

**Effects of Implicit Theories of Intelligence and Gender on Self-Defining Academic Memories**

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### *Abstract*

Our study examined the effect of implicit theory on autobiographical reasoning patterns in college students' academic self-defining success and failure memories. Research explored two differing perspectives of gender differences in autobiographical reasoning and the effect of stereotype threat on women's failure memories in the natural science domain. Participants completed a questionnaire containing a plethora of scales prior to writing memory narratives. Memories were coded for positive self-transformation, emotional tone, and attributions to effort and ability. Results showed a significant interaction effect of implicit theory and memory type on positive self-transformation. Neither gender perspective was supported. There was no evidence of an effect of a stereotype threat with respect to academic discipline. Discussion focuses on how other factors such as self-esteem might be better predictors of autobiographical reasoning patterns than implicit theory.

Almost everyone at some point in life experiences both success and failure. Particularly during the college years, academics become an important and meaningful domain for many people. Although academic success and failure events are common among college students, what differs among college students is their perceptions of these events (see examples 1 and 2).

Example 1:

I remember coming to [university] and loving math. I took math 1b and got a really bad grade on the final. It blew apart my dream of majoring in math. I got a B in the class, but since then, I have not taken any math classes.

Example 2:

I feel I can do much better in school. It is still hard for me to accept that I have a C on my transcript, but I look at my grades and am inspired to do well... And despite my grades, I feel like I have learned a lot (Robins & Pals, 2002).

Both students in examples one and two relate a memory about a failure experience pertaining to receiving a grade lower than what they desire. However, example one ends with a negative emotional tone. Receiving a bad grade discourages the student in example one from pursuing his dream of majoring in math and pursuing future math classes. However, the student in example two ends her memory in a positive emotional tone; despite a poor grade she is inspired to work harder. In addition, the student in example two is able to acknowledge learning and growth.

Why do people perceive similar academic failures differently? One explanation that our research will explore is differences in implicit beliefs about the self. There are two different implicit theories that we examine in our research: entity theory and incremental theory. According to the entity theorists, intelligence is fixed, whereas according to incremental theorists, intelligence is malleable. There is a continuum

between these theories in which any individual will tend to either be more incrementally or entity oriented in thought. Thus, our research examines whether one's implicit theory affects one's perceptions of academic success and failure memories. Our research explores ways in which success and failure experiences are connected to learning and growth. In addition, our research examines gender differences with respect to perceptions in academic failure and success memories. Through this study, we hope to gain insight as to how perceptions of academic successes and failures relate to feelings about the self and consequently help shape identity.

### *Narrative Identity*

Identity is an important component of personality psychology because it is essentially how people characterize, define, and think of the self. Identity is shaped by a life story, which consists of a story or an interconnected group of stories that integrate the past, present, and future to provide one with a sense of meaning and purpose in life (McAdams, 2001). More simply, a life story is: "The life as told, remembered, or thought about by the individual" (Habermas & Bluck, 2000). The process of creating and narrating one's life story is integral to development and well-being (Pals, 2006; Blagov & Singer, 2004). In our study we will be examining a part of college students' life stories with respect to students' perceptions of academic successes and failures.

One way in which we can learn about life stories is through self-defining memories. These are memories that are characterized by affective intensity, vividness, repetition, and linkages to other memories (Blagov & Singer, 2004; Sutin & Robins, 2005). These memories are important to the individual, reflect themes of self-discovery and self-understanding, and may focus on unresolved conflicts or ongoing concerns

(Sutin & Robins, 2005). Self-defining memories illustrate central themes in one's present life situation and when faced with uncertainty serve to remind one of his or her identity (Blagov & Singer, 2004). In our study, we will be exploring the ways in which self-defining memories reveal life stories that help shape one's identity as a college student.

We are particularly interested in self-defining memories of college students because this developmental time period is characterized as the beginning of the creation of one's life story (McAdams, 2001, Habermas & Bluck, 2000). After adolescence, one has undergone puberty, has developed more formalized operational thinking, and has perhaps begun to explore his or her occupational, interpersonal, and ideological niche as part of the process of emerging adulthood (McAdams, 2001). Although the creation of one's life story is an ongoing process that begins in early childhood, the physical, cognitive, and social changes that occur during adolescence allow the individual to integrate various experiences into a coherent life story from which the individual can construe meaning (McAdams, 2001).

According to Habermas and Bluck (2000), there are four different types of coherence present in narratives that are unlikely to be fully achieved until after adolescence. Temporal coherence allows the individual to relate one event to another based on context or chronology (Habermas & Bluck, 2000). Biographical coherence enables one to choose key events that are important to one's identity as reflected by one's culture (Habermas & Bluck, 2000). Causal coherence is one's ability to relate one event to another through reflection of continuity of discontinuity of action (Habermas & Bluck, 2000). Thematic coherence illustrates one's ability to find thematic similarities between events and to make meaning by connecting these themes (Habermas & Bluck, 2000).

Thus, the sample of our study consists of college students due to their ability to exhibit coherence in self-defining memories and life stories.

One way in which people create coherence in self-defining memories is through a process known as autobiographical reasoning. Autobiographical reasoning is “ [a] process of self-reflective thinking or talking about the personal past that involves forming links between elements of one’s life and the self in an attempt to relate one’s personal past and present” (Habermas and Bluck, 2000). Example one demonstrates autobiographical reasoning by linking the past (i.e., “loving math”) with the present (i.e., “since then, I have not taken any math classes”). Example two also exemplifies autobiographical reasoning by relating a life experience (i.e., receiving a C) to one’s self (i.e., inspired to do well, learned a lot).

When one’s autobiographical reasoning exemplifies a change in one’s idea of the self, this process is called transformational processing (Pals, 2006). Transformational processing reflects the way(s) in which an experience has impacted or influenced someone. It reveals how the insight one has gained from the experience has changed his or her life story. Thorne, McLean, and Lawrence (2004) describe gaining insight as “reflecting upon the larger implications of the event for one’s construal self... with insight there is often some kind of transformation in one’s understanding of oneself...” Transformational processing can be positive, negative, or can shift from a positive tone to a negative tone or from a negative tone to a positive tone.

Example two illustrates transformational processing because it suggests that the writer has been inspired to work harder and acknowledges that despite dissatisfaction with grades, he/she has learned a lot. In this case, the transformation is positive because

these insights are indicative of a positive change in the self. Transformational processing can also be negative in nature, as illustrated by the math student in example one who decided not to pursue any more math courses. The self-defining memory is indicative of negative transformational processing because the experience has helped to shape this student's identity as perceiving himself/herself as a poor math student.

However, the overall tone of self-defining memories is not always positive or negative. A redemption sequence is a type of transformational processing in which a memory begins with a negative tone and shifts to a positive tone by the end (McAdams, 2001). According to McAdams et al. (2001), "The bad is redeemed, salvaged, mitigated, or made better in light of the ensuing good." Example two is indicative of a redemption sequence because it suggests a shift from a negative tone (disappointment with grades) to a positive tone (an inspiration to learn).

Conversely, a contamination sequence is a type of transformational processing in which the tone in a self-defining memory shifts from positive to negative (McAdams et al., 2001). According to McAdams et al. (2001), "The good is spoiled, ruined, or undermined by what follows it." Example two is indicative of a contamination sequence because it suggests a shift from a positive tone (love of math) to a negative tone (decision not to pursue courses in math).

The overall emotional tone of autobiographical memories is important because it is associated with health and well-being (Sutin & Robins, 2005). Research has shown that people who express more positive affect in their academic self-defining memories have higher self-esteem and well-being and tend to increase in self-esteem, agreeableness, and conscientiousness over the course of college (Sutin & Robins, 2005).

However, people who express more negative affect in their academic self-defining memories have lower self-esteem and well-being and tend to decrease in extraversion and increase in neuroticism across four years in college (Sutin & Robins, 2005).

Positive self-transformation is also attributed to physical health and well-being. Previous research has shown that positive transformational processing within narratives of difficult life events at age 52 predicts emotional maturity and satisfaction with life in late midlife (age 61) (Pals, 2006). In addition, Pals (2006) found a positive correlation between positive transformational processing and interviewer-rated physical health at age 61.

Previous research suggests that a redemption sequence is an even stronger predictor of psychological well-being and life satisfaction than the overall positive tone of the narrative (McAdams et al., 2001). McAdams et al. (2001) has shown that redemption sequences were positively associated with self-report measures of life satisfaction, self-esteem, and a sense of coherence, and negatively associated with depression. This finding was consistent in both autobiographical scenes told by midlife adults and autobiographical narratives written by college students (McAdams et al., 2001). In addition, research suggests that contamination sequences correlate with a lower level of psychological health and well-being. McAdams et al. (2001) found that contamination sequences were positively associated with depression and negatively associated with life satisfaction, self-esteem, and sense of coherence. Thus, the way in which one engages in autobiographical reasoning is particularly important to study because it affects one's psychological health and well-being.

### *Implicit Theories*

The purpose of our study is to examine whether differences in autobiographical reasoning such as transformational processing and redemption and contamination sequences may be explained by differences in incremental and entity implicit theories. Our research will extend our understanding of academic identity through examining self-defining academic success and failure memories in the framework of entity and incremental implicit theories and response patterns. Considering incremental and entity implicit theories from a social cognitive perspective, these theories suggest two different schematic frameworks that shape how people making meaning of important academic self-defining memories. According to the social cognitive approach, input from the environment (such as a success or failure experience), primes cognitive processing structures (e.g. attributions and beliefs such as an incremental or entity mindset) that are readily accessible. According to the social cognitive approach, our cognitive processing structures influence the output, or the way we think, feel, and behave in response to a situation (Mischel, 1999).

From the vantage point of an entity theorist, intelligence is an uncontrollable and fixed trait (Dweck & Leggett, 1988). Dweck and Leggett (1988) postulate that an entity theory orients one to performance goals. Performance goals are driven by motivation to gain favorable judgment of competence (Dweck & Leggett, 1988). People with performance goals view effort as an index of low ability and view effort as inversely related to ability (Dweck & Leggett, 1988). Evidence of this was supported in a study which used reading passages to prime participants toward either the entity or incremental mindset (Hong, Chiu, Dweck, Lin, & Wan, 1999). Participants were asked whether they perceived Student A, a diligent student who studied every week, or Student B who only

studied before the test, to be more intelligent (Hong et al., 1999). Only 23.3% of the students in the entity condition nominated student A as the smarter student (Hong et al., 1999), which shows that entity theorists do not tend to equate effort with ability.

Goals influence interpretation and reaction to events, particularly in the case of failure (Dweck & Leggett, 1988; Grant & Dweck, 2003). According to Dweck and Leggett (1988), the problem with a performance goal is that it can lead to a helpless response if one is not performing well. However, if one performs well, then he/she will not be affected by the helpless response. In the event of failure, individuals with performance goals exhibit a helpless response (Dweck & Leggett, 1988). Individuals exhibiting the helpless response primarily attribute failure to lack of intelligence, memory, or problem solving ability as the main cause (Dweck & Leggett, 1988). In the event of failure, individuals with a helpless response are more likely to exhibit behaviors such as giving up on a task, attempting to change the rules of a task, showing signs of boredom or anxiety, or speaking of talents in other domains (Dweck & Leggett, 1988). The helpless response is exemplified by the discouraged math student in example two, who decides not to pursue any math classes due to a poor grade on the final in math 1b. Thus, because a failure for an entity theorist often suggests a lack of ability (Molden & Dweck, 2006), entity theorists are likely to exhibit the helpless response as a coping mechanism.

From the perspective of an incremental theorist, intelligence is a controllable and malleable quality (Dweck & Leggett, 1988). An incremental theory orients individuals to learning goals and consequently a mastery-oriented response pattern (Dweck & Leggett, 1988). Learning goals focus on improving competence. In support of the

relationship between implicit theories and outcomes, research shows that people in an incrementally primed condition were more likely than people in an entity primed condition to engage in remedial tasks designed to help improve their skills after receiving negative feedback on performance (Hong, et. al, 1999). Rather than attributing failure to a lack of ability, they view unsolved problems as challenges to be overcome through effort (Dweck & Leggett, 1988; Molden & Dweck, 2006). Individuals with a mastery orientation look for new, effective strategies and are persistent and optimistic when faced with a challenge (Dweck & Leggett, 1988; Grant & Dweck, 2003). The student who received a C in example two exemplifies the mastery response pattern. The example illustrates a clear incremental mindset evident in this person's inspiration to improve grades and learn. <sup>1</sup>

In this study, we expect to see an emotional distinction between individuals with entity and incremental response patterns in academic success and failure memories. Because individuals exhibiting incremental response patterns believe that increased effort or adoption of a new strategy can improve performance in the future, they are more likely to have more positive emotional responses than individuals with entity response patterns. Particularly in failure memories, we expect individuals with incremental response patterns to show more positive transformational processing than individuals with entity response patterns. In addition, I expect that incremental theorists will exhibit more redemption sequences in their self-defining memories than entity theorists.

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<sup>1</sup> When I refer to an entity or an incremental response pattern, I am referring to the theory (entity or incremental), goal-orientation (performance or learning), and response pattern (helplessness or mastery) associated with that implicit theory. When I use the term incremental or entity theorist (or theory), I am referring only to one's beliefs about the extent to which intelligence is a malleable or fixed quality.

However, given that individuals exhibiting entity response patterns do not believe that they can improve future performance, I expect them to exhibit more negative emotional responses and less transformational processing and growth in their self-defining memories than incremental theorists. In addition, I postulate that entity theorists are more likely to display contamination sequences in their self-defining memories than incremental theorists.

The literature supports the idea that autobiographical reasoning and emotional reactions will be more pronounced in self-defining failure memories than in self-defining success memories. Previous research has shown that bad grades affect self-esteem and affect more than good grades (Crocker, Karpinski, Quinn, Chase, 2003). The idea that incremental theorists will show more positive emotion than entity theorists and entity theorists will show more negative emotion than incremental theorists in their self-defining memories is supported by Dweck & Leggett, 1988 which suggests that 1) an entity response pattern is maladaptive because participants with the helpless response tend to have low self-esteem and negative affect, and 2) individuals with the mastery-oriented response tend to have high self-esteem and positive affect even when faced with failure.

Robins and Pals (2002) conducted a longitudinal study that provided further evidence of this pattern in college students. Robins and Pals (2002) showed that entity theorists had lower self-esteem than incremental theorists, and that this disparity increased across four years of college. Robins and Pals (2002) also found that this pattern of self-esteem was mediated by goals, helpless/mastery response patterns, and attributions. When faced with failure, entity theorists tended to adopt performance goals and exhibit the helpless response, whereas incremental theorists tended to adopt learning

goals and exhibit the mastery response (Robins & Pals, 2002). Emotionally, entity theorists felt more upset about their academic performance and reported that they tended to give up when faced with a challenge (Robins & Pals, 2002). Unlike entity theorists, when faced with a challenge, incremental theorists put in more effort or tried a different study strategy to perform better (Robins & Pals, 2002). Entity theorists attributed their failures to low ability, but attributed their successes to luck (Robins & Pals, 2002). However, incremental theorists attributed both their successes and failures to effort and study skills (Robins & Pals, 2002).

Hong et al. (1999) found similar attributions with respect to effort for entity and incremental theorists. Hong et al. (1999) found that when people were primed to think about a task in terms of an intelligence assessment, incremental theorists attributed their performance to effort more than entity theorists. In addition, when given negative performance feedback, incremental theorists were more likely to make effort attributions than entity theorists (Hong et al., 1999). Hong et al., (1999) postulate that entity theorists were less likely to make attributions to effort because exertion of effort would suggest that one does not have high ability. Thus according to the entity theorist, if one has high ability, one should invest less effort in the task, whereas, for the incremental theorist, effort and ability are positively related and effort is used to promote ability (Hong et al., 1999).

The first main hypothesis to be tested is as follows:

Hypothesis 1: Differences between Entity and Incremental Response Patterns in Self-Defining Memories

1a) Participants exemplifying incremental response patterns will show more positive autobiographical reasoning (i.e., positive transformational processing, positive tone, redemption sequences, positive attributions) than individuals with

entity response patterns in self-defining memories and self-report measures. This difference will be most pronounced in failure memories.

1b) Participants exemplifying entity response patterns will show more negative autobiographical reasoning (i.e. negative transformational processing, negative tone, contamination sequences, negative attributions) than individuals with incremental response patterns in self-defining memories and self-report measures. This difference will be most pronounced in failure memories.

### *Gender Differences*

A variety of gender difference findings within the literature makes it necessary to test multiple hypotheses with respect to gender differences in this study. This section will explore two alternative models about gender differences with respect to implicit theories and academic self-defining success and failure memories. The first perspective focuses on the effect of implicit theory on autobiographical reasoning, with the idea that gender will moderate this pattern. This perspective assumes that most individuals either adopt an entity theory or an incremental theory (Molden & Dweck, 2006; Dweck & Leggett, 1988) and that incremental and entity beliefs remain stable over time. The stability of implicit theories is supported by a longitudinal study of college undergraduates which revealed no significant changes with respect to entity and incremental beliefs over a four year period (Robins & Pals, 2002).

However, hypothesis three will consider the effect of gender and situation (success or failure) on implicit theory and autobiographical reasoning. The third hypothesis is based on the assumption that implicit theories can change and are thus influenced by the situation, which in our study is either success or failure. The third hypothesis is supported by Hong et al. (1999), which shows that implicit theories can be manipulated through priming. The view presented in hypothesis three does not question the stability of implicit theories in general and in daily academic life. However, it does

suggest that success and failure might trigger either the entity or incremental response pattern and that these response patterns may vary for men and women in success and failure situations.

### *Perspective #1*

The first perspective discusses gender differences with respect to the expression of emotions, the recollection of emotional events, contingent self-worth, and self-esteem. Due to these gender differences, perspective one suggests that differences in autobiographical reasoning between women entity and incremental theorists will be more pronounced than between male entity and incremental theorists.

### *Expression of Emotions*

It is important to examine social influences that may play a key role in understanding gender differences with respect to the ways in which men and women learn to view their past experiences, emotions, and identity. For many people, parents are a very important influence. A longitudinal study conducted by Kuebli, Butler, and Fivush (1995) audio recorded conversations between mothers and children about recent past events at age 40, 58, and 70 months. The recordings were coded for the number and type of emotion words (Kuebli et al., 1995). Participants came from two parent, white middle class families (Kuebli et al., 1995). Although the sample was fairly limited, results showed that mothers used more emotion words with daughters than with sons, that mothers used a greater variety of emotion words with daughters than with sons, and that mothers used more positive emotions with sons than with daughters (Kuebli et al., 1995). In addition, results showed that mothers' conversations were significantly longer with daughters than with sons (Kuebli et al., 1995). By the last phase of the study (70 months),

girls used a significantly greater number and variety of emotion words than boys. Girls also had significantly more discussions about emotions with their mothers than boys (Kuebli et al., 1995).

These findings suggest that gender differences in frequency of discussion about past events and emotional aspects of the past may influence the ways in which boys and girls learn to talk about past events (Kuebli et al., 1995). From conversations with their mothers, girls implicitly learn that emotions are an important part of past experiences and thus describe a more rich and vivid emotional experience (Kuebli et al., 1995). Due to women's tendency to express more rich and vivid emotions, we expect that female incremental theorists will exhibit more transformational processing than male incremental theorists. Boys, on the other hand, may implicitly perceive emotions as less important or inappropriate to talk about when reflecting on the past (Kuebli et al., 1995). Because mothers talk more about positive emotions with sons than daughters, this may lead boys to refrain from discussing negative emotions, whereas it may lead girls to cope with negative emotions by discussing them with others (Kuebli et al., 1995).

We expect that because women will be more engaged in autobiographical reasoning about emotional events, autobiographical reasoning will be more pronounced in women's memories with women incremental theorists expressing more positive emotion than men incremental theorists and women entity theorists expressing more negative emotion than men entity theorists. Entity and incremental theories are two different ways of processing negative emotions after failure. Due to the fact that women focus more on negative emotions, hypothesis two postulates that the difference between

female entity and incremental theorists will be especially pronounced for women in their self-defining failure memories.

### *Recollection of Emotional Events*

This perspective is further supported by gender differences recalled by adults in autobiographical memories for childhood emotional experiences (Davis, 1999). Women tend to recall more autobiographical memories of events associated with emotion than men (Davis, 1999). Women also are able to recall emotional autobiographical events faster than men, which suggest that these memories are more readily accessible to women (Davis, 1999). These findings are particularly interesting because the gender differences only apply to emotional events; there is no gender difference for the number of non-emotional events recalled (Davis, 1999). This finding suggests that women may be more connected to their emotional memories than men. Consequently, women may engage in more autobiographical reasoning (both positive and negative) in their self-defining memories than men.

### *Contingent Self-Worth*

Contingent self-worth is one's invested value in a domain and the extent to which self-worth is based on success or failure in that particular domain. Academic contingent self-worth pertains to the extent to which one's self-worth is contingent on high academic performance and the extent to which one views academics as an important part of his/ her identity. Research suggests that the contingencies on which people base self-worth influence the ways in which they organize and structure their lives and direct their time and energy (Crocker et al., 2003). Domains of contingent self-worth help people to seek,

maintain, enhance, and protect self-esteem (Allport, 1955; James, 1910; Rogers, 1961; Rosenberg, 1979 as cited in Crocker, Luhtanen, Bouvrette, & Cooper, 2003).

The interaction between academic contingent self-worth and implicit theory seems to be a strong predictor of self-esteem and feelings about the self after academic successes and failures (Niiya, Crocker, and Bartmess, 2004). Niiya et al. (2004) found that priming an incremental theory can reduce the vulnerability of self-esteem to failure in domains of high contingent self-worth. Niiya et al. (2004) showed that participants who had high academic contingent self-worth and were primed with the entity theory of intelligence had lower self-esteem after receiving negative performance feedback than after receiving positive performance feedback on a GRE test. Participants who had high academic contingent self-worth and were primed with the incremental theory exhibited no difference in self-esteem regardless of receiving negative or positive performance feedback. Research has shown that women score higher than men on contingent self-worth in academics (Crocker, Luhtanen, Bouvrette, & Cooper, 2003). Therefore, these findings suggest not only that entity theorists with high contingent self-worth may be more vulnerable to negative feelings about the self, but also that females entity theorists may be more vulnerable to negative feelings than male entity theorists because women tend to have higher feelings of academic contingent self-worth than men.

Interestingly, Niiya et al. (2004) found that participants with low academic contingent self-worth experienced lower self-esteem after failure than after success, but this difference was smaller than among high academic contingent self-worth participants, and priming implicit theories had no effect on self-esteem. Thus, this finding suggests

that the extent to which implicit theory affects one's feelings about the self is linked to one's academic contingent self-worth.

Previous research has also shown that when asked to make attributions for a hypothetical academic failure scenario (e.g. receiving an F on a course important for graduation), women attributed their failure to ability, whereas men attributed their failure to lack of studying and low interest (Beyer 1998/1999). Therefore, due to women's higher level of academic contingent self-worth and their tendency to attribute failures to ability (Beyer 1998/1999), women may be more vulnerable to negative self-evaluations. Consequently, negative self-evaluations would be more pronounced in self-defining failure memories of female entity theorists than male entity theorists. This would lead us to expect more pronounced negative autobiographical reasoning in self-defining memories from female than male entity theorists.

Beyer 1998/1999 also showed that women experienced more happiness than men in reaction to a hypothetical success scenario (e.g. receiving an A on a course that was important for graduation). Thus, due to their higher academic contingent self-worth and greater feelings of happiness, we predict female incremental theorists will show more positive transformational processing and than male incremental theorists. The rationale for this idea is that women incremental theorists have invested more in academics and are more interested in learning and growing from their mistakes than men.

Given that women have higher academic contingent self-worth, and tend to recall more emotional events than men, it is likely that women will have more emotional academic self-defining memories than men, and consequently women will engage in both more intense positive and negative autobiographical reasoning about academics than

men. Due to gender differences in both emotional expression and academic contingent self-worth, hypothesis two suggests that transformational processing and negative responses in self-defining failure memories will be more pronounced between women entity and incremental theorists than between men entity and incremental theorists.

### *Self-Esteem*

In exploring feelings about the self, it is particularly important to note the role of self-esteem and some of the developmental gender differences that take place in adolescence and young adulthood. Self-esteem may fluctuate based on academic performance (Crocker et al., 2003). Research has shown that self-esteem increased when students received good grades, but led to a greater decrease in self-esteem when students received poor grades (Crocker et al., 2003). Academic contingent self-worth may moderate shifts in self-esteem based on academic performance. Crocker et al. (2003) found that self-esteem based on academic competence moderated the effects of bad grades.

Research shows that in adolescence there is a gender difference in self-esteem, but that this difference may reduce during college. Developmental research shows that women have much lower self-esteem than males at age 18, but then experience a marked increase in self-esteem from age 18-25. Men have higher self-esteem than women at age 18, but increase more gradually in self-esteem from age 18-25 (Galambos, Krahn, & Barker, 2006). By age 25, men's self-esteem is slightly higher than women's, but the difference is not significant.

This finding suggests that due to increasing levels of self-esteem, female incremental theorists in our study might express more intense positive responses than

male incremental theorists in both their self-defining memories and self-report measures. Also, female incremental theorists are more likely to exhibit more redemption sequences than female entity theorists, who are more vulnerable to low self-esteem, particularly in the context of failure.

#### Hypothesis 2: Gender and Implicit Theories

2a) Female entity theorists will exhibit more pronounced autobiographical reasoning and negative responses (i.e., emotional tone and attributions) in failure self-defining memories and self-report measures than male entity theorists.

2b) Female incremental theorists will exhibit more transformational processing and relate more experiences of positive growth than male incremental theorists.

2c) The difference between female entity and incremental theorists will be more pronounced than the difference between male entity and incremental theorists with respect to transformational processing and negative responses in self-defining failure memories and self-report measures.

#### *Perspective #2*

Perspective two suggests that success and failure prime different mindsets in men and women. This section will discuss gender differences with respect to academic attributions for success and failure. Perspective two proposes that gender differences in academic contingent self-worth may be linked to gender differences in studying behaviors and consequently gender differences in attributions. Consequently, perspective two suggests that gender differences in academic contingency and attributions will result in gender differences with respect to implicit theories which will fluctuate according to the situation of success or failure. For this perspective, I will address the literature with respect to attributions and contingent-self worth separately and then explain how these findings together form the basis of hypothesis three.

#### *Attributions*

Beyer (1998/1999) examined gender differences in academic attributions. In hypothetical scenarios, participants were asked to imagine receiving either an A or an F on an exam and then to rate the extent to which they attributed the outcome to various causes (Beyer 1998/1999). The results show that in successful situations, females tend to make more effort-based attributions such as paying attention and studying, whereas males tend to make ability attributions (Beyer, 1998/1999). However, in the case of failure, these attributions are reversed; males make attributions to effort and females to ability (Beyer, 1998/1999). Men ranked and rated ability as a more important cause of success than women, whereas women were more likely to attribute an F to lack of ability than men (Beyer 1998/1999).

#### *Contingent Self-Worth and Behavior*

Due to women's higher contingent self-worth in academics, I expect women to engage in academic activities such as studying and going to office hours more frequently than men. This assumption is supported by Beyer (1998/1999), who found a borderline main effect for the amount of time spent studying, with women studying more than men. Men ranked and rated a lack of studying as a cause for failure in a hypothetical scenario more highly than women (Beyer, 1998/1999). This pattern might also be attributable to the fact that women may be more conscientious and consequently study more than men. Research has shown that women are more likely to possess an academic ethic than men and that women also tend to have higher GPAs (Chee, Pino, & Smith, 2005). In Chee et al. (2005), academic ethic was measured by a survey of questions including time spent on academic, social and work activities, study habits, the decision-making process of

students in which they choose classes based upon learning or “making the grade”, alcohol consumption, living arrangement, and membership in student clubs or groups.

*The Effects of Contingency, Attribution, and Situation*

This set of literature suggests that gender differences in academic contingency and attributions will result in gender differences with respect to adoption of different implicit theories in success and failure situations. Because men report lower academic contingencies and study less than women, men are more likely to adopt the incremental theory as a means of protecting self-esteem in the event of failure. Because men have exerted less initial effort in terms of studying or preparing assignments than women, it is easier for men to believe that exerting more effort or trying a new strategy will lead to future success on the next assessment. Attributing failure to effort allows males to protect their self-confidence by blaming failure on an unstable cause (e.g., not studying enough) that can be altered in the future (Beyer, 1998/1999). Thus, given the tendency for men to attribute their failures to a lack of effort, it is likely that men will exhibit the incremental response pattern in their self-defining failure memories.

If this prediction is supported, we would expect to see more positive transformational processing and redemption sequences in men’s failure memories than in women’s failure memories. Also, reflecting Beyer’s findings, I would expect men to emphasize their attributions of failure to a lack of effort more than a lack of ability in the attributions they form for a failure.

In contrast, I predict that women will tend to exhibit more entity response patterns than men in their self-defining memories of failure. Females lessen self-esteem by attributing failure to an uncontrollable cause (i.e., ability level) (Beyer, 1998/1999).

Because women have put in so much effort into academics, it is difficult to attribute failure to a lack of effort. Therefore, as research supports, women tend to attribute failure to a lack of ability (Beyer, 1998/1999). Consequently, women are likely to adopt an entity mindset that ability is fixed when strong efforts to improve performance and ability have failed. Therefore, I predict that women will be more likely than men to exhibit the entity response pattern in the event of failure.

If this prediction is supported, I would expect to see more negative autobiographical reasoning, statements of negative changes in the self, and contamination sequences in women's failure memories than in men's failure memories. I would also expect women to emphasize their attributions of failure to a lack of ability rather than effort in the self-report measures and self-defining failure memory.

In the case of success, I postulate that women are more likely than men to adopt the incremental mindset because they will perceive their efforts as a means of improving their ability, and therefore view ability as being malleable with effort. If this hypothesis is supported, I would expect to see women emphasize their attributions of success to effort in both self-report measures and self-defining memories. As incremental response individuals in success situations, I would expect women to exhibit more positive transformational processing in their self-defining success memories. I would also expect women to express more positive emotions than men in both the self-defining success memory and self-report measures.

I postulate that in the case of success men will exhibit the entity mindset more than women. Because men tend to have lower academic contingent self-worth, and consequently will invest less effort in academics, it is likely that they will attribute their

successes to high ability. Hong et al. (1999) found that individuals who were primed to adopt the entity mindset were likely to associate low effort with a higher level of ability. Thus, I postulate that men will make high ability attributions for success, which will consequently prime an entity mindset. If this prediction is supported, I would expect to see men exhibit less transformational processing than women in self-defining success memories. I also predict that men will exhibit less positive emotions in their self-defining success memories and in self-report measures than women.

### Hypothesis 3: Implicit Theories and Gender Differences

#### Failure Memories

3a) In self-defining memories of failure and self-report measures, men will exhibit more incremental response patterns than women.

3b) In self-defining memories of failure and self-report measures, women will exhibit more entity response patterns than men.

#### Success Memories

3c) In self-defining memories of success and self-report measures, women will exhibit more incremental response patterns than men.

3d) In self-defining memories of success and self-report measures, men will exhibit more entity response patterns than women.

### *Academic Discipline and Stereotype Threat*

In examining gender differences with respect to attributions, it is also important to study these differences with respect to academic discipline. Previous research has shown the existence of a negative stereotype toward women's performance in natural science fields (Johns, Schmader, & Martens, 2005; Cadinau, Maass, Rosabianca, & Kiesner, 2005; Spencer, Steele, & Quinn, 1998). Women in engineering with a high academic contingency, showed an accentuated pattern of low self-esteem in response to bad grades (Crocker, Karpinski, Quinn, & Chase, 2003). Engineering is a discipline with a negative

female stereotype that ties under-representation to lack of ability in the field (Crocker et al., 2003). Negative thoughts elicited from stereotype threat are a cause of poor performance as opposed to a consequence of poor performance (Cadinau et al., 2005). Thus, researchers suggest that stereotype threat and the consequent vulnerability in self-esteem may contribute to the reduction of women within in the field (Crocker et al., 2003).

Research has shown that accentuating academic gender stereotypes decreases women's performance and their attribution of anxiety to the stereotype (Johns, et al., 2005). However, research also supports the theory that education about stereotypes helps reduce stereotype threat and does not hinder performance (Johns et al., 2005). Although our study focuses on students' attributions of their performance, poor performance may be linked to a gender stereotype threat, which could consequently make one more vulnerable to adoption of the entity theory.

Although research has shown that a gender stereotype threat enhances more negative thoughts with respect to a discipline, participants in these studies were primed with the stereotype threat. Even though we are not priming or educating participants about gender stereotypes, most people are likely aware of them. Therefore, our study will examine whether the existence of a pre-conceived gender stereotype threat in natural sciences and humanities disciplines makes women more vulnerable to negative feelings about the self than men. Because an entity theory may make one more vulnerable to pre-conceived gender stereotype threats and previous research has particularly targeted women's math and science abilities, we hypothesize that the effects of the natural science

stereotype threat will be more pronounced for female entity theorists than female incremental theorists in both self-defining memories and self-report measures.

Hypothesis 4: The Effects of Stereotype Threat on Implicit Theories with Respect to Academic Discipline

- a) Women will express more doubt about their abilities in the natural sciences than men in their self-defining memories and in self-report measures.
- b) Women entity theorists will express more doubt about their abilities in the natural sciences than women incremental theorists in their self-defining memories and self-report measures.

*Overview of Present Study*

In this study, we predict that incremental theorists will exhibit more positive autobiographical reasoning than entity theorists and that entity theorist will exhibit more negative autobiographical reasoning than incremental theorists in their academic self-defining memories. We postulate that this pattern will be most pronounced in failure memories. We also predict that there will be gender differences with respect to autobiographical reasoning and attributions for success and failure. One prediction is that positive self-transformation between women entity and incremental theorists will be more pronounced than between men entity and incremental theorists. However, a second prediction about gender suggests that success and failure situations will prime men and women to adopt different attributions and consequently lead to different autobiographical reasoning patterns for men and women. We predict that due to a negative stereotype threat, women will be more vulnerable to negative autobiographical reasoning than men when reporting memories in the natural science domain. We postulate that women entity theorists will exhibit more negative thoughts about the self than women incremental theorists when reporting failures in the natural science domain.

Our study builds on our existing understanding of implicit theories and applies these theories to the narrative identity approach through examining academic self-defining success and failure memories. It is unique from other research in that it examines identity through self-defining memories which are real-world situations rather than hypothetical scenarios (e.g. Beyer, 1998/1999). Thus, through studying academic self-defining memories, we hope to gain insight into people's life stories and the ways in which they use implicit theories to help shape identity and make meaning of their academic successes and failures. It is important to study implicit theories not only because they provide insight with respect to one's identity, but also because they have implications for health and well-being.

In this study, college students will be asked to complete two questionnaires in addition to writing about an academic self-defining success memory and a self-defining failure memory. The first questionnaire is a general assessment of the participant's personality and implicit orientation (i.e., entity or incremental). The second questionnaire is a follow-up questionnaire that participants will receive after the completion of both memories. The second questionnaire will ask participants to reflect on their attributions with respect to success and failure as well as their ability in the subject area they have chosen to write about. It will also ask participants to reflect on how they felt about the memory at the time and how it presently makes them feel.

The dependent variable in this study is one's feelings about the self. The factors in this study that will shape feelings about the self are: implicit theory, gender, and memory type (success or failure). Feelings about the self will be measured by coding self-defining memories for emotional sequencing (i.e., positive and negative affect, redemption and

contamination sequencing) and autobiographical reasoning (i.e., transformational processing). The self-defining memory coding will be our primary measure of the dependent variable. However, the second questionnaire will hopefully further support the main findings from the self-defining memories as well as replicate previous findings on the effects of implicit theories.

### *Method*

#### *Participants*

The sample consisted of 65 college students, 64 Haverford students and 1 Bryn Mawr student, 15 seniors, 10 juniors, 11 sophomores, and 29 freshman. There were 11 participants majoring in a natural science discipline, 45 in social sciences/humanities, and 9 who were undecided or other.

#### *Measures*

With the exception of the Theories of Intelligence scale (Dweck, 1999), all items were rated on a five point scale with 1) strongly agree, 2) disagree, 3) neutral/neither agree nor disagree, 4) agree, and 5) strongly agree.

The *Theories of Intelligence* scale (Dweck, 1999) is an 8 item, self-report scale that is a measure of the degree to which one adopts either the incremental or entity mindset. This measure uses a 6-point scale from 1 (strongly agree) to 6 (strongly disagree). One item states: “You have a certain amount of intelligence, and you can’t really do much to change it.” A median split was conducted for implicit theory in which participants were classified as either an entity theorist if they scored below the median (3.13) or an incremental theorist if they scored above the median on the theories of intelligence scale. There were 32 entity theorists and 33 incremental theorists based on

the median split. The median split was necessary for analysis involving entity and incremental group comparisons such as ANOVAs and t-tests, though correlations were run without the median split. Alpha reliability was  $\alpha=.93$ . The mean and standard deviation for our sample were  $M = 3.27$  and  $SD = 1.03$ .

The *Rosenberg Self-Esteem* scale (Rosenberg, 1965) is a 10 item self-report scale which asks participants to rate statements relating to self-esteem. For example, one item states: "I feel that I am a person of worth, at least on an equal basis with others." Alpha reliability was  $\alpha=.87$ . The mean and standard deviation for our sample were  $M = 3.56$  and  $SD = .28$ .

The *Academic Contingent Self-Worth* scale (Crocker & Cooper, 2003) is a 5 item self-report scale that measures the extent to which academics are important with respect to the participant's identity and overall level of self-esteem. For example, one item states: "My opinion about myself isn't tied to how well I do in school." This scale was included in Crocker and Cooper (2003) as a composite of a larger scale of contingent self-worth in different domains. Alpha reliability was  $\alpha = .40$ . The mean and standard deviation for our sample were  $M = 3.77$  and  $SD = .84$ .

The *Performance and Learning Goal* scale (adapted from Grant & Dweck, 2003) is a 10 item self-report measure that assesses the extent to which an individual adopts performance and learning goals. For example, one item states: "I really want to get good grades in my classes." Alpha reliability was  $\alpha = .88$ .

*Miscellaneous Items pertaining to Helpless and Mastery Response Patterns* were included in the preliminary and follow-up memory questionnaires. The purpose of these items was to measure the participant's general tendency to act in a helpless or mastery

oriented way as well as to measure the extent to which they demonstrated a helpless or mastery oriented response with respect to the events discussed in their success and failure memories. For example, one item on the preliminary questionnaire states: “I try to look at my failures as an opportunity to learn.” An item on the follow-up questionnaire states: “To what extent has this event encouraged you to try harder?”

The *Confidence in One’s Intelligence* measure (Dweck, 1999) is a 3 item self-report scale which asks participants to check one of two statements that is the most true for them and then to indicate how true the statement is on a continuum from very true of me to sort of true of me. An example pairing of sentences is: “I usually think I’m intelligent. I wonder if I’m intelligent.” Alpha reliability was  $\alpha=.58$ .

The *Big Five Inventory* (John & Srivastava, 1999) is a 44 item self-report scale that measures the Big Five factors of personality. Only items from the conscientiousness and neuroticism scale were used for this study. Participants are presented with the phrase “I see myself as someone who... and asked to rate various items that complete this sentence. For example, one item states “does a thorough job.” Nine items measure conscientiousness, eight items measure neuroticism. The alpha reliability for conscientiousness was  $\alpha = .86$ . The alpha reliability for neuroticism was  $\alpha= .89$ . The means and standard deviations for our sample were  $M = 3.62$  and  $SD = .67$  for conscientiousness and  $M = 2.78$  and  $SD = .82$  for neuroticism, respectively.

### *Procedure*

Participants were scheduled for a lab time and were emailed a participation consent form along with a preliminary questionnaire to be completed on-line prior to the lab session. The preliminary questionnaire contained items from the Rosenberg Self-

Esteem Scale, Theories of Intelligence Scale, Confidence Measures, Academic Contingent Self-Worth, Big Five Inventory, and Performance and Learning Goal Scale. In the lab, participants were seated at a computer and were asked to type their responses to prompts for two academic self-defining memories, one for success and one for failure. If asked, participants were told that it should take approximately thirty minutes to complete the lab session. A pilot study was run to ensure that the prompt would effectively elicit rich, relevant, and meaningful self-defining memories. The prompt, adapted from Blagov and Singer's study of self-defining memories (Blagov & Singer, 2004), stated:

Please describe an academic memory of a success/ failure. The memory should be at least six months old, relevant to your identity as a student, and reveal something about how you feel about yourself in the academic domain. It should be a personally meaningful memory that you have thought about many times. In describing your memory, please share what happened, how you thought and felt about it at the time, and the significance of the memory to you as you look back on it. Does this memory connect to your view of yourself today? If so, how?

After completing both memories, participants clicked on a link and completed a follow-up questionnaire for each self-defining memory. Participants were be thanked for their participation, debriefed in writing, and either given credit or payment.

#### *Memory Coding Procedure*

All four experimenters independently coded five memories from the set. Afterwards, independent ratings were discussed among all four experimenters who came to a consensus. The consensus ratings were recorded for these five memories. After this initial practice set, each experimenter independently coded half of the memories. Two did one half, two did the other half. Discrepancies were discussed between the two experimenters and recoded according to consensus. In addition, all four experimenters

discussed a select group of memories because the second two experimenters had higher frequencies for the contamination and self-transforming positive categories. This set of memories was recoded after consensus of the four experimenters.

### *Coding Categories*

*Positive Self-Transformation.* For this classification, the experimenters rated the extent to which the memory included positive self-transforming qualities on a one to five scale. In this scale, a rating of one reflects no evidence of self-transformation. Ratings from two to five reflect the extent to which the event was transforming by considering the following factors used in Pals (2006): (1) the vividness and elaboration of the transformation being described, (2) the explicitness of the causal link between the event and transformation, (3) the inner depth or psychological richness of the transformation, (4) the subjective positive emotion conveyed by the transformation (a transformation that was completely negative was rated as 1, whereas a transformation that had a combination of positive and negative meaning was rated with respect to how positive it was), and (5) the psychological centrality of the transformation to an individual's current sense of self/identity. The following ratings for self-transforming classifications were used: (1) no evidence for self-transformation, (2) suggestive evidence; positive self-transformation implied but not explicit, (3) clear evidence for positive self-transformation, but it is not very vivid/causally integrated /deep/positive/central to self, (4) clear evidence for positive self-transformation; somewhat vivid/causally integrated/deep/positive/central to self, and (5) clear evidence for positive self-transformation; very vivid/causally integrated/deep/positive/central to self. The alpha inter-rater reliability between the first two experimenters was kappa = .73 for positive self-transformation in failure memories and

kappa = .83 for success memories. The alpha inter-rater reliability for the second two experimenters was kappa = .41 for positive self-transformation in failure memories and kappa = .16 for success memories.

*Evaluative sequencing.* Evaluative sequencing is a nominal category that relates to the overall tone of the memory (McAdams et al., 2001). Memories were classified as a predominantly positive, predominantly negative, a redemption sequence, a contamination sequence or unclassifiable. A memory was classified as a positive memory narrative if the memory was predominantly positive in emotional tone throughout the narrative, the past event was a positive experience, and any long-term impact or meaning attributed to the event was positive as well. A memory was classified as a negative memory narrative if the memory was predominantly negative in emotional tone throughout the narrative, the past event was a negative experience, and any long-term impact or meaning attributed to the event was negative as well.

Shifts in the tone of the memory were classified as redemption or contamination sequences based on McAdams et al. (2001). A memory was classified as a redemption sequence when the memory began with a negative emotional experience, but became emotionally positive in tone at the end. If a memory was classified as a redemption sequence, it was further coded for its level of redemption as 1) somewhat redemptive (weaker shift from negative to positive) or 2) very redemptive (clearer and stronger shift from negative to positive). The inter-rater reliability for level of redemption in failure memories was kappa = .95, and for success memories kappa = .96 for the first pair of experimenters. The inter-rater reliability for level of redemption in failure memories was kappa = .44 and for success memories kappa = .44 for the second pair of experimenters.

A memory was classified as a contamination sequence when the memory started out in a positive tone and turned into a negative tone (see example 3). In a contamination emotional sequence, the narrative pattern emphasizes that the event was somehow ruined or destroyed by a negative emotional event (see example 4). A memory was classified as unclassifiable if it was either too emotionally mixed throughout or too neutral or vague to classify it into any of the other emotional sequencing categories.

The inter-rater reliability for evaluative sequencing in failure memories was  $\kappa = .93$ , and for success memories  $\kappa = .80$  for the first pair of experimenters. For the second pair of experimenters evaluative sequencing inter-rater reliability for failure memories was  $\kappa = .50$  and  $\kappa = .47$  for success memories. The frequencies for evaluative sequencing in failure memories were: 1 all positive memory, 37 all negative memories, 25 redemption sequences, and 2 contamination sequences. The frequencies for evaluative sequencing in success memories were: 35 all positive memories, 2 all negative memories, 22 redemption sequences, and 6 contamination sequences.

*Autobiographical reasoning.* There are five main classifications of autobiographical reasoning: self-transforming, stable self-revealed, emotional connection to present self, autobiographical reasoning present, but difficult to characterize, and no evidence of autobiographical reasoning. With the exception of the positive self-transforming category, classifications were coded on a nominal scale with 0 indicating no evidence of a classification and 1 indicating presence of a classification. The classifications were not mutually exclusive.

A memory was classified as self-transforming if it described the person as changing in some way as a direct result of the event or its consequences. Self-

transforming events were sub-classified as either negative (e.g., This event made me decide that I should not major in math.), positive (e.g., Through this event I became more confident in my public speaking skills), or vague (e.g., It totally changed my outlook on life). The inter-rater reliability for self-transforming negative for the first two experimenters was kappa = 1.00 for failure memories, but could not be calculated for success memories. The inter-rater reliability for self-transforming negative for the second two experimenters for failure memories was kappa = .52 and could not be calculated for success memories.<sup>2</sup> The inter-rater reliability for self-transforming positive for the first two experimenters was kappa = .92 for failure memories and kappa = .73 for success memories. The inter-rater reliability for self-transforming positive for the second two experimenters was kappa = .67 for failure memories and kappa = .63 for success memories.

A memory was classified as a stable self-revealed memory if the event described, revealed, or demonstrated a characteristic that the person already had before the event (e.g., This event shows how smart I can be). A stable self-revealed memory shows a link to the self, but not a change in the self. Stable self-revealed memories were further sub-classified into stable self-revealed positive and stable self-revealed negative. Stable self-revealed negative memories relate a stable, negative link to the self (e.g., This event shows how dumb I can be), whereas positive stable self-revealed memories relate a stable, positive link to the self (e.g., This event shows how intelligent I am). The inter-

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<sup>2</sup> Some kappa values could not be calculated because one experimenter did not code for the presence of a category, but usually in these cases the second experimenter had coded for the presence of the category minimal times. Because we used every category for all the memories, some categories were more likely to be present in success or failure memories. Also, in some instances kappa values could not be calculated because neither experimenter coded for the presence of a category.

rater reliability for the first pair of experimenters for stable self-revealed negative was kappa = .90 for failure memories and could not be calculated for success memories. The inter-rater reliability for the second pair of experimenters for stable self-revealed negative was kappa = .53 for failure memories and could not be calculated for success memories. The inter-rater reliability for the first pair of experimenters for stable self-revealed positive could not be calculated for failure memories and was kappa = .53 for success memories. The inter-rater reliability for the second pair of experimenters for stable self-revealed positive for failure memories could not be calculated and was kappa = .37 for success memories.

A memory was classified as an emotional connection to the present self when the writer described how the past event currently makes him/her feel upon recalling the event. An emotional connection to present self was further sub-classified into present emotion negative and present emotion positive. A present emotion negative event makes the person experience negative emotions in the present as in feeling angry, guilty, or bad upon remembering the event (e.g., I feel upset, ashamed at my failure, angry that I couldn't have done better, and even a little depressed (Robins & Pals, 2002)). A present emotion positive event makes the person feel good in some way as in remembering an achievement and feeling proud upon recalling the memory (e.g., I look at my grades and am inspired to do well (Robins & Pals, 2002)). The inter-rater reliability for the first pair of experimenters for present emotion negative was kappa = 1.00 for failure memories and kappa = .65 for success memories. The inter-rater reliability for the second pair of experimenters for present emotion negative in failure memories was kappa = .35 and could not be calculated for success memories. The inter-rater reliability for the first pair

of experimenters for present emotion positive could not be calculated in failure memories, but was kappa = .84 for success memories. The inter-rater reliability for the second pair of experimenters for present emotion positive for failure memories could not be calculated and was kappa = .15 for success memories.

An event was categorized as “autobiographical reasoning present, but difficult to recognize”, if autobiographical reasoning was present, but could not be placed in any of the other categories. Within the category of autobiographical reasoning present, but difficult to recognize, memories were sub-categorized as positive, negative, or too vague to classify. The inter-rater reliability for the first pair of experimenters for autobiographical reasoning present, but difficult to categorize positive could not be calculated for failure or success memories. The inter-rater reliability for the first pair of experimenters for autobiographical reasoning present, but difficult to categorize negative was kappa = 1.00 for failure memories and could not be calculated for success memories. The inter-rater reliability for the second pair of experimenters for autobiographical reasoning present, but difficult to characterize negative could not be calculated for either success or failure memories. The inter-rater reliability for the first pair of experimenters for autobiographical reasoning present, but difficult to characterize positive could not be calculated for either success or failure memories. The inter-rater reliability for the second pair of experimenters for autobiographical reasoning present, but difficult to categorized positive could not be calculated in failure memories and was kappa = -.05 in success memories. The negative kappa value is due to the fact that there were so few memories that either experimenter put in this category, which made agreement more difficult to

attain. If no autobiographical reasoning was present in the memory, memories were classified as “no evidence of autobiographical reasoning in memory narrative”.

Effort, ability, and performance outcome were initially coded on a three point scale 1) theme not mentioned, 2) theme is mentioned, but not very developed, 3) theme is mentioned and is a central theme of the narrative. However, these three ratings were later collapsed and coded as either one or two to code for either the presence or absence of each theme.

*Effort.* Memories were coded for the evaluation of self in terms of effort with respect to four different, non-mutually exclusive themes: 1) effort contributes to success, 2) effort fails to contribute to success, 3) lack of effort contributes to undesired outcome, 4) lack of effort/successful anyway.

*Ability.* Memories were coded for the evaluation of self in terms of ability as a trait-like characteristic. Memories were coded for two, non-mutually exclusive themes: 1) positive evaluation of ability/attribution to high ability, 2) negative evaluation of ability/attribution to low ability.

*Performance.* Memories were coded for the participant’s evaluation of the performance outcome (e.g. the grade). Memories were coded for two non-mutually exclusive themes: 1) positive performance outcome, 2) negative performance outcome.

*Success and Failure Memory Follow-Up Questionnaires.* (See Appendix C).

The purpose of these questionnaires was to reinforce findings with respect to attributions, emotion, and gender stereotype threat that emerge in participants’ self-defining academic memories. It is also a measure that sheds light on elements of personality that are not written in the self-defining memory.

The questions within the questionnaire were aimed at addressing causal attributions, goals, emotions, and autobiographical reasoning with respect to the memory. The first question asked participants to state whether the self-defining memory was about a math or science experience, social science or humanities experience, or neither. With the exception of the first question, all items were rated on a 5-point scale from 1 (not at all) to 5 (very). Part one of the questionnaire (some adapted from Weiner as cited in Beyer, 1999) asked participants to rate the extent to which they currently experience emotions (e.g., anger, frustration, pride) in response to remembering the event. In addition, participants were asked questions aimed at addressing the extent to which they attributed the result of the memory to effort, ability, luck, and task difficulty (e.g., “To what extent do you attribute your success/failure experience to effort?”). One question also was aimed at addressing participants’ locus of control (i.e., “To what extent did you feel you had control over the outcome?”). This question was not used in our analysis. Two items asked the participants to rate the extent to which the goal of the event they described was a learning goal or performance goal (e.g., “To what extent was the goal of the event to perform well?”). Emotion questions attempted to gauge autobiographical reasoning as well as measure the level of positive or negative affect that the memory elicits (e.g., “Looking back, how does this make you feel about yourself now?”)

Part two items were different for the success and failure memories. For the success memories in part two, participants were asked to indicate how true various statements were pertaining to their behavior, emotions, and motivations with respect to the remembered event (e.g., I studied effectively, I am a very motivated student, I was proud of my accomplishment.). In addition, one question pertained to academic discipline

(e.g., I am good at [subject area]). For part two of the failure memories, participants were asked to evaluate the truth of statements such as “I did not have time to study”, “I am not a very motivated student”, and “I was disappointed in myself”. One question also pertained to academic discipline (e.g., I am not very good at [subject area].) Lasting thoughts and feelings elicited from the memory also serve as indicators of autobiographical reasoning. Both parts of the questionnaire asked the participant to rate the extent to which he/she currently feels good or bad about the event, the extent to which the event is self-defining, and the extent to which the event has positively or negatively changed the participant’s view of the self (e.g., This event is very self-defining—it says something important about me and my identity).

## *Results*

### *Hypothesis 1*

Hypothesis one postulated that the difference between entity and incremental theorists on positive self-transformation would be more pronounced in failure memories than in success memories. A 2 x 2 repeated measures ANOVA was run to examine the effects of implicit theory (entity, incremental) and memory type (success, failure) on positive self-transformation. Results revealed a main effect for memory type,  $F(1,63) = 13.84, p < .05$ . Not surprisingly, success memories had significantly more positive self-transformation ( $M = 2.95, SD = .13$ ) than failure memories ( $M = 2.28, SD = .15$ ). No main effect was found between entity theorists ( $M = 2.44, SD = .16$ ) and incremental theorists ( $M = 2.79, SD = .16$ ) for positive self-transformation,  $F(1,63) = 2.45, p > .05$ . A significant interaction was found between implicit theory and memory type,  $F(1,63) = 3.96, p < .05$ . Incremental theorists showed a greater difference in positive self-

transformation between success ( $M = 3.30, SD = .19$ ) and failure ( $M = 2.27, SD = .22$ ) memory type compared to entity theorists (success,  $M = 2.59, SD = .19$  and failure,  $M = 2.28, SD = .22$ ). Although our findings do not coincide with our hypothesis that the difference between implicit theory on positive self-transformation would be more pronounced in failure memories, they do reveal an important interaction effect (see figure 1).

An independent samples t-test was conducted with the implicit theory median split to test whether there was a significant difference in positive self-transformation between entity and incremental theorists in success memories. As predicted, the results revealed a significant difference in positive self-transformation for success memories,  $t(63) = -.2.68, p < .05$ . Incremental theorists had more positive self-transformation ( $M = 3.30, SD = 1.11$ ) than entity theorists ( $M = 2.59, SD = 1.02$ ) in success memories.

An independent samples t-test was also conducted with the implicit theory median split to test whether there was a significant difference in positive-self-transformation between entity ( $M = 2.28, SD = 1.28$ ) and incremental ( $M = 2.27, SD = 1.20$ ) theorists in failure memories. Contrary to our prediction, the difference was not significant,  $t(63) = .03, p > .05$ .

Hypothesis one postulated that implicit theory would be a predictor of positive self-transformation and level of redemption in the self-defining memories. A Pearson correlation was calculated to investigate the relationship between implicit theory (entity and incremental) and positive self-transformation in both success and failure memories. Contrary to our prediction, a weak correlation that was not significant was found between implicit theory and positive self-transformation in success memories,  $r = .13, p > .05$ , and

in failure memories,  $r = .04$ ,  $p > .05$ . Another Pearson correlation was run to examine the relationship between implicit theory and level of redemption in both success and failure memories. Contrary to our prediction, a weak correlation that was not significant was found between implicit theory and level of redemption in success memories,  $r = .07$ ,  $p > .05$ , and in failure memories  $r = .08$ ,  $p > .05$ . These findings suggest that implicit theory is not related to positive self-transformation and level of redemption in success and failure memories.

Additional Pearson correlations were run to examine the association between implicit theory with respect to positive emotion, negative emotion, positive autobiographical reasoning, and negative autobiographical reasoning for success and failure memories. Results yielded no significant correlations for any of these analyses.

Because our results suggest that implicit theory may not be the best predictor of self-transformation in failure memories, we decided to examine self-esteem. There was a significant correlation between self-esteem and level of redemption in failure memories,  $r = .37$ ,  $p < .01$ , and success memories,  $r = .31$ ,  $p < .05$ . In addition, there was a significant correlation between self-esteem and positive self-transformation in failure memories,  $r = .31$ ,  $p < .05$  and in success memories,  $r = .31$ ,  $p < .05$ .

Independent samples t-tests were run to examine whether individuals with high self-esteem would have more positive self-transformation than individuals with low self-esteem in success and failure memories. Results revealed that individuals with high self-esteem ( $M = 3.30$ ,  $SD = 1.10$ ) had more positive self-transformation than individuals with low self-esteem ( $M = 2.62$ ,  $SD = 1.10$ ),  $t(63) = -2.54$ ,  $p < .05$  in success memories. Individuals with high self-esteem ( $M = 2.61$ ,  $SD = 1.34$ ) also had more positive self-

transformation than individuals with low self-esteem ( $M = 1.95, SD = 1.04$ ) in failure memories,  $t(63) = -2.20, p < .05$ . Thus, these findings suggest that self-esteem might be a better predictor of positive self-transformation than implicit theory.

### *Hypothesis 2*

Hypothesis two was based on the assumption that women would have higher academic contingent self-worth than men. Contrary to prediction, an independent sample t-test revealed that there was no difference between women ( $M = 3.68, SD = .85$ ) and men ( $M = 3.84, SD = .84$ ) on a academic contingent self-worth,  $t(63) = -.76, p > .05$ . However, an independent sample t-test revealed that women have lower self-esteem ( $M = 3.50, SD = .28$ ) than men ( $M = 3.64, SD = .26$ ),  $t(63) = 2.00, p < .05$ .

A 2 x 2 factorial ANOVA was run to test whether there was an interaction effect between gender and contingent self-worth on positive self-transformation for failure memories. Results revealed no significant main effects or interaction effect. A 2 x 2 factorial ANOVA was run to see if there was an interaction effect between contingent self-worth and gender on positive self-transformation for success memories. There was no main effect of contingent self-worth, but there was a surprising interaction effect between gender and contingent self-worth,  $F(1,61) = 5.60, p < .05$  (see figure 2). Males with low contingent self-worth ( $M = 2.59, SD = .33$ ) had less positive self-transformation than males with high contingent self worth ( $M = 3.35, SD = .27$ ). Females with low contingent self-worth had more positive self-transformation ( $M = 3.18, SD = .27$ ) than females with high contingent self-worth ( $M = 2.63, SD = .24$ ).

A 2x 2 factorial ANOVA was run to examine the effect of contingent self-worth and implicit theory on positive self transformation in success memories. There was no

significant difference between those with high academic contingent self-worth ( $M = 3.08$ ,  $SD = .20$ ) and those with low academic contingent self-worth, ( $M = 2.93$ ,  $SD = .17$ ) on positive self-transformation in success memories,  $F(1,61) = .10$ ,  $p > .05$ . There was a main effect for implicit theory,  $F(1,61) = 8.90$ ,  $p < .05$ . Incremental theorists had more positive self-transformation ( $M = 3.41$ ,  $SD = .20$ ) than entity theorists ( $M = 2.60$ ,  $SD = .19$ ). There was an interaction effect between contingent self-worth and implicit theory which approached significance,  $F(1,61) = 3.18$ ,  $p < .05$ . Entity theorists with high academic contingent self-worth had more positive self-transformation ( $M = 2.77$ ,  $SD = .32$ ) than entity theorists with low academic contingent self-worth ( $M = 2.44$ ,  $SD = .26$ ). Incremental theorists with low academic contingent self-worth had more positive self-transformation ( $M = 3.73$ ,  $SD = .32$ ) than incremental theorists with high academic contingent self-worth ( $M = 3.09$ ,  $SD = .23$ ).

Independent samples t-tests were run to examine whether there was a significant difference in positive self-transformation between entity and incremental theorists with low academic contingent self-worth in success memories. Results revealed that incremental theorists with low academic contingent self-worth ( $M = 3.73$ ,  $SD = 1.01$ ) had more positive self-transformation than entity theorists with low academic contingent self-worth ( $M = 2.44$ ,  $SD = .85$ ),  $t(26) = -3.65$ ,  $p < .05$ . Another independent samples t-test was run to investigate whether there was a significant difference in positive self-transformation between entity and incremental theorists with high academic contingent self-worth in success memories. However, there was no significant difference between entity theorists with high academic contingent self-worth ( $M = 2.77$ ,  $SD = 1.19$ ) and

incremental theorists with high academic contingent self-worth ( $M = 3.09$ ,  $SD = 1.12$ ),  $t(35) = -.84$ ,  $p > .05$ .

A 2 x 2 factorial ANOVA was also run to examine the effect of contingent self-worth and implicit theory in failure memories, but yielded no significant main effects or interaction effect.

Hypothesis two postulated an interaction effect between gender and implicit theory in which the difference in autobiographical reasoning between entity and incremental theorists would be more pronounced for females in failure memories. A 2 x 2 factorial ANOVA examined the effects of implicit theory (entity and incremental) and gender (male, female) on positive self-transformation for failure memories. There was no significant difference on positive self-transformation autobiographical reasoning in male ( $M = 2.4$ ,  $SD = 2.38$ ) and female ( $M = 2.20$ ,  $SD = .21$ ) failure memories,  $F(1,61) = .78$ ,  $p > .05$ . There was also no significant main effect with respect to positive self-transformation between entity ( $M = 2.28$ ,  $SD = .22$ ) and incremental ( $M = 2.32$ ,  $SD = .22$ ) theorists in their self-defining memories,  $F(1,61) = .03$ ,  $p > .05$ . Contrary to prediction, results yielded no significant interaction effect between gender and implicit theory for failure memories,  $F(1,61) = .55$ ,  $p > .05$ .

Another 2 x 2 factorial ANOVA examined the effect of implicit theory based on the median split (entity and incremental) and gender (male, female) on positive self-transformation for success memories. There was no significant difference in positive self-transformation between males ( $M = 3.09$ ,  $SD = .20$ ) and females ( $M = 2.85$ ,  $SD = .18$ ) in success memories,  $F(1,61) = .74$ ,  $p > .05$ . Consistent with previous analysis, there was a significant main effect found for implicit theory, such that incremental theorists ( $M =$

3.34,  $SD = .19$ ) exhibited more positive self-transformation in their success memories than entity theorists ( $M = 2.60$ ,  $SD = .19$ ),  $F(1,61) = 7.68$ ,  $p < .05$ . However, as with failure, there was also no significant interaction effect for gender and implicit theory for success memories,  $F(1,61) = .34$ ,  $p > .05$ .

We also investigated whether gender moderated the effects of implicit theory on negative autobiographical reasoning, specifically examining the self as negatively changed by failure. It was predicted that female entity theorists would have the most negative autobiographical reasoning. A 2 x 2 factorial ANOVA was used to study the effect of gender (male, female) and implicit theory (entity, incremental) on self-transforming negative autobiographical reasoning in failure memories. There was no significant difference on self-transforming negative autobiographical reasoning between males ( $M = .14$ ,  $SD = .06$ ) and females ( $M = .09$ ,  $SD = .05$ ) for failure memories,  $F(1,61) = .32$ ,  $p > .05$ . There was also no significant difference on self-transforming negative autobiographical reasoning between entity ( $M = .16$ ,  $SD = .06$ ) and incremental theorists ( $M = .08$ ,  $SD = .06$ ) for failure memories,  $F(1,61) = .63$ ,  $p > .05$ . No significant interaction between gender and implicit theory was found for failure memories  $F(1,61) = 1.59$ ,  $p > .05$ .

In order to further explore the possibility that implicit theories may relate to autobiographical reasoning differently for men and women, a battery of independent samples t-tests were run separately by gender to compare entity and incremental theorists (based on the median split) with respect to level of redemption, positive self-transformation, stable-self negative, stable-self positive, self-transforming positive, level of redemption, positive self-transformation, positive emotion, and negative emotion

elicited in self-defining success and failure memories. The first set of t-tests highlights differences between entity and incremental theorists that are unique to men only. An independent samples t-test revealed a significant difference between male entity and incremental theorists on level of redemption in self-defining success memories,  $t(26) = -1.82, p < .05$ . Male incremental theorists had a significantly higher level of redemption ( $M = .54, SD = .78$ ) than male entity theorists ( $M = .13, SD = .35$ ). There was a significant difference between male entity and incremental theorists on positive self-transformation in success memories,  $t(26) = -2.28, p < .05$ . Male incremental theorists had significantly more positive self-transformation ( $M = 3.54, SD = .92$ ) than male entity theorists ( $M = 2.63, SD = 1.14$ ).

The following t-test reflects a difference between entity and incremental theorists that is unique to women only. In support of hypothesis two, results revealed a significant difference between female entity and incremental theorists on self-transforming negative autobiographical reasoning in failure memories,  $t(35) = 2.01, p = .05$ . As predicted, female entity theorists had significantly more self-transforming negative autobiographical reasoning ( $M = .18, SD = .39$ ) than female incremental theorists ( $M = 0, SD = 0$ ).

The following set of t-tests reflects differences between entity and incremental theorists that are similar across men and women. A significant difference was found between male entity and incremental theorists with respect to self-transforming positive autobiographical reasoning in success memories,  $t(26) = -2.04, p = .05$ . Male incremental theorists had significantly more self-transforming positive autobiographical reasoning ( $M = .92, SD = .28$ ) than male entity theorists ( $M = .60, SD = .51$ ). Similar to men, a significant difference was found between female entity and incremental theorists with

respect to self-transforming positive autobiographical reasoning in success memories,  $t(35) = -2.16, p < .05$ . Female incremental theorists had more self-transforming positive autobiographical reasoning ( $M = .75, SD = .44$ ) than female entity theorists ( $M = .41, SD = .51$ ) (see figure 3).

### *Hypothesis 3*

Hypothesis three predicted gender differences with respect to attributions of success and failure in academic self-defining memories. Some significant gender differences were found with respect to effort and ability within the self-defining memories. These findings are summarized in table 1.

In addition, independent samples-t-tests were run to assess gender differences in effort and ability in the follow-up questionnaire. Consistent with hypothesis three, women ( $M = 4.53, SD = .85$ ) were more likely to rate the item: “To what extent do you attribute your success to effort?” higher than men ( $M = 3.89, SD = 1.23$ ),  $t(63) = 2.27, p < .05$ . There was also a significant difference between men and women on their ratings of the item: “To what extent do you attribute your success to ability?”,  $t(62) = 2.30, p < .05$ . Men made more attributions to ability for success memories ( $M = 4.36, SD = .62$ ) than women ( $M = 3.97, SD = .70$ ).

Independent samples t-tests also revealed significant gender differences for effort and ability on the follow up questionnaire for failure memories. There was a significant difference between men and women on their rating of the item: “To what extent do you attribute your failure to effort?”,  $t(63) = 2.27, p < .05$ . Men were more likely to attribute their failures to effort ( $M = 3.75, SD = 1.24$ ) than women ( $M = 3.00, SD = 1.37$ ). There was also a significant difference between men and women on their rating of the item: “To

what extent do you attribute your failure to ability?”,  $t(63) = -2.31, p < .05$ . As predicted, women were more likely to attribute their failures to ability ( $M = 3.05, SD = 1.05$ ) than men ( $M = 2.39, SD = 1.26$ ).

Hypothesis three predicted that gender differences in attributions might elicit gender differences in autobiographical reasoning in self-defining memories. A battery of independent samples t-tests were run to compare gender with respect to level of redemption, positive self-transformation, stable-self negative, stable-self positive, self-transforming positive, level of redemption, positive self-transformation, positive emotion, and negative emotion elicited in self-defining success and failure memories. Contrary to prediction, results yielded no significant findings in these domains.

Hypothesis three also postulated that men and women would exhibit gender differences in goal orientation (learning and performance) and response styles (helpless or mastery) in success and failure memories. Independent samples t-tests were conducted to compare men's and women's responses on the follow-up questionnaire. Results revealed a significant gender difference in response to the item: “To what extent was the goal of the event to perform well?” for failure memories,  $t(63) = -2.07, p < .05$ . Women were more likely to have performance goals ( $M = 4.57, SD = .60$ ) than men ( $M = 4.11, SD = 1.17$ ) for the events they recalled for failure memories. However, there was no significant gender difference in response to this same item for success memories,  $t(62) = -.83, p > .05$  (men,  $M = 4.25, SD = .84$ , women,  $M = 4.44, SD = .10$ ). There was no significant gender difference in response to the item: “To what extent was the goal of the event to learn something new?” in failure memories,  $t(63) = -.52, p > .05$ , (men,  $M = 2.82,$

$SD = 1.49$ , women,  $M = 3.00$ ,  $SD = 1.27$ ), or in success memories,  $t(62) = -.02$ ,  $p > .05$  (men,  $M = 3.21$ ,  $SD = 1.32$ , women,  $M = 3.22$ ,  $SD = 1.36$ ).

Contrary to prediction, there was no significant difference in self-report measures of response style. Results revealed that there was no significant gender difference in response to the item: “To what extent has the event encouraged you to try harder?” in failure memories,  $t(62) = -.91$ ,  $p > .05$  (men,  $M = 3.30$ ,  $SD = 1.44$ , women,  $M = 3.62$ ,  $SD = 1.40$ ), or in success memories,  $t(62) = -1.47$ ,  $p > .05$ .

#### *Hypothesis 4*

Hypothesis four predicted that women would express more doubt in their ability in natural science disciplines after a failure than men, but that this gender difference would not be prevalent in humanities disciplines. The predicted interaction effect between academic discipline and gender in failure memories was tested with a 2 x 2 factorial ANOVA which examined the effects of discipline (natural sciences, humanities/social sciences) and gender (male, female) on endorsement of the follow up questionnaire item: “I am not very good at [subject area].” Contrary to prediction, there was not a significant difference on ratings of this item between men ( $M = 2.74$ ,  $SD = .33$ ) and women ( $M = 3.07$ ,  $SD = .26$ ),  $F(1,51) = .62$ ,  $p > .05$ . There was also no difference on ratings of this item with respect to subject matter (natural science  $M = 3.18$ ,  $SD = .28$ , humanities/social sciences  $M = 2.62$ ,  $SD = .31$ ),  $F(1,51) = 1.77$ ,  $p > .05$ . No significant interaction was found between gender and discipline,  $F(1,51) = .22$ ,  $p > .05$ .

Independent samples t-tests were run to examine whether there was a significant difference between the extent to which women and men endorsed items on the follow-up questionnaire that expressed doubt about ability and negative feelings toward the self

after failure memories in natural science disciplines. Results revealed that there was no significant difference between men ( $M = 2.92$ ,  $SD = 1.31$ ) and women ( $M = 3.44$ ,  $SD = 1.42$ ) on their ratings of the item “I am not very good at [subject area]” for a failure in a natural science discipline,  $t(28) = -1.03$ ,  $p > .05$ . Results also showed no significant difference between men ( $M = 2.56$ ,  $SD = 1.94$ ) and women ( $M = 2.69$ ,  $SD = 1.45$ ) for the same item in a failure in humanities/social sciences discipline,  $t(23) = -.193$ ,  $p > .05$ . There was also no significant difference on endorsement of the item “Thinking about this event makes me feel bad about myself,” for failure memories in the natural sciences between men ( $M = 3.38$ ,  $SD = 1.26$ ) and women ( $M = 3.39$ ,  $SD = 1.09$ ),  $t(29) = -.01$ ,  $p > .05$ . There was also no significant difference on this same item for failure memories in humanities/social sciences between men ( $M = 2.44$ ,  $SD = 1.13$ ) and women ( $M = 2.81$ ,  $SD = .83$ ),  $t(23) = -.932$ ,  $p > .05$ . Results also showed no significant difference between men ( $M = 2.62$ ,  $SD = 1.19$ ) and women ( $M = 2.83$ ,  $SD = 1.38$ ) on their ratings of the item: “My view of myself has been negatively changed as a result of this event,” for failure memories in natural sciences,  $t(29) = -.46$ ,  $p > .05$ . There was no significant difference on this same item for failure memories in humanities/social sciences between men ( $M = 2$ ,  $SD = 1.23$ ) and women ( $M = 2.31$ ,  $SD = .87$ ),  $t(23) = -.93$ ,  $p > .05$ .

An independent samples t-test revealed that there was a significant difference between natural sciences and humanities/social science memories with respect to endorsement of the item pertaining to the self-defining memory: “Thinking about this event makes me feel bad about myself.”,  $t(54) = 2.48$ ,  $p < .05$ . Thus participants who wrote about failures in natural sciences, were more likely to rate this statement higher

( $M = 3.39$ ,  $SD = 1.15$ ) than participants who wrote about failures in humanities or social sciences ( $M = 2.68$ ,  $SD = .95$ ).

In addition, an independent samples t-test revealed that there was a marginally significant difference between natural sciences and humanities/social sciences memories with respect to the endorsement of the item pertaining to the self-defining memory: “My view of myself has been negatively changed as a result of this event.”,  $t(54) = 1.723$ ,  $p = .09$ . Participants who wrote about natural science memories rated this item higher ( $M = 2.74$ ,  $SD = 1.29$ ) than participants who wrote about memories in social sciences/humanities ( $M = 2.20$ ,  $SD = 1.00$ ). Thus, these findings suggest that negative self-feelings and doubting one’s ability were not related to gender, but rather to discipline with participants feeling more negatively about failures in natural sciences than humanities/social sciences (see figure 4).

In addition, hypothesis four predicted that female entity theorists would exhibit more doubts about their abilities in natural sciences than female incremental theorists. An independent samples t-test was run to examine the difference between women incremental theorists and women entity theorists in response to the item: “Thinking about this even makes me feel bad about myself.” Contrary to prediction, there was no significant difference between female entity theorists ( $M = 3.00$ ,  $SD = 1.10$ ) and female incremental theorist ( $M = 3.58$ ,  $SD = 1.08$ ) on their ratings of this item,  $t(16) = -1.07$ ,  $p > .05$ . Another independent samples t-test was also run to examine whether there was a difference between female incremental and entity theorists on their ratings of the item: “My view of myself has been negatively changed as a result of this event.” Contrary to prediction, there was no significant difference between female entity theorists ( $M = 2.67$ ,

$SD = 1.03$ ) and female incremental theorists ( $M = 2.92$ ,  $SD = 1.56$ ),  $t(16) = -.35$ ,  $p > .05$ .

Although our prediction was not supported, these results should also be regarded with caution given our small sample size of women who reported natural science failure memories ( $N = 6$  for entity theorists and  $N = 12$  for incremental theorists).

### *Discussion*

#### *Findings*

The first hypothesis was partially supported because we found that incremental theorists exhibited more positive self-transformation in their success memories than entity theorists. However, contrary to our prediction, this pattern was not true in failure memories. It is unclear from our results why implicit theory only made a difference in success memories.

One explanation is suggested by the implicit theory and contingent self-worth interaction effect which showed that incremental theorists low in academic contingent self-worth had the most positive self-transformation in success memories. Thus, it may be the case that incremental theorists who do not base their self-worth on academics are able to experience positive growth from their success memories because their source of self-worth is derived from other domains. However, this pattern does not hold true for entity theorists in success memories. Entity theorists with low academic contingent self-worth had less positive self-transformation than entity theorists with high academic self-worth. Thus, perhaps individuals who are incremental theorists with low academic contingent self-worth are the healthiest, and thus exhibit the most positive self-transformation.

One reason that we may not have found an effect of implicit theory on positive self-transformation in failure memories is that participants were asked to think of a

memory that was at least six months old. It is likely that one's implicit theory mindset may influence the way one perceives failure at the time of the incident, but given the time between the occurrence of the event and the participant's reflection of the event in the self-defining memory, it is likely that one's mindset may have shifted and the event may be perceived differently. Therefore, perhaps one's implicit theory mindset might be more salient for events that have recently occurred. Therefore, if we had asked for more recent memories, perhaps we would have seen a significant difference in positive self-transformation between entity and incremental theorists in failure memories. Maybe people tend to remember successes and positive memories more easily than failure memories for which implicit theory is likely to have an enduring influence on how the event is perceived. Consequently, this explanation might have implications for why there was a difference in positive self-transformation between entity and incremental theorists for success memories, but not failure memories.

Another explanation for this phenomenon might be due to the fact that our study does not control for the degree of severity in failure memories. Because participants are allowed to select a failure experience, some may have chosen their worst and most salient failures that had significant implications, whereas others may have chosen more small scale failures, or failures in elementary school that have less important implications for the future. Perhaps these differences created some noise in the data and consequently affected participants' autobiographical reasoning patterns. Therefore, our study was limited in that we only asked for one success memory and one failure memory from each participant. However, if each participant had provided multiple failure memories, perhaps

we would have found a significant difference in positive self-transformation between entity and incremental theorists in failure memories.

One reason that few differences between entity and incremental theorists were found with respect to autobiographical reasoning might be that the implicit theories of intelligence scale does not accurately reflect one's goal orientation or response patterns. The way the questions on the scale are phrased might be problematic because the word "intelligence" suggests a fixed attribute. For example, the statement "Your intelligence is something about you that you can't change very much," is true in that genetics does play a large role in our intellectual capabilities. So therefore, a participant might endorse this entity statement in acknowledgement of the role of genetics, but exhibit learning goals and a mastery response pattern typical of an incremental theorist. Perhaps the question might be more valid if the word "skill", a more malleable quality that could be learned or acquired replaced intelligence. Thus, implicit theory beliefs as measured by this scale may not be a valid measure of our goal orientation, response pattern, or autobiographical reasoning patterns about our experiences.

In addition, the fact that implicit theory only affected transformational processing in success memories may be due to social factors such as the emphasis on success and growth that are accentuated by the academic environment at Haverford and Bryn Mawr. Previous literature has focused primarily on failure memories and negative experiences. Therefore, there is a need for more research on success narratives with a more diverse sample.

Our results suggest that implicit theory is not a good predictor of autobiographical reasoning patterns such as transformational processing in failure memories and level of

redemption in both success and failure memories. One explanation for this is that other variables such as self-esteem might be affecting positive self-transformation. We found that individuals with high self-esteem exhibited more positive self-transformation than individuals with low self-esteem in both success and failure memories. Thus, these findings suggest that perhaps self-esteem is a better predictor of self-transformation than implicit theory. However, it is likely that other variables in addition to self-esteem, academic contingent self-worth, and implicit theory affect positive self-transformation.

Both gender perspectives two and three were based on the assumption that women would have higher academic contingent self-worth than men. However, our results revealed no gender difference in academic contingent self-worth. This result is particularly surprising because it does not replicate previous findings of gender differences (Crocker et al., 2003). We found that incremental theorists with low academic contingent self-worth had more positive self-transformation than incremental theorists with high academic contingent self-worth in success memories, but not failure memories.

Contrary to our predictions, there were no gender differences between male and female entity and incremental theorists with respect to positive self-transformation. However, the second hypothesis was somewhat supported by predicted gender differences in autobiographical reasoning. More specifically, when looking at differences in specific categories of autobiographical reasoning for entity and incremental theorists separately for men and women, female entity theorists showed significantly more self-transforming negative autobiographical reasoning than female incremental theorists. In addition, female incremental theorists had more self-transforming positive autobiographical reasoning than female entity theorists. However, results also showed

that male incremental theorists had a higher level of redemption, more positive self-transformation, and more positive autobiographical reasoning than male entity theorists. Thus, contrary to our prediction, more pronounced gender differences seemed to be more prevalent between male entity and incremental theorists than between female entity and incremental theorists.

The second gender perspective assumed that women and men would make different attributions to effort and ability in success and failure memories. Our results showed that women were more likely to attribute success to effort on the follow-up questionnaire, whereas men were more likely to attribute their successes to ability. As supported by hypothesis three, men were more likely to attribute their failures to effort than women on the follow-up questionnaire. Thus, these findings replicate the attributions found in previous research (Beyer 1998/1999).

However, hypothesis three went a step further to postulate that due to these differences in attributions, these differences might have elicited differences in entity and incremental response patterns in success and failure memories. However, contrary to prediction, there were few gender differences with respect to autobiographical reasoning that were linked to gender differences in attributions. In addition, hypothesis three postulated gender differences in entity and incremental response patterns specifically for success and failure memories. As predicted, we found that women were more likely to report having performance goals for failure memories. However there were no other gender differences with respect to learning goal orientation. In addition, there were no gender differences with respect to self-report measures of eliciting a helpless or mastery response pattern in the follow up questionnaire.

Although there may be some gender differences with respect to attributions of effort and ability, these differences are related neither to autobiographical reasoning in self-defining memories, nor to entity and incremental response patterns. Neither gender perspective two or three seems to fit the findings from our study. Our findings suggest that differences in gender attributions cannot be mapped onto adoption of implicit response patterns and that implicit theory may not be the best predictor of autobiographical reasoning patterns. Thus, as suggested earlier, these differences are more likely due to other factors such as self-esteem rather than gender.

Contrary to our hypothesis, women were not more likely to report doubt in their ability or report feeling more negatively about themselves than men in memories pertaining to the natural science domain. Our prediction that women entity theorists would be more affected by negative stereotype threat than women incremental theorists was also not supported, but this finding should be regarded with caution due to an extremely small sample. However, our findings suggest that both men and women are more likely to report more negative feelings about the self after a failure in a natural science than in a social science/humanities discipline. However, it may be that no gender differences were found because we did not present a gender stereotype threat in our study. However another explanation may be that such stereotypes are becoming less prevalent in our society as women have been becoming more actively involved in natural science disciplines.

### *Limitations*

Our study was limited in that we had a rather unique sample in which the population of our sample had overall high self-esteem and high academic contingent self-

worth. Previous research has shown that women tend to score higher on academic contingent self-worth (Crocker et al.,2003), yet this was not the case with our sample. Thus, our findings may be somewhat attributable to the homogeneity of our sample.

In addition, because each pair of coders only coded and discussed discrepancies for half of the memories, there may have been some inconsistencies between the two pairs of coders. However, efforts were made to eliminate these inconsistencies by having all experimenters code and discuss five memories together as a practice set.

### *Conclusion*

The implications of our findings suggest that self-esteem is probably a better predictor of how people perceive their academic successes and failures than implicit theory. Thus, our findings suggest that individuals with higher self-esteem are more likely to take their failures in stride, take pleasure in success, and exhibit more transformational processing in both success and failure experiences. Consequently, this suggests that individuals with higher self-esteem may have a more positive outlook on their experiences and therefore experience greater health and well-being.

However, the fact that our sample has high self-esteem according to the Rosenberg self-esteem scale suggests that our sample has high explicit self-esteem. However, previous research suggests that those with high self-esteem may also have unstable self-esteem if self-esteem is based on external factors such as performance and views of peers (Tracy & Robins, 2003). Research also suggests that ideals of perfectionism can lead children to feel rejection and humiliation in failure situations and can consequently lead to dissociated representations of the self (Tracy & Robins, 2003). Thus, these dissociations may allow an individual to report having high explicit self-

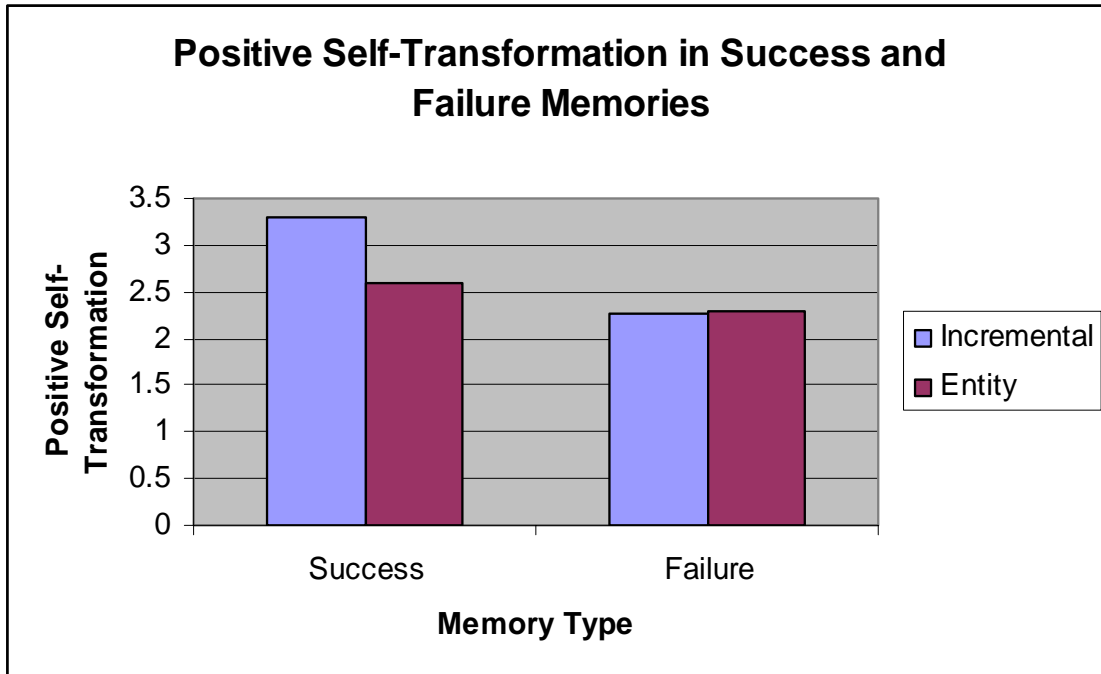
esteem, though the individual may have more negative self representations at the implicit level, making the individual particularly vulnerable to threats of self-worth. Therefore, further research should investigate different types of self-esteem and the ways in which they may affect thoughts and feelings about the self in success and failure situations. More specific research should be done to ascertain whether there is a difference in positive self-transformation between individuals with high explicit self-esteem, but low implicit self-esteem and individuals with high explicit and high implicit self-esteem.

Although our study only examined thoughts about the self, it would be interesting for future research to examine the ways in which our successes and failures influence our thoughts and perceptions of others. Jordan, Spencer, & Zanna, 2005 found that after receiving a self-esteem threat (e.g. negative performance feedback on a test), participants with high explicit, but low implicit self-esteem were more biased against out-groups when deciding on a punishment for either a Canadian or Native American student. However, participants with high explicit and high implicit self-esteem gave more equitable punishments to the Native American and Canadian student (Jordan et al., 2005). Our research primarily focused on thoughts about the self. It would be interesting to pursue whether entity theorists with high explicit and low implicit self-esteem might be more vulnerable to negative thoughts about others when faced with a self-esteem threat such as an academic failure. Jordan et al. (2005) examined thoughts targeted at ethnic out-groups. However, research should also explore feelings toward groups such as students, peers, professors, and administration and how these negative feelings toward others may relate to one's view of the self.

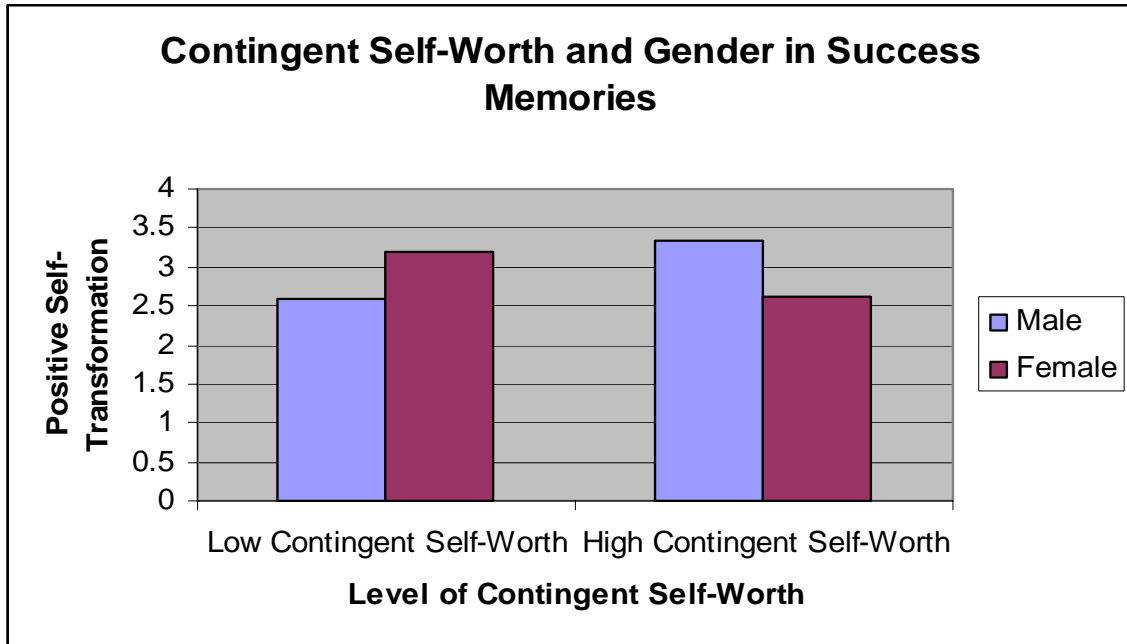
Although research should continue to explore gender differences with respect to perceptions of the self in success and failure situations, it seems that there are more individual differences within gender based on other variables. More research is needed to investigate the effect of contingent self-worth, self-esteem, and other variables that are associated with positive self-transformation and growth in self-defining memories.

Results of our study suggest that failures in natural sciences elicit negative feelings toward the self more than failures in social sciences/humanities. Therefore, educators in natural science disciplines should be aware of the negative impact a failure can have on their students. However, all educators should know that students with high self-esteem will be able to cope with failure in a healthier manner and grow from it more than those with low self-esteem.

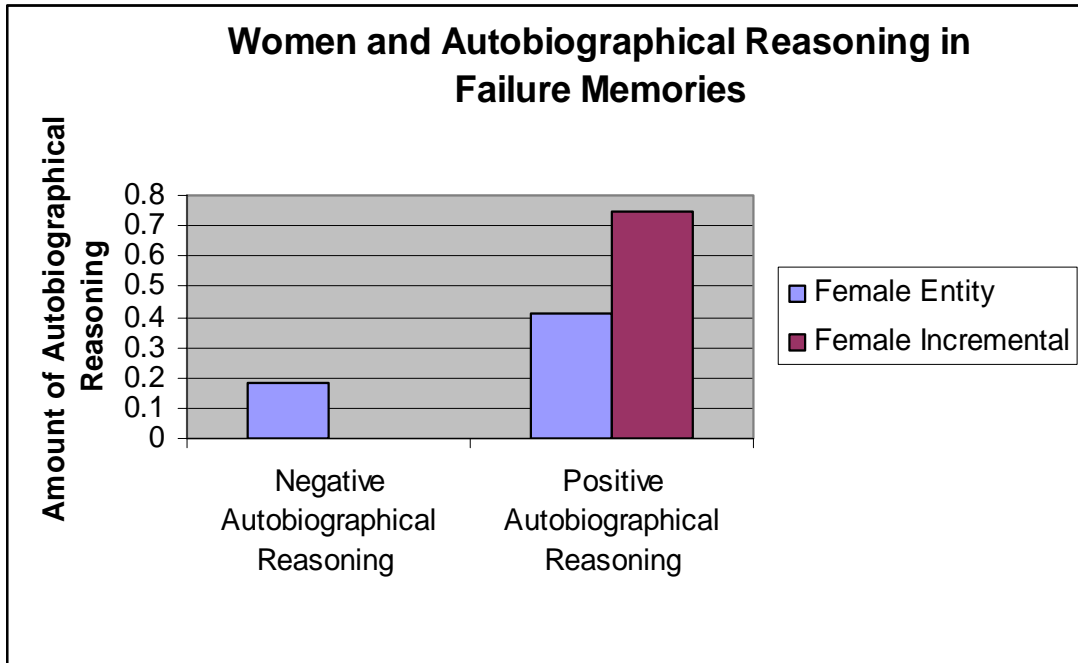
Our research focused on perceptions of the self with respect to academic identity. However, future research should explore the effect of self-esteem and how it affects perceptions of the self in success and failure situations in other identity domains. Other identity domains for future study might include sports teams, school clubs, or work environment.



**Figure 1.** Interaction effect of implicit theory and memory type.



**Figure 2.** Interaction effect between gender and contingent self-worth on positive self-transformation.



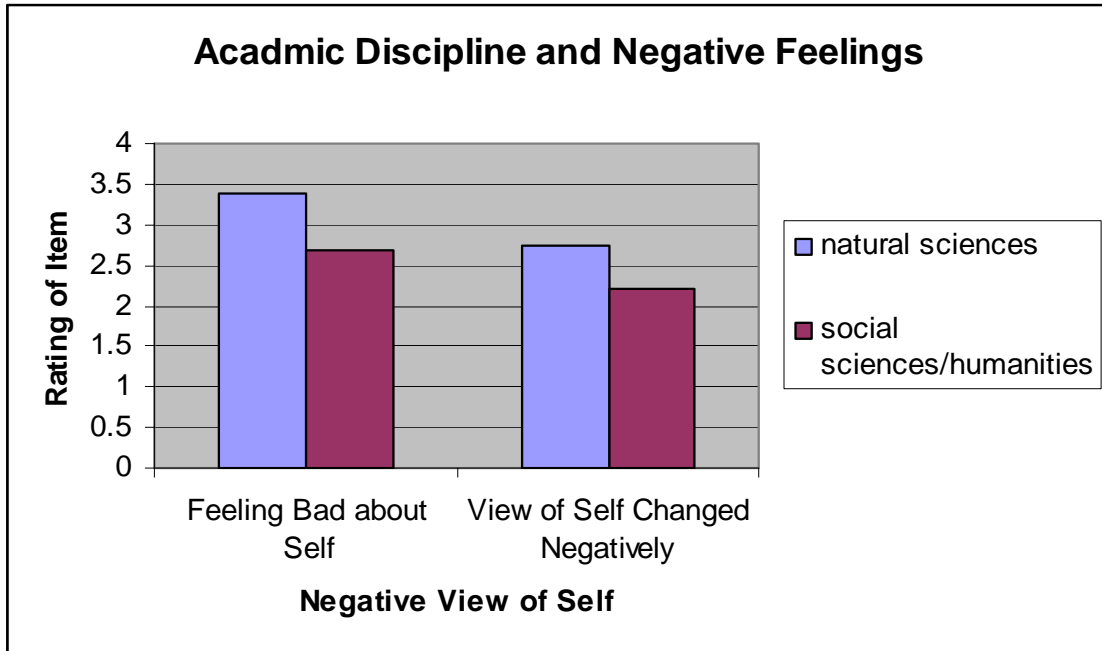
**Figure 3.** Difference in autobiographical reasoning patterns for female entity and incremental theorists in failure memories.

**Table 1. Gender and Attributions**

	Success			Failure		
	Male	Female	T-value	Male	Female	T-value
<b>Effort for Memories</b>						
Effort contributes to Success	1.54 (.51)	1.73 (.45)	-1.63	1.00 (0.0)	1.03 (.16)	-.87
Effort fails to contribute to Success	1.00 (0.0)	1.00 (0.0)	-----	1.18 (.39)	1.32 (.48)	-1.32
Lack of effort contributes to Undesired outcome	1.00 (0.0)	1.00 (0.0)	-----	1.54 (.51)	1.32 (.48)	*1.73
Lack of Effort/ Successful Anyway	1.07 (.26)	1.08 (.28)	-.14	1.18 (.39)	1.00 (0.0)	**2.79
<b>Ability for Memories</b>						
Positive Evaluation/ Attribution to high ability	1.61 (.50)	1.39 (.49)	*1.75	1.21 (.42)	1.05 (.230)	**1.98
Negative Evaluation/ Attribution to low ability	1.04 (.19)	1.16 (.37)	-1.64	1.36 (.49)	1.54 (.51)	-1.47

\*marginally significant ( $p > .05 < .10$ )

\*\* significant  $p < .05$



**Figure 4.** Negative feelings of self according to academic discipline.

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## **Appendix A: Recruitment Posting (to be posted on the “Go boards”)**

**Self-defining Memory Study** – make \$10 and get entered into a \$50 lottery for completing a two-part questionnaire!

We are looking for male and female students of any year who would be willing to complete a two-part questionnaire. In this study, you will be asked to:

- 1) Complete Part 1 of the questionnaire on-line. This part will take about 15 minutes.
- 2) Come to our lab in Sharpless Hall at a scheduled time of your convenience and complete Part 2 of the questionnaire. This part will take about 30 minutes and will involve typing two narratives, one about a memory of an academic success and one about a memory of an academic failure. Upon your completion of Part 2, you will be paid \$10 and entered into a \$50 lottery.

Eligibility requirements:

Any undergraduate student is eligible to participate.

For more information about this study, click [HERE](#) or contact Amy Havassy ([ahavassy@haverford.edu](mailto:ahavassy@haverford.edu)) who is one of the students conducting this study for her senior thesis project under the supervision of Professor Jennifer Pals.

## **Appendix B: Self-report measures to be included in Part 1 of questionnaire**

I. Demographic information: gender, class year, age, major/intended major

II. Implicit Theories Scale (Dweck, 1999): Items rated on a 6-point scale, with 1 equal to strongly agree and 6 equal to strongly disagree

1. You have a certain amount of intelligence, and you can't really do much to change it.
2. Your intelligence is something about you that you can't change very much.
3. No matter who you are, you can significantly change your intelligence level.
4. To be honest, you can't really change how intelligent you are.
5. You can always substantially change how intelligent you are.
6. You can learn new things, but you can't really change your basic intelligence.
7. No matter how much intelligence you have, you can always change it quite a bit.
8. You can change even your basic intelligence level considerably.

III. Rosenberg Self-Esteem Scale (Rosenberg, 1965): Items rated on a 5-point scale, with 1 equal to not at all true of me and 5 equal to very true of me.

1. I feel that I am a person of worth, at least on an equal basis with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure. **Reversed**
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of. **R**
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself. **R**
9. I certainly feel useless at times. **R**
10. At times I think I am no good at all. **R**

IV. Academic Contingent Self-Worth Scale (Crocker, Luhtanen, Cooper, & Bouvrette, 2003): Items rated on a 7-point scale, with 1 equal to strongly disagree and 7 equal to strongly agree.

1. My self-esteem is influenced by my academic performance.
2. I feel better about myself when I know I'm doing well academically.
3. Doing well in school gives me a sense of self-respect.
4. I feel bad about myself whenever my academic performance is lacking.
5. My opinion about myself isn't tied to how well I do in school. **R**

V. Confidence in Intelligence (Dweck, 1999): In each item of this measure, participants first choose one of the two statements that is most true of them and then rate the chosen statement on a scale ranging from 1 (very true of me) to 6 (sort of true of me).

1. \_\_\_\_\_ I usually think I'm intelligent.  
\_\_\_\_\_ I wonder if I'm intelligent.

2. \_\_\_\_\_ When I get new work in school, I'm usually sure I will be able to learn it.
- \_\_\_\_\_ When I get new work in school, I often think I may not be able to learn it.
3. \_\_\_\_\_ I'm not very confident about my intellectual ability.
- \_\_\_\_\_ I feel pretty confident about my intellectual ability.

VI. Achievement Goals (adapted from Grant & Dweck, 2003): These items measure several different forms of achievement goals, including performance outcome goals, ability-validation goals, learning goals, and challenge-mastery goals. They are rated on a 7-point scale where 1 equals strongly disagree and 7 equals strongly agree.

1. It is very important to me to do well in my courses.
2. In school I am always seeking opportunities to develop new skills and acquire new knowledge.
3. When I take a course in school, it is very important to me to validate that I am smarter than others.
4. It is important to me to confirm my intelligence through schoolwork.
5. I strive to constantly learn and improve in my courses.
6. In school I am focused on demonstrating my intellectual ability.
7. I really want to get good grades in my classes.
8. I seek out courses that I will find challenging.
9. I really enjoy challenges, and I seek out opportunities to do so in my courses.
10. A major goal I have in my courses is to perform really well.

VII. Conscientiousness scale from the Big Five Inventory (John & Srivastava, 1999): In this scale, participants rate the extent to which they agree with the following statements as a completion of: "I see myself as someone who . . ." Each item is rated on a 5-point scale with 1 equal to strongly disagree and 5 equal to strongly agree.

1. Does a thorough job.
2. Can be somewhat careless. **R**
3. Is a reliable worker.
4. Tends to be disorganized. **R**
5. Tends to be lazy. **R**
6. Perseveres until the task is finished.
7. Does things efficiently.
8. Makes plans and follows through with them.
9. Is easily distracted. **R**

VIII. Neuroticism scale from the Big Five Inventory (John & Srivastava, 1999): In this scale, participants rate the extent to which they agree with the following statements as a completion of: "I see myself as someone who . . ." Each item is rated on a 5-point scale with 1 equal to strongly disagree and 5 equal to strongly agree.

1. Is depressed, blue.
2. Is relaxed, handles stress well. **R**
3. Can be tense.
4. Worries a lot.

5. Is emotionally stable, not easily upset. R
6. Can be moody.
7. Remains calm in tense situations. R
8. Gets nervous easily.

References for scales:

- Crocker, J., Luhtanen, R. K., Cooper, M. L., & Bouvrette, A. (2003). Contingencies of self-worth in college students: Theory and measurement. *Journal of Personality and Social Psychology*, *85*, 894-908.
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**Appendix C: Part 2 of Questionnaire – Academic Self-Defining Memory Narratives and Follow-up Questions**

Step 1: Participants will type two personal narratives on a lab computer, one about an academic success experience and another about an academic failure experience, in response to the following prompt presented in bold below.

**Please describe a memory of an academic [success/failure]. The memory should be at least 6 months old, relevant to your identity as a student, and reveal something about how you feel about yourself in the academic domain. It should be a personally meaningful memory that you have thought about many times. In describing your memory, please share what happened, how you thought and felt about it at the time, and the significance of the memory to you now as you look back on it. Does this memory connect to your view of yourself today? If so, how?**

*[Additional verbal instructions that will be provided before participants begin: “Please refrain from including any specific information in your narrative that could identify you, including your own name, names of friends, or specific details from your life or the circumstances of the event that could be identifying, such as the name of your residence or names/numbers of specific courses.”]*

Step 2: After completing both memory narratives, participants will then be asked to answer several questions about each memory. These questions are presented below. This first part, labeled Section A, is the exact same for success and failure memories. The second part, labeled Section B, varies depending on whether the questions are addressing the success or failure memory. Two versions of Section B are presented, Section B: Success Memory and Section B: Failure Memory.

**Section A**

1. This memory was about an experience in:

math/natural sciences \_\_\_\_\_ humanities/ social sciences \_\_\_\_\_  
 other \_\_\_\_\_

2. Use the scale below to rate the extent to which you currently experience the following emotions in response to remembering the event.

1	2	3	4
		5	
Not at all		Somewhat Very	
Anger _____	Incompetent _____		Interest _____
Anxiety _____	Intelligent _____		Shame _____

Sadness	_____	Frustration	_____	Guilt
Pride	_____	Happy	_____	Disappointment
	_____			

3. Answer the questions using the scale above. (*some adapted from Weiner, as cited in Beyer, 1999*)

- |  |   |   |
|--|---|---|
| To what extent do you attribute your [success/failure] to effort?          | 1 | 2 |
| 3      4      5  |   |   |
| To what extent do you attribute your [success/failure] to ability?         | 1 | 2 |
| 3      4      5  |   |   |
| To what extent do you attribute your [success/failure] to luck?            | 1 | 2 |
| 3      4      5  |   |   |
| To what extent do you attribute your [success/failure] to task difficulty? | 1 | 2 |
| 3      4      5  |   |   |
| To what extent did you feel you had control over the outcome?              | 1 | 2 |
| 3      4      5  |   |   |
| To what extent was the goal of the event to perform well?                  | 1 | 2 |
| 3      4      5  |   |   |
| To what extent was the goal of the event to learn something new?           | 1 | 2 |
| 3      4      5  |   |   |

4. Answer this question using the scale that follows (circle one): Looking back, how does this event make you feel about yourself now?

Very Negative      Negative      Neutral      Positive      Very Positive

**Section B: Success Memory**

5. In thinking about *reasons* for your success experience, indicate the accuracy of each statement listed below using the following scale: (*adapted from Beyer, 1999*)

1	2	3	4
		5	

Not at all

Somewhat  
Very

- I studied effectively. \_\_\_\_\_
- I paid attention in class and went to class regularly. \_\_\_\_\_
- The remembered event was easy. \_\_\_\_\_
- I am very interested in the subject matter. \_\_\_\_\_
- I am good at [subject area]. \_\_\_\_\_
- I was lucky. \_\_\_\_\_
- I am a very motivated student. \_\_\_\_\_

6. In thinking about your *feelings* following your success experience, indicate the accuracy of each statement below using the above 1-5 scale.

- I was proud of my accomplishment. \_\_\_\_\_
- I was relieved. \_\_\_\_\_
- I was motivated to continue to do well. \_\_\_\_\_
- I felt confident. \_\_\_\_\_
- I was happy and in a generally good mood. \_\_\_\_\_
- I felt a sense of accomplishment. \_\_\_\_\_

7. Rate the extent to which each of the following statements is true of you using the above 1-5 scale:

Thinking about this event makes me feel good about myself.

Thinking about this event makes me feel bad about myself.

My view of myself has been positively changed as a result of this event.

My view of myself has been negatively changed as a result of this event.

This event is very self-defining – it says something important about me and my identity.

\_\_\_\_\_



My view of myself has been negatively changed as a result of this event. \_\_\_\_\_  
This event is very self-defining – it says something important about me and my identity.  
\_\_\_\_\_

## Appendix D: Memory Narrative Coding Procedures

I. Emotional Sequencing (adapted from McAdams, et al., 2001): Memory narratives will be categorized as one of the following, in terms of which category best represents the emotional tone displayed from the beginning to the end of the narrative:

- A. All positive (emotional tone is predominantly positive from beginning to end)
- B. All negative (emotional tone is predominantly negative from beginning to end)
- C. Redemption sequence: shift from emotionally negative tone to emotionally positive tone.
- D. Contamination sequence: shift from emotionally positive tone to emotionally negative tone.
- E. Too emotionally vague or mixed to categorize.

II. Positive self-transformation (PST) (Pals, 2006): Memories narratives will be coded on a 5-point continuum where 1 is equal to evidence whatsoever for positive change in self in response to the event and a 5 being equal to a very clear, vivid and well-elaborated description of a major change in self as a response to the event. Change could involve a wide range of self-characteristics, including new insights or lessons learned about life, greater maturity, changes in personality traits or patterns of behavior, changes in beliefs and values, changes in goals and plans for the future, changes in well-being and self-esteem, etc. Specific coding instructions for PST are as follows:

- First, determine whether or not there is any evidence for positive self-transformation in the narrative. If not, give the person a 1 and move on to the next narrative. If there is some evidence for PST, then you must decide on a rating from 2-5. Please consider the following factors in determining your rating:
- a) The vividness and elaboration of the transformation being described.
  - b) The explicitness of the causal link between the event and transformation.
  - c) The inner depth or psychological richness of the transformation (More external transformations such as a new relationship should not receive the highest rating unless the psychological impact of the self is made explicit).
  - d) The subjective positivity of the transformation (a transformation that is completely negative should be rated 1, whereas a transformation that has a mixture of positive and negative meaning should be rated in terms of how positive it is).
  - e) The psychological centrality of the transformation to an individual's current sense of self/identity (For example, transformations that conclude a narrative tend to be psychologically central to the person).

1	2	3	4	5
No evidence for transformation		Somewhat transforming		Very transforming

1 = No evidence for positive self-transformation

2 = Suggestive evidence; positive self-transformation implied but not explicit

- 3 = Clear evidence for positive self-transformation, but it is not very vivid/causally integrated/deep/positive/central to self
- 4 = Clear evidence for positive self-transformation; somewhat vivid/causally integrated/deep/positive/central to self
- 5 = Clear evidence for positive self-transformation; very vivid/causally integrated/deep/positive/central to self

III. Specific self-related outcomes of autobiographical reasoning (AR) (newly developed coding procedure, Pals, unpublished): This newly developed coding procedure captures a variety of different ways the person may establish a connection between the past event and the present self. The categories listed below are not mutually exclusive; each one that appears to capture a statement within the narrative will be given 1, and a total of negative AR statements and positive AR statements may be totaled for each person across their two narratives (and separately for positive and negative events):

1. Stable self revealed – this category is for when an event is described as revealing, bringing out, or demonstrating a characteristic that the person already had before the event, such as when a person says something like, “This event shows how selfish I can be.” There is a link to the self, but it is not a change in self. Rather, the event is used to show something stable about the self. This stable quality could be negative or positive.
  - 1.a. Stable self, negative – e.g., “This event shows how dumb I can be sometimes.”
  - 1.b. Stable self, positive – e.g., “This event shows how strong I can be when times are tough.”
2. Self-transforming – this category is for when the event is described as changing the person in some way. This change could be negative, positive, or both, but the key here is that there is a clear sense within the narration that a change has occurred within the person as a direct result of the event or its consequences.
  - 2.a. Self-transforming, negative – e.g., “This event has turned me into a less trusting person.”
  - 2.b. Self-transforming, positive – e.g., “Through this event, I became stronger and more confident in my choices in life.” Positive changes in self could also involve a changed perspective on the world, life, etc. that clearly implies greater maturity.
  - 2.c. Self-transforming, vague – the event is described as changing the person, but the person is too brief or vague for the change to be definitely categorized as positive or negative. e.g., “It totally changed my outlook on life.”
3. Emotional connection to present self – this category is for when the connection to self in the present is more about the emotions one feels in relation to recalling the past event than about a conceptual description of self. Here to, these emotions could be positive or negative. It is important here to separate emotions in the past (what was felt at the time) from emotions felt in the present, which is the focus of this coding category.
  - 3.a. Present emotion, negative – remembering the event makes the person experience negative emotions in the present, as in still feeling angry, guilty, or bad in some way.

3.b Present emotion, positive – remembering the event makes the person feel good in some way, as in remembering an achievement and feeling proud.

4. Autobiographical reasoning present but difficult to categorize
5. No evidence of autobiographical reasoning in memory narrative

IV. Themes of effort and ability in the context of self-evaluation: Newly developed for this project, student researchers will code the memory narratives for the presence of the themes of effort and ability in how the person evaluates self in the context of success/failure event. Each theme will be coded separately, on a three-point scale:

- 1 = [Effort/ability] theme is not mentioned.
- 2 = [Effort/ability] theme is mentioned.
- 3 = [Effort/ability] theme is mentioned and is a central theme of the narrative.

V. Event Type: Also newly developed for this project, student researchers will code the memory narratives for how the success/failure event itself is characterized, in terms of whether it is described in external and quantitative terms (e.g., I got an A) or more internal, subjective, and qualitative terms (e.g., I learned a lot), or both. Each memory will be categorized into one of the following categories:

- A. Quantitative description of [success/failure]
- B. Qualitative description of [success/failure]
- C. Both quantitative and qualitative description of [success/failure]

References for coding:

McAdams, D. P., Reynolds, J., Lewis, M., Patten, A.H., & Bowman, P. J. (2001). When bad things turn good and good things turn bad: Sequences of redemption and contamination in life narrative and their relation to psychosocial adaptation in midlife adults and in students. *Personality and Social Psychology Bulletin*, 27, 474-485.

Pals, J. L. (2006). Narrative identity processing of difficult life experiences: Pathways of personality development and positive self-transformation in adulthood. *Journal of Personality*, 74, 1079-1109.

## **Appendix E: Informed Consent Form – Version A for Psych 100 students (to appear in on-line format)**

**Purpose and Procedure:** The purpose of this research is to learn more about how college students perceive themselves in relation to memories of academic successes and failures. To investigate this issue, we have developed a two-part questionnaire that we will ask to you complete. The first part will consist of a series of specific questions about how you think and feel about yourself generally and in the context of academics. This part you will complete on-line and will take approximately 15 minutes. After you complete the first part, we will contact you to come into our laboratory in Sharpless Hall to complete the second part of the questionnaire. In the second part, you will be asked to type two narratives, one about a memory of an academic success and one about a memory of an academic failure. After you type these two narratives, you will be asked to complete a series of ratings about each of the memories. The second part of the questionnaire will take about 30 minutes. We plan on recruiting approximately 60 participants for this study.

**Credit:** Completing this two-part questionnaire will take about 1 hour total across the two separate sessions. You will receive 1 of your 3 hours of credit for Psychology 100 for participating in this study. In addition, you will be entered into a \$50 lottery along with the rest of the participants in the study.

**Benefits/Risks:** Participation in this study poses no physical risk to you. This study will require you to reflect on emotionally significant past experiences, both positive and negative, but we do not expect any discomfort associated with reflecting on negative past experiences to go beyond the normal emotional ups and downs encountered in everyday life. Moreover, based on feedback from past studies using similar procedures, possible benefits associated with your participation in this project are that you may enjoy being given the opportunity to reflect on personally meaningful past events and you may gain psychological insight into your academic self-concept and research investigating this topic. However, if participation in this study causes you discomfort beyond what you perceive to be acceptable, you may discontinue your participation at any time.

**Confidentiality:** The data collected in this study will be confidential. We do request that you provide your name and e-mail address so that we can arrange for you to participate in the second part of the study, provide you with course credit, and contact you at the end of the study if you win the lottery. However, identifying information will be kept separate from your data and replaced with an arbitrary code number that will be used to match the first and second part of your questionnaire. Only the faculty member in charge of the study will have access to your name and email address; student researchers will not have access to this information. In addition, your e-mail address will not be used for any commercial purposes, and your identity will not be revealed in any publication or presentation of the results of this research. The researchers are interested in patterns of results at the aggregated group level of analysis rather than the responses of any single individual. Finally, the faculty researcher will read all memory narratives and eliminate any potentially identifying information from them prior to analyses conducted by the student researchers.

**Voluntary Nature of Participation:** Your participation in this research project is voluntary. In addition, you can decline to answer any question you don't want to answer or discontinue your participation at any time without any penalty.

**Contact Information:** If you have any questions about this research project or your rights as a research participant, please contact Prof. Jennifer Pals via email at [jpals@haverford.edu](mailto:jpals@haverford.edu). You may also address concerns to Prof. Rob Scarrow ([rscarow@haverford.edu](mailto:rscarow@haverford.edu)), chairperson of Haverford College's IRB (a committee with oversight on human subject research).

You have been informed about this study's purpose, procedures, possible benefits and risks. In addition, you voluntarily agree to participate in this study. By electronically signing this form, you are not waiving any of your legal rights.

**Enter your full name here to acknowledge you have read this information and voluntarily agree to participate in this study.** [ \_\_\_\_\_ ] **Email address:** \_\_\_\_\_

You must include your name here prior to participating in the study. It is needed to document that you are volunteering to participate in this study. Please note, any identifying information (e.g., your name) will be removed and replaced with an arbitrary identification number, and will not appear in our data file.

## **Appendix F: Informed Consent Form – Version B for paid participants (to appear in on-line format)**

**Purpose and Procedure:** The purpose of this research is to learn more about how college students perceive themselves in relation to memories of academic successes and failures. To investigate this issue, we have developed a two-part questionnaire that we will ask to you complete. The first part will consist of a series of specific questions about how you think and feel about yourself generally and in the context of academics. This part you will complete on-line and will take you approximately 15 minutes. After you complete the first part, we will contact you to come into our laboratory in Sharpless Hall to complete the second part of the questionnaire. In the second part, you will be asked to type two narratives, one about a memory of an academic success and one about a memory of an academic failure. After you type these two narratives, you will be asked to complete a series of ratings about each of the memories. The second part of the questionnaire will take about 30 minutes. We plan on recruiting approximately 60 participants for this study.

**Credit:** Completing this questionnaire will take about 1 hour total across the two separate sessions. When you complete the second part of the questionnaire in the lab, you will be paid \$10 for your participation. In addition, you will be entered into a \$50 lottery along with the rest of the participants in the study.

**Benefits/Risks:** Participation in this study poses no physical risk to you. This study will require you to reflect on emotionally significant past experiences, both positive and negative, but we do not expect any discomfort associated with reflecting on negative past experiences to go beyond the normal emotional ups and downs encountered in everyday life. Moreover, based on feedback from past studies using similar procedures, possible benefits associated with your participation in this project are that you may enjoy being given the opportunity to reflect on personally meaningful past events and you may gain psychological insight into your academic self-concept and research investigating this topic. However, if participation in this study causes you discomfort beyond what you perceive to be acceptable, you may discontinue your participation.

**Confidentiality:** The data collected in this study will be confidential. We do request that you provide your name and e-mail address so that we can arrange for you to participate in the second part of the study, provide you with course credit, and contact you at the end of the study if you win the lottery. However, identifying information will be kept separate from your data and replaced with an arbitrary code number that will be used to match the first and second part of your questionnaire. Only the faculty member in charge of the study will have access to your name and email address; student researchers will not have access to this information. In addition, your e-mail address will not be used for any commercial purposes, and your identity will not be revealed in any publication or presentation of the results of this research. The researchers are interested in patterns of results at the aggregated group level of analysis rather than the responses of any single individual. Finally, the faculty researcher will read all memory narratives and eliminate any potentially identifying information from them prior to analyses conducted by the student researchers.

**Voluntary Nature of Participation:** Your participation in this research project is voluntary. In addition, you can decline to answer any question you don't want to answer or discontinue your participation at any time without any penalty.

**Contact Information:** If you have any questions about this research project or your rights as a research participant, please contact Prof. Jennifer Pals via email at [jpals@haverford.edu](mailto:jpals@haverford.edu). You may also address concerns to Prof. Rob Scarrow ([rscarrow@haverford.edu](mailto:rscarrow@haverford.edu)), chairperson of Haverford College's IRB (a committee with oversight on human subject research).

You have been informed about this study's purpose, procedures, possible benefits and risks. In addition, you voluntarily agree to participate in this study. By electronically signing this form, you are not waiving any of your legal rights.

**Enter your full name here to acknowledge you have read this information and voluntarily agree to participate in this study. [\_\_\_\_\_] Email address:\_\_\_\_\_**

You must include your name here prior to participating in the study. It is needed to document that you are volunteering to participate in this study. Please note, any identifying information (e.g., your name) will be removed and replaced with an arbitrary identification number, and will not appear in our data file.

## Appendix G: Debriefing

- 1. What is the general aim of this research?** Our main purpose in conducting this study is to examine how students' beliefs about whether their intelligence is a fixed or changeable trait relates to how they remember and interpret the impact of academic successes and failures on the self. We expect that people who believe that their intelligence is something that can be changed through effort will be more likely to see past failures as having caused positive growth and transformation within the self.
- 2. Is this correlational or experimental research?** This is a correlational study. There is no experimental manipulation involved. We are interested in the relationships between how people think about themselves generally and how they remember and interpret specific past events in relation to the self.

- 3. Where can I learn more about this type of research?**

You can look at the following references for more detailed information:

Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia: Psychology Press.

McAdams, D. P., Reynolds, J., Lewis, M., Patten, A.H., & Bowman, P. J. (2001). When bad things turn good and good things turn bad: Sequences of redemption and contamination in life narrative and their relation to psychosocial adaptation in midlife adults and in students. *Personality and Social Psychology Bulletin*, 27, 474-485.

Pals, J. L. (2006). Narrative identity processing of difficult life experiences: Pathways of personality development and positive self-transformation in adulthood. *Journal of Personality*, 74, 1079-1109.

Robins, R. W., & Pals, J. L. (2002). Implicit self-theories in the academic domain: implications for goal orientation, attributions, affect, and self-esteem change. *Self and Identity*, 1, 313-336.

- 4. Who is the faculty member supervising the research and how can I contact him or her?** This research is supervised by Jennifer Pals in the Psychology Department. You may reach her via telephone at (610) 896-1236, via email at [jpals@haverford.edu](mailto:jpals@haverford.edu), or in Sharpless 405.
- 5. How does this experiment fit into the investigator's research program?** Professor Pals has been studying self-defining memory narratives and implicit self-theories of intelligence separately for the past ten years. This study represents her first attempt to connect these two lines of research by looking at relationships

between implicit self-theories of intelligence and academic self-defining memories.