

Psychiatric Disorders, Memory, and the Future: The Effect of Anxiety and Depression on Self-
Defining Memory and Self-Defining Future Projections

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ABSTRACT: Prior research has found that depression affects how individuals recall self-defining memories by preventing individuals from properly encoding and retrieving memories, resulting in a suspected inability to recall specific events and information (Conway, 1990). The current study aimed to replicate this finding and to examine whether this phenomenon exists within those with higher levels of anxiety, a concept not previously studied. Fifty-three participants were asked to recall two self-defining memories (Singer & Blagov, 2000) and forty-seven participants described where they saw themselves two years from now in order to determine whether depression and anxiety affect future projections as well as memory recall. It was hypothesized that individuals who score higher on depression and anxiety inventories would respond to the self-defining memory task with generic or episodic memories more often than they would with a specific response, a hypothesis that was not supported, although memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) was predictive of scores on the BDI and BAI. It was also hypothesized that these individuals would write about their future using more negatively valenced words and shorter response lengths than would individuals who scored lower on these inventories, and it was found that valence, although not response length was predictive of scores on the BAI. These findings suggest that the self-defining memory task and self-defining future projections task may be a good indicator of high anxiety and depression as determined by the BAI and BDI and can be used as a tool to identify individuals for early intervention for anxiety and depression treatment.

Keywords: depression, anxiety, self-defining memories, self-defining future projections

The Effect of Anxiety and Depression on Self-Defining Memory and Self-Defining Future Projections

Memory is an integral part of the human existence, and it is memory that guides everyday decisions and shapes one's personality over time. As described in detail by Inglis (2014), the formation of a memory begins with one of the five memory pathways in the brain: semantic, episodic, procedural, automatic, and emotional. These pathways are involved in both the coding and storage of memories, as well as the retrieval of memories at a later date. The events that are associated with these memories determine which pathway to storage and retrieval the brain utilizes. Compared to the three other memory pathways, the episodic and emotional memory pathways are more crucial in self-defining memory as the result of their content.

Episodic memories entail details concerning locations and circumstances surrounding events (Inglis, 2014). In other words, the setting of the memory is important during retrieval, just as when you walk into a room you are more apt to remember past events that have occurred there. Emotional memories have priority over the four other memory types, in the sense that emotionally toned memories can be linked to threats and therefore are more important for survival than other memory types (Inglis, 2014). Emotions play a strong role in the formation of memory and almost every memory has an emotion tied to it. For example, witnessing something traumatic, such as the passing of a relative in the hospital, can result in the memory of hospitals becoming linked to feelings of sadness and fear, and may even deter an individual from ever entering a hospital again. Even more interestingly, "if the emotional stimuli is [*sic*] too strong, the formation of factual memory can actually be blocked by neurochemicals" (Inglis, 2014, p.43), impacting an individual's ability to store and retrieve accurate memories. Memories help

form our perception of the world, our actions and behaviors, beliefs, and our ability to make decisions. More importantly, memories, especially episodic and emotional memories, shape our personality and are strongly linked to our emotional states.

Not defined as one of the five major memory pathways, autobiographical memory is considered episodic memory, or more specifically, consists of consciously recalled episodic memories (Rubin, 2005; Tulving 1972; 1983). In fact, Philippe, Koestner, Beau-lieu-Pelletier, Lecours, and Leke (2012) found that autobiographical memories are often linked to other types of memory, even ones with less importance to the self. It is this connection between these various memory types that makes up the memory network. However, autobiographical memories are more vivid than most memories, and in the act of recalling these memories, individuals feel as if they are reliving the event and can typically describe details and specifics, although these details may be unclear and inaccurately remembered (Brewer, 1999; Rubin, 1998). It is also important to note the emotional nature of these memories, as they often highly impact the choices an individual later makes and work to shape an individual into his or her present self. Rubin (2005) demonstrated that the amygdala, which is associated with emotion, and the hippocampus, associated with episodic memory, were more active during the retrieval of autobiographical memory than during the retrieval of semantic memory, highlighting the episodic and emotional nature of these memories. Conway proposed a definition of autobiographical memory when he stated:

Autobiographical memory includes memories for specific experiences and memory for the personal facts of one's life... Autobiographical memories for specific experiences represent interpretations of complex events, which are extended in time and may feature multiple actors and locations... Long-term collection of general features of the event,

interpretations, and some recall of a few specific details characterize the autobiographical memory of the experiment (Conway, 1990, pp. 4-5).

Conway's definition hints at the complexity of autobiographical memory and its importance in understanding complex events, which influence how we interpret and respond to similar events.

Conway's definition of autobiographical memory comes years after autobiographical memory first became a focus of psychological research. Nearly a decade earlier, researchers such as Kolodner and Schank began theorizing about autobiographical memory (Kolodner, 1980; Schank, 1982), noting the importance of understanding earlier memories and how they, in turn, aid in understanding later events. An understanding and analysis of past events allows an individual to process events of a similar nature much faster and with better success (Barsalou, 1988). Autobiographical memory is thought to have five main components: a) cueing, b) a search process, c) retrieval of a narrative, d) visual imagery, and e) affective components, similar to other memory models (Rubin, 1988). More specifically, autobiographical memory is impacted and shaped by individual senses (hearing, sight, and smell), spatial reasoning (location), emotions, narrative systems, which help understand relations between various objects, as well as a memory system which helps to organize and store the aforementioned stimuli and information (Rubin, 2005). The complexity and vast connection of autobiographical memory to various neurological processes exemplifies the importance of these memories in everyday life and the development of the self. It is clear that these memories are more than just basic knowledge or insignificant memories lost over time.

Autobiographical memory is complex and therefore cannot be understood in isolation. Autobiographical reasoning is the process in which individuals recall and analyze their autobiographical memories. Autobiographical reasoning allows an individual to relive an event,

and then use the consequences and lessons learned from that event to shape and guide decisions throughout daily life (Singer & Bluck, 2001). As a result, autobiographical memories play an important role in determining how an individual sees the world and interprets the events that occur in his or her life.

Self-Defining Memories.

The concept of autobiographical memory expanded over the years as research allowed experimenters to further understand the implications of these memories and how they work. More current research refers to these salient memories as “self-defining memories,” reflecting the importance of these memories to the self. Singer and Blagov (2000) published a classification manual concerning self-defining memories, in which explicit guidelines for self-defining memories were set forth. A self-defining memory is one which is (a) over one year old, (b) remembered very clearly and which has importance in both meaning and theme, (c) is linked to other similar memories, (d) invokes a feeling, and (e) has been thought about frequently, and thus is familiar to the individual. Singer and Blagov also created a classification system by which to score and code self-defining memories. Within this classification system, self-defining memories are more broadly organized as being specific or non-specific based on the content contained within them (Singer & Blagov, 2000). Specific memory narratives consist of a unique occurrence and are focused on an event that occurred within a single day. Within the specific memory classification, memories can be considered pure specific memories (the recalled memory consists only of single-event statements which are related to one another), a specific memory with generalization (a single-event statement which contains mentions of other events as well), and a specific memory with multiple single events (the recalled memory may consist of several specific memories or may also contain a specific memory as well as an episodic or

generic memory). Non-specific memories are classified as either episodic or generic. An episodic memory lacks any single-event statements and is less detailed in both content and emotion. Furthermore, these memories tend to occur over a larger span of time when compared to specific memories. A generic memory is a memory that has occurred over time and is repetitive throughout an individual's life. These reoccurring events blend into one memory (Singer & Blagov, 2000-2001).

Self-Defining Memories and Depression.

Given the complexity of self-defining memory and the involvement of various brain regions and pathways, researchers have examined the effects of depression on self-defining memories. Depression has a known effect on memory; in general, it reduces the amount of attention and resources that individuals can allocate to their environments (Bolles, 1998). With respect to self-defining memory, Conway (1990) hypothesized that depression has a clouding effect on self-defining memory, an effect that may act as an adaptive function in order to protect an individual from memories, which might exacerbate his or her depressive state (Conway, 1990). An individual essentially blocks out parts of memories that may be harmful to his or her emotional state, as a protective factor.

With a relationship established between depression and reduced encoding and retrieval of memory, researchers examined the effect of depression more specifically on autobiographical memories. Moore, Watts, and Williams (1988) suggested that deficits and biases in autobiographical memory result from an inability to progress beyond general recall, as a result of the effects of depression, to a more specific memory. Interestingly, they found that depressed individuals, when asked to recall a specific positive memory, instead responded with a general memory, unable to recall a specific memory, even when prompted to do so. This suggests that

when attempting to recall a memory, individuals first access general memories and then move to specific recall. Barsalou (1988) proposed a similar processing model, in which individuals move from general memory to specific memory, a phenomenon termed the hypothesis of event organization. When trying to understand an event, the comprehension hypothesis of event organization states that generic information concerning the event is first retrieved, which helps to establish a basic understanding of what is occurring. If other memories are similar to the one currently being analyzed, those memories help create a more accurate inference of the events in the original memory. Finally, each memory event is an integration of generic knowledge and the specifics concerning the event. It is the comprehension of the event that determines how the memory is to be stored and organized in memory. As was suggested by the findings of Moore, Watts, and Williams (1988) as well as the hypothesis of event organization, when attempting to recall specific memories, the pathology of depression hinders an individual from progressing beyond general recall to specific recall. Depression's clouding effect may prevent full comprehension of an event, impacting the storage and organization of memory, and interfering with an individual's ability to recall specific details of an event.

The inability to progress past general memory to specific memory in individuals diagnosed with depression has been demonstrated by multiple researchers. Moffit, Singer, Nelligan, Carlson, and Vyse (1994) found that individuals diagnosed with depression struggled to retrieve and describe specific positive memories when asked to do so. More specifically, depressed individuals recalled more summary-type memories than did a normative population when asked to provide a self-defining memory. Moffit et al. suggested that individuals' inability to recall a specific self-defining memory was due to a lack of specific details to retrieve. They proposed that the specific details of the memory had not been encoded in the first place,

years earlier. Therefore, these individuals could not retrieve specific cues, as they did not exist, preventing an individual with depression from moving from a general recall to a specific memory.

The inability to recall specifics had been demonstrated among clinically depressed samples as well. Individuals who had attempted suicide had a harder time recalling positive memories compared to the speed at which they were able to recall a negative memory (Williams & Broadbent, 1986). These findings are not surprising given that individuals diagnosed with emotional disorders are more likely to have memories biased by their current moods, and are more likely to recall a negative event faster than a positive event (Clark & Teasdale, 1982; Lloyd & Lishman, 1975; Teasdale & Fogarty, 1979). Furthermore, it was found that the individuals who overdosed (deemed clinically depressed), accessed nonspecific memories more than specific memories for both positive and negative cueing; however, this phenomenon was more strongly demonstrated for positive cueing (Williams & Broadbent, 1986). Similarly, a meta-analysis performed on eleven studies demonstrated a significant difference between depressed individuals and controls in their ability to recall non-specific memories and specific memories. The overall findings suggested that depressed individuals were significantly more likely to produce a non-specific memory than the controls, who were more likely to produce a specific memory when prompted. Even more convincingly, these researchers discovered a mean Cohen's d statistic of 0.94, indicating a very strong effect size (Williams et al., 2007).

It is clear that depression and autobiographical memory recall are linked, but what is the importance of this relationship? One study found that individuals who were depressed and provided non-specific memories when prompted, especially for positive memories, were less likely to recover from depression and were less responsive to anti-depressant treatment

(Brittlebank, Scott, Williams, & Ferrier, 1993). These findings suggest that autobiographical memory may be valuable in identifying and targeting individuals who, as a result of persistent depression are less responsive to pharmacological treatment and are at a greater risk from attempting suicide, given that a relationship between suicide attempters and non-specific memory recall has been found (Brittlebank, Scott, Williams, & Ferrier, 1993; Williams & Broadbent, 1986).

The Relationship Between Depression and Anxiety.

Although depression and anxiety are classified as separate disorders, there is some overlap between the two disorders in their symptomology, and comorbidity with anxiety and mood disorders is high. Some of the overlapping symptoms of depression and anxiety include oversensitivity to criticism, self-consciousness, feeling rejected, dysphoria, sleep disturbances, appetite disturbances, fatigue, and irritability (Liebowitz, 1993; Zajecka & Ross, 1995).

According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) individuals who meet the criteria for generalized anxiety disorder are likely to have met, either currently or previously, the criteria for unipolar depressive disorders (American Psychiatric Association, 2013). The DSM-5 suggests that “the neuroticism or emotional liability that underpins this pattern of comorbidity is associated with temperamental antecedents and genetic and environmental risk factors shared between these disorders” (American Psychiatric Association, 2013, p.226). Wetzler and Katx (1989) found that in a review of 17 studies, 10 of which pertained to individuals with anxiety and 7 of which pertained to individuals with depression, that the other condition existed within patients 50% of the time, suggesting that a link may exist between these two disorders. Other research suggests that the comorbidity rates between these two disorders may be even higher, with 85% of patients with depression also

experiencing symptoms of anxiety and 90% of patients with an anxiety disorder also having symptoms of depression (Gorman, 1997). Gorman (1997) also suggests that patients with comorbid anxiety and depression do not respond as well to therapy, have longer courses of illness, and have less positive treatment outcomes, although selective serotonin reuptake inhibitors seems to be beneficial for these individuals. In reference to the neurological aspects of mental disorders, there are implications that corticotropin-releasing factor (CRF) plays a role in both depressive and anxious symptomology. An increase of CRF neuronal activity has been assessed as a state marker for depression and CRF also plays a role in the pathology of anxiety disorders as a result of its effect on the central noradrenergic systems (Arborelius, Owens, Plotsky & Nemeroff, 1999). Given that anxiety and depression may be the result of similar pathophysiology, they may also have a similar effect on the recall of autobiographical memories to that of depression.

Self-Defining Memories and Anxiety.

Although not as extensively studied as the impact of depression on self-defining memory recall, research has examined the impact of anxiety on self-defining memory recall. Krans, de Bree, and Bryant (2014) found that individuals who scored high in social anxiety recalled more negative autobiographical memories with a focus on events related to social anxiety. These individuals also reported that they had active goals to overcome social anxiety. This is meaningful because current goals impact the recall of autobiographical memories according to the Self-Memory System model of autobiographical memory. Therefore, the active goal of overcoming social anxiety made an individual more likely to recall an autobiographical memory with a focus on social anxiety, as this topic was of central interest to the individual.

Sutherland and Bryant (2005) performed a similar study, except individuals were focused on overcoming PTSD, not social anxiety. They found that individuals with PTSD reported more negative, and fewer positive, self-defining memories than individuals without PTSD. Similarly to Krans, de Bree, and Bryant's (2014) findings, Sutherland and Bryant (2005) found that individuals with PTSD reported memories with a focus on trauma. This once again suggests a strong influence of current goals on the retrieval process on self-defining memories.

Further research suggests there may be a differential impact on autobiographical memory based on an individual's specific psychopathology. Rubin (2005) found that individuals who were diagnosed with panic disorder or PTSD had a stronger memory for events involving threatening stimuli, but that these findings did not hold true for individuals with generalized anxiety disorder and social phobia. Rubin suggested that these findings may be due to the fact that autobiographical memories involving events concerning trauma and fear are fundamentally different from autobiographical memories involving events concerning social anxiety and generalized anxiety (Rubin, 2005). As a result, traumatic experiences would be less likely to be recalled by an individual with social anxiety or general anxiety, as trauma is not as central to the self as it is in an individual with PTSD or a panic disorder. Rubin (2005) also found that memories recalled concerning panic and trauma were more specific than memories concerning worry and social phobia. This suggests that panic and trauma have less of a clouding effect on recall than does social phobia and worry.

Although it appears that there have been no studies concerning the effects of anxiety on the recall of self-defining memories, research concerning PTSD and social anxiety suggests that anxiety does in fact impact recall. However, future research should be conducted in order to

conclude whether or not generalized anxiety has the same clouding effect on recall as depression does, given their similar psychopathology and past findings.

Self-Defining Future Projections.

Understanding how individuals view their future is just as important as understanding how an individual recalls his or her past. It has been shown that self-defining memories are important to personal identity, but anticipating meaningful events to occur in the future may play a similar role in shaping personal identity (Demblon & D'Argembeau, 2016). D'Argembeau, Lardi, and Van der Linden (2012) introduced the term "self-defining future projections" to describe these predictions about our future. The counterpart to self-defining memories, self-defining future projections are thought to have the same effect on an individual's identity as a self-defining memory. A self-defining future projection is a mental representation of a realistic, but also significant, future event that an individual feels strongly will happen in the future (D'Argembeau et al., 2012). These projections can be as simple as imagining yourself as being a parent one day, since in the present moment you are relatively certain that this will happen one day. Demblon and Argembeau (2016) argued that "in the same way as self-defining memory support representations of present and past selves, self-defining projection may ground and exemplify people's conceptions of themselves in the future" (p. 2). Vingoles, Regalia, Manzi, Golledge, and Scabini (2006) proposed that there are six identity motives that individuals incorporate into their concepts of their own futures. These motives demonstrate an individual's values and how that individual wishes to be in the future. These six motives are: the self-esteem motive, the distinctiveness motive, the continuity motive, the meaning motive, the belonging motive, and the efficacy motive. As evidenced by their names, these motives were based on Maslow's hierarchy of human needs (Maslow, 1943, 1954). These motives often appear in self-

defining future projections, as individuals feel that they need them in order to be successful and to be happy (Maslow 1943, 1954).

Researchers have found that when asked to think about future events, individuals overestimate the impact that future events will have on their mood, whether the predicted event is negative or positive (Wenze, Hunthert, & German, 2012). This phenomenon has been termed impact bias (Wenze et al., 2012). In one study, researchers hypothesized that the differences in an individual's ability to incorporate current moods in judgment-making influence likelihood estimation. Likelihood estimation is similar to self-defining future projections in that both concepts focus on an individual's prediction of his or her future. These researchers found that dysphoric individuals used negative emotion more often in cognition than positive emotion, resulting in a pessimistic view of the future. These findings "suggest that dysphoric individuals' tendency not to use positive emotion may be a cognitive mechanism distinguishing depressive future-oriented thinking from more general mood effects" (Marroquin & Nolen-Hoeksema, 2015, p.130). In another study, researchers found that both depression and anxiety symptoms were related to a bias in predicting a negative mood for the future (Wenze et al., 2012). Therefore, understanding self-defining future projections and how each individual predicts and envisions his or her future is crucial in helping to identify individuals who may need treatment for depression or anxiety.

The Present Study.

The proposed study will further research in the area of self-defining memory, which appears to have few recent findings, despite its important implications in the formation of the self. This study aims to replicate previous findings, which demonstrate a non-specific recall of autobiographical memory, within a non-clinical population with elevated depressive symptoms.

The present study elected not to present participants with a positive or negative cue for retrieval. Instead, individuals were simply prompted to recall a self-defining memory, as defined by Singer and Blagov (2000). The decision to abstain from emotional cueing was in hopes of overcoming the difficulty that individuals with depression have in recalling a specific memory of a certain valence, given the prior research that suggests that recalling a negative memory is less challenging for an individual with depression than a positive memory (Clark & Teasdale, 1982; Lloyd & Lishman, 1975; Teasdale & Fogarty, 1979; Williams & Broadbent, 1986). Therefore, the this study would determine whether or not non-specific recall exists for individuals with depression regardless of emotional cueing; they struggle to recall specific memories no matter valence. The proposed study will also examine whether anxiety impacts self-defining memory recall given the close relationship between anxiety and depressive disorders.

The proposed study will also address the effects of anxiety and depression on self-defining future projections. Given the limited previous findings in this area, additional research will be able to add to the confidence that depressive symptoms might have a similar detrimental effect on future projections (e.g., predicting a more negative future) as it does on recalling past memories. Furthermore, few studies concerning future projections have examined the impact of anxiety on this cognitive process. Finally, little research has been conducted specifically on the valence of future projections among depressed and anxious individuals, more specifically the emotional tone of future projections.

Based on previous research, the proposed study hypothesized that: 1(a) memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) is predictive of depression scores on the BDI; 1(b) memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) is predictive of

anxiety scores on the BAI, State form of the STAI, and Trait form of the STAI; 2(a) individuals who report greater depressive symptomology will respond to a self-defining memory prompt with non-specific responses significantly more than individuals who report less depressive symptomology; 2(b) individuals who report higher anxiety symptomology will respond to a self-defining memory prompt with non-specific responses significantly more than those with lower anxiety symptomology; 3(a) Lower valence scores on the self-defining future projection task are predictive of depression scores on the BDI; 3(b) Lower valence scores on the self-defining future projections task are predictive of anxiety scores on the BAI, State form of the STAI, and Trait form of the STAI; 4(a) Shorter lengths of responses on the self-defining future projection task are predictive of depression scores on the BDI; 4(b) Shorter lengths of response on the self-defining future projection task are predictive of anxiety scores on the BAI, State form of the STAI, and Trait form of the STAI.

Method

Participants

The participants in this study were 52 undergraduate students enrolled at Union College, 32.7% of whom were men and 67.3% of whom were women. Participants ranged in age from 18 to 22 years ($M= 19.5$, $SD= 0.71$) and 73.1% identified as Caucasian/White, 11.5% as Asian, 5.8% as African American or Black, and 1.9% as Native American. Participants volunteered to participate in the study advertised as “narrative memory and personality” through an online psychology participant pool at Union College. Participants either received credit towards a psychology course or received \$6 monetary compensation in exchange for their participation.

Materials

Demographic Questions. Participants were asked to complete three open-ended questions regarding age, race, and gender, in order to determine the demographics of the sample.

Beck Depression Inventory (BDI; Beck, 1961). A shortened version of the Beck Depression Inventory, consisting of 20 questions on a Guttman scale ranging from 0-3, was administered to participants in order to assess depressive symptoms. Question 9, which asks about suicidal thoughts, was removed from the inventory per request of the Human Subjects Review Committee. Therefore, the score on each item was summed to create a total score, divided by the 20 questions to determine the average, and then multiplied by 21 to determine the score for the full measure, with the lowest possible score being 0 and the highest possible being 63. The higher the score on the measure, the higher the degree of depressive symptomology within the individual. The internal consistency of the BDI is reported as being .90, while the retest reliability ranges from .73 to .96 (Wang & Gorenstein, 2013).

Beck Anxiety Inventory (BAI; Beck, Brown, Epstein, & Steer, 1988). The Beck Anxiety Inventory, which consists of 21 questions, was administered to participants in order to assess anxiety levels. The BAI was designed to better discriminate between anxiety and depression, something that other anxiety inventories, including the STAI had not done effectively (Beck, Brown, Epstein, & Steer, 1988), with STAI-BDI correlations of .60 reported for the State scale and .73 reported for the Trait scale, respectively (Tanaka-Matsumi & Kameoka, 1986). Participants were presented with a symptom such as “feeling hot” and were asked to indicate how much they have been bothered by that symptom in the past month (0-*not at all*, 1-*mildly but it didn't bother me much*, 2- *moderately- it wasn't pleasant at times*, 3- *severely-it bothered me a lot*). Each item on the BAI was summed in order to determine a total score, with a lowest possible score of 0 and a highest possible score of 63. The BAI has an

internal consistency of $\alpha = .92$ in a sample of adults ranging in age from 17 to 80 years old and test-retest reliability over one week of $r(81) = .75$ (Beck, Brown, Epstein, & Steer, 1988).

State Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). Forms Y-1 and Y-2, which contain a total of 40 questions, were administered to participants in order to determine state and trait levels of anxiety in each individual. The first 20 questions ask the participant to assess how they are feeling in that moment in order to determine the state anxiety score for that individual. Questions 21-40 ask the participant to assess how they generally feel in order to determine the trait anxiety score for that individual. Participants are presented with a statement and then are asked to select a corresponding score (1- *Almost Never*, 2- *Sometimes*, 3- *Often*, 4- *Almost Never*) that they best feel corresponds to how they are feeling in that moment or how they feel generally. Scores for each question are summed, with some being reversed coded. The higher the score on the STAI, the higher the level of anxiety within the individual. Individuals were divided into low and high level groups of anxiety for the state and trait forms, separately, based on a median split, as determined by the scores of all the participants. Although the STAI has shown some correlation to the BDI (Tanaka-Matsumi & Kameoka, 1986), the STAI has strong internal consistency and is useful as it provides both a state and trait measure, something that the BAI does not provide. The internal consistency coefficients for the STAI ranged from .86 to .95 and coefficients for test-retest reliability over two months range from .65 to .75 (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983).

Self-Defining Memory Task (Singer & Blagov, 2000-2001). The Self-Defining Memory Task was administered to participants in an adapted form. Participants were given the definition of a self-defining memory as defined by Singer and Blagov and were then asked to provide two self-defining memories, as opposed to the ten memories that the full task requires.

Self-Defining Future Projection Question. Participants were asked to describe where they see themselves in two years from that exact moment. They were instructed to use as much time and space as they felt they needed to sufficiently answer the question.

Classification System and Scoring Manual for Self-defining Autobiographical Memories (Singer & Blagov, 2000). The two self-defining memory responses were scored using the guidelines set forth by Singer and Blagov in their scoring manual. Self-defining memories were categorized as a pure specific memory, a specific memory with generalization, a specific memory with multiple single events, an episodic narrative, or a generic narrative. Self-defining memories were also then more generally classified as either specific or non-specific for further analysis.

Affective Norms for English Words (ANEW): Instruction Manual and Affective Ratings (Bradley & Lang, 1999). In designing the manual, participants were asked to rank words depending on how happy or unhappy they made them feel on a one-to-ten point scale represented by facial expressions ranging from a frown to a smile. The scores for each word were then averaged in order to determine the average valence for that word. The lower the average, the more unhappy the word and the higher the average the happier the word.

Text Analyzer (Online-Utility.org). An online text analyzer, online-utility.org, was used to analyze the word count and word frequency of the self-defining future projection.

Procedure

The Human Subjects Review Committee at Union College approved this study. All participants completed and signed an informed consent form prior to participating in this study, and were debriefed following study completion. All participants were asked to complete an electronic narrative writing task that consisted of the Self-Defining Memory Task (Singer &

Blagov, 2000-2001). Specifically, participants were presented with the definition of a self-defining memory and asked to provide two self-defining memories. They were then asked to describe where they see themselves two years “from this exact moment” in an effort to see whether or not individuals who present with anxiety and/or depression see the future in more pessimistic terms when compared to individuals who do not present with anxiety or depression. Once individuals completed the narrative writing task they were then asked to complete a personality inventory, designed as an online survey. The personality inventory consisted of an altered version of the BDI, and full versions of the BAI and STAI. Individuals were fully debriefed at the completion of the study and informed that their written responses to the self-defining future projection prompt would be further analyzed in conjunction by the online-utility.org, an online text analyzer, as well as the ANEW to determine the average emotional valence of the self-defining future projection. At this point participants had the opportunity to have their responses and corresponding data destroyed so as to no longer participate in the study; none of the individuals opted to withdraw their responses.

Statistical Analysis

Self-Defining Memory. Self-defining memory responses were categorized based on the Classification System and Scoring Manual for Self-defining Autobiographical Memories as either a pure specific memory, a specific memory with generalization, a specific memory with multiple single events, an episodic narrative, or a generic narrative. Self-defining memories were also then more generally classified as either specific or non-specific for further analysis (Singer & Blagov, 2000-2001). The BAI, BDI, the State form of the STAI, and the Trait form of the STAI were analyzed separately, due to the nature of their measures, in order to determine whether depression and anxiety (general, state, and trait) have an effect on the specificity of self-

defining memory. A One-way ANOVA was performed in order to determine if there was a significant difference between specific or non-specific memory type for depression and anxiety scores as determined by the BDI, BAI, and the State and Trait forms of the STAI. For this analysis only participants who had responded with two specific or two general memory type responses were considered (N=36). Four linear regressions were also performed in order to determine if memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) was predictive of scores on the BDI, BAI, State form of the STAI, and Trait form of the STAI. The type I error rate was set at $p < .05$ to determine whether depression or anxiety significantly predicted memory type response.

Self-Defining Future Projections. Participant's responses to the self-defining future projection task were scored for valence by averaging the valence scores for each word used in the response according to the valence scores reported by the ANEW. The BAI, BDI, the State form of the STAI, and the Trait form of the STAI were analyzed separately, due to the nature of the measures. Eight linear regression analyses were performed in order to determine whether valence or length of response for the self-defining future projections was a predictor of scores on the BDI, BAI, State form of the STAI, and the Trait form of the STAI. The type I error rate was set at $p < .05$ to determine whether valence and length of response on the self-defining future projections significantly predicted BDI, BAI, and STAI scores.

Results

Self-Defining Memory.

Inter-rater Reliability. For the responses on the modified Self-Defining Memory Task the inter-rater reliability (Intraclass Correlation) was $r = .89$ ($p < .05$) for content.

Findings. Contrary to what was expected, the One-Way ANOVA failed to detect a significant difference between the scores on the BDI, BAI, State form the STAI, and Trait form of the STAI for specific and general memory type response on the self-defining memory task. However, the five memory types (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) were predictive of scores on the BDI and the BAI, but not the State form of the STAI or the Trait form of the STAI. The results for analyses are reported in Tables 1-5.

BDI. There was no significant difference between the mean scores on the BDI for specific and non-specific memory types, $F(1,33) = .02, p > .05$. The linear regression analysis found that memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) significantly predicted BDI scores, $F(4, 46) = 2.58, p < .05$, with an R^2 of .183. More specifically, the “specific with multiple single events” memory type was a significant predictor of BDI scores ($\beta = .38, p = .01$).

BAI. There was no significant difference between the mean scores on the BAI for specific and non-specific memory types, $F(1,33) = 1.23, p > .05$. The linear regression analysis showed that memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) significantly predicted BAI scores, $F(4, 46) = 3.33, p = .02$, with an R^2 of .224. More specifically, the “specific with multiple single events” memory type ($\beta = .471, p = .002$) and the episodic memory type ($\beta = .366, p = .015$) were significant predictors of BAI scores.

State Form of the STAI. There was no significant difference between the mean scores on the State form of the STAI for specific and non-specific memory types, $F(1,33) = .13, p > .05$. A linear regression analysis was performed to predict BAI scores based on memory type (pure

specific, specific with generalization, specific with multiple single events, episodic, and generic). Results were not statistically significant, $F(4, 46) = .592, p > .05$, with an R^2 of .049.

Trait Form of the STAI. There was no significant difference between the mean scores on the Trait form of the STAI for specific and non-specific memory types, $F(1,33) = .10, p > .05$. A linear regression analysis was performed to predict BAI scores based on memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic). Results were not statistically significant, $F(4, 46) = .941, p > .05$, with an R^2 of .074.

Self-Defining Future Projection.

Findings. Contrary to what was expected, valence and length of self-defining future projections were not significant predictors of BDI, State form of the STAI, and the Trait form of the STAI, in linear regression analyses. However, valence scores, but not length of responses, were predictive of scores on the BAI. The results of these analyses are reported in Tables 6-9.

Discussion

In contrast to what was predicted, there was no significant difference the mean scores on the BDI, BAI, State form of the STAI, and Trait form of the STAI for specific and general memory responses on the self-defining memory task. It was also found that memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) on the self-defining memory task was not predictive of scores on the State and Trait forms of the STAI. However, supporting hypotheses, it was found that memory types (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) on the self-defining memory task were predictive of scores on the BDI and BAI. Individuals who had lower scores on the BDI and BAI tended to report the specific memory types (pure specific, specific with generalization, and specific with multiple single events). In particular, the specific with

multiple single events memory type was predictive of lower scores on the BDI and BAI and episodic memory type was predictive of elevated scores on the BAI. In other words, individuals who are less anxious and depressed tend to respond more often with the specific with multiple single events memory type and those who are more anxious tend to respond with the episodic memory type, suggesting that memory type may be a predictive factor in determining anxiety and depression levels when specific with multiple single events and episodic memory types are present. Furthermore, this finding also follows the trend that individuals with higher symptomology respond more often with general memory types (episodic) than specific (specific with generalization).

On the self-defining future memory task, valence and length scores were not predictive of scores on the BDI, State form of the STAI and Trait form of the STAI, nor was length of the self-defining future projection task predictive of BAI scores. However, negatively valence scores on the self-defining future projections task were predictive of higher BAI scores.

Unlike previous findings that showed an effect of depression on an individual's ability to recall specific memories in a nonclinical population (Moffit, Singer, Nelligan, Carlson, & Vyse, 1994), this study failed to find an effect of depression on specific and general memory recall. However, this study did find that the five memory types (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) were predictive of scores on the BDI. The failure to replicate previous findings that depression has an effect on specific and general memory recall may be a result of the new scoring guidelines. In the past the specific with multiple single events was often falsely scored as a non-specific memory type, and the increase from two categories (specific and non-specific) to five (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) allowed for more

accurate scoring of memory types. With a larger number of individuals falling into the specific with multiple single events category as opposed to one of the non-specific categories (episodic and generic) this study may provide a more accurate representation of the effects of depression and anxiety on an individual's ability to recall specific memories. The average BDI score for the present study was $M= 7.77$, $SD= 6.74$, well within the range of normal mood changes.

Furthermore, the median BDI score was 5.25, indicating that 50% of the participants scored in normal mood changes range.

The STAI also produced null results for self-defining memories and self-defining future projections. Tanaka-Matsumi and Kameoka (1986) found that the STAI was correlated to the BDI (a correlation of .60 for the State scale and .73 for the Trait scale), suggesting that the STAI does not measure anxiety symptomology completely independently of depression. A correlation between scores on the State and Trait scales of the STAI and the BDI was performed for the scores in the present study, and a significant correlation was determined ($r= .56$, $p<.001$, for state anxiety and $r=.80$, $p<.001$ for trait anxiety) replicating previous findings. Given, the null findings on the effect of BDI scores for specific and general memory response on the self-defining memory task, the failure of valence and length of response on self-defining future projections to predict scores on the BDI, and the high correlation between the STAI and the BDI, it is not surprising that null results occurred for the STAI as well. Furthermore, the median score for the STAI for the state form was 34 and 37 for the trait form. A cut-score of 39 has been suggested for the determination of clinically significant symptomology on either form the STAI (Julian, 2011). At least 50% of participants did not reach clinical symptomology, resulting in range restriction, and therefore there may not have been enough variability between scores to

accurately determine the effects of state and trait anxiety on specific and general self-defining memories.

Some of the limitations of the present study include range restriction for the BDI and the STAI, which resulted in mean scores that placed individuals within the normative range, with few scores in clinically significant ranges. This may have resulted in null results and a failure to replicate previous findings that depression was associated with decreased ability to recall specific memories. Secondly, the strong correlation between the BDI and the State and Trait forms of the STAI suggest that the STAI may have been studying anxiety disorders that had greater overlap with depressive symptomology. Therefore, the results concerning the STAI were not independently assessing anxiety, but were nevertheless helpful in assessing different forms of anxiety, as some anxious individuals exhibit depressive symptomology as well. Future research could utilize anxiety measures with minimal correlation to depression that exclude items assessing common symptomology, in order to address anxiety disorders that have minimal overlap with depressive symptomology. Thirdly, the current sample was a convenience sample and may not generalize to the broader population, as the current sample consisted of young adults who were predominantly female and predominantly White. Lastly, the small sample size of this study resulted in limited statistical power necessary to detect small effect sizes typically seen in nonclinical samples, an occurrence that could easily be remedied by replicating this study with a larger sample.

Despite these limitations, the current study had notable strengths. This study was the first to examine the effects of anxiety on self-defining memory and found that the type of memory response on a self-defining memory task as well as the valence score on a self-defining future projection task are predictive of anxiety scores on the BAI. This study was also the first to

examine valence and length of self-defining future projections as predictors of depressive and anxiety symptomatology. Although valence and length of self-defining future projections was not predictive of BDI, and STAI scores, valence was predictive of BAI scores, suggesting the importance of examining this relationship in future research. Lastly, although the STAI demonstrated a strong correlation to the BDI, the BAI was designed to study anxiety independently of depression, and therefore the significant finding that self-defining memory type is predictive of anxiety scores suggests that anxiety, independent of depression, may have an effect on memory type retrieval.

A larger non-clinical sample may improve range and variability amongst scores and allow for a more accurate representation of high and low scores on each measure. The failure to replicate previous findings of the effects of depression on self-defining memories suggests that non-clinical samples of this size may not be suitable for replicating previous findings, as effect sizes are likely to be smaller within nonclinical samples than those comparing clinical to nonclinical groups. The failure to replicate previous findings also demonstrates that the general and specific memory types on the self-defining memory task are not refined as an indicator of depression at lower ranges of depressive symptomatology, but is instead better designed to identify moderate and more severe levels of depression. However, memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) is predictive of scores on the BDI and may be useful in determining individuals in need of psychiatric intervention. Furthermore, this study determined that anxiety, as measured by the BAI, affects an individual's ability to recall specific memory types, a new finding for self-defining memory research, and even more importantly found that memory type (pure specific, specific with generalization, specific with multiple single events, episodic, and generic) on a self-

defining memory task is predictive of scores on the BAI. This suggests that anxiety may have the same clouding affect in reference to specifics that previous researchers suggested that depression has on memory. Just as depression utilizes much of an individual's cognitive resources, anxiety may do the same, reducing the cognitive resources that an individual has to encode and retrieve specifics for memory.

Future research should focus on replicating the previous non-clinical findings of Moffit, Singer, Nelligan, Carlson, and Vyse (1994) in larger samples, which would be expected to increase variation in scores. Furthermore, research should be done to refine the self-defining memory task for children to see if it can be used as an accurate marker for children who are at risk for anxiety and depression. This task would be a low-stress activity that could be beneficial for identifying children who may require more testing to determine if they meet the diagnostic criteria of anxiety and depression. Future research should also examine the effects of anxiety and depression on self-defining future projections, as the limited sample in this study may have failed to determine an effect that may exist in larger samples with greater variability.

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Appendix A

Table 1. One-Way ANOVA (N=36). The Significance Level of the Difference Between Mean Scores on the BDI, BAI, State Form of the STAI and Trait Form of the STAI for Specific and Non-Specific Memory Types on the Self-Defining Memory Task.

	F	df	sig (2-tailed)
BDI	.02	1, 33	.88
BAI	1.24	1, 33	.27
State form of the STAI	.13	1, 33	.72
Trait form of the STAI	.10	1, 33	.76

Table 2. Summary of Linear Regression Analysis for Memory Type on the Self-Defining Memory Task Predicting Scores on the BDI (N=51).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Pure Specific	-2.07	1.98	-.15	.30
Specific with Multiple Single Events	4.77	1.83	.38	.01*
Episodic	1.70	1.45	.18	.25
Generic	-.80	3.11	-.04	.80

*Significant Finding

Table 3. Summary of Linear Regression Analysis for Memory Type on the Self-Defining Memory Task Predicting Scores on the BAI (N=51).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Pure Specific	2.75	2.78	.14	.33
Specific with Multiple Single Events	8.50	2.57	.47	.002*
Episodic	5.12	2.03	.27	.02*
Generic	5.48	4.36	.17	.22

*Significant Finding

Table 4. Summary of Linear Regression Analysis for Memory Type on the Self-Defining Memory Task Predicting Scores on the State form of the STAI (N=51).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Pure Specific	-2.32	3.19	-.11	.47
Specific with Multiple Single Events	1.86	2.95	.10	.53
Episodic	2.26	2.33	.16	.34
Generic	.09	5.01	.00	.99

Table 5. Summary of Linear Regression Analysis for Memory Type on the Self-Defining Memory Task Predicting Scores on the Trait form of the STAI (N=51).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Pure Specific	-1.75	3.55	-.08	.63
Specific with Multiple Single Events	5.42	3.28	.26	.11
Episodic	1.70	2.60	.10	.52
Generic	-.32	5.58	-.00	.96

Table 6. Summary of Linear Regression Analysis for Valence and Length of Response on the Self-Defining Future Projection Task Predicting Scores on the BDI (N=46).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Valence	4.61	2.95	.23	.13
Length of Response	-.00	.01	-.02	.90

Table 7. Summary of Linear Regression Analysis for Valence and Length of Response on the Self-Defining Future Projection Task Predicting Scores on the BAI (N=46).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Valence	9.05	3.82	.34	.02*
Length of Response	-.03	.02	.28	.06

*Significant Finding

Table 8. Summary of Linear Regression Analysis for the Valence and Length of Response on the Self-Defining Future Projection Task Predicting Scores on the State Form of the STAI (N=46).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Valence	5.85	4.64	.19	.21
Length of Response	-.01	.02	-.04	.80

Table 9. Summary of Linear Regression Analysis for the Valence and Length of Response on the Self-Defining Future Projection Task Predicting Scores on the Trait Form of the STAI (N=46).

Variable	<i>B</i>	SE(<i>B</i>)	β	Sig.
Valence	5.39	5.27	.15	.31
Length of Response	-.01	.03	.08	.62