Otherwise, the extraneous noise resulting from confounding variables may introduce competing interpretations of findings and pose challenges in making definitive conclusions regarding the experimental treatment effect.

The present findings raise questions in regard to the ecological validity of the trauma film, whether or not this tool is provocative enough to evoke anxiety-related symptoms consistent with posttraumatic stress symptomatology. Actual experiences of trauma often lead to acute or even chronic posttraumatic stress symptoms, which may include impaired mood and memory functioning and diminished memory confidence more generally. However, viewing the five-minute traffic accident safety video did not universally raise participants' level of negative affect.

As a whole, watching the trauma film raised negative affect among the High Feedback group (M_{diff} = 2.28; $p < 0.001$), but it did not seem to affect the Low Feedback group (M_{diff} = .51, $p > .05$). There may be multiple reasons for the lack of distress observed among participants: the traffic accident film was dated, it was non-interpersonal in nature (i.e., not directly related to the participant and there was no human perpetrator), and it was filmed in a foreign country, which includes foreign individuals, accents, and ambulatory vehicles. Individuals are routinely exposed to graphic and violent films/TV/video games, which may lead to generally low sensitivity to graphic films. In fact, research has shown that regular exposure to filmed violence leads to lower physiological response (Carnagey, Anderson, & Bushman, 2006) and fewer helping behaviors (Bushman & Anderson, 2009). Together, these factors may have created emotional distance between participants and the traumatic episode, thereby decreasing distress reactions that are more consistent with a traumatic event.

Nevertheless, previous research has used similar – albeit not identical – footage in substitution for trauma stimuli (e.g., Halligan et al., 2003), which has successfully produced intended effects among its participants. Therefore, it is intriguing that some participants in the current study (the Low Feedback group) did not seem particularly distressed by the film. As a whole, participants who had received positive feedback regarding their WMS-IV performance experienced a significant increase in their negative affect following the film viewing (i.e., the difference between T1 PANAS and T2 PANAS). Considering that the Low Feedback group reported a stronger preference for horror film genres as compared to the High Feedback group, it is possible that the former group has had additional exposure to this genre and thereby experienced minimal distress after watching the traffic accident film. Nonetheless, the extent of

participants' exposure to violent or horror film genres were not assessed in this study. Given the prevalence of trauma-related stimuli in the current media, future studies utilizing trauma analogue stimuli may consider assessing participants' exposure to similar genres in order to rule out the potential effect of desensitization.

Further, there is evidence that the memory confidence paradigm did not seem to produce the intended effects (i.e., to induce poor memory confidence in a group of normally functioning participants) based on manipulation checks. Two manipulation checks were employed: T1 PANAS (negative affect following WMS-IV bogus feedback) and the Post-Feedback Questionnaire. Although all retained participants responded to the post-WMS feedback question, "Based on this feedback, I believe my memory is excellent/good/average/fair/poor," in a manner that was consistent with the feedback they received, the High Feedback group and the Low Feedback group did not differ in their negative affect after receiving the bogus feedback. As the memory manipulation paradigm was unable to produce a sufficient level of anxiety that would interfere with one's actual performance and self-rated performance on trauma narrative tasks, the external validity of the paradigm remains questionable in this study. Specifically, it was unclear whether the paradigm could produce and mimic memory-related anxiety reported by individuals who have personally experienced a traumatic event.

According to Sansone, Morf, and Panter (2008), experiments often do not succeed when the manipulation of the independent variable is weak; therefore, inclusion of a manipulation check of the independent variable is one of the most important rules of experimentation. Manipulation checks are "a way of ensuring that an experiment actually has been conducted (i.e., that the independent variable has been effectively manipulated)" (Sansone et al., 2008, p. 244),

especially in studies such as the present one wherein the treatment represents an indirect manipulation of another latent variable (Perdue & Summers, 1986). Further, manipulation checks can ensure construct validity by uncovering potential confounding variables that may pose a challenge to an interpretation of findings (Newsted, Todd, & Zmud, 1997). This practice is especially important in the presence of failed random assignment. In this study, although participants indicated on the first manipulation check (Post-Feedback Questionnaire) that they understood the WMS-IV feedback they received, it was unclear whether the manipulation truly worked, especially after considering the finding that the High Feedback group and the Low Feedback group did not differ in their level of negative affect as indicated by the second manipulation check (T1 PANAS). Although the manipulation appeared successful based on the first manipulation check, the item, "Based on this feedback, I believe my memory is excellent/good/average/fair/poor," may have really only assessed participants' ability to comprehend the feedback. In retrospect, a better manipulation check would have been, "Do you agree with/believe this feedback?" Such item might be a more direct and effective assessment of participants' belief about their memory functioning post-feedback. Taken together, without knowing whether participants truly believed this treatment (as determined by the presence of negative affect), null effects cannot be distinguished from weak or ineffective manipulations or simply caused by an inaccurate theory (Franco, Malhotra, & Simonovits, 2014).

The null findings could be related to the failed randomization across the High Feedback group and the Low Feedback group. For instance, the High Feedback group came into the experiment with fairly high memory confidence (MACCS) as compared to the Low Feedback group; as such, the former group might not be surprised by the positive bogus feedback they

subsequently received during the experiment. Likewise, the Low Feedback group may be less negatively affected by the negative bogus feedback given that, as a group, they endorsed low memory confidence at baseline. As a result, this may lead to reduced potency of the manipulation paradigm and/or reduced statistical power in detecting a true difference in negative affect. In addition, the memory confidence manipulation paradigm was adapted from Alcolado and Radomsky (2011), which substantiated the role of manipulated memory beliefs in OCD-related checking behaviors; however, the paradigm has not been used in any trauma-related studies known to the author. In future studies, ensuring the effectiveness of random assignment throughout the course of data collection, rather than after it has been completed, will be critical to reduce the statistical noise.

Most importantly, a stronger manipulation of the independent variable may increase the likelihood that the construct is successfully manipulated to produce the intended effect. Researchers may attempt a different method of manipulating memory confidence. For instance, the manipulation may be more effective if the memory task could be individually tailored for each participant (i.e., adjusting the difficulty level of the task to ensure participants who would eventually receive low feedback were reasonably challenged and participants who would eventually receive high feedback completed the task with sufficient ease) to enhance the believability of the task. As a gradual buildup, participants may also be offered doses of bogus feedback throughout the memory task regarding their memory performance. Preferably, they could view instantaneous feedback from the stimuli (e.g., computer system) following the completion of the task. Receiving an “official” feedback instantaneously followed by explanation from experimenters may reinforce the potency of such feedback given its immediacy and the

"bona fide" nature of the result. The bogus feedback may also be modified to increase its internal validity – participants in the Low Feedback group may be told their score falls in the range between, for example, 20th and 25th percentile, as opposed to between 35th and 40th percentile as stated in the current experiment.

Jennings, Nedeljkovic, and Moulding (2011) employed a memory confidence manipulation paradigm whereby the difficulty level of the memory task was adjusted to ensure participants were sufficiently challenged, and feedback was provided throughout the task. The authors replicated success with this manipulation paradigm, showing participants in the treatment condition endorsed significantly increased memory confidence, whereas participants in the control condition demonstrated significantly decreased memory confidence. Other environmental manipulations may include misleading participants to believe they were under the influence of alcohol or providing them information regarding a confederate's task performance, all of which have been shown in previous research to increase malleability of memory (e.g., Loftus, 2005).

Another potential problematic construct lies with the main variable of interest – objective memory fragmentation. As put forth by Cronbach and Meehl (1955), "Construct validity is ordinarily studied when the tester has no definite criterion measure of the quality with which he is concerned, and must use indirect measures. Here the trait or quality underlying the test is of central importance" (p. 282). Memory impairments pertinent to traumatic memory are well documented in the trauma literature and clinical taxonomy (i.e., *DSM-V*, APA, 2013); however, this set of symptom presentation is comprised of different symptoms that may seem contradictory with one another (Berntsen & Rubin, 2014; Meg ás et al., 2007). For instance, Berntsen and Rubin (2014) recently put forth evidence that challenges a key premise in the

PTSD literature – that poor recall of traumatic memory is critical in the onset and maintenance of PTSD. The authors showed that difficulty forgetting important aspects of the trauma is more related to PTSD symptoms as compared to difficulty retrieving important aspects of the trauma. Other concerns have been raised in regard to the operationalization and measurement of the memory within the context of PTSD (e.g., Jelinek et al., 2009).

Memory fragmentation has been quantified in several different ways, with some operational definitions more closely aligned than others. Per *DSM-V* (APA, 2013), these symptoms may include experiencing recurring and intrusive memories, difficulty in recalling important aspects (e.g., details, coherence, and temporal order) of the trauma, as well as both internal and external suppression of trauma memories. In separate empirical studies, trauma memory fragmentation has been defined and measured in multiple ways, including abnormal chronology (Byrne, Hyman, & Scott, 2001), memory confusion (Foa et al., 1995; Halligan et al., 2003), and "increased sensory components" (Hopper & van der Kolk, 2001). Methods of assessing memory fragmentation also differ across studies. In Bedard-Gilligan and Zoellner (2012), memory fragmentation was assessed with both metamemory (i.e., self-reported memory quality [e.g., degree of clarity] or content [e.g., degree of sensory components] related to fragmentation) as well as narrative recounting to capture sensory components, organization, and other indicators of fragmentation. Most other studies (e.g., Foa et al., 1995) only assessed narrative fragmentation as an indicator of trauma-related memory impairment. In a seminal article, Brewin and Holmes (2003) discussed the importance of developing more reliable ways to measure memory fragmentation. Narrative disorganization may also reflect difficulties with retrieval and expression of memory content, in addition to (or as opposed to) memory

disorganization underlying PTSD. The authors further suggested fragmentation in a memory representation may take place at the level of the individual image, a sequence of images, or a complete narrative. As such, one can see that the field has attempted many different operationalizations of a construct that remains muddy at the taxonomic level.

In the present study, two separate indicators of objective memory fragmentation were included: the coded trauma narrative recall task and the Coh-Metrix software. It was puzzling that our objective memory fragmentation rating did not correlate with indices of memory fragmentation produced using the Coh-Metrix software. In this case, our objective memory fragmentation rating was not correlated with the Narrativity index, which is used to indicate the reader's familiarity of a story including its characters, events, and places. This finding was unanticipated considering that the indicators of objective memory fragmentation were selected after consulting previous research (e.g., Foa et al., 1995; Halligan et al., 2003). This is further evidence that measurement of memory fragmentation remains a complicated and contentious matter. Therefore, the lack of association between these two indices of memory fragmentation warrants further investigation of the criterion validity for both memory fragmentation indicators as well as the most accurate way to assess memory fragmentation in experimental studies. Notably, results did not change when using either operational definition of objective memory fragmentation (i.e., the coded narrative task or the Coh-Metrix software).

Finally, considering that this project was developed based on and informed by the PTSD-metamemory literature, not having participants who qualify for the diagnosis (PTSD+) may pose challenges to the internal validity of the constructs being investigated. In other words, could it be possible that the metamemory phenomenon is constrained to individuals suffering from a

diagnostic level of PTSD symptoms? In the present study, participants who met criteria for PTSD were deliberately excluded for ethical purposes. Future studies may consider comparing healthy (no diagnoses, no trauma history), healthy but trauma exposed (PTSD-), and PTSD+ groups. This may further our understanding on whether there is something informative about having a trauma history or diagnosis of PTSD that makes low memory confidence a particular risk factor for objective/subjective memory fragmentation.

Limitations

Several additional limitations in this study need to be addressed in future research. The current study was limited by the use of only trauma analogue stimuli. Future studies should include a neutral video to explore whether potential memory and metamemory impairments are confined to traumatic events or whether they affect one's functioning more broadly. Another potential confounding variable could be participants' sense of self-efficacy (i.e., one's belief in one's capacity to perform or accomplish tasks) and personal confidence, all of which may account for metamemory beliefs. For example, one's poor rating regarding task performance may be associated more generally with perceived competence in executing tasks, as opposed to memory functioning specifically. Future studies related to metamemory may consider assessing participants' self-efficacy and confidence given their potential effects on their beliefs about their memory capacity and functioning.

Implications and Conclusion

Despite the largely null findings in the present study, it is important to continue exploring the roles of both memory and metamemory functioning among individuals diagnosed with PTSD.

Current theories of PTSD attribute a significant portion of weight to the lack of trauma memory integration in the development and maintenance of PTSD. As suggested by various researchers, the lack of coherence in trauma memory may instead be related to other PTSD symptoms, such as increased arousal, memory intrusions, attempts to avoid internal and external reminders of the trauma (O'Kearney & Perrott, 2006), as well as the intentional suppression of trauma-related thoughts (Gray & Lombardo, 2001). If metamemory indeed accounts for at least some of the variance in PTSD-related memory disorganization, it may have important implications in both research and clinical settings. As recommended by Bennett and Wells (2010), for example, exposure therapy may not be as essential if the observed memory disorganization is due to the influence of metamemory. Rather, it may be more important to target clients' meta-cognitive and metamemory beliefs in therapy to ameliorate their PTSD symptoms (Bennett & Wells, 2010).

To date, the current study is the first known experimental study aimed at testing the hypothesized role of low memory confidence in PTSD directly using a memory confidence paradigm. The memory confidence paradigm has been effective in research related to OCD and memory confidence, yet limited success was observed in the current study. Although the role of memory confidence was not corroborated by findings of the current research, there are reservations regarding the criterion validity of various measurements and paradigms involved. Further, findings in the current study also reflect ongoing challenges in accurately quantifying memory impairments among trauma survivors both in research and clinical settings. Considering its potential clinical implications, future research exploring the roles of memory and metamemory impairments using more suitable, validated experimental design is warranted.

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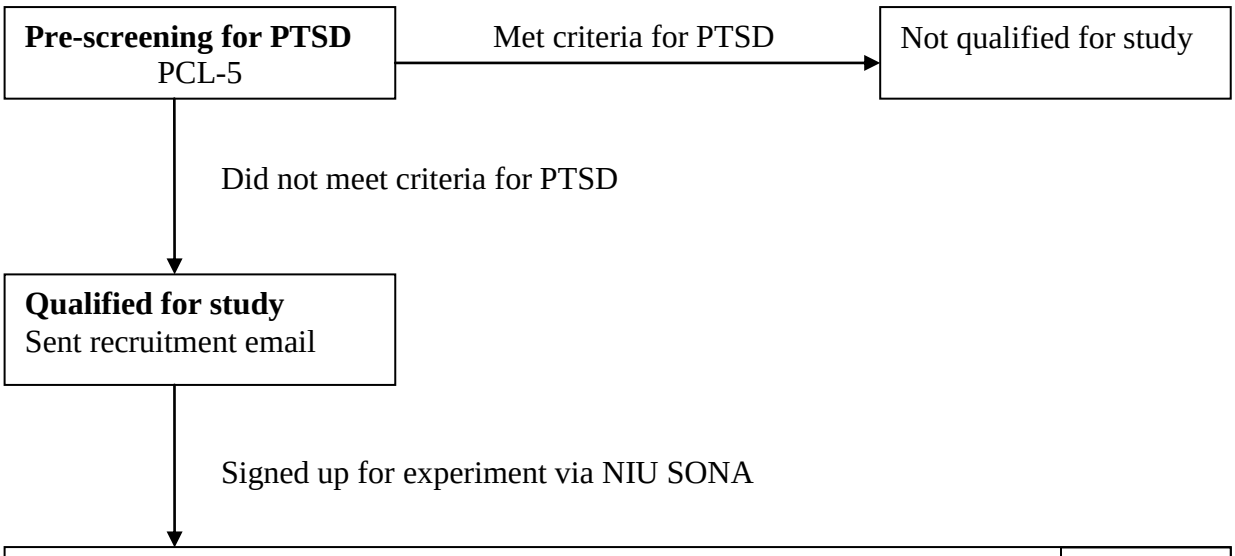
APPENDIX A

PROCEDURAL FLOW CHART



Experiment (scheduled for 90 minutes)	**Duration (minutes)**
1. Informed consent	5
2. Initial measures	6
a. Demographic questionnaire	
b. Preference for Distressing Films	
c. Multiscale Dissociation Inventory (MDI)	
d. Memory and Cognitive Confidence Scale-Confidence in General Memory (MACCS)	
3. Administration of Wechsler Memory Scales-IV (WMS-IV)	20
4. Bogus feedback (positive or negative) on WMS-IV performance	10
5. Post-Feedback Questionnaire	1.5
6. The Positive and Negative Affect Schedule (PANAS) - T1 PANAS	1.5
7. Trauma Video	5
8. Peritraumatic Dissociation Experience Questionnaire (PDEQ)	1.5
9. Distracter arithmetic task	5
10. Sequential memory task	10
11. Trauma Memory Questionnaire (TMQ)	1.5
12. The Positive and Negative Affect Schedule (PANAS) – T2 PANAS	1.5
13. Life Events Checklist for *DSM-5* (LEC-5)	2
14. Debriefing and probe for suspicion	10
Total	**80.5**

APPENDIX B

LIST OF VARIABLES

Main Variables of Interest	**Purpose/ Definition**
Trauma film	Traumatic event
Wechsler Memory Scales-IV (WMS-IV)	Memory ability
Bogus feedback regarding WMS-IV performance	Manipulated metamemory beliefs
Sequential memory task	Objective fragmentation
Trauma Memory Questionnaire (TMQ)	Subjective fragmentation

Secondary Variables	**Purpose/ Definition**
PTSD Checklist for *DSM-5* (PCL-5)	Pre-screening for PTSD
T1 PANAS	Manipulation check – negative affect following WMS-IV bogus feedback
Post Feedback Questionnaire (PFQ)	Manipulation check – metamemory beliefs following WMS-IV bogus feedback
Demographic questionnaire	Potential covariate
Preference for Distressing Films	Potential covariate and cover story – general dislike for distressing films
Multiscale Dissociation Inventory (MDI)	Potential covariate – trait dissociation
Peritraumatic Dissociation Experience Questionnaire (PDEQ)	Potential covariate – dissociation during the trauma film
Memory and Cognitive Confidence Scale-Confidence in General Memory (MACCS)	Potential covariate – metamemory beliefs
Life Events Checklist for *DSM-5* (LEC-5)	Potential covariate – trauma history
Rumination on WMS-IV feedback	Potential covariate – rumination during trauma film

APPENDIX C

PTSD CHECKLIST FOR *DSM-5*

Thank you for completing the PTSD Checklist for *DSM-5* (PCL-5; Weathers, Litz, Keane, Palmieri, Marx, & Schnurr, 2013). Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each one carefully, circle one of the numbers to indicate how much you have been bothered by that problem **IN THE PAST MONTH.** If you have questions about this survey, you may contact Phylice Lim (blim@niu.edu, or 815-753-7186).

In the past month, how much were you bothered by:	***Not at all***	***A little bit***	***Moderately***	***Quite a bit***	***Extremely***
1. Repeated, disturbing, and unwanted memories of the stressful experience?	0	1	2	3	4
2. Repeated, disturbing dreams of the stressful experience?	0	1	2	3	4
3. Suddenly feeling or acting as if the stressful experience were actually happening again *(as if you were actually back there reliving it)*?	0	1	2	3	4
4. Feeling very upset when something reminded you of the stressful experience?	0	1	2	3	4
5. Having strong physical reactions when something reminded you of the stressful experience *(for example, heart pounding, trouble breathing, sweating)*?	0	1	2	3	4
6. Avoiding memories, thoughts, or feelings related to the stressful experience?	0	1	2	3	4
7. Avoiding external reminders of the stressful experience *(for example, people, places, conversations, activities, objects, or situations)?*	0	1	2	3	4
8. Trouble reminding important parts of the stressful experience?	0	1	2	3	4
9. Having strong negative beliefs about yourself, other people, or the world *(for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)*?	0	1	2	3	4
10. Blaming yourself or someone else for the stressful experience or what happened after it?	0	1	2	3	4
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?	0	1	2	3	4
12. Loss of interest in activities that you used to enjoy?	0	1	2	3	4
13. Feeling distant or cut off from other people?	0	1	2	3	4
14. Trouble experiencing positive feelings *(for example, being unable to feel happiness or have loving feelings for people close to you)*?	0	1	2	3	4
15. Irritable behavior, angry outbursts, or acting aggressively?	0	1	2	3	4

16. Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
17. Being “superalert” or watchful or on guard?	0	1	2	3	4
18. Feeling jumpy or easily startled?	0	1	2	3	4
19. Having difficulty concentrating?	0	1	2	3	4
20. Trouble falling or staying asleep?	0	1	2	3	4

APPENDIX D

RECRUITMENT EMAIL

Hi,

My name is Phylice Lim and I am a clinical psychology graduate student at the Northern Illinois University. I would like to invite you to participate in an experiment entitled **'Personality, Cognitive Processing Style, and Film Preferences'.**

This study is designed to understand **individual differences in film preferences**. This experiment will approximately **90 minutes** to complete and will be conducted in the **psychology building**. It will involve a number of different portions: completing a series of questionnaires, completing a standardized memory assessment, and watching one video clip that is randomly selected using a computer algorithm. You may also receive feedback regarding your performance during the experiment.

Participants will receive a total of **3 participation credits** toward their introductory psychology course upon completion of the study. There are mild risks or discomforts associated with participation in this study. Participants' identities and responses will be kept anonymous using a numerical coding system. Participants must be at least 18 years old and proficient in English to participate. Participants are not eligible for this study if they have previously completed a study by Arielle Rogers entitled 'Acquiring and Savings Behavior'.

If you wish to participate in the current study, please sign up for the experiment via the **SONA research system** or click on this link: https://niu.sona-systems.com/Default.aspx?ReturnUrl=/ You could look up the title of the experiment, which is 'Personality, Cognitive Processing Style, and Film Preferences', and select an experiment time that works for you. The invitation code is PLDISS.

If you have any questions, please contact me at blim@niu.edu. Thank you for your consideration!

Phylice Lim
Clinical psychology graduate student

This study was approved by the Northern Illinois University Institutional Review Board for Protection of Human Subjects (code number XXXX). If you have questions or concerns about the approval or the research process, you may contact the Institutional Review Board at (815) 753-8588. This study is being supervised by Dr. Michelle Lilly, whom you may contact at mlilly1@niu.edu.

APPENDIX E

DEMOGRAPHIC QUESTIONNAIRE

Age: ____

Gender:

[ ] Female
[ ] Male
[ ] Other

Year in School: (check one)

[ ] Freshman
[ ] Sophomore
[ ] Junior
[ ] Senior
[ ] Other _____

Race/Ethnicity: (check one)

[ ] Native American
[ ] Asian
[ ] Black, African-American
[ ] Latino, Hispanic-American
[ ] Caucasian, European American
[ ] Biracial (mixed): specify _____
[ ] Other _____

APPENDIX F

PREFERENCE FOR DISTRESSING FILMS

Using the following scale, please indicate your preference for different film genres.

		Completely Uninterested			**Neutral**			**Completely Interested**
1.	Action	1	2	3	4	5	6	7
2.	Comedy	1	2	3	4	5	6	7
3.	Crime	1	2	3	4	5	6	7
4.	Disaster	1	2	3	4	5	6	7
5.	Drama	1	2	3	4	5	6	7
6.	Fantasy	1	2	3	4	5	6	7
7.	Horror	1	2	3	4	5	6	7
8.	Romance	1	2	3	4	5	6	7

APPENDIX G

MULTISCALE DISSOCIATION INVENTORY

The following items describe a number of things that might or might not have happened to you. Read each item carefully. Then circle the number that indicates how often the experience has happened to you *in the last month*. Please answer each item as honestly as you can. Be sure you answer every item. You can take as much time as you need to finish. Do you have any questions?

	Never				**Very Often**
1. Absent-mindedness or forgetfulness	1	2	3	4	5
2. Your body feeling like it was someone else's	1	2	3	4	5
3. Things around you suddenly seeming strange	1	2	3	4	5
4. Knowing you must be upset, but not being able to feel it	1	2	3	4	5
5. People telling you that you said or did something that you don't remember saying or doing	1	2	3	4	5
6. Feeling like there was more than one person inside of you	1	2	3	4	5
7. Not paying attention because you were in your own world	1	2	3	4	5
8. Your hands or feet nor feeling connected to the rest of your body	1	2	3	4	5
9. Feeling like you were in a dream	1	2	3	4	5
10. Not having any emotions or feelings at a time when you should have been upset	1	2	3	4	5
11. Suddenly realizing that hours had gone by and not knowing what you had been doing during that time	1	2	3	4	5
12. Having different people inside of you with different names	1	2	3	4	5
13. "Spacing out"	1	2	3	4	5
14. Feeling mechanical, like a robot	1	2	3	4	5
15. Things around you suddenly seeming strange	1	2	3	4	5
16. Not being able to feel emotions	1	2	3	4	5

17. Suddenly finding yourself somewhere and not knowing you got there	1	2	3	4	5
18. Different people taking charge inside of your mind	1	2	3	4	5
19. Driving or walking without noticing where you were going	1	2	3	4	5
20. Feeling outside of yourself	1	2	3	4	5
21. Suddenly things around you not feeling real or familiar	1	2	3	4	5
22. Feeling frozen inside, without feelings	1	2	3	4	5
23. Having blank spells	1	2	3	4	5
24. Switching back and forth between different personalities	1	2	3	4	5
25. Staring into space without thinking	1	2	3	4	5
26. Feeling like you didn't belong in your body	1	2	3	4	5
27. Your home or work suddenly seeming unfamiliar to you	1	2	3	4	5
28. Knowing you should be mad or sad about something, but not having any feelings	1	2	3	4	5
29. Realizing that you must have done something that you don't remember doing	1	2	3	4	5
30. Feeling like two or more people were fighting or arguing inside of yourself	1	2	3	4	5

APPENDIX H

MEMORY AND COGNITIVE CONFIDENCE SCALE-CONFIDENCE IN GENERAL MEMORY

This questionnaire is concerned with beliefs that you have about your own memory, planning, concentration and decision-making abilities, and your confidence in these abilities. Read each statement below, and circle the response that most accurately describes how strongly you agree or disagree with each statement. Please respond to all items even though some may seem repetitive. There are no right or wrong answers.

	Strongly Disagree				**Strongly Agree**
1. I have a poor memory.	1	2	3	4	5
2. I expect myself to be 100% certain about the way I plan things.	1	2	3	4	5
3. I experience many doubts after making a decision.	1	2	3	4	5
4. I often doubt my memory for having completed tasks.	1	2	3	4	5
5. I have little confidence in my memory generally.	1	2	3	4	5
6. I never do well at memory tests.	1	2	3	4	5
7. I am easily distracted.	1	2	3	4	5
8. I find it difficult to making decisions on the spot.	1	2	3	4	5
9. My poor concentration interferes with my ability to plan things effectively.	1	2	3	4	5
10. I have doubts about my memory.	1	2	3	4	5
11. I don’t feel that I make good decisions.	1	2	3	4	5
12. I have difficulty keeping my mind focused on one task until it is completed.	1	2	3	4	5
13. My memory can mislead me at times.	1	2	3	4	5
14. I have little confidence in my memory for actions.	1	2	3	4	5
15. I am never certain about my memory.	1	2	3	4	5
16. I have little confidence in my memory for words and names.	1	2	3	4	5
17. I have little confidence in my ability to remember how I performed on particular tasks.	1	2	3	4	5
18. I have doubts about my decision-making ability.	1	2	3	4	5

19. I expect myself to be 100% certain about my decisions.	1	2	3	4	5
20. I often doubt my memory for having done things properly.	1	2	3	4	5
21. I have difficulty knowing if I have actually done something, or imagined it.	1	2	3	4	5
22. I have a poor concentration ability.	1	2	3	4	5
23. I often feel that my memory misleads me.	1	2	3	4	5
24. I have little confidence in my decision-making.	1	2	3	4	5
25. I have little confidence in my ability to remember what I did in particular situations.	1	2	3	4	5
26. I try so hard to remember things, that I end up forgetting everything.	1	2	3	4	5
27. I put a lot of pressure on myself to do well on even small tasks.	1	2	3	4	5
28. I must perform tasks perfectly.	1	2	3	4	5

APPENDIX I

POST-FEEDBACK QUESTIONNAIRE

1. Were you pleased with the feedback you received?
    a. Completely pleased
    b. Very pleased
    c. Moderately pleased
    d. Not very pleased
    e. Not pleased at all

2. Were you upset with the feedback you received?
    a. Completely upset
    b. Very upset
    c. Moderately upset
    d. Not very upset
    e. Not upset at all

3. Based on this feedback, I believe my memory is
    a. Excellent
    b. Good
    c. Average
    d. Fair
    e. Poor

4. Based on this feedback, would you like to repeat this test?
    a. Definitely repeat
    b. Most likely repeat
    c. Potentially repeat
    d. Likely not repeat
    e. Definitely not repeat

5. Would you recommend this test to others?
    a. Definitely recommend
    b. Most likely recommend
    c. Maybe
    d. Not very likely recommend
    e. Not at all recommend

6. Was the assessor courteous while administering the feedback?
    a. Completely courteous
    b. Mostly courteous
    c. Somewhat courteous
    d. Mostly not courteous
    e. Not at all courteous

7. Did the assessor explain the feedback in a way that was clear and understandable?
    a. Completely understandable
    b. Mostly understandable
    c. Somewhat understandable
    d. Mostly not understandable
    e. Not at all understandable

8. Would you choose this assessor again in the future?
    a. Definitely
    b. Most likely
    c. Maybe
    d. Not very likely
    e. Definitely not

APPENDIX J

THE POSITIVE AND NEGATIVE AFFECT SCHEDULE

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment.**

1	2	3	4	5
Very Slightly or Not at All	**A Little**	**Moderately**	**Quite a Bit**	**Extremely**

_____ 1. Interested

_____ 2. Distressed

_____ 3. Excited

_____ 4. Upset

_____ 5. Strong

_____ 6. Guilty

_____ 7. Scared

_____ 8. Hostile

_____ 9. Enthusiastic

_____ 10. Proud

_____ 11. Irritable

_____ 12. Alert

_____ 13. Ashamed

_____ 14. Inspired

_____ 15. Nervous

_____ 16. Determined

_____ 17. Attentive

_____ 18. Jittery

_____ 19. Active

_____ 20. Afraid

APPENDIX K

TRAUMA ANALOGUE VIDEO SCENES

1. **Woman 1** is **texting and driving** and teasing woman 2.
2. **Woman 2** is **upset (or any other indicator of negative affect) at Woman 1 for texting** her crush.
3. Woman 1 is not paying attention to the road and car 1 **crosses the line** into oncoming traffic.
4. Car 1 **crashes into another car** (car 2) and the air bags deploy.
5. **Girls' heads hit** into each other, girls' head hit window, **glass shattering.**
6. Girls **look at each other** injured.
7. **Car 3 comes crashing** into them.
8. Window shatters and girl's neck breaks. (Or indicate any movement in the car).
9. **Woman 1 screams/cries** after finding her **friends unresponsive/dead**.
10. Road **sign** of City **welcomes** careful drivers.
11. **A man** comes to help.
12. The **man** asks onlookers to **call/ring the ambulance**.
13. The **man** tries to open the car **door** but he **can't.** He tells her **to stay calm/help is coming.**
14. **Police and ambulance** (or any indicators of emergency responders) arrive.
15. First responder's voice: Three vehicles are involved in the accident. Two people are in there I **couldn't get a response** from them.
16. **Toddler** repeated **twice** (or any indication of more than once), "**Mummy, daddy, wake up**."
17. **Baby is unresponsive/dead** and her eyes are open.
18. First responders **use equipment** (or **cut the car 1**) to rescue women.
19. First responder asks Woman 1 for her friends' **names** and they are checked for heartbeat. **Other women** (Cassie and Jules) are **unresponsive**.
20. **Helicopter arrives** on scene. A scene shows all the emergency vehicles from above.
21. **Woman 1** is being rescued out of the car and strapped into a **stretcher** and neck brace.
22. Woman 1 is being transported onto the helicopter (**woman 1 in helicopter**).
23. Helicopter **lands/arrives at hospital** helipad.
24. **Woman 1** closes eyes and is being taken **away**.

Note: Participant must include bolded information to earn a point.

APPENDIX L

PERITRAUMATIC DISSOCIATIVE EXPERIENCES QUESTIONNAIRE (ADAPTED)

Please complete the items below by circling the number that best describes the experiences you had had **during and immediately after watching this film**. If an item does not apply to your experience, please circle "not at all true".

1	2	3	4	5
Not at All True	**Slightly True**	**Somewhat True**	**Very True**	**Extremely 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
2.	My sense of time changed. Things seemed to be happening in slow motion.	1	2	3	4	5
3.	I felt as though I were 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
4.	There were moments when my sense of my own body seemed distorted or changed. I felt disconnected from my own body, or it was unusually large or small.	1	2	3	4	5
5.	I felt as though things that were actually happening to others were happening to me – like I was in danger when I really wasn't.	1	2	3	4	5
6.	I felt confused; That is, there were moments when I had difficulty making sense of what was happening.	1	2	3	4	5
7.	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

APPENDIX M

OBJECTIVE MEMORY FRAGMENTATION SCORING RUBRIC

First, narratives were broken into "chunks," which are clauses that contain "only one thought, action, or speech utterance." Individual chunks were evaluated using the following criteria:

1. **Fragmentation in narrative** such as memory uncertainty, confusion, or nonconsecutive chunks, as well as repetition errors,

- **Memory uncertainty** is defined as clear expressions of uncertainty with regards to memory, confusion, or nonconsecutive chunks. These may include:
    - Incomplete clauses (e.g., "…and he c'-."),
    - Difficulty with content retrieval (e.g., "I know something didn't, at least, they were broken," "I don't remember," "I think…")
    - Error of commission, which represents obvious errors to important details of the film but may not be captured by the scoring of 'accuracy of events.' For example, the participant stated "there's *four* teenage girls in a car" when there are only *three* women in the car.
    - Unexplained jump in narrative, which occurs when the participant provided a detail that significantly interrupted the flow of the narrative but may not be captured by the scoring of 'correct sequence of events.' For example, the participant stated "…and she arrived at the hospital and I saw her maybe um she is very unconscious and she she was tired of all the accident. And oh, uh yeah, I remember the baby was okay and I'm not sure how it did ha- happen, because the accident was very um the accident was very very bad and that baby was was okay." The clause "And oh, uh yeah, I remember the baby was okay" was coded as an unexplained jump because the participant recalled a detail that was part of an earlier narrative, which significantly interrupted the flow of the current narrative.

- **Repetition errors** constitute the following errors:
    - Content repetition occurs when the same event is referenced or repeated within five clauses
    - Word repetition occurs when an utterance is repeated within the same clause unless it is used for rhetoric purposes

2. **Completion of events** represents the ratio of correct details recalled. Accurate events are defined by the correct description of actual scenes from the film, whereas inaccurate events represent mistaken description of actual film scenes or description of scenes that are unrepresented. It is derived using the following equation:

= Total number of correct events / Total events in film (24)

3. **Correct sequence of events** represents the proportion of sequential accuracies. It is derived using the following equation:

= Total recall events in the correct order / Total correct sequences in film (23)

Note: These scoring rules were developed following consultation on previous research (e.g., Foa, Molnar, & Cashman, 1995; Halligan et al., 2003; Olsen & Beck, 2013; Wegner, Quillian, & Houston, 1996).

APPENDIX N

TRAUMA MEMORY QUESTIONNAIRE (ADAPTED)

Please rate the extent to which these statements apply to **YOUR MEMORIES OF THE FILM YOU <u>JUST</u> VIEWED** by circling the appropriate number. If the statement is not true for you, please circle 'not at all.' There are no right and no wrong answers to these questions.

		Not at all	**A little**	**Moderately**	**Strongly**	**Very Strongly**
1.	I feel that my memory for the film is incomplete	0	1	2	3	4
2.	There are periods of time during the film that I cannot account for	0	1	2	3	4
3.	I have trouble remembering the order in which things happened during the film	0	1	2	3	4
4.	My memory of the film is muddled	0	1	2	3	4
5.	I cannot get what happened during the film straight in my mind	0	1	2	3	4

APPENDIX O

THE LIFE EVENTS CHECKLIST FOR *DSM-5*

Listed below are a number of difficult or stressful things that sometimes happen to people. For each event check one or more boxes to the right to indicate that (a) it **happened to you** personally; (b) you **witnessed it** happen to someone else; (c) you **learned about it** happening to a close family member or close friend; (d) you were exposed to it as **part of your job** (for example, paramedic, police, military, or other first responder); (e) you're **not sure** if it fits; or (f) it **doesn't apply** to you.

Be sure to consider your **entire life** (growing up as well as adulthood) as you go through the list of events.

Event	***Happened to me***	***Witnessed it***	***Learned about it***	***Part of my job***	***Not sure***	***Doesn't apply***
1. Natural disaster (for example, flood, hurricane, tornado, earthquake)						
2. Fire or explosion						
3. Transportation accident (for example, car accident, boat accident, train wreck, plane crash)						
4. Serious accident at work, home, or during recreational activity						
5. Exposure to toxic substance (for example, dangerous chemicals, radiation)						
6. Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)						
7. Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)						
8. Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)						
9. Other unwanted or uncomfortable sexual experience						
10. Combat or exposure to war-zone (in the military or as a civilian)						
11. Captivity (for example, being kidnapped, abducted,						

held hostage, prisoner of war)						
12. Life-threatening illness of injury						
13. Severe human suffering						
14. Sudden violent death (for example, homicide, suicide)						
15. Sudden accidental death						
16. Serious injury, harm, or death you caused to someone else						
17. Any other very stressful event or experience						

APPENDIX P

INFORMED CONSENT

Personality, cognitive processing style, and film preferences

You are invited to participate in a research study conducted by Phylice Lim, a graduate student at Northern Illinois University (NIU). Please read this form carefully and ask any questions you may have before agreeing to take part in this study.

Purpose of the study: This study is interested in examining individual differences in film preferences. Research shows that personality traits influence the type of movies an individual prefers to watch. Further, a recent nationwide survey involving frequent theater-goers showed that individual traits such as gender, cognitive processing style, and mental health state may also affect preference for media genre.

Your participation: This experiment will take approximately 90 minutes to complete. It will involve a number of different portions: completing a series of questionnaires, completing a standardized memory assessment, and watching one out of eight video clips that are randomly selected using a computer algorithm. You may also receive feedback regarding your performance during the experiment.

Potential benefits: You will receive three research credits for your participation. Further, your participation will contribute to research on how individual differences, including personality, gender, cognitive processing style, and mental health state might influence film preferences.

Potential risks: There are certain risks or discomforts associated with this research. First, we will ask you about some experiences and feelings that you have that may be difficult or uncomfortable to discuss. Feel free to skip any questions that you do not wish to answer. Second, there may be graphic contents in several of the video clips; as such, you may potentially be exposed to distressing contents. Similar studies have *not* found long-term risks associated with watching these clips. That said, if you continue to feel uncomfortable at the end of the study, you are encouraged to talk to the researcher and/or contact a mental health agency. A list of affordable counseling services will be provided to you.

Protection of confidentiality: Your participation and your responses during the experiment will be kept strictly confidential using a numerical coding system. All participants' responses will be stored within a secure server that is password protected. No one will be identifiable in any reports written about the study.

Voluntary participation: Your participation is voluntary, and you have the right to withdraw your participation at any time with no penalty or negative consequences to you. That is, you will still receive participation credit, regardless of whether you complete the entire study.

Contact information: If you have any additional questions concerning this study, you may contact the principal investigators, Phylice Lim, M.A. at (815) 753-7186 or Michelle Lilly, Ph.D. at (815) 753-4602. Either investigator will be happy to answer any questions or concerns. To learn further information regarding your rights as a research subject, you may also contact the Office of Research Compliance at Northern Illinois University at (815) 753-8588.

I have read the above information and have been given the opportunity to ask questions. I consent to take part in the study and acknowledge that I have received a copy of this consent form.

Your Signature _____ Date _____

Your Name (printed) _____

APPENDIX Q

PROBING FOR SUSPICION

Say the following to the participant:

"The experiment is now over and I have a few questions to ask you."

Ask the participant the following questions to get a sense of how much they knew about the true purpose of the experiment.

"Do you have any general questions about the study?"

"If you had to guess, what do you think the study is about?"

If participants appear unaware of the true nature of the study, continue with the debriefing script (see Appendix Q).

If participants are correct when they indicate what they believe is the true nature of the study, ask them the following:

"At what point in the study did you come to realize this?"

APPENDIX R

DEBRIEFING SCRIPT

"First of all, let me thank you for your participation in this study. We are now going to spend some time debriefing you for this study. This is important because we would like you to understand the true objectives of the present study as well as give you an opportunity to ask us any questions you have about the study. At the beginning of the experiment, you were told the purpose of this study was to examine whether individual differences such as personality, cognitive processing style, and mental health state affect film preferences. In actuality, the real objective of the study is to examine the effects of memory confidence on memory reports, especially after being exposed to a distressing incident.

We could not inform you specific goals of the study and details of the tasks before you completed the experiment because we did not want it to influence the ways you respond to the questionnaires, memory assessment feedback, and the memory tasks. We want to take this opportunity to clarify the deception used in the experiment and provide you information about the tasks you completed.

First, we provided you a false feedback on the memory assessment. Participants either received a positive or slightly negative evaluation of their performance. In actuality, the evaluation you received was entirely made up and adapted from a script used in previous research. The purpose of the evaluation was to make participants believe that they have a poor memory or that they have an excellent memory. We wanted to see whether or not participants' memory confidence affects their performance on subsequent memory tasks. Do you understand that this feedback was completely made up and untrue?

[Give Participant opportunity to verbally respond that they understand.]

Next, we had all participants watch an emotionally charged video clip. It is a way to induce distress and other negative effects that a traumatic event may have do to people. We do not, however, expect the video to cause long-lasting distress to participants. We did not reveal the real purpose of showing the video because we wanted to ensure the false memory assessment feedback seemed credible and to make sure you do not make connection between the feedback and the memory tasks immediately following the film.

Your participation can help us better understand how memory confidence may affect memory recall, especially after experiencing a negative life event. We hope your participation in this study will help inform research and treatments for individuals who have experienced negative life events.

Due to the nature of the experiment, it is possible that participants may notice feeling emotionally upset. In most cases, these feelings are fleeting and resolve quickly. However, if you continue to experience distress or discomfort, please contact one of the providers listed on this resource sheet (hand ***Counseling Resource sheet*** *to participant). Most of the NIU campus resources are free to NIU students.*

Again, thanks for your help with this project. We would ask that you do not discuss your experiences in this experiment to other students who may end up participating in this study. As you can imagine, if you came in today knowing the true intent of the study, it might influence your participation and responses. We would really appreciate your help in protecting the integrity of this study. Do you have any questions?" (Answer any questions posed by participants.) Once again, thank you for your participation.

If you have additional questions regarding this study, or you are unable to access resources listed on this sheet, please contact the researchers. Their numbers are located on your consent form. Either investigator will be happy to answer any questions that you may have or address concerns. Once again, thank you for your participation.

Thank the participant for participating and escort them out of the experiment lab.

APPENDIX S

COUNSELING RESOURCES IN DEKALB

DeKalb and Northern Illinois University are fortunate in having several free or low-cost counseling services available to the community. This list is intended to help you find timely and appropriate assistance. Sometimes one agency will have a high demand for services that necessitates a waiting period for new clients, or you may have personal reasons for choosing one agency over another. Counselors at any of these agencies will gladly assist you in making a final decision about where to seek help.

NIU CAMPUS SERVICES

COUNSELING AND STUDENT DEVELOPMENT CENTER, NIU *(STUDENTS ONLY)*
Phone: 815/753-1206
Address: Campus Life Building – 200
Fees: None for counseling. Modest testing fees.
Hours: 8:00 a.m. – 4:30 p.m. Monday – Friday
Open whenever NIU is open, including breaks.
After Hours: Assistance after hours available by calling – 815/753-1212
Description of Services: This service provides students with short-term, individual and group counseling for a broad range of personal concerns. Career counseling services include interest assessment, workshops, and use of computerized career counseling programs. Educational counseling services include assistance with test anxiety and study skills. Assessments of drug and alcohol abuse are also provided. First appointment scheduled within 3-7 days. (Handicapped Accessible)

COUNSELING LABORATORY, NIU
Phone: 815/753-9312
Address: 416 Graham Hall
Fees: None for students, faculty, or staff.
Hours: Call for available counseling hours
Description of Services: A wide range of services are offered by the counselors including both personal and vocational counseling. In general, the approach used is one that promotes growth and focuses on increasing emotional well-being and self-awareness. All counselors are either doctoral or masters level students who are being supervised by members of the counseling faculty. First appointments scheduled within 7 days. (Handicapped accessible)

FAMILY CENTER, NIU
Phone: 815/753-1684
Address: Wirtz Hall
Fees: Faculty, staff, and community members charged on a sliding scale. No one will be denied services due t to inability to pay.
Hours: Tuesdays, Wednesdays, and Thursdays. Daytime and evening appointments are available.
Open whenever NIU is open, including breaks.
Description of Services: Individual, couple, and family counseling. Services provided by graduate students under supervision of Marriage and Family Therapy faculty. First appointment scheduled within 7 days.

PSYCHOLOGICAL SERVICES CENTER, NIU
Phone: 815/753-0591
Address: Normal Rd and Lincoln Hwy.
Fees: No fee for students. Faculty, staff, and community members charged on a sliding scale.
Hours: Monday – 11:00 a.m. – 7:00 p.m.
Tuesday – 12:00 noon – 8:00 p.m.
Wednesday – Friday – 9:00 a.m. to 5:00 p.m. Open whenever NIU is open, including breaks.
Description of Services: Individual, couples, family, and group psychotherapy, Intellectual, personality, and academic assessments. Clients are generally seen by advanced level graduate student staff under faculty supervision. Services tailored to meet a client's specific needs. (Handicapped accessible.)

WOMEN'S RESOURCE CENTER
Phone: 815/753-0320
Address: 105 Normal Rd.
Fees: No fee for students, faculty or staff.
Hours: Monday – Friday - 8:00 a.m. – 4:30 p.m.
Evening hours by appointment. Open whenever NIU is open, including breaks.
Description of Services: Short-term counseling to individuals about their academic progress, careers, personal development, and other special concerns. Offered also are support groups, information and referral, issues regarding workplace disputes, and issues involving sexual harassment. (This facility is handicapped accessible.)

COMMUNITY RESOURCES

BEN GORDON COMMUNITY MENTAL HEALTH CENTER
Phone: 815/756-4875
Address: 12 Health Services Dr. - DeKalb
Fees: Sliding fee scale based on income. Insurance accepted.
Hours: Monday – Thursday - 8:00 a.m. – 8:30 p.m.
Friday – 8:00 a.m. – 5:00 p.m.
After Hours: BGC Response Line: 1-866-242-0111
Description of Services: Comprehensive counseling services to all residents of DeKalb County. Services to all persons affected by mental health problems, substance abuse, family/child welfare concerns. 24-hour sexual assault/abuse services can be accessed through the Crisis Line. First appointment scheduled within 7 days. (Handicapped accessible and on Campus Bus Route).

FAMILY SERVICE AGENCY, CENTER FOR COUNSELING
Phone: 815/758-8636
Address: 14 Health Services Dr. - DeKalb
Fees: $75.00 per visit. Insurance accepted, including NIU Student Insurance. Payment plans and scholarship funds available.
Hours: Monday – Wednesday - 9:00 a.m. – 8:00 p.m.
Thursday - Friday – 8:00 a.m. – 4:00 p.m. Additional hours available by appointment.

Description of Services: Individual, couple, group counseling for children, adults, senior citizens, and families. First appointment scheduled within 1-7 days. (Handicapped accessible and on Campus Bus Route).

SAFE PASSAGE, INC.
Phone: 815/756-7930
Hotline/Crisis: 815/756-5228
Address: P.O. Box 621, DeKalb, IL 60115
Description of Services: A wide variety of services are offered to victims and perpetrators of domestic and sexual violence including crisis intervention and medical advocacy for victims of domestic and sexual violence, short- and long-term housing for victims and their children, counseling, legal advocacy, children's services, community education, a batterer's intervention program, and a Latina outreach program.

NATIONAL RESOURCES

NATIONAL COALITION AGAINST DOMESTIC VIOLENCE (NCADV)
Phone: 303/839-1852
Hot Line: 1-800-799-SAFE (7233)
Address: P.O. Box 18749 Denver, CO 80218
Description of Services: Provides support and community-based, non-violent alternatives (safe home and shelter programs) for battered women and their children.

NATIONAL DOMESTIC VIOLENCE HOTLINE
Phone: 1-800-799-SAFE (7233); 1-800-787-3224 TTY for the Deaf
E-mail: ndvh@ndvh.org
Description of Services: Help is available to callers 24 hours a day, 365 days a year. Hotline advocates are available for victims and anyone calling on their behalf to provide crisis intervention, safety planning, information and referrals to agencies in all 50 states, Puerto Rico and the U.S. Virgin Islands. Assistance is available in English and Spanish with access to more than 170 languages through interpreter services.

RAPE, ABUSE, AND INCEST NATIONAL NETWORK
Phone:1-800-656-HOPE
Address: 635-B Pennsylvania Avenue SE., Washington, DC 20003
Description of Services: More than 1,100 trained volunteers are on duty and available to help victims 24 hours a day, 7 days a week at RAINN-affiliated crisis centers across the country. Calls are confidential.

SAFE NEST
24-Hour Hotline: 1-800-486-7282
Description of Services: Offers a wide variety of services including a national hotline, shelters, counseling, advocacy programs, and community outreach programs.

Private counselors, clinical social workers, and psychologists are available in the yellow pages of the phone book under "Psychologist" or "Mental Health Services" or "Social Services".