

CREATIVITY AND AFFECTIVE TRAITS ACROSS THE LIFE SPAN:
DEVELOPMENTAL INFLUENCES AMONG ADOLESCENTS AND OLDER ADULTS

Elizabeth C. Wohl, B.A., M.A.

Dissertation Prepared for the Degree of
DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

August 2003

APPROVED:

Bert Hayslip, Jr., Major Professor
Donna L. Fleming, Committee Member
C. Edward Watkins, Committee Member
John Hipple, Committee Member
Earnest Harrell, Chair of the Department of
Psychology
C. Neal Tate, Dean of the Robert B. Toulouse
School of Graduate Studies

Wohl, Elizabeth C., Creativity and Affective Traits Across the Life Span: Developmental Influences Among Adolescents and Older Adults. Doctor of Philosophy (Counseling Psychology), August 2003, 114 pp., 10 tables, 2 figures, references, 149 titles.

In recent years, empirical research has consistently supported an association between susceptibility to affective illness and creativity at the level of eminent achievement and at the non-eminent, or “everyday creativity” level. Although this research has provided greater evidence for the existence of this link, it has simultaneously unearthed more questions about how and why such an association exists.

The purpose of this research was twofold: first, to provide further analysis of the nature of the relationship between hypomanic traits and creativity by employing a longitudinal study to determine the extent to which inter-individual differences over time in creativity are predicted by hypomanic traits. Second, the purpose of the cross-sectional analysis in the present study was to further determine how developmental components such as age and expertise may help unravel the ways in which hypomanic traits contribute to creativity and to further describe inter-individual differences among these variables.

The first hypothesis, which proposed that the direction of the relationship between hypomanic traits and creativity could be predicted, was not supported by these results. The second research hypothesis was partially supported: hypomanic traits predict creativity in the combined adolescent and older adult samples. However, upon further examination of the regression analyses, the data indicate that the relationship between hypomanic traits and creativity is also influenced by age and developmental factors. Furthermore, the way in which the relationship is influenced by these

other factors depends on the way in which the creativity construct is measured (e.g., process or personality).

The findings suggest that the antecedents of creativity may differ between adolescents and older adults. In adolescents, the hypomanic traits measure is the only variable that predicts creative personality and creative process, while expertise is the only variable to predict creative personality and creative process among the older adults in this study. It appears expertise significantly and uniquely contributes to at least two areas of creativity in older adults, while hypomanic traits significantly and uniquely contributes to the same two areas of creativity in adolescents. Implications of these findings and limitations to this study are discussed.

Copyright 2003

by

Elizabeth C. Wohl

ACKNOWLEDGEMENTS

The author wishes to thank Dr. Teresa Amabile, Harvard University; Dr. Gary Davis, University of Wisconsin; Dr. Ruth Richards, Saybrook Graduate School; Dr. Thomas Kwapil, University of North Carolina-Greensboro; Dr. David Schulberg, University of Montana, and Dr. Jan Sinnott, Towson University, for providing copies of their unpublished instruments, unpublished papers, and for their encouragement in pursuing this research. I would also like to thank my colleague, Jennifer King, for her invaluable assistance in collecting data for this study, as well as my dissertation committee, Dr. Donna Fleming, Dr. John Hipple, and Dr. Ed Watkins, for their time and energy in reading this research paper and providing thoughtful feedback.

Most importantly, I would like to thank Dr. Bert Hayslip Jr., without whom this research would not have been possible. From providing assistance with instruments and copy fees to providing theoretical and statistical guidance, Dr. Hayslip's support, encouragement, and wisdom have been integral to this research and to my professional development. This dissertation is but a small representation of the time and energy Dr. Hayslip devotes to developing his students' skills and facilitating their success. I am privileged to have had the opportunity to work with Dr. Hayslip as my dissertation chair.

Finally, I would like to thank my husband, Eric, and my mother, Cynthia, for their unlimited support and encouragement throughout my dissertation and graduate program. I am grateful to be able to share the credit of this dissertation with them, and I am truly grateful for their unconditional love and support. With encouragement from my family, I have learned that anything is possible.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS.....	iii
LIST OF TABLES AND FIGURES.....	v
Chapter	
I. INTRODUCTION.....	1
II. METHOD.....	33
III. RESULTS.....	51
IV. DISCUSSION.....	59
APPENDIX A	81
APPENDIX B.....	97
REFERENCES	100

LIST OF FIGURES AND TABLES

Number	Title	Page
Figure 1	<i>CLPC for HDYT (dv1)</i>	55
Figure 2	<i>CLPC for TTCT (dv2)</i>	55
Table 1	<i>Longitudinal Sample Descriptive Statistics (n = 52)</i>	91
Table 2	<i>Older Adult Frequencies (n = 57)</i>	91
Table 3	<i>Adolescent Frequencies (n = 57)</i>	91
Table 4	<i>Descriptive Statistics: TAMS Class of 2002 Students Longitudinal Data (Valid n = 45)</i>	91
Table 5	<i>Descriptive Statistics: Older Adults (Valid N = 55); Adolescents (Valid n = 52)</i>	92
Table 6	<i>Summary of Hierarchical Regression Analysis for Variables Predicting Creative Process (TTCT); Older Adults and Adolescents Combined Sample (N = 107)</i>	93
Table 7	<i>Summary of Hierarchical Regression Analysis for Variables Predicting Creative Personality (HDYT) Older Adults & Adolescents Combined Sample (N = 107)</i>	94
Table 8	<i>Summary of Hierarchical Regression Analysis for Variables Predicting Creative Process (TTCT); Older Adults (n = 55); Adolescents (n = 52)</i>	95
Table 9	<i>Summary of Hierarchical Regression Analysis for Variables Predicting Creative Personality (HDYT); Older Adults (n= 55); Adolescents (n = 52)</i>	96
Appendix B	<i>Correlation Matrix: Older Adults and Adolescents Combined Sample (N = 107)</i>	98

CHAPTER I

INTRODUCTION

A hypothesized link between mood swings and creative accomplishment is perhaps one of the oldest topics in the history of psychopathology. It is also one of the human conditions that many great artists, writers and musicians throughout the centuries have expressed both metaphorically and literally in their work. Anecdotal references to this association can be found as early as the third century, B.C., in which Aristotle observed “all extraordinary men distinguished in philosophy, politics, poetry and the arts are evidently melancholic” (Becker, 1978; Jamison, 1990; Richards, 1990). However, others such as Socrates and Plato recognized “the idea of divine ‘mania’ or inspiration in relation to prophetic and poetic activity” rather than unipolar melancholia (Becker, 1978; Jamison, 1990). In the centuries that have followed, societal interest in the existence of an association between mood swings and creative accomplishment have shifted -- much like bipolar cycling, itself. Yet, this association has persisted and has emerged as a vital topic in today’s popular culture. It is hard to ignore biographical, yet anecdotal, evidence of many great poets, musicians, artists and scientists who are viewed as “eccentric,” or those creators whose lives were cut short by excessive drug or alcohol use or suicide. The long list of eminent creators in our own century who have ended their own lives has fueled the conventional wisdom that links affective illness and creativity.

In recent years, sound empirical research has provided consistent evidence to support an association between susceptibility to affective illness and creativity both at the level of eminent achievement (Andreasen, 1987; Andreasen & Powers, 1974; Jamison, 1996, 1993, 1989; Ludwig, 1998, 1995, 1992; Richards, 1993, 1981); and at the non-eminent, or “everyday creativity” level (Richards & Kinney, 1990; Richards, 1997, 1994, 1993; Richards & Kinney, 1990; Richards, Kinney,

Benet & Merzel, 1988; Schuldberg, 1990) The scope of the present study defines creativity within the context of everyday rather than eminent creativity. Thus, “everyday creativity” is defined as “products, ideas or behaviors produced or occurring in day-to-day activities [that] are characterized by [their] originality and their meaningfulness to others” (Richards, 1998, p.620). Previous studies that examine eminent creativity have been conducted across adults who are recognized in different domains of creativity such as the arts, science and business (Ludwig, 1995, 1992); among adults with a genetic susceptibility to affective illness (Richards et al. 1988); adults who have been diagnosed with an affective illness (Ghadirian, Gregoire, & Kosmidis, 2001; Richards, 1994), samples of undergraduate college students (Schuldberg, 2001, 1990; Schuldberg, French, Stone, & Heberle, 1988), and among adolescents with talents in math and science (Wohl, 2001). Although this research has provided greater evidence for the existence of this link, it has simultaneously unearthed more questions about how and why such an association exists. Perhaps the most obvious question involves cause-and-effect: does susceptibility to an affective disorder enhance creativity? One important question that may help unravel this dilemma is the impact of age, life experience, and domain-specific expertise on creative process, creative personality, and susceptibility to affective symptoms.

As Simonton’s (1990) work demonstrates, the age at which creativity peaks appears to be impacted by the specific domain of creative expertise. However, it is unclear how susceptibility to affective symptoms may interact with age and experience. Although the research on creativity and affective disorders appears comprehensive, it neglects this developmental component despite the relevant literature on creativity and aging. Evaluating how creativity and affective symptoms are impacted by age, experience, and expertise may provide more insight into how creativity and affective symptoms are related.

The focus of this research is to help clarify this relationship and better answer these questions. In order to guide this research, the current literature on creativity, creativity and affective disorders, creativity across the life span, and age-related variables that may impact creativity will be reviewed.

Creativity

Creativity research is a broad area of study, as exemplified by two scientific journals dedicated to the study of creativity: The Creativity Research Journal and The Journal of Creative Behavior. As one might expect, there are many different definitions of creativity, but these descriptions can be divided into four specific areas: (1) creative process (or abilities and behavior), which includes the cognitive, affective, behavioral and environmental factors that contribute to the act of creating; (2) creative product (or skills in a particular domain), which represents the tangible outcome of a person's creative process; (3) "everyday creativity" (e.g. Richards et. al, 1988 a,b), which is defined as "products, ideas or behaviors produced or occurring in day-to-day activities... acts of everyday creativity [that] are characterized by originality and their meaningfulness to others." (Richards, 1998, p.620); and (4) creative attitudes or personality attributes. Current creativity researchers (e.g. Amabile, 1996; Fishkin & Johnson, 1998; Plucker, 1999; Runco, 1999) emphasize the importance of measuring at least two of these areas in any "creativity battery" (Milgram, 1990). Each of these three areas are discussed and defined in detail below.

Creative Process

According to Lubart and Sternberg (1998), the creative process "involves the intellectual process of defining and redefining problems, choosing appropriate problem-solving strategies, and using insight processes to solve problems" (pp. 25-26). Sinnott (1998a) adds an emotional component to Lubart and Sternberg's (1998) definition, and classifies the creative process as a component (or, perhaps, a result) of postformal reasoning. Sinnott (1998b) describes postformal reasoning as the process by which one attains optimal, adaptive functioning. She uses Piagetian terms to define

postformal reasoning as “the way an adult structures thinking, over and above the operations of the formal operational adolescent, in order to optimally be in touch with reality, to make sense of the world and to live optimally.” (p. 47). To Sinnott (1998a), this involves a combination of emotions, a synthesis of ideas, and the social context in which these emotions and ideas develop. The process by which this occurs, according to Sinnott’s (1998a) definition, involves “multiple views of reality...multiple solutions, definitions, parameters and methods” (p. 271) when a creative problem is presented. To think postformally and, thus, creatively, one must consider that more than one correct solution to a problem exists. It involves connecting ideas and emotions from different categories of experience, and synthesizing them to produce adaptive responses. Others (e.g. Torrance, 1974, 1990) label this elusive process “divergent thinking.”

Divergent thinking, which has been operationally defined to include components of fluency (number of ideas or solutions), flexibility (number of different types of ideas or solutions) and originality (number of unique ideas or solutions), has been successfully assessed through paper-and-pencil measures developed in the 1970’s (i.e. Torrance Tests of Creative Thinking, TTCT; Torrance, 1974, 1990). The TTCT and similar measures provide an operational, standardized definition of creativity (i.e. fluency, flexibility, and originality), which allows creative process to be assessed as a research variable. Although the predictive validity of divergent thinking measures have come under recent scrutiny (i.e. Marsiske & Willis, 1998; Plucker, 1999), it appears this may be attributed to their use as sole measures of creativity rather than one part of a comprehensive creativity battery (Milgram, 1990).

Divergent thinking measures are typically used to assess creativity among children and adolescents to help assess giftedness, and are used as one of the tools used to select students for gifted education programs. The TTCT is the most widely used measure in divergent thinking research, having been cited in over 2,000 articles and dissertations (Torrance, 1998). Research using longitudinal data

(i.e. Torrance, 1993; Runco, 1993) show the TTCT has moderate predictive validity that ranges between .46 and .58 (Torrance, 1993) for creative accomplishments in adulthood. Longitudinal data using other divergent thinking measures show that “creative thinking and creative performance are better predictors of adult life accomplishment than intelligence or school grades” (Milgram & Hong, 1993, p. 138). Milgram & Hong’s (1993) data support not only concurrent, but also predictive validity for a divergent thinking measure.

The research on divergent thinking is especially important when studying talented youths. Runco (1991) suggests that divergent thinking and creative performance scores are more highly related among gifted children than non-gifted children. Although the correlations for gifted students are only moderate, they still provide greater validity of these tests as a predictor of creative performance among gifted versus non-gifted students. Runco (1993) emphasizes that “divergent thinking is not synonymous with creativity...[but is] however, [a] very useful estimate of the potential for creative thought” (p. 16). It is important to remember that real-world creative products, particularly in specific domains, are also important in determining creative ability and potential (Runco, 1993). While giftedness is not necessarily a prerequisite for talented youths, the gifted literature is the best available approximation for the talented adolescents sampled in the present study.

Divergent thinking has also been examined in research with older adults (Hendricks, 1999). While some cross-sectional studies (e.g. Alpaugh, Parham, Cole & Birren, 1982; Romaniuk & Romaniuk, 1981; Ruth & Birren, 1985) and longitudinal studies (e.g. McCrae, 1987; McCrae, Arenberg & Costa, 1987) suggest that divergent thinking abilities decline with age, other analyses (Crosson & Robertson-Tchabo, 1982) do not find significant age effects. None of the studies, however, examine how domain-specific experience might affect these results. The time spent engaged in creative production and the quantity and quality of creative products throughout an individual’s life may also contribute to determining one’s creativity. This idea bears resemblance to developmental concepts such

as expertise (e.g. Salthouse, 1990) and encapsulation of skill (e.g. Hoyer & Rybash, 1994). Both of these ideas suggest that the accumulation of knowledge and skill in a specific area or domain will allow an individual to preserve functioning in that particular area as he or she ages. In other words, gaining expertise by focusing or encapsulating one's skill set in a particular area seems to contribute to one's ability to remain productive and skilled in this area even though working memory or processing ability in other less-skilled domains may decline with age.

Creative Product

Amabile (1996) defines creativity as “a product or response that is creative to the extent that appropriate observers independently agree it is creative... and as the process by which something so judged is produced” (p. 33). This has been the implicit definition of creativity in our culture, as evidenced by the fame and recognition given to artists that we deem creative or talented. Similarly, Kogan (1973) suggests that the “ultimate” measure of creativity in its “purest form is associated with [socially recognized] accomplishments in one's chosen profession” (p. 158). Amabile (1996, 1982), however, attempts to control for cultural and societal influences (i.e. the *zeitgeist*), by assessing individuals' performances on three specific tasks in a laboratory setting. Her Consensual Assessment Technique (CAT; Amabile, 1982) utilizes independent judges to observe and evaluate these tasks to assess an individual's domain-relevant skills, creativity-relevant skills, and motivation to complete the tasks. While this technique is objective, it neglects perhaps the most important aspect of creative and intelligent behavior: adaptive functioning in one's environment. Thus, the criteria for creative products in this study will instead employ Simonton's (1991) definition of creativity being “ultimately tied to real social value” (p. 15), and Richards et. al.'s (1988 a,b) criteria for creative products demonstrating an “adaptation to reality – [where] outcomes must be meaningful to others rather than random or idiosyncratic” (p. 476).

Much of the creativity research among older adults has focused on how creative productivity covaries with age among eminent creators (e.g. Simonton, 1988) and the factors that may contribute to this variation. These factors may include the socially-judged value of products from specific creative domains, which domains the culture deems more creative than others, the number of creative individuals that can be supported in a culture at a given time, and other historical events or shifts that may influence standards of creativity (e.g. Kogan, 1973). Furthermore, these factors most likely play a role in determining the age at which most eminent creators reach their peak creativity levels.

Simonton's (1988, 1990a, 1990b, 1991) evaluation of historically eminent creators demonstrates that the effect of creative decline is not necessarily a direct result of aging: rather, it is influenced by the individual's selected domain (and the expectations from others in the field), individual differences in personality, and individual differences in periods of productivity across the life span. Simonton (1988, 1990a, 1990b, 1991) suggests that the area or domain of creative endeavor interacts with age to determine when eminent creators experience "peak" creative production. This "peak" can be defined by the quality of "masterworks" that are produced in a given period. A "masterwork," according to Simonton (1988, 1990a, 1990b, 1991) is typically achieved during the time of greatest quantitative production, since the number of works produced increases the likelihood of a quality product.

Although Simonton's work is important in its ability to disentangle the role of aging from cultural factors related to peak creative production, it is limited to individuals who have achieved eminence in their field (including classical music composition, science, math and psychology), and does not assess whether or not these domain-specific peak productivity ages occur among individuals who have made careers in the same professions but who have not attained "eminent" status. Although some researchers (e.g. Kastenbaum, 1992; Robinson & Stern, 1997, Simonton, 1988, 1990a, 1990b, 1991) suggest that creative product output peaks in the mid-thirties to mid-forties and diminishes with

age, others (Simonton, 1988, 1990a, 1990b, 1991) have found that the specific creative domain interacts with age to determine when peak creativity occurs among eminent individuals.

As is the case with Simonton's work, most of the research on creative achievement has been gauged by social recognition or eminence in a traditionally creative field like the arts or sciences. Researchers (i.e. Ludwig, 1992) have used biographical inventories to measure their subjects' degree of creative achievements. However, all of these inventories have focused solely on eminent creativity in fields that are traditionally perceived as "creative," and have not allowed for the study of "everyday creativity" (Richards et. al, 1988 a, b). In contrast to research that formally evaluates creativity in terms of personality, process, and socially judged products, there has emerged an area that explores the existence of creativity in everyday life.

A Brief History of Everyday Creativity

Richards (1990) reports that the idea of creativity in everyday life is not new. She traces the idea to Galton, who did not believe genius traits were unique and limited to eminent individuals, but rather "proposed that such 'natural abilities' were normally distributed across the population" (Richards, 1990 p. 306). In the 1950's, the intelligence testing movement prompted the cognitive assessment of such abilities, and was expanded to include the affective component with the rise of humanist psychology in the 1960's.

Beginning in the 1960's, humanist psychologists such as Abraham Maslow and Carl Rogers were among the first to recognize creativity as part of everyday life (Richards, 1994). Creativity was no longer something only eminent individuals possessed by virtue of their achievements, but rather something seemingly ordinary individuals could exhibit. Maslow rejected the idea of creativity being restricted to eminent artists, since he believed "A first-rate soup is more creative than a second-rate painting" (Rothenberg & Hausman, 1976, p. 87). Some of the humanistic ideas that helped lay the foundation for the development of Richards et. al.'s (1988 a, b) Lifetime Creativity Scales and the

study of everyday creativity include Maslow's distinction between "self actualizing creativity" and "special talent creativity" (p. 137). To Maslow, self actualizing creativity comes "more directly from the personality and (shows) itself widely in the ordinary affairs of life" (p.137, in Richards et. al., 1988). Similarly, Rogers spoke of novel products as "growing out of the uniqueness of the individual" (Richards et. al, 1988 b, p. 139) rather than finding them only in the realm of special talents.

Although the humanist movement had sparked interest in healthy, real-life creativity, the measures of creative accomplishment in the 1960's and 1970's (e.g. Holland & Nichols, 1964; Taylor & Barron, 1963; Torrance, 1972; Wing & Wallach, 1971, in Richards et. al., 1988b) focused solely on traditionally defined areas of creativity such as arts, science or leadership that also required a degree of social recognition (Richards et. al., 1988b). Hocevar's (1981; Richards et. al., 1988b) review of these types of creativity measures concluded "the best measure of those behaviors society calls 'creative' is obtained by either studying eminent individuals or using an inventory of creative activities and accomplishments" (Richards et. al., 1988b). Even though Hocevar's (1981) work suggested that an individual's inventory of activities and accomplishments is more practical, much research still focused on eminence, or societal evaluation of creative product, as they criterion by which creative achievement is judged (Richards et. al., 1988b). As Richards (1990) observes; "Although the idea of everyday creativity may appear obvious to some, to many today it remains surprising...[while] everyday creativity carries only the conditions of originality and meaningfulness, [some] people assume there must be something more. In fact, many people view creativity largely in terms of the rare genius, or of the most traditional areas for such geniuses: the arts and sciences" (p. 306).

Instead, Richards (1990) defines everyday creative accomplishment as something that "involves the full range of original outcomes from one's day to day activities, both at work and at leisure" (p. 306). To Richards (1990), everyday creativity "is not constrained to 'traditionally creative' areas and carries no requirement for social recognition" (p. 306). Thus, to assess everyday, non-

eminent creativity through a biographical account of creative achievement in the work and play of ordinary peoples' lives, Richards and her colleagues developed the Lifetime Creativity Scales (Richards et. al., 1988a). Other authors (e.g. Amabile, 1989, 1996; Milgram, 1989a, 1973) have developed similar scales to measure experience and skill in domain - specific areas.

Creative Behavior and Attitudes

A third approach used in understanding creativity incorporates a different perspective in defining creativity. The creative behavior and attitudes approach utilizes traditional personality inventories from which scales of creativity have been derived in addition to personality tests that have been specifically designed for the sole purpose of assessing traits or characteristics related to creative behavior (Amabile, 1996). The traditional personality inventories include The California Psychological Inventory (CPI; Helson, 1965); The Sixteen Personality Factor Questionnaire (16PF; Cattell & Butcher, 1968), The Adjective Check List (ACL; Gough, 1979), and the five-factor model NEO-PI (McCrae & Costa, 1987). Specific creative personality inventories include the "How Do You Think?" test (HDYT; Davis, 1975), the "Group Inventory for Finding Creative Talent (GIFT) (Rimm, 1976, Rimm & Davis, 1976), and the "What Kind of Person Are You?" test (Torrance & Khatena, 1970).

To assess creative personality, others (e.g. Milgram & Hong, 1993) have examined students' and adults' creative interest and activities. According to many vocational psychologists (e.g. Holland, 1984; Roe, 1956) an individual's interest in a particular occupation can be considered to contribute to one's personality traits and can remain a stable personality feature from adolescence through adulthood. To support this, Milgram and her colleagues (Milgram & Hong, 1993) have used the Tel-Aviv Activities Inventory (Milgram, 1973) and the Inventory of Adult Accomplishment (Milgram, 1989a) to assess how the level of creative involvement during adolescence predicts adult creative accomplishment. Milgram & Hong's (1993) longitudinal data support the stability of early activity interest by demonstrating a strong relationship between adolescent leisure activities (Arts, Science,

Social Activities, and Sports) and adult vocation areas (Artistic, Scientific, Social-Leadership and Other).

Non-pathological personality attributes such as openness to experience (McCrae, 1987) and willingness to take risks (Kogan, 1973) have also been identified as components of creative personality. However, others (e.g. Schuldberg, 2001, 1999, 1990; Wohl, 2001) have demonstrated that enduring personality traits that are typically associated with mild levels of pathology can also predict creativity. Both authors found Eckblad & Chapman's (1986) Hypomanic Traits Scale (HPS) reliably predicted creativity scores among undergraduate students and talented adolescents. Individuals who score positively on the measure are typically "in a mild manic state much of the time" and can be described as "energetic, upbeat, gregarious people who are often able to work long hours with little sleep and who juggle numerous projects and social commitments" (Eckblad & Chapman, p. 214). The authors developed the HPS to assess the subtle hypomanic trait-like tendencies that may predict the possibility of a future manic episode.

Although Eckblad & Chapman's (1986) description of hypomanic personality traits sounds benign (and perhaps desirable), individuals with these traits appear to be more prone to developing one of the bipolar disorders (Kwapil, Miller, Zinser, Chapman, Chapman and Eckblad 2000). Before reviewing the literature that connects hypomanic or bipolar symptoms with creativity, it is important to define and discuss the symptoms and consequences of bipolar disorder.

Mood Disorders, Unipolar & Bipolar

As outlined in the DSM-IV (American Psychiatric Association, 1994), mood disorders manifest in several different ways. However, many researchers believe it is most useful to think of the disorders as falling across a broad continuum (e.g. Akiskal & Mallya, 1987, in Richards, 1994; Richards, 1998, 1994; Goodwin & Jamison, 1990), with severe depression at one end, and severe episodes of mania (Bipolar I) at the other. The DSM-IV classifications that fall along this continuum include dysthymia

(mild depression), major depressive disorder, cyclothymia (milder mood swings), Bipolar II, (milder, hypomanic elevations with severe depressions), and Bipolar I (severe manic elevations and severe depressions). Based on the literature (e.g. Richards & Kinney, 1990, Schuldberg, 2001) that explores the association between mood disorders and creativity, it seems that the milder levels of elevated mood, or hypomania, seems to provide the most robust correlations. However, as Kwapil et. al.'s (2000) research demonstrates, an individual who reports more trait-like hypomanic symptoms is significantly more susceptible to bipolar illness. Thus, individuals who exhibit greater creativity may also be at greater risk for developing symptoms of a bipolar disorder.

Risk for Developing a Bipolar Disorder

The DSM-IV (American Psychiatric Association, 1994) reports community sample lifetime prevalence rates of Bipolar I to be about 1%, Bipolar II, about .5%, and cyclothymia between .4% and 1%. Other research that employs broader diagnostic categories for bipolar illness (e.g. Akiskal & Mallya, 1987) suggests as much as 4 to 5% of the general population is at risk for developing one of the “bipolar spectrum disorders” (Richards, 1999a, p.33). Being able to assess an individual’s degree of risk for developing one of the spectrum disorders by evaluating his or her creative activity involvement may be a useful diagnostic tool.

Among samples above age 65, the frequency of mild depressive symptoms appears higher than in the general population (Zarit & Zarit, 1998), but the prevalence of bipolar symptoms in later life (i.e. mania) are considered rare (Koenig & Blazer, 1992). Most research suggests the age of onset for bipolar disorder is around age 20, and proposes that the risk of onset tends to diminish with age (American Psychiatric Association, 1994; Zarit & Zarit, 1998). The incidence of manic-depressive symptoms among individuals with bipolar disorder is also believed to diminish with age (Koenig & Blazer, 1992). However, recent evidence (McDonald, 2001) suggests the prevalence of mania in the population does not decrease with age: rather, it is not often considered as a differential diagnosis.

Zarit and Zarit (1998) agree that the possibility of a bipolar disorder should be considered when assessing an older client, since “some people with bipolar disorders continue to have significant mood swings in later life” (p. 74). This may be especially important to assess if an older individual is involved in creative endeavors.

While the literature (e.g. Richards & Kinney, 1990) suggests that individuals who are at risk for developing bipolar disorder may have a “compensatory advantage” (Richards, 1999) for higher creativity, the shadow side of this compensatory advantage is a higher risk of suicide. Although the creativity and affective disorder literature focuses on the potential benefits of being susceptible to a mood disorder, it is equally important to outline the risks of such vulnerability in order to better diagnose and perhaps detect risk for suicide among creative individuals.

Risk for Suicide

Among the general population, the rate of suicide is approximately 12 per 100,000 (Zarit & Zarit, 1998). When evaluating the number of manic-depressive patients who have committed suicide across a sixty-year period, the results range from nine to sixty percent, with an average of nineteen percent (Goodwin & Jamison, 1990). This is staggeringly higher than the rate of suicide in the general population. Older adults are also at greater risk for suicide than the general population. As reported by Zarit & Zarit (1998), older adults have the highest rate of suicide than any age group: about 20 per 100,000. Studying a broader range of risk factors among older adults (such as involvement in artistically creative work) may help physicians and mental health professionals accurately diagnose an individual’s risk for bipolar symptoms and suicide.

While adolescents (ages 15-24) are reported to be the third highest age group that commits suicide, some statistics suggest that suicide is the second leading cause of death among this age group (Gust-Brey & Cross, 1999). Of the adolescents who complete suicide, between 25 and 50% have a family history of psychiatric disorders (such as bipolar disorder) and/or suicides (Gust-Brey & Cross,

1999). This statistic lends greater support to evaluating adolescents' risk of bipolar heritability, susceptibility to bipolar symptoms, and their creativity.

If individuals who are creative are more susceptible to bipolar symptoms, they are also at higher risk for suicide. By evaluating the relationship between bipolar risk and creativity, mental health professionals may be better able to assess clients by inquiring about their vocational and avocational activities. Professionals may be able to normalize these symptoms among creative individuals, which may facilitate treatment.

Creativity and Affective Traits

As early as 1921, Emil Kraepelin recognized the creative, more positive features that may be associated with manic-depressive illness (Jamison, 1990; 1993). During the decades that followed, researchers (e.g. Ellis, 1926; Juda, 1949; Karlsson, 1970; Martindale, 1972; McNeil, 1971) evaluated the frequency of psychopathology in eminent artists and scientists and their first-degree relatives. The relatively new methods of defining diagnostic criteria during these years led researchers away from Kraepelin's (1926) initial hypothesis of the link between manic-depressive illness and creativity and instead moved toward a link between schizophrenia and creativity. This association may have been attributed to cases of manic symptoms that were misdiagnosed as schizophrenia when no depressive episode was present (or assessed). The research shifted back to investigating the link between creativity and bipolar disorder rather than schizophrenia when Andreasen & Powers (1974) identified over-inclusive thinking (a creative process behavior) as a characterization of mania, not schizophrenia. However, recent research (e.g. Richards, 2001; Schulberg, 2001) suggests that some association exists between creativity and symptoms that are found along the schizophrenic spectrum (such as social anhedonia and non-conformist thinking), and that the diagnostic category should not be ruled out in its relationship with creativity. It may be possible that social interaction variables that occur along the schizophrenic spectrum could be interacting with affective and cognitive variables to produce

symptoms like over-inclusive thinking that occur along the bipolar spectrum. These social factors (such as social isolation) that may interact with hypomanic affective and cognitive traits will be discussed later in this review. First, however, it is helpful to review the current creativity and affective disorders literature.

Creativity and Affective Disorders: Current Research

As the research the area of creativity and affective traits has accelerated over the past 15 years (Russ, 1999), it has branched into different areas of study. Until recently, most research focused only on socially recognized creative accomplishment in traditional fields (such as art, music, literature and science). However, the renewed interest in creativity research and its association with manic-depressive illness has yielded new pathways into the study of “everyday” or, non- eminent creativity (Richards, 1997; Richards & Kinney, 1990, Richards et. al., 1988) and its association with mood disorders. The current state of creativity and mood disorder research can be divided into four major categories:

- (1) Systematic Studies Assessing Mental Illnesses Among Living Eminent Creators
(Andreasen & Canter, 1974; Andreasen & Powers, 1975; Andreasen, 1987; Barron, 1976; Ellis, 1926; Jamison, 1989; Ludwig, 1995, 1994; Juda, 1949; MacKinnon, 1970; McNeil, 1971)
- (2) Biographical/ Historical Studies Assessing Mental Illnesses Among Deceased Eminent Creators (Jamison, 1993,1989; Ludwig, 1995, 1992; Schildkraut, 1994)
- (3) Studies Assessing Creativity in Clinical Populations (Eisenman, 1990; Ghadirian, Gregoire, & Kosmidis, 2001; Richards et al. 1988b)
- (4) Systematic Studies Assessing Affective Symptoms In Everyday (Non-Eminent) Creators (Richards et al, 1988a, 1988b; Schuldberg, 2001,1999, 1990, 1988)

Whether evaluating eminent creativity using biographical data (e.g. Jamison, 1990, 1993; Ludwig, 1992) systematic assessments of living creators (Andreasen, 1987; Andreasen & Canter, 1974; Jamison, 1989; Ludwig, 1994;), or examining everyday creativity (Richards 1994; Richards & Kinney, 1990; Richards et al, 1988; Schuldberg, 2001, 1999, 1990, 1988), the research consistently demonstrates a higher prevalence of mood disorders among highly creative individuals than would be expected among individuals who exhibit low creativity. Furthermore, the research indicates a higher prevalence of mental illness among first-degree relatives of creative (eminent or everyday) individuals when compared with a low-creativity group of individuals.

It appears, however, that the degree and type of affective illness varies by: (a) how creativity is defined (eminent vs. everyday); (b) the degree of creative activity (quality and quantity); (c) family history; and (d) the professional domain (i.e. expressive art, music, writing, science, or business).

Eminent Creativity

Whether living or deceased, studies of eminent writers show significantly higher rates of affective (particularly bipolar) symptoms and diagnoses than would be expected in the normal population (Andreasen, 1987; Jamison, 1989), than among matched control groups (Andreasen, 1987; Ludwig, 1994), or among eminent creators from different creative domains (Jamison, 1989; Ludwig, 1995, 1992).

Andreasen's (1987) 15-year longitudinal study of creative writers found that their prevalence of affective illness symptoms and treatment for these symptoms significantly exceeded a matched control group. Similarly, when compared with the general population and with visual artists and biographers, Jamison (1989) found a much higher incidence of treatment for mood disorders among British eminent creative writers, especially poets. Furthermore, because both authors assessed symptoms, and symptom patterns instead of relying only diagnostic categories, they provided greater support for the association between creative productivity and hypomanic traits. As evidenced in

Jamison's (1989) account, the British writers reported experiencing "increases in enthusiasm, energy, self-confidence, speed of mental association, fluency of thoughts, elevated mood and a strong sense of well being" during or immediately before periods of intense creative productivity (Jamison, 1989, p.128). These descriptions are similar to the American Psychiatric Association's (1994) DSM-IV criteria for a hypomanic episode.

Because the samples in Andreasen (1987) and Jamison's (1989) research were predominantly male, Ludwig (1994) explored gender as a factor by researching these variables in a sample of eminent women writers. Determining whether gender interacted with eminent creativity is important considering that women, overall, are more likely to endorse and seek treatment for emotional symptoms (Denmark, Rabinowitz & Sechzer, 2000). Ludwig's (1994) sample included 59 female writers (mean age 44.5 years) who were participants at the national Women Writers Conference and a control group matched for family characteristics, education, and demographics. Instead of assuming the writers were more creative than the control group, Ludwig also included the Lifetime Creativity Scales (LCS; Richards et. al, 1988a) to assess creativity as a dependent variable in addition to the psychiatric symptom inventory. Ludwig's (1994) study lends support to Andreasen (1987) and Jamison's (1989) studies of predominantly male writers: the female writers exhibited significantly higher overall creativity scores on the LCS when compared with a non-creative group, and found higher incidences of depressive and manic symptoms among the writers when compared to non-writers. Furthermore, the writers were more likely to endorse difficulties of an emotional nature rather than ones of a behavioral, interpersonal, or cognitive quality. Although Ludwig's (1994) method in administering a self-report questionnaire to assess DSM-III-R symptom clusters (rather than conducting a clinical interview) may have yielded some inaccurate information, it is clear the writers reported significantly higher symptoms – particularly bipolar symptoms – than the non-writers.

When examining historical and biographical data of deceased eminent creators (e.g. Jamison, 1993, 1990; Ludwig, 1998, 1995, 1992; Schildkraut, Hirshfeld & Murphy, 1994; Weisberg, 1994), the findings are similar. The results from these studies provide further evidence that eminent individuals in artistic professions are much more likely to suffer from manic-depressive illness, cyclothymia or the manifestations of these illnesses (such as suicide or suicide attempts) than eminent individuals than would be expected in the general population or among eminent individuals in non-artistic professions.

Everyday Creativity

Based on the summary of the research thus far, it appears mood disorders are highly prevalent among eminent individuals in traditional artistic professions with perhaps the exception of more structured mediums such as biography and architecture (Jamison, 1996, 1993; Ludwig, 1992). Most susceptible to mood disorders, particularly bipolar disorders, are eminent poets and fictional writers (Andreasen, 1987; Jamison, 1996, 1993, 1990, 1989; Ludwig, 1998, 1992). Until the late 1980's, however, the literature neglected to investigate the potential of such an association in non-eminent individuals who exhibit everyday, real-life creativity.

Since the evidence for an association between bipolar disorders and creativity had only been supported in studies of eminent individuals, it was difficult to determine if artistic creativity was driving the association or whether other personality variables related to achieving eminence were also at work. Richards and Kinney (1990) proposed that “extracreativity factors, related to manifest bipolar disorders themselves – including a driven, ‘obssoid,’ work-orientation ability to think in broad if not grandiose terms; a sense of ‘standing apart’ from the mainstream; and a need for more publicly recognized achievement to validate a fluctuating sense of self – might raise the odds for eminent level creativity when creative talent is already present” (Richards, 1993, p. 213).

To better test how creativity and bipolar disorder may be related, Richards and her colleagues controlled for eminence and potential confounds by creating the Lifetime Creativity Scales (LCS;

Richards et al., 1988a). They wanted to better determine if the relationship between affective disorders and creativity existed independent of achievement in one's profession. In addition, Richards and her colleagues (1988 a, b) were the first to evaluate creativity as a dependent variable while using a psychiatric diagnosis as an independent variable. Using this inventory, individuals in the study were interviewed to determine their lifetime vocational and avocational activities, which were rated using Holland Occupational Codes and ranked from most to least creative.

Having validated the scales across a large Danish sample of normal and psychiatrically ill adoptees, the authors evaluated a smaller sample that included five groups: (1) manic-depressive (2) cyclothymic; (3) normal individuals who were first-degree relatives of either manic-depressives or cyclothymes; (4) normal individuals whose first-degree relatives had no personal or family history of an affective disorder, a disorder in the schizophrenia spectrum or suicide; and (5) individuals with a mental disorder other than an affective or schizophrenic illness.

Richards and her colleagues (1988b) found significantly higher overall peak creativity scores in the manic-depressives, cyclothymes and normal first-degree relatives of a family member who had been diagnosed with an affective disorder than in control subjects who were not at risk for an affective illness. This suggests a creative advantage for individuals with the mildest form of bipolar disorder (cyclothymes) and for individuals who carry familial risk for bipolar disorder but who do not have clinical manifestations of the illness.

Supplementary analyses revealed additional differences among the groups when vocational creativity and avocational creativity were considered. Normal relatives of individuals with a bipolar disorder scored significantly higher than manic-depressives on avocational versus vocational creativity. Cyclothymes' (or individuals with hypomanic traits) scores fell between the two. Richards et. al. (1988a) conclude that avocational creativity tends to vary directly with the degree of an individual's psychological health. When examining vocational creativity, however, the results are much different.

The study found that cyclothymes have significantly higher creativity scores than either the manic-depressives or the normal relatives of individuals with a bipolar disorder. The authors (Richards & Kinney, 1990) suggest a more recent diagnostic scheme would now categorize many of the individuals earlier identified as cyclothymes instead now falling into the Bipolar II category. Later research (Kinney, Richards, Daniels & Linkins, 1989 in Richards & Kinney, 1990) confirmed that individuals diagnosed as Bipolar II showed a high level of vocational creativity, and Bipolar I subjects fell closer to typical values for vocational creativity in previous control samples. This supports evidence that a milder form of mania (i.e. hypomania) may facilitate creativity more easily than a more severe manic illness found in Bipolar I patients. This lends further support to the hypomanic or cyclothymic symptoms endorsed among a greater number of eminent artists than among controls (Andreasen, 1987; Jamison, 1993, 1989; Ludwig, 1995, 1992). The authors suggest two primary conclusions from this research:

- (1) Different forms of bipolar disorder may carry different consequences for creativity (i.e. avocational vs. vocational, degree of severity), with the milder forms of mood elevations (including an unexpressed genetic risk) displaying a greater creative advantage. Later research (e.g. Eisenman, 1990) that shows diminished creativity among individuals who have been hospitalized with manic-depressive illness supports this finding.
- (2) Among individuals without a psychiatric illness, it is the relationship to a family member with a bipolar disorder that may predict heightened creativity. Andreasen's (1987) and Ludwig's (1994) studies of creative writers finds similar conclusions: writers' first degree relatives were significantly more likely than the relatives of controls to have a mental illness, particularly an affective disorder. Richards (1999, 1998, 1994, Richards & Kinney, 1990; Richards et. al., 1988) suggests this may be a "compensatory advantage" to the heritability of bipolar disorder: although it increases vulnerability to an illness, it may be linked with positive characteristics that are inherited along with the risk factor. She uses the biological analogy of

sickle cell anemia, in which individuals who inherit the gene (homozygous carriers) experience severe anemia, but individuals who are only carriers of the gene (heterozygous carriers) frequently have no symptoms and have the added benefit of a resistance to malaria (Richards et. al, 1988b). This research suggests that the same concept may be at work with bipolar disorder, with creativity as the compensatory advantage.

To this point, most studies of creativity and mood disorder are correlational and do not explore how the two may be connected. *Although this research demonstrates a connection between bipolar risk and creativity, it is unclear how this link operates.* If the degree of involvement (e.g. vocational vs. avocational) carries different consequences, then perhaps experience or time spent in the creative endeavor affects the expression of symptoms, which may enhance creativity. For example, perhaps individuals who pursue artistic vocations isolate themselves in order to devote more time to their art. This may lead to social isolation throughout the lifespan, which is defined as “a lack of significant relationships with kin, neighbors, coworkers, and friends, and of fulfilling roles” (Pillemer & Glasgow, 2000; p. 8). Being isolated from others may affect an individual’s ability to understand social cues, may force the individual to rely on his or her own thought process to make decisions (rather than checking with others) and may limit an individual’s practice of interpersonal skills. These factors may contribute to the loosening of associations, flight of ideas, excessive talking, and increased energy when around others. Alternately, perhaps individuals with strong divergent thinking skills, or, who have the ability to engage in postformal thinking (Sinnott, 1998a) can cope more effectively with interpersonal stimulus overload by “understanding the many possible logical structures that can underlie a perceived interaction...using the self as a complex filter” (Sinnott, 1988a, p. 283). This would support the idea of a compensatory advantage for creative individuals who may experience milder forms of bipolar symptoms, or who may be genetically susceptible to them. In this case, creativity may protect

individuals who may be susceptible to bipolar illness by moderating the degree to which bipolar symptoms manifest.

Perhaps to understand if the same relationship exists independent of vocation, avocation, achievement, or a diagnosed psychiatric illness, other authors (e.g. Richards & Kinney, 1989 in Richards & Kinney, 1990; Schulberg, 1999) have evaluated creative process and personality along with psychiatric traits in a more general population.

Measuring Creativity among Non-Eminent, Non-Clinical Samples

Like Richards et. al. (1988 a,b), Schulberg (1999, 1990) and colleagues (Schulberg, French, Stone and Heberle, 1988), assessed non-eminent individuals' creativity along with other factors of pathology. However, Schulberg's research examines a non-clinical, non-eminent population in which to evaluate the presence of creativity and psychopathology: undergraduate psychology students. As with Jamison's (1989) study, Schulberg (1999, 1990) does not assess a discrete, clinical diagnosis of a mood disorder or other mental illness. Instead, Schulberg's (1999, 1990) research focuses on traits, which, in much milder forms, resemble certain features of the disorders. As previous research (e.g. Richards et. al., 1988; Jamison, 1989; Andreasen, 1987) has suggested, milder forms of bipolar disorder may facilitate creativity, while more severe forms of bipolar illness may be destructive and non-creative (Schulberg, 1999). Schulberg's research is derived from and provides additional support for the relationship between moderate levels of manic traits correlating with higher levels of creativity, while none or very high levels of manic traits do not correlate with creativity (Richards et. al, 1988; Richards & Kinney, 1990). As Richards' (1997; Richards et. al., 1988) work has suggested, perhaps creativity protects susceptible individuals from developing more serious forms of a bipolar disorder.

Schulberg (2001, 1999, 1990) has focused on this milder facet of bipolar disorder that has emerged as a key correlate to creativity: hypomanic traits (e.g. Andreasen, 1987; Jamison, 1989,

Richards et. al, 1988b). To better determine the degree to which hypomanic traits (versus other pathology traits) contribute to creativity, Schuldberg (2001, 1999, 1990; Schuldberg et. al, 1988) also assessed schizotypal traits (magical thinking, flat affect), and depressive traits (negative affect) in his research. In three separate studies (2001, 1999, 1990, 1988), Schuldberg administered a series of “psychosis-proneness” scales (Schuldberg, 1990), creative product, creative process, and personality assessments to large samples of undergraduate students from an introductory psychology subject pool at the University of Montana. Schuldberg’s findings from all three studies support previous research that connects hypomania with creativity: using multiple measures, a significant positive correlation between mildly elevated affect (e.g. hypomania) and creativity consistently exists. In addition, the study showed significant negative correlations between negative or flat affect (e.g. depression or anhedonia) scores and three creativity measures. Overall, Schuldberg’s findings support the importance of subclinical symptoms of hypomania and impulsivity to everyday creativity. Schuldberg’s study emphasizes the positive, healthy outcomes (i.e. creativity) that are associated with a mild degree of elevated affect and increased activity.

Other research among college students (e.g. Feist, 1995; Goldfinch 1993) depicts higher creativity among individuals who score higher on indicators of psychological dysfunction; however, these participants simultaneously score higher on ego strength inventories (Feist, 1995).

As supported in previous research, these studies find that it is not the mild depressive symptoms that correlate with greater creativity, but instead the milder hypomanic symptoms or traits. Similar to Richards et. al. (1998b), Goldfinch (1993) found that cyclothymics report significantly more creative activity in music and writing.

While both eminent and everyday creativity research (e.g. Jamison, 1989; Ludwig, 1994; Richards et. al., 1988 a,b; Goldfinch, 1993) suggest that the domain of creative interest and involvement contributes significantly to the relationship between creativity and hypomanic traits, it is

unclear whether an individual's interest in artistic occupations facilitates these hypomanic traits as a function of time spent engaged in artistic activities, or whether these hypomanic traits facilitate deeper involvement in the artistic endeavor. It would be useful to determine the extent to which expertise in a particular creative domain may impact the relationship between hypomanic traits and creativity.

Creativity and Vocational/Avocational Domain

An individual's interest in a particular occupation is a function of many interacting variables, particularly a combination of personality traits (Holland, 1984; Roe, 1956; Rovezzi-Carroll & Fitz, 1984 in Dudek, Berneche, Berube & Royer, 1991). Holland (1999) asserts that vocational interest measures can "assess many of the factors entailed in a comprehensive personality inventory" (p. 96). Considering the now well-documented risk of bipolar illness and suicide among individuals in artistic professions (e.g. Andreasen, 1987; Jamison, 1989; Ludwig, 1998, 1992; Stack, 1997), having interest, experience, and expertise in artistic endeavors may have a greater impact in determining psychological health.

This interest and experience in a particular domain will most likely determine the amount of practice an individual devotes to the endeavor. As noted by Bosman & Charness (1996), increased practice leads to increased skill, which can contribute to expertise. As one ages, expertise in a particular area may offset declines in levels of cognitive functioning when engaged in tasks in which one has extensive practice (Salthouse, 1990). According to this, expertise may contribute to adaptive aging.

Simonton's (1988, 1990a, 1990b, 1991) creativity and aging work supports this idea of expertise as adaptive. He suggests that the effect of creative decline is not necessarily a direct result of aging, but instead, it is influenced by the vocational domain, individual differences in personality, and individual differences in periods of productivity across the life span. In his studies of eminent individuals in creative fields that have included classical music composition, science, math, and

psychology, Simonton (1990b) finds that the “productive period” varies across an individual’s life span. It is this productive period that will best predict whether a “masterwork” will be produced, rather than a function of the individual’s age at the time of the productive period. Lindauer, Orwoll and Kelley’s (1997) study of living older artists provides further support for “sustained creativity” (p.149) into older adulthood: most reported experiencing peak quality and quantity of creativity into their sixties. Thus, it is not chronological age, but “career age” (Simonton, 1991) that will determine peak quality and quantity of creative production. Simonton (1991) defines “career age” as the average age at which eminent creators are the most productive, and thus increase the likelihood of producing a masterwork. However, this age is not uniform across occupations: an individual’s peak productivity will vary by age and by creative domain. Simonton’s (1991) work suggests that individuals in artistically creative occupations such as musical composition are able to sustain productivity longer into the life span than are eminent individuals in math and science.

Simonton’s idea of career age being influenced by the quantity of work a creator produces which, in turn, increases the likelihood of a quality “masterwork” being produced sounds related to the concepts of increased energy and fluidity of associations – which are key criteria of hypomanic traits and bipolar risk. This key variable has not been assessed in older adults despite recent evidence (McDonald, 2001) that suggests the prevalence of mania in the population does not decrease with age. It would be useful to determine if a susceptibility to experiencing milder forms of mania is also equally prevalent among older adults – especially older adults who have developed expertise in creative endeavors. This is similar to Jamison’s (1989) and Ludwig’s (1994) research that demonstrates the greater prevalence of hypomanic or manic episodes among individuals in artistic professions. It would appear that individuals in artistic professions are more likely to sustain their involvement in creative work later in life, and thus, may also be more likely to experience bipolar symptoms. What is unclear,

however, is whether or not older creative people are more isolated, which may increase their susceptibility to bipolar symptoms.

If experience and expertise in a creative domain are related to hypomanic traits among older adults, and if this relationship contributes to greater adaptive functioning in older adulthood, then evaluating how the strength of this relationship is affected by age and experience may be important in unraveling the role of hypomanic traits in their contribution to creativity. Determining how adolescents' interest and involvement in specific creative domains relates to their creativity and susceptibility to affective symptoms is an important component to this equation. This could be measured by assessing affective traits and creativity variables among a group of talented adolescents upon entering an intensive academic program that fosters their experiences in specific creative domains. By assessing the same variables among the same group following their involvement in and successful completion of the program, the direction of the relationship between hypomanic traits and creativity could be better determined. Determining the direction of this relationship would be important, considering that "among the various professions, two to four times the percentage of artistic types – especially musical entertainers, actors, and musical composers – as compared to other types, were likely to have had their first professional success before the age of 21" (Ludwig, 1995, p. 57). Similarly, Simonton (1988, in Piirto, 1991) has noted that the most successful and productive scientific creators began their career productivity earlier than other scientists who were categorized as less successful and productive. Combining this information with Jamison's (1990) observation that finds "the risk period for a first manic or depressive episode overlaps considerably with the period of advanced education" (p. 342), it seems negligent to ignore this important young population in studying the degree to which creativity and occupational interest may contribute to affective symptom vulnerability.

Despite this, research is lacking among talented young students with abilities and interests in creative fields. Pursuing a career in an artistic profession may place them at a much greater risk for

developing a mood disorder than any other profession [i.e. a ten percent lifetime rate of mania among artistic individuals (Ludwig, 1995, 1992)] and also appears to place them at greater risk for suicide than any other profession (i.e. 112% greater risk in Stack, 1997). It would be useful to determine if individuals who are interested in artistic endeavors are at greater risk for developing a mood disorder than individuals who are interested in other creative work (such as science), or if individuals who may be at risk for affective symptoms may be more interested in artistic occupations.

Although the gifted adolescent literature details studies of intelligence, creativity, and personality variables (e.g. Runco, 1999,1996; Milgram, 1990; Bireley & Genshaft, 1991), it does not assess the link between increased creativity and hypomanic traits. The only study to date to approach the issue is Gallucci, Middleton & Kline (1999) and this author's (Wohl, 2001) unpublished thesis. The Galucci et. al. (1999) study is limited in scope, in that it utilizes only the CBCL to assess affective symptoms (not traits) and the TTCT on pre-teens and adolescents who are only defined as gifted by their WISC-III IQ scores (above 130); not by creative accomplishments or talents in specific domains. While giftedness is positively correlated with intelligence, it does not always translate into greater creativity (Hunsaker & Callahan, 1995). Furthermore, a high IQ does not necessarily equate with high creativity (Runco, 1991). Not surprisingly, the study did not find elevated levels of creativity, nor did they find any correlations between TTCT and CBCL scores.

However, an unpublished study conducted by this author (Wohl, 2001) among students entering the Texas Academy of Mathematics and Sciences lends additional support to existing research (Andreasen, 1987; Andreasen & Canter, 1974; Jamison, 1993, 1990, 1989; Ludwig, 1994, 1992; Richards 1994; Richards & Kinney, 1990; Richards et al, 1988; Schuldberg, 1999, 1990) that has demonstrated the positive link between hypomanic traits and creativity. This study also provides support for research (i.e. Ludwig, 1995, 1994, 1992) that demonstrates how creative domain (artistic or scientific) contributes to this correlation. This research is unique in that it assesses these variables

among talented adolescents who may well become the future eminent creators that have been studied in previous research (i.e. Andreasen, 1987; Jamison, 1993; Ludwig, 1994, 1992).

The unpublished study (Wohl, 2001) found that hypomanic traits correlated with both artistic interest and investigative interest, but similar to Ludwig's (1998, 1995) findings, this data showed that the correlation between hypomanic traits and artistic interest was stronger than the correlation between hypomanic traits and investigative interest. These results lend further support to previous research (i.e. Feist, 1998; Ludwig, 1998, 1995, 1994) that suggests individuals who favor artistic interest show greater susceptibility to "being in a mildly manic state much of the time" (Eckblad and Chapman, 1986). Not only do these findings support previous empirical data (i.e. Feist, 1998; Ludwig, 1998, 1995; 1994) that depict a strong relationship between artistic occupational interest and susceptibility to expansive mood states, but the findings also suggest that this link occurs early in a potential creator's career. However, it is important to emphasize that these findings do not suggest that individuals with investigative interest are not creative. Rather, it is proposed that the stakes may be higher for artistically-oriented individuals to exhibit their creativity when compared with scientifically-oriented individuals. As Feist (1998) noted in his meta-analysis of personality in scientific and artistic creativity: "there is institutional support (albeit not much) for relatively noncreative science, but there is not institutional support for relatively noncreative art...noncreative art does not survive" (p. 291).

Two multiple regression equations (one predicting creative process, the other creative personality) demonstrated that artistic interest and hypomanic traits contributed to significant portions of the variance in creativity among 172 TAMS students. Additionally, it is important to note that artistic interest and hypomanic traits seem to be stronger predictors when taken individually than when combined. Thus, although artistic interest and hypomanic traits are significantly correlated, it appears that having both (as opposed to one or the other) may not necessarily contribute to greater creativity.

While this study provides greater evidence for the role that hypomanic traits contribute to creativity, particularly at an early age in a creator's career, it does not assess the direct, predictive role of hypomanic traits and the extent to which these traits interact with other variables. What the current literature neglects is an investigation of developmental reasons for the existence of hypomanic traits, and the role they play in their contribution to artistic creativity.

Developmental Aspects of the Bipolarity/Creativity Relationship

Several psychologists (e.g. Lubart & Sternberg, 1998; Kogan, 1973; Pillemer & Glasgow, 2000; Salthouse, 1990; Simonton, 1988, 1990, 1991, 1998; Sinnott, 1998 a, b) have explored developmental issues that are central to creativity, affective symptom risk, and aging. Although these authors do not explicitly discuss the link between bipolar symptoms and creativity, their developmental concepts seem implicit in the relationship between these two variables. Three developmental concepts seem most salient in determining the role of hypomanic traits in their contribution to creativity: expertise (e.g. Salthouse, 1990); postformal thinking (e.g. Sinnott, 1998); and social isolation (e.g. Pillemer & Glasgow, 2000).

Expertise (Salthouse, 1990) can be defined as an increase in knowledge, life experience and career experience that can serve as a buffer against declines in other cognitive resources (such as intellectual processing). As an individual increases expertise in a certain area, it is to the exclusion of knowledge and skill in other areas. In other words, expertise encapsulates an individual's set of knowledge and skills as he or she ages (Hoyer & Rybash, 1994). Expertise and encapsulation of skill can facilitate greater creativity through knowledge of what exists and what is possible (Lubart & Sternberg, 1998) as well as through greater optimization (Baltes, 1993) of cognitive resources that result from increased practice. Thus, expertise may lead to greater fluidity of associations, and a greater array of potential solutions to a given problem. Expertise, in this case, may increase postformal reasoning (Sinnott, 1998).

Postformal reasoning (Sinnott, 1998a) can be described as “multiple views of reality...multiple solutions, definitions, parameters and methods” (p. 271) when a creative problem is presented. To think postformally and, thus, creatively, one must consider that more than one correct solution to a problem exists. Expertise and postformal reasoning may be the components that contribute to the strength of the relationship between hypomanic traits (loose associations) and creativity (divergent thinking, creative personality), which may result in greater “ultimate creativity,” (Kogan, 1973) or successful creative outcomes with age. Assessing postformal reasoning in talented adolescents and older adults would help determine the extent to which postformal reasoning contributes to creativity, and at what point it may relate to the development of hypomanic traits.

An alternative to the above scenario would suggest that expertise and encapsulation of skill may lead to less flexibility and increased entrenchment in the “right” way to solve a problem (Lubart & Sternberg, 1998): a direct contrast to postformal thinking. In this scenario, expertise does not facilitate postformal reasoning, does not relate to hypomanic traits, nor does it contribute to creativity. Rather, expertise and encapsulation of skill in this model may insulate an individual as he or she ages and may prevent creative outcomes. Again, assessing these variables in both talented adolescents and older adults would help determine how expertise in specific creative domains impacts the role hypomanic traits play in their contribution to creativity as one ages.

Alternatively, being insulated in an artistic profession may instead impact one’s social involvement as he or she ages, which may instead increase susceptibility to hypomanic traits, and may thus increase creative outcomes. Although expertise may insulate an individual, it is unclear the degree to which an individual’s involvement in an artistic domain may contribute to social isolation, which is defined as “a lack of significant relationships with kin, neighbors, coworkers, and friends, and of fulfilling roles” (Wethington, Moen, Glasgow, & Pillemer, 2000; p. 8). Perhaps time spent in a creative endeavor may isolate an individual, which may impact the expression of bipolar symptoms.

Since some researchers (e.g. Richards, 2001, personal correspondence; Schuldberg, 2001) suspect that some traits along the schizophrenic spectrum may contribute to creativity, perhaps the more socially isolating schizoid traits may be at work. Similarly, creative individuals may have ideas that do not conform to current societal expectations. These non-conformist ideas may prompt social rejection by peers, which may increase the likelihood of an artist's isolation. In this scenario, isolation increases creativity, and hypomanic traits only mediate the relationship.

On the other hand, individuals who are passionate about their art may choose to devote their time to their creations at the expense of social integration. Being isolated from others may affect an individual's ability to understand social cues, may force the individual to rely on his or her own thought process to make decisions (rather than checking with others) and may limit an individual's practice of interpersonal skills. In this scenario, it is these factors that may cause the loosening of associations, flight of ideas, excessive talking, and increased energy (i.e. hypomanic traits) when around others. It would be worthwhile to determine if social isolation induces hypomanic symptoms, or if it exacerbates previous tendencies. Evaluating social isolation, expertise, and postformal thinking among younger and older creators may provide insight into the direct or mediating role that hypomanic traits play in their contribution to creativity.

The Present Study

Purpose

It appears that the well-established link between hypomanic traits (such as loose associations and increased energy), artistic interest, and creativity exists not only among eminent and everyday adult creators, but is also prevalent in talented adolescents who may well be future eminent creators. However, the direction of this relationship still remains unclear. Although it appears that the relationship between hypomanic traits, artistic interest, and creativity exists relatively early in a potential creator's life and perhaps continues through the working years, it is not clear if hypomanic

traits play a similar role in determining creativity in later life or the extent to which other developmental variables influence or covary with this relationship.

Thus, the purpose of the present study was twofold: to determine if a causal relationship between hypomanic traits and creativity can be determined through a longitudinal study, and to evaluate if the extent to which similar determinants of creativity exist among a sample of talented adolescents and a sample of talented older adults.

CHAPTER II

METHOD

Participants

Longitudinal Sample

Participants for the longitudinal sample consisted of students from the Texas Academy of Mathematics and Science (TAMS) graduating class of 2002). The TAMS program is located at the University of North Texas, and is a Texas Legislature-created program that provides an opportunity for talented students to complete their first two years of college while earning a high school diploma. Students enroll in the academy after their sophomore year in high school, live in a special supervised UNT residence hall, and attend regular UNT courses. Many of the students typically have numerous and diverse interests in artistically creative domains such as writing, composing, and drawing or painting. Although these may be considered extracurricular to their math and science focus, recent studies (e.g. Milgram & Hong, 1993 in Rysiew, Shore & Leeb, 1999) suggest that “leisure activities pursued by adolescents have been found to be valid predictors of adult occupational choice” (p.427).

In the initial data set collected in June 2000, a total of 184 participants from the TAMS class of 2002 volunteered to take part in the research project. Of these 184, approximately 30 were lost due to attrition from the TAMS program. Of the remaining 154 students in the class of 2002, a total of 52 volunteered to participate in the follow-up research for which data was collected in April and May 2002. Of the 52 who volunteered, a total of 44 participants had completed both inventories measured at Time 1 and at Time 2. The demographic data for the longitudinal sample can be found in Table 1.

Cross-Sectional Sample

Older Adults

To evaluate how developmental components such as social isolation, postformal reasoning, and hypomanic traits impact creativity across the life span, a sample of adults age 60 or older were recruited to participate in this research. Older adults were recruited from alumni and emeritus faculty at The University of North Texas, other national university alumni groups in the Dallas and Fort Worth area, and at local senior centers (Denton and Lewisville). Potential participants were contacted through personal contacts, letters, and meeting announcements at local senior centers. Contacts were asked to nominate creative individuals (themselves or others) who were over the age of 60. By recruiting individuals with university affiliations, and who were “nominated” as creative individuals, the likelihood of reaching participants with similar levels of intelligence, interests, and abilities to the TAMS students was increased.

A total of 100 potential participants agreed to participate in the research, of which 57 completed at least one inventory, and 55 had completed the majority of the inventories administered. Of the 57 participants, 42 completed every measure needed for the present analysis. After using a mean substitution option for 8 of the participants who were missing the postformal reasoning inventory and for 5 of the participants who had not completed the Brief Demonstrator Torrance Test of Creative Thinking, a total of 55 valid participants were used in the present data analysis. The sample happened to include more women than men, and included more individuals with a graduate school education than would be expected in the population (see Table 2).

Adolescents (TAMS classes of 2003 and 2004)

Participants for the adolescent sample of the cross-sectional study were recruited from the TAMS graduating classes of 2003 and 2004. Although 190 potential participants from the TAMS class of 2004 were contacted multiple times, only 25 volunteered to complete the measures and 17 completed all measures included in the study. An additional 130 students from graduating class of

2003 were contacted through a required meeting and were asked to volunteer to participate in the research. Of the 130, 55 agreed to participate and 40 completed each measure needed to evaluate the results. Thus, a total of 52 TAMS students exclusive of the TAMS students surveyed in the longitudinal study (Hypothesis 1) comprise the adolescent sample for the cross sectional study (see Table 3).

Procedure

Administration

Longitudinal Sample (TAMS 2002)

After receiving approval from the University of North Texas' Institutional Review Board (IRB), an approved letter and consent form (see Appendix A) was given to each parent or guardian of a student attending the Texas Academy of Mathematics and Science orientation held June 4th and 5th 2000. After receiving consent from parents, students were assembled into groups to facilitate administration of each measure.

Before taking the inventories, students were provided with an IRB-approved letter (see Appendix A) that provided information about the questionnaires and the research project. Students were assured both verbally and in the letter that their status in the TAMS program would not be affected if they chose not to participate in the study. Students and parents were informed that each measure would be coded with a number that would identify the participant only to the researchers so that measures could be evaluated together along with demographic information of the participant. The codes and correlating identifying information have been kept securely in a locked file cabinet in the author's research office.

The Torrance Test of Creative Thinking, Verbal Form A (Torrance, 1990) was administered by this author to all participants in a large lecture hall at the University of North Texas on June 4, 2000. The author followed the standardized group administration procedure in the TTCT Directions Manual

for Verbal Forms A and B (Scholastic Testing Service, 1990) to ensure valid and reliable interpretation of normative scores. To preserve participant confidentiality, the TTCT (Torrance, 1990) response books were coded using a master list of codes that corresponded with participants' seating order during test administration. Participants signed a list that indicated their seating order when they arrived, and this list was used to code the inventories.

The final two measures, the How Do You Think? Test (HDYT) and the Hypomanic Personality Scale (HPS) were administered to three groups of approximately 65 to 70 students each on June 5, 2000. As recommended by its author (Davis, 1975), The How Do You Think? Test was administered with a separate Scantron® sheet for participants to record their responses. The questions on the HPS inventory were alternated with questions from another Wisconsin Psychosis-Proneness Scale (The Impulsive Non Conformity Scale, Eckblad & Chapman, 1986), as per the authors' recommendation. The inventories were coded with participant numbers before administration. Students were handed their respective participant-coded inventories as the experimenter called each participant by name and handed him or her the corresponding coded inventory packet. Each group lasted approximately 60 minutes.

During April and May 2002, TAMS 2002 students who had participated in the initial data collection described above were recruited for participation in the longitudinal research in several ways. Letters that were copied onto UNT Psychology Department letterhead (see Appendix A) were placed in each student's mailbox at the student dormitory, flyers were posted throughout the dormitory lobby, announcements were made by the Residential Advisors during Wednesday night wing meetings, the author contacted students by phone, and the researcher recruited potential participants in the dormitory recreation room during the evenings in which surveys were being administered. Participants were offered free pizza in exchange for participation in the longitudinal research. Eight group meeting times

were scheduled during the week and on weekends at the dormitory to provide flexible scheduling for participants and to increase participation.

Students who agreed to participate were provided with an updated IRB-approved consent form (see Appendix A) and a packet of inventories in their mailboxes to complete on their own and to bring to their scheduled meeting time. Each inventory was coded with the corresponding subject number in order to protect participants' identity. The letter confirmed the students' final meeting time/pizza party time and the duration of the meeting (one hour). The three inventories that were given to students consisted of the How Do You Think? Test (Davis, 1975), the Hypomanic Personality Scale (Eckblad & Chapman, 1986) with the Impulsive NonConformity Scale (Ibid.) on alternating items, and the Student Interest and Experience Questionnaire (Amabile, 1989). Participants were asked to complete the inventories at their leisure, but were asked to complete them before the final meeting. At the final meeting, the participants were administered the Torrance Test of Creative Thinking, Verbal Form B (Torrance, 1990). The alternate form of the Torrance Test of Creative Thinking, Verbal (Torrance, 1990) was administered to control for practice effects that may have occurred if Form A were used a second time. The TTCT Verbal, Form B (Torrance, 1990) was also coded with the corresponding subject number to protect participant confidentiality. The TTCT Verbal, Form B (Torrance, 1990) administration lasted approximately 45 minutes, and the students received the delivered pizzas at the end of the meeting. The author collected students' inventories for scoring.

Cross-Sectional Samples

Older Adults

Participants for the older adult sample were recruited using several methods and resources beginning in March 2002 and continuing through April 2003. An extension for recruiting older adults through April 2003 was granted by the Institutional Review Board (IRB) (see Appendix A). First, potential participant names and addresses were obtained from the UNT Human Resources department.

A list of names and addresses of retired staff and faculty who had previously given consent to have their names and addresses released was used to generate an initial contact letter (see Appendix A). In the letter, individuals were asked to nominate a creative individual who was 60 years of age or above, and were encouraged to nominate themselves. No one nominated an individual other than herself or himself. Individuals who were interested in contacted the researcher for follow up. Similar letters were also sent to individuals known by the researcher who have been members of the University of Michigan Club of Dallas. Additional participants were recruited in person at the Denton Senior Center, the Lewisville Senior Center, and through a caregiver group at Good Samaritan in Denton.

Once they agreed to participate, older adults were assigned a subject number and were mailed or handed an envelope with the following materials: (a) a letter about the project and a recruiting incentive of a raffle for \$50.00; (b) a research consent form; (b) the How Do You Think? Test (Davis, 1975); (c) the Hypomanic Personality Scale (Eckblad & Chapman, 1986); (d) the UCLA Loneliness Scale (Version 3; Russell, 1996); (e) the Horn (1975) Gf-Gc Sampler; (f) Sinnott's (1998b) postformal reasoning scale; (g) the Adult Interest and Experience Questionnaire (Amabile, 1989); (h) the NEO-FFI Form S© (Costa & McCrae, 1991); (i) a demographic questionnaire with vocational and avocational activities and (j) a postage-paid envelope to return the completed materials. Each of the surveys included only the participant's subject number to protect their identity. After returning the completed packets, participants were asked to complete a final ten-minute follow up meeting in which the Brief Demonstrator form of the Torrance Test of Creative Thinking (BD-TTCT) (Goff & Torrance, 2000) was administered. Similar to the other surveys, only a corresponding subject number was used on the BD-TTCT (Goff & Torrance, 2000) inventories. The BD-TTCT (Goff & Torrance, 2000) was administered in groups and individually by this author and by a fellow doctoral student. The author collected the inventories and organized them by subject number for scoring.

The random drawing for the \$50.00 was held in May 2003 after the data collection had been completed. The winner of the raffle was contacted and given the \$50.00 prize.

TAMS Students

Students from the TAMS graduating classes of 2004 and 2003 were recruited using various methods between June 2002 and April 2003. Each student in the TAMS 2004 class was assigned a subject number and an envelope was assembled with the same materials given to the older adult participants. The author set up a table at the information fair held as part of the June 8, 2002 TAMS orientation. Students who approached the table were asked if they would be willing to volunteer for the study. If they agreed, they were given a packet with their corresponding subject number and a postage-paid envelope addressed to the author in which the completed surveys could be returned. Because only a limited number of students were present at the orientation, the author distributed the remaining packets with a revised letter to students' mailboxes in September 2002. Students were instructed to complete the packets by September 30 and drop them in a ballot-style box labeled "Creativity Study" at the front desk. The author checked the box weekly for envelopes to ensure security of the data. Students were reminded to turn in their packets through wing meeting announcements, reminder slips attached to a candy bar that were placed in their mailboxes, and phone calls made by the author. The students who returned their surveys were contacted by phone in order to set up a 10-minute follow-up appointment for a group administration of the BD-TTCT (Goff & Torrance, 2000). This author and a fellow doctoral student facilitated the follow-up group administration in February 2003.

Additional TAMS students in the graduating class of 2003 were recruited at a mandatory monthly meeting held March 31, 2003. Students who agreed to participate in the study were administered an updated consent form, the BD-TTCT (Goff & Torrance, 2000), and were given the packet of self-administered inventories as the older adults and other TAMS students received. The BD-TTCT (Goff & Torrance, 2000) inventories were collected and participants were instructed to take the

envelopes with them to complete on their own and drop in the “Creativity Study” box at their dormitory’s front desk by April 15. Two random drawings for \$25.00 each were completed in April 2003 and two TAMS students were contacted and awarded their prizes.

Measures

Creativity Measures

Most researchers in the gifted and creativity literature agree, “any single measure of creativity is rarely sufficient by itself” (Fishkin & Johnson, 1998, p. 45). Therefore, two types of creativity measures were employed as dependent variables in this study: a divergent thinking measure to assess creative process and a creative personality measure that assesses interests, attitudes and self-perceptions. For the longitudinal study (Hypothesis 1), The Torrance Test of Creative Thinking (TTCT) Verbal, Forms A & B (Torrance, 1990) were employed as the divergent thinking measure. In the cross-sectional study (Hypothesis 2), the Brief Demonstrator Form of the Torrance Tests of Creative Thinking, (BD-TTCT) (Goff & Torrance, 2000) was used. To measure creative personality, the How Do You Think? Test (HDYT) (Davis, 1975) was used across all samples.

Torrance Test of Creative Thinking, Verbal (TTCT); & Brief Demonstrator Form of the Torrance Tests of Creative Thinking (BD-TTCT)

The TTCT (Torrance, 1990) is one of the most widely recognized and employed measures of creativity in the U.S. and worldwide (Plucker, 1999). The test has been employed in an estimated “2,000 dissertations, journal articles, monographs, and books” (Torrance, 1998 p. 87), and is the most extensively researched of the divergent thinking measures (Fishkin & Johnson, 1998). It measures flexibility, fluency and originality through both verbal and non-verbal assessments for children through adults. However, it should be noted that norms for the TTCT reach a ceiling at the 12th grade (age 18), and are categorized as “grades 12+.” For this reason, the full TTCT was used only with the longitudinal sample (Hypothesis 1).

The standard TTCT has two parts: a Verbal test and a Figural test. The Verbal test consists of six subtests, and the Figural test consists of three. Each verbal subtest is scored on the basis of fluency, flexibility, and originality, and lasts between 5 to 10 minutes each. It can easily be administered in groups, and takes approximately 45 minutes to complete. The figural test uses three picture-based exercises to assess five mental characteristics: fluency, originality, elaboration, abstractness of titles, and resistance to premature closure. It takes approximately 30 minutes to complete. In the longitudinal study, only the Verbal form of the TTCT was used. Because the TTCT Verbal is available in two forms (A and B), the different forms could be used without introducing familiarity and exposure as a confounding variable in the pre and post test sessions.

A new Brief Demonstrator Form (BD-TTCT) was recently introduced (Goff & Torrance, 2000) through Scholastic Testing Services. It assesses creativity by quantifying both the figural and verbal creative strengths. It was designed and normed for adults, and can be administered by an examiner (in a group setting or individually) in 15 minutes. Because the BD-TTCT has been developed for adults and because of its brevity, it was employed in the cross-sectional study (Hypothesis 2) in which older adults and older adolescents participated.

Test-retest reliability for scores on the TTCT range from .50 to .93, dependent upon the grade level of the participants, selection of participants, and sample sizes (Treffinger, 1992 *Mental Measurements Yearbook*). On average, test-retest reliabilities fall in the .60 and .70 range (Chase, 1992 *Mental Measurements Yearbook*). Validity of the TTCT is more complex. With regard to construct validity, it is important to emphasize that the TTCT is not intended to represent every aspect of creativity, but rather just certain original and creative thinking abilities (Treffinger, 1992). The predictive validity of the TTCT has become a controversial and complex issue, primarily because it is difficult to define criteria for later creative accomplishments, and because longitudinal data can be difficult to collect. However, according to Treffinger (1992), “within these constraints...TTCT scores

have been positively and significantly correlated with achievement criteria in several studies involving periods as short as nine months and as long as 22 years.” (p. 5). Other studies (e.g. Milgram & Hong, 1993 and Torrance & Safter, 1989, in Fishkin & Johnson, 1998) corroborate these estimates of predictive validity. While the measure has come under scrutiny in recent years for its perceived lack of predictive validity in longitudinal studies, many argue it has been the statistical analysis and exclusion of key personality and intellectual variables that has led to this erroneous conclusion (Fishkin & Johnson, 1998). Combining the TTCT with other creativity and personality measures in the present study could contribute to its validity as a measure of creativity: especially since the instrument is widely recognized as the best existing standardized measure of creative potential (O’Neil, 1994, in Gallucci, Middleton & Kline, 1999).

How Do You Think? Test (HDYT Form E, Davis, 1975).

The HDYT is a 100-item test that measures creative interests, attitudes, and self-perceptions. Responses are weighted in accordance with the respondent’s agreement to specific items, and scores are obtained by summing the individual weighted scores. The measure is sensitive to personality characteristics and biographical experiences that are associated with creativity. While reliability and validity data is scarce for the most recent form (Form E), data from previous forms (Form B) suggest that the test is both reliable and valid: internal consistency for Form B was .94 and correlation with ratings of creative products was .42 (Davis, 1975). For the current samples, coefficient alphas were found to range between .88 for the TAMS graduating seniors to .93 for the older adults.

Davis divided his sample into thirds based on creativity ratings, and using a t-test, found significantly higher scores on the HDYT among the creative students at the $p < .01$ level. Furthermore, Schulberg (1990) has established convergent validity for the HDYT with other tests (i.e. Creative Personality Scale, Gough 1979, in Schulberg, 1990). The test has been validated through studies that have tested adult populations, college students, middle-school students (Lees-Haley & Swords, 1981 in

Davis, 1977) and elementary school students (Lees-Haley & Sutton, 1982 in Davis, 1977). The paper-and-pencil test takes approximately 15 to 20 minutes for participants to complete on their own.

Creative Experience and Skill (Expertise)

The Student/Adult Interest and Experience Questionnaire (Amabile, 1989), a highly face-valid questionnaire, was used to assess participants' perceived domain-specific experience and skill in common artistic and scientific activities. The inventory is not published, but has been used in scientific articles by Amabile and others (e.g. Ruscio, Whitney, & Amabile, 1998) to assess stable, domain-specific motivation in studies of creativity. SIEQ items ask participants about their perceived skills (15 items) and experience (15 items) in various activities on a 5-point Likert scale ranging from 1 (low) to 5 (high). To control for age-related differences, participants are asked to evaluate their skills and experiences relative to others their age. Ruscio et. al. (1998) do not report internal reliabilities for the skills or experiences portion of the SIEQ: they are only reported for the interest portion (30 items). However, because the items are repeated in each section, and because the items are highly face-valid, it can be assumed that internal reliabilities are similar for each of the scales. The authors (Ruscio et. al, 1998) report that Cronbach's alphas range from .88 to .90 for artistic and scientific interest among a sample of 151 undergraduate psychology students. Alpha coefficients that were calculated using the present sample of older adults and adolescents (N = 111) yield similar results: .92 for the artistic interest scale (20 items); .92 for the scientific interest scale (10 items); .76 for the artistic experience scale (10 items); .77 for the scientific experience scale (5 items); .87 for the artistic skill scale (10 items) and .91 for the scientific skill scale (5 items).

Vocational/Avocational Interest Measure

The Student/Adult Interest and Experience Questionnaire (SIEQ, Amabile, 1989) contains a 30-item scale that uses a 5-point Likert scale to assess participants' interest in artistic and scientific

activities regardless of their experience or skill in each activity. As reported above, alpha coefficients for the interest scales are very good (ranging from .88 to .92).

Hypomanic Traits/Susceptibility to Bipolar Symptoms Measure

One instrument was used to measure the level of hypomanic traits among participants: the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986). Rather than assess hypomanic episodes or states of hypomania, The HPS was developed to assess the “premorbid personality style” (Eckblad & Chapman, 1986, p. 214) of individuals who have been diagnosed with bipolar disorder. The individuals who score positively on the measure have been observed by Eckblad and Chapman as people who are “in a mild manic state much of the time” (Eckblad & Chapman, 1986, p. 214). They can be described as “energetic, upbeat, gregarious people who are often able to work long hours with little sleep and who juggle numerous projects and social commitments” (Eckblad & Chapman, 1986, p. 214). The HPS was developed to assess the more subtle hypomanic tendencies that may predict the possibility of a future manic episode. In addition, the authors wanted to develop a scale that did not include depressive content (as the General Behavior Inventory contains), since individuals with a bipolar illness are less likely to endorse items with “strong dysphoric content.” (Eckblad & Chapman, 1986, p. 214).

The measure was developed to help predict susceptibility to a bipolar spectrum disorder, and appears to have very good reliability. Eckblad & Chapman (1986) administered the inventory to 768 college students, and readministered the test 15 weeks later to 89 participants. Test-retest reliability was very good ($r = .81$). To test concurrent validity, the authors selected students with an HPS raw score of 36 or above (standard score = 1.82 for men, 1.67 for women), and a control group of students with scores at or below one half a standard deviation above the mean for their gender.

To determine concurrent validity, the authors conducted clinical interviews with students in both the experimental and control groups. Of the 40 experimental participants, 36 qualified for the

SADS-L diagnosis of hypomanic episodes, but none of the control participants received this diagnosis (Eckblad & Chapman, 1986). Very high validity was obtained for the measure in diagnosing both hypomanic (1.0) and depressive (.95) episodes in this population. The thoroughness of the interviews is credited with these high coefficients. While these results have drawn past criticism for the small sample (n=36) and the short duration for follow-up, the authors have recently published a 13-year longitudinal study with the experimental and control groups (Kwapil, Miller, Zinser, Chapman, Chapman, & Eckblad, 2000). The results show that individuals who were identified as high-scorers on the inventory (n=36) reported significantly more bipolar disorders and major depressive episodes than the control participants (n=31). This important longitudinal data provides even greater validity for the usefulness of the HPS scale in assessing individuals with bipolar risk. Other authors (Petzel & Rado, 1990) provide additional validity for the HPS by demonstrating that the HPS measures hypomania more accurately than the MMPI because it does not include anxiety and cognitive interference in its construct. More recent research (Rawlings, Barrantes, Cleridge, McCreery, & Galanos, 2000) provides extensive normative data from a British sample of 1,073 16-93 year olds, and demonstrates cross-cultural validity for the scale among Spanish and Australian undergraduates. It is important to note that the Rawlings et. al. (2000) British data demonstrated lower mean scores among the 70-79 year-old British participants when compared with the 16-19 year-old group. However, they did not assess the relationship of these scores to other variables within the 70-79 year old group (such as creativity or artistic interest/expertise).

As recommended by the authors (Eckblad & Chapman, 1986), the HPS was intermixed with a second scale from the Wisconsin Psychosis-Proneness Scales (i.e., The Social Anhedonia Scale; Eckblad, Chapman, Chapman & Mishlove, 1982). HPS items were listed as the odd-numbered items through item 81, and constituted the remaining six items (82 – 88) on the scale. Internal reliability

using the present sample (N=107) of older adults and adolescents revealed good internal consistency with an alpha coefficient of .89 for the 48 items assessed.

Social Isolation Measure

The UCLA Loneliness Scale (Version 3; Russell, 1996) was originally developed in 1978, and is considered to be “the standard scale” in measuring social isolation and loneliness (Russell, 1996). The revised scale consists of 20 items that begin with the stem “How often do you feel...”, for which respondents use a 4-point scale to indicate how often they feel the way described (never, rarely, sometimes, always). The reliability of this version of the scale appears consistent (.89 to .94 across college students, nurses, and elderly), and has good test-retest reliability ($r = .73$). In addition, the scale correlates significantly with other measures of loneliness, and shows a significant negative correlation to a measure of social support (Social Provisions Scale, Cutrona & Russell, 1987, in Russell, 1996). Factor analyses reveal that the UCLA Loneliness Scale, Version 3 fits a global loneliness factor, and provides a reliable and valid assessment of loneliness and perceived lack of social support across younger and older cohorts.

Postformal Thinking Measure

To assess postformal thinking, Sinnott (1998b) has outlined eleven complex thinking operations that characterize postformal thought: (1) metatheory shift, or primary ways of conceptualizing a problem (i.e. abstract vs. practical); (2) problem definition, or labeling of the problem; (3) process-product shift, which is the development of a process that would fit a type of problem, while simultaneously a non-concrete answer and a specific answer to a particular problem; (4) parameter-setting, or naming the important limiting variables to a solution; (5) pragmatism, or, being able to identify a “best” solution; (6) multiple solutions to a problem; (7) multiple goals, or, giving several endpoints that would each deem a problem “solved”; (8) multiple methods, which are several ways to reach the same solution; (9) multiple causality, or, several causes at work in a problem;

(10) paradox, which are statements that indicate the solver sees inherent practical contradictions; and (11) self-referential thought, or the solver's awareness of being the only ultimate judge of the appropriateness of a chosen logic to create a preferred solution (Sinnott, 1998b). Each of these areas were assessed using an unpublished paper-and-pencil form that Sinnott (1998b) has developed along with a scoring system to determine an individual's score in each operation. Participants were asked to self-assess the degree to which they employed each of these operations either on the job (older adults, during last occupation if retired or currently if still working) or at school (adolescents). Participants were given a 7-point scale to rate the degree to which each of these operations were true to their working context. Participants were also given space to write an example of each. Coefficient alphas for the older adults (.81) and adolescents (.67) in this study are good.

Fluid/Crystallized Intelligence Measure

To determine the extent to which cognitive abilities contribute to the variance in creativity, the Horn (1975) Gf-Gc Sampler was included in the administered measures. The unpublished inventory is based on Horn and Cattell's (1966) theory that there exist two types of intelligence: fluid and crystallized. The Gf-Gc Sampler is comprised of a number of subtests that are designed to yield a quick and accurate assessment of crystallized and fluid functioning. Four subtests are assessed in the Gf-Gc Sampler: vocabulary (Gc); abstruse word analogies (Gc); common word analogies (Gf) and letter series/matrices (Gf). Each test consisted of 13 to 15 items.

Alpha coefficients were evaluated for the older adults and adolescents (N = 107) of the Gf-Gc Sampler. Coefficients range from .69 to .77 on the crystallized subscales (Gc), while alpha coefficients range between .65 and .84 on the fluid subscales (Gf). Therefore, the items that comprise these scales appear consistent.

General Personality Measure

Because the personality measure evaluated (Hypomanic Personality Scale) suggests a level of pathology is necessary to predict creativity, a non-pathological personality inventory was also included in the measures administered to the cross-sectional sample of older adults and TAMS students. The NEO-FFI Form S (Costa & McCrae, 1992a) is a brief (60 item) measure of the full NEO-PI-R (Costa & McCrae, 1992b). Like the NEO-PI-R, the NEO-FFI asks respondents to rate the degree to which they agree or disagree with each item using a 5-point Likert scale. The NEO-FFI was developed using 60 of the “best” NEO-PI items indicated by item and factor analyses (Tokay, Fischer, Snell & Harik-Williams, 1999). Psychological Assessment Resources, Inc. (1992) report the NEO-FFI correlations to fall between .77 and .92 with the NEO-PI-R domain scales. Previous research (Holden & Fekken, 1994) has demonstrated acceptable alpha coefficients for the NEO-FFI Form S among Canadian university women ($\geq .73$), and the publisher (Psychological Assessment Resources, Inc., 1992) reports internal consistency values ranging from .68 to .86.

Scoring

All forms of the Torrance Tests of Creative Thinking (Verbal A and B; Brief Demonstrator Form) were scored by the author. In each case, the Manual for Scoring and Interpreting Results (Scholastic Testing Service, 1990; 2000) was used. On both the TTCT-Verbal (A & B) and the BD-TTCT, protocols were scored for fluency, flexibility, and originality of responses. The fluency score was derived from the number of responses, the flexibility score was calculated based on the number of different categories of responses, and originality was scored by determining if a participant’s response differed from the normed list of non-original responses. On the BD-TTCT, participants’ responses were also evaluated for figural elaboration, and creative indicators on both the figural and verbal sections. Creative indicators included items such as combination or synthesis of figures, feelings and emotions expressed, humor, fantasy, movement and sound (figural) breakthrough of closure/extension

of boundaries (figural) provocative questions (verbal), richness and colorfulness of imagery, and abstractness of titles (figural).

After scoring the TTCT and BD-TTCT by hand, the completed inventories were submitted to the data entry department at The University of North Texas. Inventories such as the HDYT and the HPS had keys available from the authors with the reverse score items identified. These items were transformed to reflect the reverse scoring before summing the inventories. After transforming the appropriate scores, each of the items that were inclusive to specific items such as the HPS, SAH, HDYT, UCLA Loneliness Scale, and Postformal Thinking Scale were summed into total scale scores. Subscales were calculated on the Gf-Gc Sampler (Horn, 1975) and the SIEQ (Amabile, 1989). The Big Five Factors were calculated on the NEO-FFI, and the scores were transformed to z-scores in order to more accurately compare the scores from the 18 participants from the TAMS 2004 sample for whom the only NEO scores available were based on the Five Factor scores from the full version of the NEO-PI that had been administered by TAMS during data collection for the present study.

Research Hypotheses

Hypothesis 1

It was hypothesized that hypomanic traits cause creativity rather than creativity causing hypomanic traits. The first hypothesis predicted that the correlation between hypomanic traits measured among talented adolescents (TAMS class of 2002) before beginning the program (Time 1, 2000), and creativity that was measured among the same group at the end of their program (Time 2, 2002) would be stronger than the correlation between creativity measured at Time 1 (2000) and hypomanic traits that were measured at Time 2 (2002).

Hypothesis 2

It was hypothesized that the variables that predict creativity in talented adolescents who were tested for the first time in 2002 would also predict creativity in older adults who were also tested for

the first time in 2002. Specifically, it was expected that hypomanic traits and artistic interest would predict creativity in both samples. It was also hypothesized that developmental variables such as postformal reasoning, expertise, and social isolation would also contribute to the variance in creativity measures. The extent to which these variables contributed to creativity separately from hypomanic traits would provide greater information about the role of hypomanic traits with regard to creativity, and how these traits may manifest across the lifespan.

Design

To test the first hypothesis, it was proposed that a predictive model be employed using a cross-lagged panel correlational design (CLPC; Kenny, 1975). This quasi-experimental design was employed to measure covariations of hypomanic traits and creativity between times of testing (cross-lagged correlations), within times of testing (synchronous correlations), and correlations between the same variable across test times (autocorrelations) to construct the analytic panels.

To test the second hypothesis, it was proposed that a cross-sectional design be employed. Hierarchical multiple regression analyses were used for the entire sample to determine each variable's unique contribution to (1) creative process and (2) creative personality among (1) the TAMS Class of 2004 and (2) older adults, each of which were assessed in 2002 and 2003. Because age was an important variable in understanding the relationship between hypomanic traits and creativity, additional regression analyses for each sample (adolescents and older adults) were also planned for each dependent variable. Thus, four additional hierarchical multiple regression analyses were planned after conducting the two hierarchical regression analyses for the combined sample.

CHAPTER III

RESULTS

Descriptive Statistics

Prior to running the CLPC (Hypothesis 1) and the hierarchical regression equations (Hypothesis 2), descriptive statistics and tests of normality were analyzed. The descriptive data for each measure in the longitudinal analysis (Hypothesis 1) are presented in Table 4 and the descriptive data for each measure in the cross-sectional analysis (Hypothesis 2) are presented in Table 5.

Analysis

Hypothesis 1

The first research hypothesis was tested via cross-lagged panel correlation (CLPC, Kenny, 1975), a quasi-experimental research design, which was used in the analysis of longitudinal data. Measured covariations concerning hypomanic traits and two measures of creativity between times of testing (cross-lagged correlations) and within times of testing (synchronous correlations) in addition to correlations between the same variable across test times (autocorrelations) constituted the analytic panels. Analogous designs were employed to assess Time1/Time2 data for hypomanic traits (HPS, Eckblad & Chapman, 1986) and creative personality (HDYT, Davis, 1975) and to also assess Time1/Time2 data for hypomanic traits (HPS, Eckblad & Chapman, 1986) and creative process (TTCT Verbal; Torrance, 1990). The predictive roles of hypomanic traits and creativity were subsequently tested using a cross-lagged panel correlation (CLPC) procedure, which compared the correlations between hypomanic traits and creativity within Time 1 and within Time 2 (synchronous correlations), those between Time 1 and Time 2 within each variable separately (autocorrelations) and those between Time 1 and Time 2 between variables (cross lagged correlations). Two CLPC procedures were employed to evaluate the predictive role of hypomanic traits and each measure of

creativity (HDYT; TTCT-Verbal). These comparisons helped determine the direction of the relationship between the existence of hypomanic traits and creativity over time. The null hypothesis tested by the equality of the cross-lag comparison states that the relationship between the two variables is due to some unmeasured third variable and is not predictive in nature (Kenny, 1975; Kenny & Harckiewicz, 1979).

CLPC can provide additional evidence in explaining the predictive nature of the relationship between two variables. One of the benefits of utilizing a CLPC is an increased ability to better determine the dynamics of the relationship between hypomanic traits and creativity (e.g., Schuldberg, 1990). Despite its potential in this respect, Kenny and Harckiewicz (1979) caution researchers in the application of the CLPC, and note some of its limitations. For example, synchronous correlations (those between each measure at Time 1 and at Time 2) must be at least .30, sample size must be adequate, and there must be a theoretical basis for the stationarity of the predictive process.

When using the CLPC method, data are first analyzed for the equality of synchronous correlations to test for stationarity, and the equality of cross lags is explored to test for spuriousness. By comparing the magnitude of the cross-lagged correlations over time, it is assumed that predictive relationships can be inferred. Kenny (1975; Kenny & Harckiewicz, 1979) suggests utilizing the Pearson-Filon test to evaluate the significance of the differences between such cross-lag r 's. The equation is presented here as cited in Kenny (1975, 1979): Let 1, 2, 3 and 4 be variables, N be sample size and $k = (r_{12} - r_{24}r_{14})(r_{34} - r_{24}r_{23}) + (r_{13} - r_{12}r_{23})(r_{24} - r_{12}r_{14}) + (r_{12} - r_{13}r_{23})(r_{34} - r_{13}r_{14}) + (r_{13} - r_{14}r_{34})(r_{24} - r_{34}r_{23})$. The following then has approximately a standard normal distribution:

$$Z = \frac{(N)^{1/2} (r_{14} - r_{23})}{[(1 - r_{14}^2)^2 + (1 - r_{23}^2)^2 - k]^{1/2}}$$

Pearson-product moment correlations were first computed involving each indicator of hypomanic traits and creativity and were used in the computation of z scores used in the cross-lagged panel analyses of the data. These correlations are depicted in Figures 1 and 2. Due to the stability of coefficients between constructs at each time of testing, corrections for variations in such correlations were not necessary as otherwise suggested by Kenny (1975).

Figure 1
CLPC for HDYT ($dv1$)

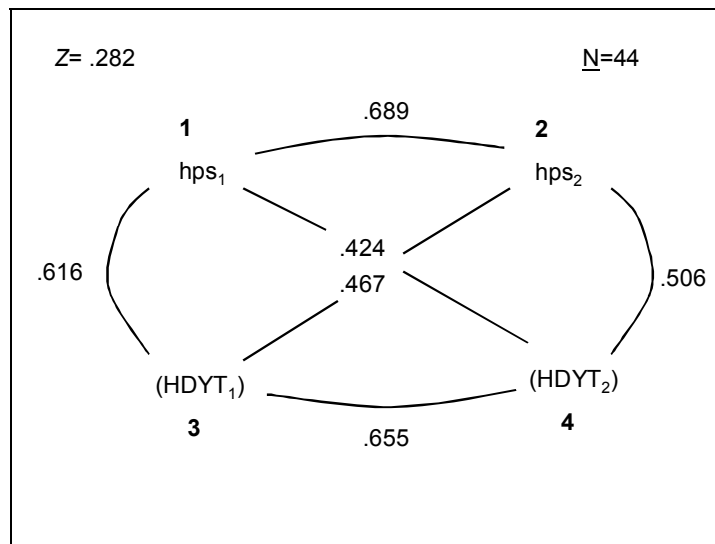
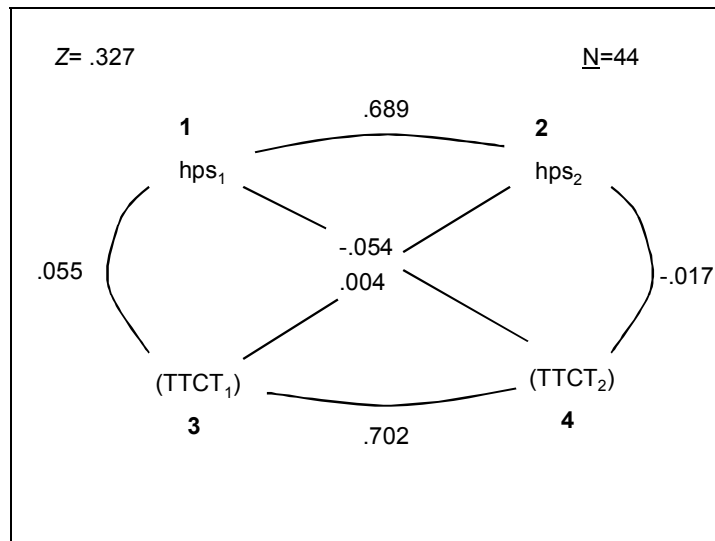


Figure 2
CLPC for TTCT ($dv2$)



Hypomanic Traits Indicator: Hypomanic Personality Scale (HPS)

Pearson-product moment correlations revealed strong autocorrelations between the HPS scores administered at Time 1 and Time 2 ($r = .689$). Tests of within-subjects effects (ANOVA, Repeated Measures, Sphericity Assumed) also revealed no significant difference in mean scores on the HPS at Time 1 and Time 2 [$F = 1.24 (1,44)$; $p > .05$]. Synchronous correlations between the HPS and HDYT are also strong at Time 1 ($r = .616$) and at Time 2 ($.506$), but the correlation between the HPS and TTCT is much weaker at both Time 1 ($r = .055$) and at Time 2 ($-.017$). Cross-lagged correlations between the HPS at Time 1 and the HDYT at Time 2 are moderate ($r = .424$), and are small between the HPS at Time 1 and the TTCT at Time 2 ($r = -.054$).

Creative Personality Indicator: How Do You Think? Test (HDYT)

Pearson-product moment correlations for the HDYT scores also revealed strong autocorrelations between the scores when administered at Time 1 and Time 2 ($r = .655$). Tests of within-subjects effects (ANOVA, Repeated Measures, Sphericity Assumed) revealed no significant differences between mean scores on the HDYT at Time 1 and Time 2 [$F = .528 (1, 44)$; $p > .05$]. Synchronous correlations between the HDYT and HPS are moderate to strong at both Time 1 ($r = .616$) and Time 2 ($r = .506$). The cross-lag correlation between the HDYT at Time 1 and the HPS at Time 2 are also moderate ($r = .467$)

Creative Process Indicator: Torrance Test of Creative Thinking, Verbal (TTCT-Verbal, Forms A & B)

To minimize practice effects, The Torrance Test of Creative Thinking, Verbal, Form A was administered at Time 1 and the Verbal Form B was administered at Time 2. Pearson-product moment correlations indicate a strong relationship between the autocorrelated scores on the TTCT Verbal (A) at Time 1 and the TTCT Verbal (B) at Time 2 ($r = .702$). Tests of within-subjects effects (ANOVA, Repeated Measures, Sphericity Assumed) also reveal no significant differences between mean scores

on the TTCT Verbal (A) at Time 1 and the TTCT Verbal B at Time 2 [$F = 1.30 (1, 46)$; $p > .05$].

Synchronous correlations, however, reveal a weak relationship between the TTCT Verbal (A) and the HPS ($r = .055$) and between the TTCT Verbal (B) and the HPS ($r = -.017$). The cross-lag correlation between the TTCT (A) and HPS is also weak ($r = .004$) as is the cross-lag correlation between the TTCT (B) and the HPS ($r = -.054$).

CLPC: Hypomanic Traits and Creativity

Using Kenny's (1979, 1975) Pearson-Filon test and Z-score equation, the results reveal no significant predictive power can be inferred between the cross-lag r 's ($Z_1 = .282$; $Z_2 = .327$).

According to Kenny's (1975) CLPC model, hypomanic traits (HPS) are not predictive of creative personality (HDYT) or creative process (TTCT-Verbal) when administered to scientifically talented adolescents within a two-year time frame. Kenny's (1975) CLPC also reveals that neither creative personality nor creative process directly predicts hypomanic traits in the same two-year time frame.

Hypothesis 2

The second research hypothesis was tested using a hierarchical regression analysis in which variables were entered in an a priori order to best determine the unique contributions of key variables (i.e. artistic interest, hypomanic traits) while accounting for the unique contribution of secondary variables (i.e. postformal reasoning, social isolation, and expertise).

Prior to running the hierarchical regression analyses, Pearson correlations were initially run to determine if relationships exist among the variables, and to evaluate the variables for collinearity. Pearson correlations reveal significant relationships at the $p < .01$ and the $p < .05$ levels among some of the independent variables. Although the highest correlation exists between artistic interest and artistic expertise ($r = .784$), a high correlation is expected since both variables are measured on the same inventory (SIEQ). Excluding the artistic interest and artistic expertise relationship, the highest correlation among the other independent variables is $-.664$ (scientific experience and age). Aside from

the artistic interest/artistic experience and scientific experience/age correlations, the correlations between the independent variables range between .036 and .447. Thus, it can be assumed that these variables do not violate collinearity: they are independent from one another and can be used with confidence as independent variables in the hierarchical multiple regression equations (see Appendix B).

To ascertain the unique contribution each variable provides to creativity, a hierarchical regression model was employed. Two dependent measures of creativity, the TTCT and the HDYT, were used in separate hierarchical regression equations. To best determine the unique contribution that hypomanic traits provides to the variance in each dependent variable (i.e., TTCT, Torrance, 1990; HDYT, Davis, 1975), the independent variables and planned interaction variables were entered in the following order (as blocks, where appropriate): (1) age X NEO ; (2) age x expertise; (3) age x postformal reasoning; (4) age x hypomanic traits age; (5) age; (6) NEO Five-Factor scores (Neuroticism, Extraversion, Openness, Agreeableness, Conscientiousness); (7) perceived expertise (artistic and scientific skill and artistic and scientific experience as measured by the SIEQ, Amabile, 1989); (8) postformal reasoning (Sinnott, 1998); (9) fluid and crystallized intelligence (Gf-Gc Sampler, Horn, 1975); social isolation (UCLA Loneliness Scale, Russell, 1996); (10) artistic interest (SIEQ, Amabile, 1989); and (11) hypomanic traits (HPS, Eckblad & Chapman, 1986).

Since hypothesis two was designed to evaluate the extent to which diverse variables would predict creativity across the life span, age was entered as the first independent variable in the regression equation. By entering age as the first independent variable, other variables could be assessed for their unique contribution to each measure of creativity independent of subject age. Because age is an important variable in this research, interactions between age and key variables (expertise, postformal reasoning, hypomanic traits) were derived and were entered prior to age as an independent variable. Next, the Big Five (Costa & McCrae, 1990) personality factors measured by the NEO-FFI, S (Costa & McCrae, 1990) were entered as the second block of the hierarchical regression equation. Expertise as

measured by perceived skill in artistic and scientific endeavors was entered as the third block. Perceived experience in artistic and scientific work was entered as the fourth block in the equation. The fifth block included postformal reasoning and the sixth block included fluid and crystallized intelligence. The measure that evaluated social isolation (UCLA Loneliness Scale, Russell, 1996) was entered as the seventh block in the equation, artistic interest was entered eighth, and hypomanic traits were entered as the final block. Because past research (i.e. Schulberg, 1990) has demonstrated a significant relationship between hypomanic traits and creativity, this variable was entered as the final block in the model to fully evaluate its contribution to the variance in creativity having accounted for the variance of all other variables measured.

Creative Process (BD-TTCT): Older Adults and Adolescents

To evaluate Hypothesis 2, a hierarchical regression analysis was first conducted for the entire sample (both older adults and adolescents) using the BD-TTCT (Goff & Torrance, 2000) as the dependent variable. In evaluating this hierarchical regression analysis, three independent variables appear to make significant, unique contributions to creative process: (1) The Big Five personality factors [$F(5,100) = 2.64; p = .03$]; (2) artistic interest [$F(1,91) = 9.45; p < .01$]; and (3) hypomanic traits [$F(1,90) = 14.93; p < .01$]. It appears that each of these variables contribute a significant portion of the variance in scores on the BD-TTCT (Goff & Torrance, 2000) independent of age, fluid and crystallized intelligence, expertise, social isolation, and postformal reasoning (see Table 6).

Creative Personality (HDYT): Older Adults and Adolescents

A second hierarchical regression analysis was conducted for the entire sample (both older adults and adolescents) using creative personality (HDYT) as the dependent variable. The analysis reveals somewhat different results for creative personality than creative process. It appears that four independent variables uniquely contribute to the variance in scores on the HDYT: (1) age of participant [$F(1,105) = 15.89; p < .01$]; (2) perceived artistic and scientific skill (expertise) [$F(2,98) = 5.61; p <$

.01]; (3) perceived artistic and scientific experience (expertise) [$F(2,96) = 6.20; p < .01$]; and (4) hypomanic traits [$F(1,90) = 9.60; p < .01$] (see Table 7).

Additional Hierarchical Regressions by Age Group

Given that age contributed a significant portion of the variance on the creative personality measures, four additional hierarchical regression analyses were conducted to further determine the differences between older adults and adolescents in evaluating the independent variables' unique contributions to creative process (BD-TTCT, Goff & Torrance, 2000) and creative personality (HDYT, Davis, 1975).

Creative process (BD-TTCT, Goff & Torrance, 2000) was significantly and uniquely predicted by two independent variables for the older adults: (1) perceived experience/expertise in art and science [$F(2, 44) = 11.45; p < .01$] and (2) artistic interest [$F(1,39) = 7.61; p = .01$]. Hypomanic traits did not significantly predict higher scores on the older adults' BD-TTCT. However, two different independent variables significantly and uniquely contributed to the variance in scores on the adolescents' BD-TTCT (Goff & Torrance, 2000): (1) postformal reasoning [$F(1,40) = 8.72; p < .01$] and (2) hypomanic traits [$F(1,35) = 8.90; p = < .01$]. Thus, hypomanic traits significantly contributed to the variance in scores on the TTCT for adolescents (see Table 8).

Creative personality (HDYT, Davis, 1975) was significantly and uniquely predicted by one independent variable for the older adults: (1) perceived skill/expertise in art and science [$F(2, 46) = 9.05; p < .01$]. Hypomanic traits did not significantly contribute to the variance on the older adults' HDYT scores. However, hypomanic traits were the only significant predictor of the variance in adolescents' scores on the HDYT [$F(1,35) = 5.15; p = .03$] (see Table 9).

CHAPTER IV

DISCUSSION

Although previous research (e.g. Andreasen, 1987; Andreasen & Canter, 1974; Jamison, 1993, 1990, 1989; Ludwig, 1994, 1992; Richards, 1994; Richards & Kinney, 1990; Richards et. al., 1988; Schuldberg, 1999, 1990; Wohl, 2001) has consistently suggested a link exists between hypomanic traits and creativity (both eminent and non-eminent) most of these studies of creativity and mood disorder are correlational and do not explore how the relationship works. The components of hypomanic traits (such as increased energy, loose associations, mildly elevated affect, and a decreased need for sleep) seem to be associated with healthy, positive outcomes (e.g. greater creativity) rather than a debilitating bipolar disorder. Previous research (i.e. Andreasen, 1987; Jamison, 1989; Richards et. al, 1988; Schuldberg, 1999) has suggested that milder forms of bipolar disorder (i.e., hypomanic traits) may facilitate creativity, while more severe forms of bipolar illness may be destructive and non-creative. Additional research (Richards, 1999, 1998, 1994; Richards & Kinney, 1990; Richards et. al., 1988) suggests that susceptibility to subclinical symptoms (hypomanic traits) can provide a compensatory advantage in facilitating creativity. As Richards (1999, 1998, 1994) has suggested, the compensatory advantage of creativity that is associated with hypomanic traits may insulate a susceptible individual from developing a more serious bipolar illness. While these are interesting suggestions, one of the most important questions that has not been addressed in the literature is one of direct prediction: does susceptibility to hypomanic traits enhance creativity, or does creativity create greater risk for hypomanic traits? If a direct, predictive relationship does not exist, then what other factors might be considered to help explain the consistent correlations between hypomanic traits and creativity that have been found in past research (e.g. Schuldberg, 1999, 1990; Wohl, 2001)?

A second element that has not been previously addressed is the impact of how developmental components such as age, expertise (Salthouse, 1990), and postformal reasoning (Sinnott, 1996) may contribute to the relationship between hypomanic traits and creativity. While both eminent and everyday creativity research (e.g. Jamison, 1989; Ludwig, 1994; Richards et. al., 1988 a,b; Goldfinch, 1993) suggest that the domain of creative involvement contributes significantly to the relationship between creativity and hypomanic traits, it is unclear whether an individual's experience in artistic occupations facilitates these hypomanic traits as a function of time spent engaged in artistic activities, or whether hypomanic traits facilitate deeper involvement in an artistic endeavor. While experience and expertise in a creative domain have been linked to greater adaptive functioning in older adulthood (i.e. Simonton, 1988, 1990a, 1990b, 1991), the literature has not addressed how expertise may relate to hypomanic traits. Although Simonton's (1991) work suggests that many individuals with expertise in artistically creative endeavors experience increased energy and fluidity of associations (which are components assessed in the hypomanic traits measure) well into their sixties, previous research has not evaluated hypomanic traits in older adults and the relationship between expertise and creativity. The existing literature does not evaluate the role of hypomanic traits in predicting creativity among older adults. It is unclear if susceptibility to hypomanic traits predicts creativity across the life span, or if age, cohort, or other developmental variables covary with hypomanic traits (or predict creativity unique of hypomanic traits).

The purpose of this research was twofold: first, to provide further analysis of the nature of the relationship between hypomanic traits and creativity by employing a longitudinal study and using Kenny's (1975) CLPC to determine the extent to which inter-individual differences over time in creativity are predicted by hypomanic traits. The implications of the findings from the CLPC are discussed below. Second, the purpose of the cross-sectional analysis in the present study was to further

determine how age and expertise may help unravel the ways in which hypomanic traits contribute to creativity and to further describe inter-individual differences among these variables.

Longitudinal Study: Predicting the Direction of the Relationship Between Hypomanic Traits and Creativity

The first hypothesis, which proposed that the direction of the relationship between hypomanic traits and creativity could be predicted, was not supported by these results. Neither measure of creativity could be significantly and directly predicted by the presence of hypomanic traits across the two-year time span in the longitudinal design, nor could creative process or creative personality significantly predict hypomanic traits across the two-year period. Although past research (e.g., Schuldberg, 1999, 1990; Wohl, 2001) indicates that hypomanic traits are consistently correlated with creativity measures, this research suggests that a direct predictive relationship between the two variables does not exist. In other words, being susceptible to hypomanic traits followed by involvement in scientific (and some artistic) creative projects over the course of two years in adolescence does not directly predict higher creativity scores on measures of creative process and creative personality within an individual. The findings suggest that creativity is just as likely (or unlikely) to be caused by hypomanic traits and hypomanic traits are just as likely (or unlikely) to be caused by creativity.

Several factors may have contributed to the lack of support for Hypothesis 1 in the present study. First, although the study employed a longitudinal design, a two-year time lapse among adolescents may not be sufficient to determine significant changes in creativity or affective traits such as increased energy and loose associations. Although the research (e.g., Ludwig, 1995; Simonton, 1988) suggests that eminent creators in the arts and sciences typically begin their careers earlier in life than less successful scientists and artists, the limitations of measuring a two year period in adolescence may not be sufficient to detect how hypomanic traits contribute to creativity or how creativity may contribute to susceptibility to hypomanic traits in this short time frame. It would be useful to conduct

future longitudinal research on this sample of talented adolescents to determine if time and experience would predict creativity given the presence of hypomanic traits (or if time and experience would predict hypomanic traits given the presence of creativity). Alternately, conducting a separate longitudinal analysis on another sample of talented adolescents during the same time period would be useful in determining whether cohort may be impacting the results of the longitudinal analysis.

Second, the way in which creativity was assessed may have contributed to the lack of predictive significance between hypomanic traits and creativity. As addressed in Chapter 1, the current creativity literature (e.g. Amabile, 1996; Fishkin & Johnson, 1998; Milgram, 1990; Plucker, 1999; Runco, 1999) has identified four areas in which creativity can be measured: creative process, creative product, creative experience/ everyday creativity, and creative attitudes/personality. Creative process can be categorized as divergent thinking (Torrance, 1990, 1974), or determining multiple solutions to a problem (Sinnott, 1998a). Creative product can be defined as a product or response that is judged by others as creative (Amabile, 1996) or accomplishments that are socially recognized (Kogan, 1973, Simonton, 1988). Creative experience or everyday creativity (Richards et al., 1988a, b) does not necessarily reflect social recognition, but instead is defined as an individual's inventory of his or her own creative activities and accomplishments (vocational or avocational). Finally, creative attitudes or personality can be defined as personality traits assessed in paper-and-pencil assessments (e.g. NEO-FFI, Costa & McCrae, 1992; HDYT, Davis, 1975) that have been evaluated and validated as scales that assess creative personality and/or are scales in which creative individuals achieve higher scores.

As suggested by creativity researchers (e.g., Amabile, 1996; Fishkin & Johnson, 1998; Milgram, 1990; Plucker, 1999; Runco, 1999) two of these areas were assessed in Hypothesis 1: creative process and creative personality. Although both measures have correlated positively with hypomanic traits in past research (e.g. Schuldberg, 1999, 1990; Wohl, 2001), assessing other creativity areas (i.e., creative product/skills, and creative experience/everyday creativity) may have yielded

different results. The relationship between hypomanic traits and creativity may therefore depend upon the definition and measurement of creativity. Measuring creative product using a method similar to Amabile's (1982) Consensual Assessment Technique in the longitudinal study may have better assessed the TAMS students' creative skills as an additional measure of creativity. The Consensual Assessment Technique (Amabile, 1982) utilizes independent judges to observe and evaluate participants' performance on three specific tasks that are created in a laboratory setting. Similarly, different results may have been obtained by adding additional dependent variable measures of creative experience into the study such as Richards and colleagues' (1988a) Lifetime Creativity Scales, which uses an interview format to assess and code an individual's level of vocational and avocational involvement in creative activities; Amabile's (1989) Student Experiences and Activities Questionnaire, which asks individuals to rate their interest, skill, and experience compared with others their age in specific artistic and scientific areas; or Milgram's (1973) Tel-Aviv Activities Inventory, which also asks individuals to rate their experiences in specific activities. Including additional areas of creativity in future research may lend further support to the idea of a "generalized confluence model" (Sternberg and Lubart, 2001, p. 500) where assessing multiple attributes of creativity are necessary to fully evaluate it as a construct. Using more than two measures of creativity as dependent variables in future research could increase the likelihood of ascertaining a relationship between creativity and hypomanic traits.

Third, other research (e.g., Ludwig, 1998, 1995, 1994, 1992; Feist, 1998; Wohl, 2001) has suggested that the vocational/avocational domain may contribute to the relationship between hypomanic traits and creativity. These studies indicate that interest and experience in an artistic domain (such as creative writing, art, or music) may make a greater contribution to hypomanic traits (or creativity) than interest and experience in a scientific domain (such as math, biology, chemistry, or engineering). This author's previous research (Wohl, 2001) demonstrated higher correlations between

measures of artistic interest and hypomanic traits than between scientific interest and hypomanic traits. Using a sample of adolescents at an arts magnet school, for example, in a similar study may have yielded different results than using the present sample of TAMS students. Further examination of the hypomanic traits measure supports the idea that the TAMS sample may have been as homogenous in hypomanic trait scores when they began the TAMS program as when they completed it (HPS₁ \bar{X} = 23, SD = 7.4; HPS₂ \bar{X} = 22, SD = 7.9). It appears that spending two years in the science and math oriented program did not contribute to variance in hypomanic traits within this sample of scientifically-talented adolescents. These results lend further support to the idea that interest and involvement in an artistic endeavor (e.g. vocational vs. avocational) may carry different consequences (i.e, hypomanic traits contributing to creativity only when a deeper involvement in an artistic endeavor is present). Replicating this study with a more artistically-oriented sample (such as from an arts magnet school) may therefore provide greater information about the role of creative domain with respect to hypomanic traits.

Fourth, the results from the longitudinal study differ from previous (e.g. Schuldberg, 1990, 1990; Wohl, 2001) studies in that this study assesses average intra-individual changes between individuals across time. In other words, this study examines the stability over time in rank order of individuals by hypomanic traits and by creativity by attenuating the correlations at each occasion and in a cross-lagged manner. According to the results, the rank order of hypomanic traits or creativity did not change across the two year period. The variances are constant for each measurement of hypomanic traits and creativity. Furthermore, It appears that greater heterogeneity exists across creative personality and process rather than susceptibility to hypomanic traits: the sample is much more homogenous on the hypomanic traits measure (HPS₁ \bar{X} = 23, SD = 7.4; HPS₂ \bar{X} = 22, SD = 7.9) than on either creativity measure. The ratio of the mean to the standard deviation for creativity is approximately 6:1 per subject, while the ratio of mean to standard deviation for hypomanic traits is

approximately 3:1. The lack of variability in hypomanic traits relative to that for creativity could account for the lack of predictability in either direction.

It appears that hypomanic traits may not directly predict creativity, nor may creativity directly predict hypomanic traits across time within an individual, scientifically oriented adolescent. However, because only two years of adolescence had lapsed between Time 1 and Time 2, it is unclear if other developmental variables may contribute to intra-individual changes across the life span. To explore this possibility, inter-individual differences in the relationship between creativity and other variables were examined in the second hypothesis and cross-sectional design. The results from Hypothesis 1 suggest that other developmental variables such as age, experience, and domain-specific expertise may play an important role in predicting creativity.

Cross-Sectional Study: Hypomanic Traits and Creativity in Older Adults and Adolescents

Results from the initial hierarchical regression analysis with the combined samples partially support the second research hypothesis: hypomanic traits predict creativity in both the adolescent and the older adult samples. When the older adult and adolescent samples are combined, the data suggest that hypomanic traits contribute to both creative personality (HDYT) and creative process (TTCT) having already accounted for the variance contributed by age, personality, expertise, postformal reasoning, intelligence, social isolation, and artistic interest. Having accounted for these other developmental, personality, and cognitive variables, it appears that hypomanic traits make a unique contribution to individual differences in creative process (TTCT) and creative personality (HDYT). These initial findings appear to support previous research (e.g., Schulberg, 1999, 1990; Schulberg et. al, 1988; Wohl, 2001) that depict a positive, predictive relationship between hypomanic traits and multiple measures of creativity.

However, upon further examination of the regression analyses, the data indicate that the relationship between hypomanic traits and creativity is also influenced by age and developmental

factors. Furthermore, the way in which the relationship is influenced by these other factors depends on the way in which the creativity construct is measured (e.g., process or personality).

Creative Personality, Age, and Expertise

Because age predicted creative personality (HDYT), the second hypothesis is not fully supported. Although hypomanic traits predict creative personality when the older adult and adolescent samples are combined, it appears that age and/or expertise may also predict creative personality. Further analysis using separate hierarchical regression analyses for the older adults and the adolescents suggests that the antecedents of creativity may differ between adolescents and older adults. In adolescents, the hypomanic traits measure is the only variable that predicts creative personality, while expertise is the only variable to predict creative personality among the older adults in this study. It appears that hypomanic traits may be the strongest predictor of creativity in adolescents, but other developmental factors are more likely to predict creativity in older adults. In other words, it appears hypomanic traits may be necessary for creativity among the adolescents in this study, but may not be sufficient to predict creativity among the older adults who participated in this research.

Although previous research has demonstrated a strong correlation between the HPS and HDYT measures (Schulberg, 1999, 1990; Schulberg et. al, 1988; Wohl, 2001), the studies have one element in common: the participants have been limited to adolescents and college students. The findings from this study suggest that age, cohort, and expertise impact the degree to which hypomanic traits (such as increased energy, loose or fluid associations, and decreased need for sleep) predict creative personality. These findings support Sternberg and Lubart's (2001) ideas about the variance in creative production across the life span. According to the authors, "Young creators, those in their twenties or thirties, produce spontaneous, intense and 'hot from the fire' works. Older creators, age forty and above, 'sculpt' their products with more intermediate processing" (Sternberg & Lubart, 2001, pp. 510-511). It appears that the energy, spontaneity, and intense productivity that can occur

during youth are adaptive for young creators in that they increase the likelihood of a masterwork being created. Young creators who do not have as much experience in their creative domain as older creators may increase the likelihood of getting one of their works noticed by using probability of numbers to their advantage. When more skill and expertise is attained with age and with time spent involved in a creative endeavor, it becomes more adaptive to spend greater time crafting a masterwork carefully rather than simply trying to increase the odds of a “hit” through fast and furious production. These findings support Simonton’s (1991) idea that the adaptive components of creative personality shift from high energy to expertise as one ages.

Alternately, the cohort differences between the generation of older adults and adolescents may contribute to the differences in creative personality. Because the generation of older adults assessed have lived during times in which the pace of American culture was slower when compared to the cultural pace in which the adolescents have developed (e.g. multiple sources of media, cellular phones, computers, etc.), the effects of culture may be influencing the higher likelihood of hypomanic traits being present in the adolescents when compared to the older adults. Conducting a follow-up study with this group of adolescents in 30 or 45 years would help determine the extent to which age or cohort influence the differences between the adolescents and older adults in this cross-sectional study. Alternately, replicating this cross-sectional study in 10 or 20 years may also help determine the extent to which cohort and age impact the relationship between hypomanic traits, expertise, and creativity. Using a time-sequential study with the existing samples would also help determine the extent to which time of measurement may have contributed to the present results.

The results also suggest that expertise (Salthouse, 1990) plays a significant role in predicting creative personality and may serve as a buffer against declines in cognitive and emotional health. As knowledge, life experience, and domain-specific experience increase with age, a creative individual’s susceptibility to bipolar symptoms (i.e., hypomanic traits) may be less likely to occur. The findings in

this study support research (American Psychiatric Association, 1994; Koenig & Blazer, 1992; Zarit & Zarit, 1998) that depicts the course of hypomanic or manic symptoms across the lifespan. According to Zarit and Zarit (1998), the risk of onset for hypomanic or manic symptoms occurs around age 20 and diminishes with age. Koenig and Blazer (1992) add that the prevalence of manic symptoms in later life is considered rare. If susceptibility to bipolar symptoms covary with age, and if expertise also covaries with age, then hypomanic traits could also covary with age. Future research could use a cohort-sequential design to better determine how age or cohort impact the differences observed in hypomanic traits between younger and older samples.

It appears that encapsulation of skill (Hoyer & Rybash, 1994) does not inhibit creative outcomes, but instead seems to enhance creative outcomes without the susceptibility to bipolar symptoms in this study. Hypomanic traits may be necessary in a young creator's career to increase the likelihood of achieving a masterwork, but do not appear to predict creativity as well as experience and skill as a creator ages. Nonetheless, hypomanic traits were not absent in predicting creativity among the older adults: correlations reveal a significant relationship between hypomanic traits and artistic experience ($r = .411$; $p < .01$). This finding lends further support to previous research (Ludwig, 1998, 1992; Jamison, 1993, 1989) that suggests creative domain (i.e., creative writing, music composition, art) is important to the relationship between hypomanic traits and creativity. In light of the stronger role that other variables (such as expertise) play in predicting creativity in this sample, it appears the way in which the sample of older adults was recruited may have contributed to the lack of significance found between hypomanic traits and creativity. Had more of the older adults been involved in artistic careers, the results for the older adults may have been similar to those from the adolescent sample. Replicating this study among older adults who were involved in artistic or scientific vocations would provide further support for previous research (e.g., Richards et. al., 1988a) concerning differing affective consequences (i.e. bipolar susceptibility) for vocational versus avocational involvement.

Creative Process, Age, Postformal Reasoning, and Artistic Interest

Although age did not predict creative process (TTCT) when the adolescents and older adults were combined, separate hierarchical regression analyses for each age group depict significant differences in the variables that predict creative process scores. Similar to the findings from the creative personality (HDYT) analyses, hypomanic traits predicted creative process among adolescents but not among the older adults. As discussed above, these findings lend further support to Sternberg & Lubart's (2001) ideas about how the "form and substance of creativity differs with age" (p. 510). Similar to the creative personality (HDYT) results for the older adults, expertise in a specific domain also predicted creative process (TTCT). Thus, it appears expertise significantly and uniquely contributes to at least two areas of creativity in older adults.

While hypomanic traits were the sole predictor of creative personality among the adolescents, another variable also predicts adolescents' scores on the TTCT: postformal reasoning. To further evaluate these results, correlations between postformal reasoning, expertise, hypomanic traits, and creative process were examined among the adolescent sample. Consistent with the regression analysis, the data reveal that postformal reasoning correlates with creative process among the adolescent sample ($r = .359, p < .01$) and with hypomanic traits ($r = .346; p = .01$). Postformal reasoning does not correlate with expertise ($p > .05$) among the adolescents. Since Sinnott (1996) defines postformal reasoning as greater fluidity of associations and generating multiple solutions to a given problem, it appears this level of thinking may be related to hypomanic traits in adolescents but not among older adults. Although Sinnott (1998a, b) has suggested that expertise and increased practice in a specific area may contribute to postformal reasoning, it appears this relationship does not exist among adolescents.

Although expertise predicts creativity in the older adults, postformal reasoning does not predict creativity, nor does postformal reasoning correlate with expertise. In this light, perhaps expertise and

encapsulation of skill lead to *less* flexibility and increased entrenchment in the “right” way to solve a problem (Lubart & Sternberg, 1998) among these older adults, which is in direct contrast to Sinnott’s (1998a, b) definition of postformal thinking. Further examination of the correlations reveal that the measures of expertise and postformal reasoning are not related to one another among the adolescents ($p > .05$) or among the older adults ($p > .05$) in this study. The quantitative, self-report measure of postformal reasoning may not be measuring the construct, or perhaps the way in which the sample was recruited contributed to the lack of covariance between expertise and postformal thinking.

Although postformal reasoning did not correlate with expertise in each sample, expertise, nonetheless, predicted creative personality and in creative process among the older adults in this study. While postformal reasoning does not predict creativity in the older adults, it appears that expertise and encapsulation of skill (Hoyer & Rybash, 1994) may facilitate greater creativity among this sample of older adults. Although expertise appears to have contributed to a greater array of potential solutions to a given creative problem (through knowledge and optimization of cognitive resources) on the creative process measure (TTCT), across this sample, expertise may not be related to Sinnott’s (1998b, 1996) generation of multiple solutions through postformal reasoning. Again, the way in which the sample was recruited may have contributed to the lack of significance in postformal reasoning predicting creativity. Alternately, an overlooked or a suppressor variable may be affecting the lack of predictive significance between postformal reasoning and creativity in this study. For example, including education level in the analysis may have yielded different results.

Because the adolescent sample’s responses on a postformal measure predicted creative process and also correlated with hypomanic traits, variables that covary with postformal reasoning but that may have gone unmeasured here, may be at play. First, the differences in scores between the adolescents and older adults may be an artifact of cohort/age, or may be related to the grandiosity that is part of experiencing hypomanic traits. On the postformal measure, participants self-rated the degree to which

postformal statements (such as “I see the paradoxes in life,” and “In my work, I see that a given problem has several good solutions”) applies to them either on the job or in school. Retired older adults were instructed to answer the questions as they pertained to what they considered to be their main job or career prior to retirement. In Piagetian terms, because adolescents’ “starry-eyed egocentrism” (Miller, 1993, p. 62) affects their thinking more than (most) mature adults, their self-perceptions of their postformal reasoning abilities may be inflated. Adolescents may have rated themselves higher on each of the items than an objective rater (especially an adult rater) may have scored them. Furthermore, creative adolescents who also scored higher on the hypomanic traits measure may have been even more likely to have an inflated perception of their postformal reasoning abilities simply by the nature of being more susceptible to the grandiosity inherent in hypomania. The older adults, who may actually be postformal thinkers and may thus see multiple reasons for their postformal abilities, may have underestimated the degree to which each of the statements were true for them on the job. In Eriksonian terms, the older adults may have answered more humbly with the understanding of an “acceptance of the limitations of life, [and] a sense of being a part of a larger history” (Miller, 1993, p. 167). Finding older adults who have more humble estimations of their abilities when compared with younger adults supports the “pessimist” orientation in older adults that has been found in previous research (Schaie, Willis, & O’Hanlon, 1994). Similarly, the older adults in this study may be less likely to take credit for their accomplishments at work, knowing that other factors may have contributed to their views and to their ability to see multiple solutions to problems. Alternately, because the adolescents sampled in this study have demonstrated more sophisticated cognitive abilities simply by their involvement in the TAMS program, it is possible that they have achieved a qualitatively different way of thinking and solving problems than most adolescents (and many adults) achieve.

Second, the retrospective nature of the postformal measure used in this study may have impacted the results. Because older adults were asked to estimate the ability to which they thought

postformally on their last job or career before retirement, the older adults were essentially asked to rely on their memories to recall how they have solved past problems. The variability among participants with respect to the number of years between their last job and the time in which they answered the postformal survey may have affected the results. In addition, participants who have not worked in 10 or 20 years may very well have inaccurate memories of their problem-solving abilities: many may have filled in the gaps to fit their current experiences with their remembered experiences from their working days. Perhaps asking older adults to evaluate their current problem solving abilities rather than asking them to recall how they thought about problems in the past may decrease the variability in responses to the postformal measure. Further examination of the data confirms that the variance in postformal reasoning scores among the older adults (variance = 162.3) was greater than the variance in scores among the adolescents (variance = 80.7). Moreover, the older adults' creativity scores (variance = 77.6) were, indeed, approximately half the mean to standard deviation ratio of the adolescents' creativity scores (variance = 166.7). Future research that recruits older adults who participate in targeted creative activities that more closely resemble the TAMS students may yield different results.

As with the creative personality measure, expertise also predicted creative process among the older adults in this study. In addition to having experience and skill in artistic and scientific areas, having an interest in artistic endeavors also significantly predicted creative process among the older adults having already accounted for the contributions made by age, personality factors, expertise, cognitive abilities, and social isolation. These results support previous research among adolescents (Wohl, 2001) and adults (Ludwig, 1998, 1992; Jamison, 1993, 1989) that depicts a significant relationship between artistic interest and creative process. In this study, however, artistic interest only predicts creative process among the older adults: not among the adolescents. This may be an artifact of the measures used to assess artistic interest in the current study (i.e., the SIEQ, Amabile 1989) compared with the inventory (Strong Interest Inventory, Strong et. al., 1995) used in the author's

previous unpublished study (Wohl, 2001). Nonetheless, the SIEQ artistic interest scale revealed a significant and meaningful contribution to the variance in creative process scores among the older adults. It appears that older adults with greater interest in artistic endeavors (such as writing, painting, and music), *independent of their experience or skill in these endeavors*, are more likely to score higher on verbal and figural creative process exercises than older adults who score lower on the artistic interest measure. This suggests that although expertise and increased practice may increase the likelihood of older adults viewing themselves as creative, simply being interested in or curious about artistically creative activities can uniquely predict older adults' creative ability on a creativity exercise independent of their experience with creative endeavors. This finding appears related to ideas of intrinsic motivation (Amabile, 1996), and flow (Csikszentmihalyi, 1990) in which subjective significance or engaging in an activity for its own sake contributes significantly to creative abilities and process. This study therefore provides additional support for the idea (e.g., Nakamura and Csikszentmihalyi, 2003) that intrinsic motivation or flow become more accessible with age.

Fluid and Crystallized Abilities

The results from this research suggest that the variance due to aging in fluid and crystallized abilities (e.g. Hayslip & Sterns, 1979) do not predict creative process or creative personality. The present study suggests that neither fluid nor crystallized abilities predict divergent thinking (as measured by the TTCT). Since experience and skill appear to be better predictors of both divergent thinking and creative personality than fluid (or crystallized) abilities to creativity, the present study supports Salthouse's (1990) idea that expertise, or domain-specific abilities, are stronger predictors of creativity than fluid/crystallized abilities among older adults.

Social Isolation

While the older adults in this study who have greater expertise in a specific area tend to score higher on measures of creative process and creative personality, it does not appear that their expertise

correlates with insulation and social isolation (Wethington et. al., 2000) from others. Although some researchers (Richards, 2001; Schulberg, 2001) suspect that some of the traits along the schizophrenic spectrum (such as lack of interest in social relationships) may contribute to creativity, the results in the present study do not support this finding. It was hypothesized that creative individuals might devote more time to their creations at the expense of social integration, which could increase the likelihood of an individual exhibiting more hypomanic behaviors when creators are around other people. This hypotheses was not supported for either sample. Among the older adult sample, hypomanic traits were not correlated with social isolation ($p > .05$) and neither social isolation or hypomanic traits predicted either measure of creativity. Although hypomanic traits predicted creativity among the adolescents in this study, further examination of the correlations reveal that social isolation is not related to hypomanic traits among adolescents ($p > .05$). Therefore, it seems that young and older individuals with higher scores on creative personality and creative process measures do not endorse greater feelings of loneliness or social isolation. In addition, the results suggest that potentially pathological personality attributes are less likely to contribute to creativity in older adults than they are to contribute to creativity in adolescents. Perhaps other personality attributes make more significant contributions to creativity as one gains greater experience in a specific creative domain. The findings from one of the personality measures (NEO-FFI Form S, Costa & McCrae, 1992) employed in this research appear to lend some support to this explanation.

Big Five Personality Factors

Further examination of the data suggests that the NEO Factor O (Costa & McCrae, 1992), openness to new experiences, appears to contribute significantly ($p < .05$; $\beta = .333$) to creative process (TTCT) scores for the combined sample. This finding supports McCrae's (1987) idea that openness to new experiences is a key personality factor in creative productivity. However, when the results were examined for each age group separate from one another, the NEO-FFI (and, thus, Factor O) did not

predict creativity ($p > .05$) among adolescents or among the older adults. In this light, another hierarchical regression analysis for the combined sample was conducted in which an interaction variable (Age x Factor O) was created and entered as the first block in the analysis. The results indicate that the interaction of age and Factor O accounts for the variance in creative process scores ($p < .01$) over and above the variance contributed uniquely by age ($p > .05$) and uniquely by openness to experience (Factor O) ($p > .05$). It appears the interaction between age and openness to experience is a much stronger predictor of creative process than either individual variable. Because age did not predict creative process independent of openness to experience (or any other variable), perhaps developmental factors rather than age alone are more important in predicting creativity. For example, as Sternberg & Lubart (2001) note, openness to experience is especially important as an individual works to move forward in his or her creative products. As one accrues more expertise and encapsulates skill, maintaining curiosity and openness may be important to sustaining creativity. The interaction between openness to experience and age may be relevant to Simonton's (1991, 1990a, b, 1988) findings in which age does not solely predict a creator's "peak creativity." These results support Simonton's (1991, 1990a, b, 1988) ideas in that other factors such as creative domain and openness to experience appear to interact with age in predicting creativity. In the same vein, the interaction between openness to experience and age supports the idea that a creator must strive to make products that are novel and different from his or her previous products and resist being satisfied with previous products (Sternberg & Lubart, 2001). It is unclear, however, how expertise (and perhaps encapsulation of skill) can predict creativity if one must continue to make novel creations. Because most of the older adults in this study were involved avocationally with creative production, perhaps the results would differ for older adults who spent their career in an artistic profession. It would be useful to evaluate a different sample of older adults who were involved in artistic vocations to better determine the extent to which encapsulation of skill may interfere with or facilitate creativity.

Limitations and Future Directions

Although the results suggest that developmental factors across the life span (i.e. expertise) appear to predict creativity, there are several limitations to this study.

First, the adolescent sample is not representative of most adolescents, and it represents a bias in scientific creativity as opposed to other creative domains (such as art). Assessing future samples of talented adolescents from other domains such as an arts magnet school may be useful in determining how the relationship between hypomanic traits and creativity operates among this age group. On the other hand, the adolescents recruited from the TAMS population were selected because they were representative of a scientifically creative group. The way in which the older adults were recruited, however, may account for the fact that the regression analysis found different results with regard to hypomanic traits and creativity. Although the older adults were involved in creative activities at local senior centers and were recruited from the University of North Texas faculty, this may have contributed to a homogenous sample. The older adults' creativity scores (variance = 77.6) were, indeed, more narrow in scope than the adolescents' scores (variance = 166.7). Future research that recruits older adults who participate in targeted creative activities that more closely resemble the TAMS students may yield different results.

Second, there may also be other factors (such as anxiety or obsessive personality traits) among the TAMS students not assessed in this study or in the author's previous study (Wohl, 2001) that could contribute to hypomanic traits or creativity in the TAMS students. Parental expectations or other family interaction variables may also contribute to higher scores on the hypomanic traits inventory and on creativity inventories among the TAMS sample. Using other personality measures in a regression analysis or via a structural equation approach would help identify other variables that impact the relationship between hypomanic traits and creativity among talented adolescents.

Third, the longitudinal study may not have allowed enough time to pass for a predictive relationship between hypomanic traits and creativity (or creativity and hypomanic traits) to emerge within an individual (assuming a third variable does not contribute to the correlation between hypomanic traits and creativity). Assessing the longitudinal sample (TAMS Class of 2002) in 5 or 10 years would be useful in better determining how the direction of the relationship could evolve in an individual across time. Supplementing the longitudinal study with a cross-sectional sequence would help future researchers explain intraindividual change, or would provide further evidence for a contributing third (or suppressor) variable that was not included in the longitudinal study.

Fourth, the small sample size of adolescents in the longitudinal study ($N = 45$) and adolescents in the cross-sectional study ($N = 52$) also limits the ability to generalize the results. Sample size is also an issue among the older adults ($N = 55$). The moderate sample size reduces the power of the findings and the ability to generalize the results to other older adults. As expected, for the combined sample, power was moderate when the TTCT was used as the dependent variable (power = .415). Although power was stronger (power = .970) for the combined sample using the HDYT as the dependent variable, when power for HDYT was examined in each sample, power was low to moderate among the older adults (power = .352) and among the adolescents (power = .457). These low to moderate power estimates could explain, in part, why hypomanic traits failed to predict creativity among the older adults. Expanding this research to include a larger sample of TAMS students and older adults would suggest a stronger likelihood to be able to generalize the results across other TAMS students and older adults in the Denton and Dallas area. To supplement the cross sectional data, recruiting older adults using different criteria might yield different findings. Specifically, finding a pool from which older adults could be identified as creative without being self-selected would be useful to determine the extent to which the sample of older adults who participated in the present study may have impacted the results.

Finally, the creative experiences within the sample of older adults may also contribute to the lack of significance found in the relationship between hypomanic traits and creativity. Finding an alternative means other than self-selection to recruit creative adults may also yield different results in future studies. Because the older adults were recruited primarily from senior centers, and because everyone in the sample was a self-nominated creative individual, their creative abilities may not have matched the adolescent sample. Although many of the older adults were recruited from creative activity groups (such as a creative writing group, an art group, a woodworking group, and a musicians' performance group), their creative interests and experiences may have been more avocational than vocational. In contrast, since many of the TAMS students had already spent time involved in creative projects and had planned to pursue careers in the sciences (and some in the arts), their creative interests and experiences may have been more vocational in nature. These differences may warrant further examination of the data to determine the extent to which the older adults were involved in creative vocations and avocations to better compare their experiences with the TAMS students. As Richards and colleagues (1988a) illustrated in their research using the Lifetime Creativity Scales, involvement in vocational and avocational creativity produce different results when evaluating their correlation with bipolar susceptibility. Although many of the older adults appeared to have engaged in a significant amount of "everyday creativity" (Richards et. al.,1988a), rather than having achieved eminent creativity through their work, the TAMS students may be more likely to fall in the eminent creativity category. Follow up research with the TAMS students to determine the level of eminence they achieve (or everyday creativity they achieve) would also help provide greater insight into the differences found between the age groups in this study. Future research could also evaluate and categorize the current sample of older adults based on the scores from the modified Lifetime Creativity Scale (Richards et. al., 1988a) that was collected but was not analyzed in the present study. A future study in which different participants are recruited to measure similar variables might use the same recruiting methods

for adolescents at area high schools instead of TAMS students for more creative equality between the age groups. Alternately, older adults who have achieved some recognition for their scientific and mathematic talents (much like the TAMS students) could also be recruited for future research to create more equality between the TAMS sample and the older adults. Despite these differences, however, the TAMS sample and the older adults appeared to be similar in some ways. First, the older adult sample had a much higher percentage of participants with a graduate school education. Similarly, many of the TAMS students plan to pursue graduate education beyond the bachelor's degree. Second, the TAMS students exhibited interest and skills in multiple endeavors (such as music, drama, and art in addition to computers, math, and science). Many of the older adults also demonstrated involvement in multiple areas (such as music, writing, dance, and art) in addition to their previous jobs and other endeavors.

Implications

In light of these findings, it appears that creativity may be defined differently in early life than in later life. While personality traits (or perceived personality traits) appear to be stronger predictors of creative process and creative personality in adolescence, outright achievement (or the perception of having achieved something) is a stronger predictor of creative process and creative personality in later life. Alternately, cohort effects may be impacting the results that depict differences between personality traits and achievement or experience in predicting creative process and creative personality between the two samples. The generation of older adults sampled were Depression-era children who most likely grew up in a culture with a greater emphasis on achievement and production as measures of success. In contrast, the adolescent sample were born into a time of greater affluence and a culture that has focused on more psychologically-minded, internal measures of fulfillment (such as self-esteem and personality-environment fit). The adolescent cohort may look to internal processes for creative

inspiration, while the older adult cohort may use external products as their compass for creative production.

APPENDIX A

**UNIVERSITY OF NORTH TEXAS COMMITTEE FOR
THE PROTECTION OF HUMAN SUBJECTS
RESEARCH CONSENT FORM**

Subject Name:

Date:

Title of Study:

Creativity and Affective Traits Across the Life Span: Developmental Influences Among
Adolescents and Older Adults

Principal Investigator: Elizabeth Wohl, M.A.

Co-investigators: Bert Hayslip, Ph.D.; Donna Fleming, Ph.D.

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the proposed procedures. It describes the procedures, benefits, risks, and discomforts of the study. It also describes the alternative treatments that are available to you and your right to withdraw from the study at any time. It is important for you to understand that no guarantees or assurances can be made as to the results of the study.

Purpose of the study and how long it will last:

The purpose of this study is to investigate the relationship between creativity (creative personality and creative behavior), some emotional and cognitive traits (such as increased energy, fluidity of associations, loose thinking, solving problems), social components (such as desire for social interaction), and vocational/avocational involvement. This study will take between one and two and three-quarter hours of your time, and the entire study will be completed in 2003.

Description of the study including the procedures to be used:

This study involves the use of standardized test instruments to measure the variables indicated above. Each instrument is a "paper and pencil" test, which means that you will think about and privately record your own responses. Some of the instruments will be administered in a group setting, while others will be administered on an individual basis. Regardless of the administration, all the instruments will be coded with a special number to protect your identity, and your responses will be kept confidential. Your responses will be entered and calculated with others' to determine the results of this study. Only the researchers listed on this form will have access to the information of each subject's identity, and subjects will not be identified by name when the results of the study are reported.

Research Consent Form -Page 1 of 3 _____ Participant's initials

**UNIVERSITY OF NORTH TEXAS
RESEARCH CONSENT FORM (Continued)**

Description of procedures/elements that may result in discomfort or inconvenience:

Sitting for paper-and-pencil tests may create some mental and physical fatigue, and may be inconvenient if you travel to the University of North Texas to take the tests and spend a total of two and three-quarter hours of your time taking the measures. The study will take about one hour for students in the TAMS 2002 class, and will take about two and three-quarter hours total for students in the TAMS 2004 class and for older adults. The researcher will work with you minimize fatigue by scheduling breaks, and will work to minimize travel and time inconveniences as much as possible during the course of the study.

Description of the procedures/elements that are associated with foreseeable risks:

The risks for participating in this study are minimal. Some of these minimal risks may include: frustration with creatively challenging questions; provoking thoughts about your vocational/avocational choices; increased awareness of your emotional reactions and social interactions; and changes in social relationships as a result of gaining and acting on this awareness. If this occurs, you will be provided with low-cost or free walk-in referral sources for counseling on UNT's campus or in the Dallas/Ft. Worth/Denton community. Anyone participating in this study may access the UNT Psychology Clinic in Terrill Hall (940-565-2631). Students enrolled in the TAMS program may contact the TAMS psychologist, Donna Fleming, Ph.D., at (940) 565-4657.

Benefits to the subjects or others:

The potential benefits to participating in this study include: an opportunity to exercise creative thought; a chance to experience increased mastery of cognitive tasks; gaining a better understanding of your vocational/avocational choices; and gaining greater insight and awareness into your personality and your relationships with others.

Confidentiality of research records:

You will only be identified by number for this research. One master list will be created that matches names with numbers to ensure yours and others' demographic information is recorded accurately. This master list will be kept in a secured file by the researcher, and will not be available to anyone who is not involved in this study without approval by the IRB.

**UNIVERSITY OF NORTH TEXAS
RESEARCH CONSENT FORM (Continued)**

Review for protection of participants:

This research study has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

RESEARCH SUBJECTS' RIGHTS: I have read or have had read to me all of the above.

Ms. Wohl has explained the study to me and answered all of my questions. I have been told the risks or discomforts and possible benefits of the study. I have been told of other choices of treatment available to me.

I understand that I do not have to take part in this study, and my refusal to participate or to withdraw will involve no penalty or loss of rights or benefits or legal recourse to which I am entitled. The study personnel may choose to stop my participation at any time.

In case there are problems or questions, I have been told I can call the faculty advisor, Bert Hayslip, Jr., Ph.D. at telephone number (940) 565-2675; the TAMS psychologist, Donna L. Fleming, Ph.D. at (940) 565-4657; or the Institutional Review Board at the number listed above.

I understand my rights as a research subject, and I voluntarily consent to participate in this study. I understand what the study is about and how and why it is being done. I have been told I will receive a signed copy of this consent form.

_____ Subject's Signature	_____ Date
_____ Witnesses' Signature	_____ Date

For the Investigator or Designee:

I certify that I have reviewed the contents of this form with the person signing above, who, in my opinion, understood the explanation. I have explained the known benefits and risks of the research.

_____ Principal Investigator's Signature	_____ Date
---	---------------

**UNIVERSITY OF NORTH TEXAS COMMITTEE FOR
THE PROTECTION OF HUMAN SUBJECTS
INFORMED PARENTAL CONSENT**

March 1, 2002

Dear TAMS Parent:

My name is Elizabeth Wohl, and I am a Doctoral Candidate in Counseling Psychology at the University of North Texas. I am currently working to collect data for my dissertation, entitled *Creativity and Affective Traits Across the Life Span: Developmental Influences Among Adolescents and Older Adults*. Specifically, I am looking at how creativity, interests, personality, and developmental factors interact. Your son or daughter may choose to participate in this research by his or her own informed consent. However, since he or she is a minor, it is important for you to be aware of the study and its proposed procedures.

Purpose of the study and how long it will last:

The purpose of this study is to investigate the relationship between creativity (creative personality and creative behavior), some emotional and cognitive traits (such as increased energy, fluidity of associations, loose thinking, solving problems), social components (such as desire for social interaction), and vocational/avocational involvement. For students in the TAMS class of 2002, this study will take approximately one hour of your son/daughter's time. For students in the TAMS class of 2004, this study will take approximately 2 and $\frac{3}{4}$ hours because they will be taking more surveys than the 2002 class. This time will be divided into separate sessions to minimize test-taking fatigue. The entire study will be completed in 2003.

Description of the study including the procedures to be used:

This study involves the use of standardized test instruments to measure the variables indicated above. Each instrument is a "paper and pencil" test, which means that your son or daughter will think about and privately record his or her own responses. Some of the instruments will be administered in a group setting, while others will be administered on an individual basis. Regardless of the administration, all the instruments will be coded with a special number to protect your son or daughter's identity, and his or her responses will be kept confidential. His or her responses will be entered and calculated with others' to determine the results of this study. Only the researchers listed on this form will have access to the information of each subject's identity, and subjects will not be identified by name when the results of the study are reported. Participating or declining to participate in this study will in no way affect your child's status in the TAMS program.

Description of procedures/elements that may result in discomfort or inconvenience:

Sitting for paper-and-pencil tests may create some mental and physical fatigue. I will work with your son or daughter to minimize fatigue by scheduling breaks, and will work to minimize time inconveniences as much as possible during the course of the study.

Description of the procedures/elements that are associated with foreseeable risks:

The risks for participating in this study are minimal. Some of these minimal risks may include: frustration with creatively challenging questions; provoking thoughts about your son or daughter's vocational/avocational choices; increased awareness of his or her emotional reactions and social interactions; and changes in social relationships as a result of gaining and acting on this awareness. If this occurs, he or she will be provided with immediate, free counseling referral sources for TAMS students on campus. Any student or parent enrolled in the TAMS program may contact the TAMS psychologist, Donna Fleming, Ph.D., at (940) 565-4657.

Benefits to the subjects or others:

The potential benefits to your son or daughter in participating in this study include: an opportunity to exercise creative thought; a chance to experience increased mastery of cognitive tasks; gaining a better understanding of his or her vocational/avocational choices; and gaining greater insight and awareness into his or her personality and relationships with others.

Confidentiality of research records:

Your son or daughter will only be identified by number for this research. One master list will be created that matches names with numbers to ensure his or hers' and others' demographic information is recorded accurately. This master list will be kept in a secured file by the researcher, and will not be available to anyone who is not involved in this study without approval by the IRB.

Review for protection of participants:

This research study has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

In case there are problems or questions, please feel free to contact me (972-898-7518), the TAMS psychologist, Donna L. Fleming, Ph.D. at (940) 565-4657, the faculty advisor, Bert Hayslip, Jr., Ph.D. at (940) 565-2631; or the Institutional Review Board (940-565-3940). Thank you.

Sincerely,

Elizabeth C. Wohl, M.A.
Doctoral Candidate
Counseling Psychology

June 15, 2002

Dear UNT Faculty Member:

My name is Liz Wohl, and I am a doctoral candidate in Counseling Psychology at the University of North Texas. I would like to ask for your help with my dissertation research in the area of creativity.

The research I am conducting involves taking some paper-and-pencil inventories about creativity, personality traits, and interests. Most of these would be mailed to participants to complete on their own and would take about an hour to complete. I will also ask participants to spend about a half hour at UNT (Denton campus) to complete one final creativity exercise that would last about 20 minutes. All the information will be confidential, and will be coded with a special number to protect participants' identity. All the results will be compiled with others' scores on the same inventories, and individual scores will not be revealed.

I am looking for individuals age 60 or older whom you would consider creative in their occupations (such as the arts, humanities, sciences, or in business), or who have engaged in creative leisure activities or hobbies (in the arts, humanities, or sciences).

If you (yes, you can nominate yourself!) or someone you know fits these descriptions and may be interested in participating, please contact me by phone (972-898-7518) or e-mail (lizwohl@umich.edu) at your earliest convenience with the individual's name, phone number, and address. Please feel free to nominate more than one individual. In return for participation, I will provide a light meal or snack at the meeting, and will also place the participant's name in a drawing for a \$50 American Express gift certificate. The results of this research project would also be available to participants who express interest in receiving the findings.

Thanks for your time and interest in this project!

Sincerely,

Elizabeth C. Wohl, M.A.
Doctoral Candidate
Counseling Psychology
University of North Texas

Bert Hayslip, Jr., Ph.D.
Regents Professor
Faculty Advisor

This research study has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

June 15, 2002

Dear _____:

Thank you for volunteering as a research participant in my creativity study. Enclosed you will find 1) an informed consent letter to read and sign; 2) a set of questionnaires for you to complete on your own; 3) a form to indicate a convenient time for our final 1-hour meeting and exercises; and 4) a postage-paid envelope in which you may return your signed consent form and the completed inventories. It would be helpful if I could receive your inventories no later than July 15, 2002.

The inventories should take approximately 1 ½ hours to complete on your own, and you will be asked to complete two final inventories in person that will take about one hour to finish. After completing the inventories and participating in the final meeting, I will enter your name in a raffle to win a \$50 American Express gift certificate.

If you have any questions about the surveys, please feel free to contact me (972-898-7518; lizwohl@umich.edu) or my faculty advisor, Bert Hayslip, Ph.D. (940-565-2675).

Thanks for your help!!

Sincerely,

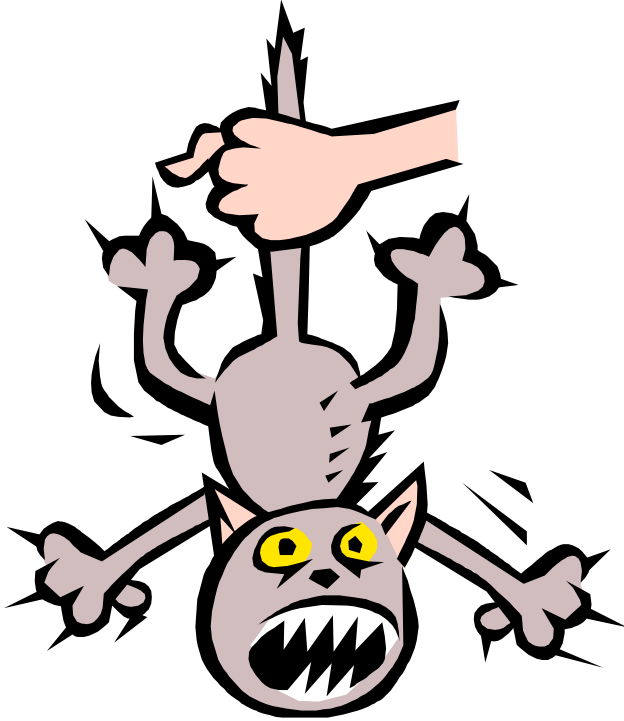
Liz Wohl, M.A.
Doctoral Candidate
Counseling Psychology
University of North Texas

Bert Hayslip, Ph.D.
Regents Professor of Psychology
Faculty Advisor
University of North Texas

This research study has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

TAMS SENIORS:

I NEED ***YOU*** FOR DISSERTATION HELP!



Give yourself some good thesis/dissertation karma...

Just complete one fun, creative writing exercise at 5 P.M. THURSDAY IN THE MAC CAFÉ

Please bring the short surveys I left in your box with you. It's okay if they're not completed yet, please come anyway!!

I will give you pizza (or \$3 cash), I will register you for a \$25 gift certificate, whatever it takes. This research study has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

June 15, 2002

Dear TAMS Class of 2004 Student:

Congratulations on your acceptance to the TAMS program! My name is Liz Wohl, I am a doctoral candidate in counseling psychology at UNT, and need your help to complete my dissertation. Enclosed you will find 1) an informed consent letter about my creativity study to read and sign; 2) an informed consent letter for your parents to read; 3) a set of questionnaires for you to complete on your own; and 4) a postage-paid envelope in which you may return your signed consent form and the completed inventories.

The inventories should take approximately 1 ½ hours to complete on your own this summer, and you will be asked to complete two final inventories in the fall that will take about one hour to finish.

Students who return their completed surveys before July 31, 2002 will be entered in a drawing to win a \$25 American Express gift certificate to use anywhere as cash!

If you have any questions about the surveys, please feel free to contact me (972-898-7518; lizwohl@umich.edu) or the TAMS psychologist, Dr. Donna Fleming, (940-565-4657).

Thanks for your help!!

Sincerely,

Liz Wohl, M.A.
Doctoral Candidate
Counseling Psychology
University of North Texas

Bert Hayslip, Ph.D.
Regents Professor of Psychology
Faculty Advisor
University of North Texas

This research study has been reviewed and approved by the UNT Committee for the Protection of Human Subjects (940) 565-3940.

TABLES

Table 1
Longitudinal Sample Descriptive Statistics (n = 52)

Variable	Frequency	Percent
Male	30	57.7
Female	22	42.3

Table 2
Older Adult Frequencies (n = 57)

Variable	Frequency	Percent
Male	17	29.8
Female	40	70.2
Education ≤ High School	27	47.4
Education = College	11	19.3
Education = Graduate School	19	33.3

Table 3
Adolescent Frequencies (n = 57)

Variable	Frequency	Percent
Male	31	54.4
Female	26	45.6
Education = College	57	100.0

Table 4
Descriptive Statistics
TAMS Class of 2002 Students Longitudinal Data (Valid n = 45)

Variable	N	Mean	SD	Range	Min	Max
TTCT (A)	47	107.06	16.80	62.00	77.00	139.00
TTCT (B)	51	109.41	13.44	49.00	87.00	136.00
HDYT (1)	47	316.49	41.76	200.00	219.00	419.00
HDYT (2)	51	318.61	36.74	173.00	225.00	398.00
HPS (1)	47	22.94	7.43	34.00	11.00	45.00
HPS (2)	52	21.94	7.89	35.00	3.00	38.00

(A) and (1) = Measures administered at Time 1 (June 2000)

(B) and (2) = measures administered at Time 2 (April 2002)

Table 5
Descriptive Statistics
Older Adults (Valid n = 55); Adolescents (Valid n = 52)

Sample	Variable	N	Mean	SD	Range	Min	Max
Older Ad.	TTCT	57	32.08	8.15	43.00	9.00	52.00
Adolescents		57	34.37	12.91	54.00	11.0	65.00
Older Ad.	HDYT	57	277.46	42.60	251.00	147.00	398.00
Adolescents		57	309.88	39.07	190.00	202.00	392.00
Older Ad.	Age	57	72.0	6.81	33.00	53.00	86.00
Adolescents		57	16.7	.462	1.00	16.00	17.00
Older Ad.	N Factor (Z)	57	-.402	.444	2.04	-1.61	.432
Adolescents		57	.397	1.23	5.68	-1.22	4.46
Older Ad.	E Factor (Z)	57	-.196	.624	2.64	-1.20	1.44
Adolescents		57	.144	1.19	8.20	-2.87	5.33
Older Ad.	O Factor (Z)	57	-.303	.624	1.67	-1.14	.537
Adolescents		57	.243	1.26	4.89	-1.04	3.85
Older Ad.	A Factor (Z)	57	-.430	.647	2.54	-1.56	.980
Adolescents		57	.420	1.12	6.03	-2.75	3.28
Older Ad.	C Factor (Z)	57	-.112	.409	1.69	-1.12	.572
Adolescents		57	.088	1.35	8.09	-3.93	4.16
Older Ad.	Art Skill	55	2.25	.845	3.20	1.00	4.20
Adolescents		57	2.82	.773	3.40	1.00	4.40
Older Ad.	Sci Skill	55	2.17	1.05	3.80	1.00	4.80
Adolescents		57	3.29	.933	3.80	1.00	4.80
Older Ad.	Art Exp	55	1.60	.638	2.80	1.00	3.80
Adolescents		57	1.63	.430	1.60	1.00	2.60
Older Ad.	Sci Exp	55	1.60	.772	4.00	1.00	5.00
Adolescents		57	2.90	.716	3.20	1.00	4.20
Older Ad.	Art Interest	55	2.67	.866	3.15	1.10	4.25
Adolescents		57	3.00	.797	3.30	1.25	4.55
Older Ad.	Sci Interest	55	2.22	.916	3.80	1.00	4.80
Adolescents		57	3.16	.921	3.90	1.00	4.90
Older Ad.	Postformal	57	40.63	12.74	59.00	6.00	65.00
Adolescents		56	46.15	8.98	33.00	27.00	66.00
Older Ad.	GC	57	24.03	3.42	14.00	14.00	28.00
Adolescents		56	21.01	4.42	27.00	0.00	27.00
Older Ad.	GF	57	22.19	7.19	27.00	8.00	35.00
Adolescents		56	32.46	5.10	25.00	15.00	40.00
Older Ad.	Soc. Isolation	57	53.72	4.34	24.00	45.00	69.00
Adolescents		57	52.67	5.44	30.00	33.00	63.00
Older Ad.	HPS	57	12.44	7.16	34.00	2.00	36.00
Adolescents		57	19.68	8.25	33.00	5.00	38.00

Table 6

Summary of Hierarchical Regression Analysis for Variables Predicting Creative Process (TTCT); Older Adults and Adolescents Combined Sample (N = 107)

Dependent Variable	Predictors ^a	F ^b	B ^c	β ^d	R ^{2e}
TTCT	Age X O	7.85**	.115	.264	.061
	Age	1.88	-.005	-.133	.008
	N Factor	2.64*	-1.74	-.156	.080
	E Factor		1.11	.099	
	O Factor		3.74	.334	
	A Factor		1.31	.122	
	C Factor		-.161	-.015	
	Art Skill	2.10	2.48	.195	.100
	Sci Skill		-1.02	-.108	
	Art Exp	1.71	-3.22	-.162	.113
	Sci Exp		-1.33	-.122	
	Postformal	2.47	.147	.154	.126
	GC	1.03	-.380	-.148	.127
	GF		.171	.126	
	Soc. Isolation	.090	-.007	-.031	.118
	Art Interest	9.45*	6.84	.534	.192
	HPS	14.93**	.564	.442	.300

* $p < .05$; ** $p < .01$

^a Hierarchical regression method.

^b F value for B

^c unstandardized regression coefficient (B)

^d standardized regression coefficient (β)

^e adjusted R²

Table 7

Summary of Hierarchical Regression Analysis for Variables Predicting Creative Personality (HDYT)
Older Adults & Adolescents Combined Sample (N = 107)

Dependent Variable	Predictors ^a	F ^b	B ^c	β^d	R ^{2e}
HDYT	Age	15.9**	-.571	-.363	.123
	N Factor	1.25	-2.90	-.064	.134
	E Factor		8.17	.180	
	O Factor		-7.46	-.165	
	A Factor		-3.98	-.092	
	C Factor		-2.07	-.048	
	Art Skill	5.61*	14.69	.286	.207
	Sci Skill		4.23	.110	
	Art Exp	6.20*	34.21	.426	.283
	Sci Exp		-4.40	-.100	
	Postformal	.413	.221	.057	.279
	GC	.399	.889	.085	.270
	GF		-.360	-.065	
	Soc. Isolation	.063	-.223	-.024	.262
	Art Interest	3.39	15.66	.302	.281
	HPS	9.60*	1.77	.344	.343

* $p < .05$; ** $p < .01$

^a Hierarchical regression method.

^b F value for B

^c unstandardized regression coefficient (B)

^d standardized regression coefficient (β)

^e adjusted R²

Table 8

Summary of Hierarchical Regression Analysis for Variables Predicting Creative Process (TTCT); Older Adults (n = 55); Adolescents (n = 52)

Sample	Predictors ^a	F ^b	B ^c	β^d	R ^{2e}
Older Adults	Age	.085	.005	.040	-.017
Adolescents		3.94	-7.58	-.270	.054
Older Adults	N Factor	1.24	-5.98	-.294	.005
Adolescents		.775	-.339	-.032	.033
Older Adults	E Factor	1.24	1.36	.097	.005
Adolescents		.775	1.33	.126	.033
Older Adults	O Factor	1.24	3.89	.137	.005
Adolescents		.775	4.17	.413	.033
Older Adults	A Factor	1.24	1.41	.068	.005
Adolescents		.775	1.32	.115	.033
Older Adults	C Factor	1.24	1.58	.070	.005
Adolescents		.775	-.002	-.002	.033
Older Adults	Art Skill	.213	.747	.076	-.028
Adolescents		1.785	3.98	.239	.065
Older Adults	Sci Skill	.213	-.723	-.092	-.028
Adolescents		1.785	-1.75	-.126	.065
Older Adults	Art Exp	11.45**	-1.62	-.125	.293
Adolescents		.979	-5.34	-.181	.064
Older Adults	Sci Exp	11.45**	-6.00	-.562	.293
Adolescents		.979	-1.75	.217	.064
Older Adults	Postformal	.022	-.001	.020	.277
Adolescents		8.72*	.600	.404	.213
Older Adults	GC	.024	.000	.002	.242
Adolescents		1.84	-.770	-.267	.245
Older Adults	GF	.024	.004	.031	.242
Adolescents		1.84	.336	.130	.245
Older Adults	Soc. Isolation	.208	-.144	-.068	.228
Adolescents		.038	.007	.029	.225
Older Adults	Art Interest	7.61*	6.62	.695	.337
Adolescents		2.13	6.45	.400	.248
Older Adults	HPS	1.64	.258	.348	.227
Adolescents		8.90*	.671	.420	.383

* $p < .05$; ** $p < .01$

^a Hierarchical regression method.

^b F value for B

^c unstandardized regression coefficient (B)

^d standardized regression coefficient (β)

^e adjusted R²

Table 9

Summary of Hierarchical Regression Analysis for Variables Predicting Creative Personality (HDYT); Older Adults ($N = 55$); Adolescents ($N = 52$)

Sample	Predictors ^a	F ^b	B ^c	β ^d	R ^{2e}
Older Adults	Age	.014	-.106	-.016	-.019
Adolescents		1.15	12.54	.150	.003
Older Adults	N Factor	2.31	-26.35	-.246	.093
Adolescents		1.20	-7.62	-.241	.023
Older Adults	E Factor	2.31	21.05	.285	.093
Adolescents		1.20	5.84	.185	.023
Older Adults	O Factor	2.31	-14.51	-.097	.093
Adolescents		1.20	-21.10	-.700	.023
Older Adults	A Factor	2.31	1.42	.021	.093
Adolescents		1.20	-5.80	-.468	.023
Older Adults	C Factor	2.31	14.78	.140	.093
Adolescents		1.20	-7.45	-.268	.023
Older Adults	Art Skill	9.05**	25.81	.503	.321
Adolescents		.134	-.407	-.008	-.017
Older Adults	Sci Skill	9.05**	1.23	.030	.321
Adolescents		.134	3.21	.077	-.017
Older Adults	Art Exp	2.63	28.69	.422	.366
Adolescents		2.06	35.41	.402	.031
Older Adults	Sci Exp	2.63	-3.26	-.058	.366
Adolescents		2.06	-6.68	-.124	.031
Older Adults	Postformal	.010	-.004	-.013	.351
Adolescents		.000	.001	.002	.007
Older Adults	GC	1.06	2.46	.191	.353
Adolescents		.021	.186	.055	-.044
Older Adults	GF	1.06	-.627	-.103	.353
Adolescents		.021	-.272	-.035	-.044
Older Adults	Soc. Isolation	.001	.004	.004	.337
Adolescents		.000	-.002	.003	-.072
Older Adults	Art Interest	1.61	15.87	.317	.347
Adolescents		2.81	25.80	.536	-.022
Older Adults	HPS	.442	.710	.119	.338
Adolescents		5.15*	1.86	.390	.084

* $p < .05$; ** $p < .01$

^a Hierarchical regression method.

^b F value for B

^c unstandardized regression coefficient (B)

^d standardized regression coefficient (β)

^e adjusted R²

APPENDIX B

Appendix B
Independent Variables Correlation Matrix
Adolescent and Older Adult Combined Sample (N = 107)

	HPS	Soc. Iso.	GC	GF	Post For.	N	E	O	A	C	ART INT	SCI INT	ART EXP	SCI EXP	ART SKILL	SCI SKILL	AGE
HPS		-.099	-.189	.138	.333	.090	.390	.136	.310	.012	.356	.267	.303	.320	.292	.063	-.421
Soc. Iso.	-.099		-.017	-.208	-.099	-.095	-.051	-.165	.029	.244	.103	-.064	.135	-.014	-.068	-.151	.138
GC	-.189	-.017		.036	-.024	-.205	-.126	-.089	-.203	-.152	.055	-.135	.016	-.186	-.048	-.147	.364
GF	.138	-.208	.036		.164	.253	-.050	.198	.228	-.083	.141	.396	-.109	.383	.301	.520	-.639
Post Formal	.333	-.099	-.024	.164		.107	.095	.112	.150	-.016	.116	.246	.008	.319	.097	.142	-.258
Factor N	.090	-.095	-.205	.253	.107		.131	.610	.331	-.008	.031	.088	.017	.332	.064	.196	-.404
Factor E	.390	-.051	-.126	-.050	.095	.131		.434	.270	.409	.157	.131	.192	.263	.127	.105	-.181
Factor O	.136	-.165	-.089	.198	.112	.610	.434		.255	.092	.145	.199	.140	.301	.205	.260	-.284
Factor A	.310	.029	-.203	.228	.150	.331	.270	.255		.332	.098	.288	.040	.397	.074	.184	-.440
Factor C	.012	.244	-.152	-.083	-.016	-.008	.409	.092	.332		-.004	.146	-.078	.124	-.059	.181	-.103
ART	.356	.103	.055	.141	.116	.031	.157	.145	.098	-.004		.176	.717	.153	.784	.071	-.171

INT																		
<i>Appendix B(cont'd)</i>	HPS	Soc. Iso.	GC	GF	Post For.	Facto N	Factor E	Factor O	Factor A	Factor C	AR T INT	SCI INT	AR T EXP	SCI EXP	ART SKIL	SCI SKIL	AGE	
SCI INT	.267	-.064	-.135	.396	.246	.088	.131	.199	.288	.146	.176		.057	.591	.210	.755	-.447	
ART EXP	.303	.135	.016	-.109	.008	.017	.192	.140	.040	-.078	.717	.057		.220	.601	-.071	-.017	
SCI EXP	.320	-.014	-.186	.383	.319	.332	.263	.301	.397	.124	.153	.591	.220		.239	.539	-.664	
ART SKIL	.292	-.068	-.048	.301	.097	.064	.127	.205	.074	-.059	.784	.210	.601	.239		.264	-.324	
SCI SKIL	.063	-.151	-.147	.520	.142	.196	.105	.260	.184	.181	.071	.755	-.071	.539	.264		-.504	
AGE	-.421	.138	.364	-.639	-.258	-.404	-.181	-.284	-.440	-.103	-.171	-.447	-.017	-.664	-.324	-.504		

REFERENCES

- Adams-Price, C.E. (1998). Aging, writing, and creativity. In Adams-Price, C.E. (Ed.). *Creativity and Successful Aging: Theoretical and Empirical Approaches* (pp.269-288). New York, NY: Springer Publishing.
- Akiskal, H.S. & Mallya, G. (1987). Criteria for the “soft” bipolar spectrum: Treatment implications. *Psychopharmacology Bulletin*, *23*, 68-73.
- Alpaugh, P., Parham, I., Cole, K., & Birren, J.E. (1982). Creativity in adulthood and old age; an exploratory study. *Educational Gerontology*, *1*, 17-40.
- Amabile, T.M. (1996). *Creativity in Context*. Boulder, CO: Westview Press.
- Amabile, T. M. (1989). *The Student Interest and Experience Questionnaire*. Unpublished instrument, Brandeis University, Waltham, MA.
- Ambers, S.J. (1994). An examination of the relationship between artistic creativity and psychological functioning. *Dissertation Abstracts*, *55/01*, July, 204.
- Andreasen, N.C. (1996). Creativity and mental illness: a conceptual and historical overview. In Schildkraut, J.J. & Otero, A. (Eds.) *Depression and the spiritual in modern art: homage to Miro* (pp . 2-14). Chichester, West Sussex England: John Wiley & Sons Ltd.
- Andreasen. N.C. (1987). Creativity and mental illness: prevalence rates in writers and their first-degree relatives. *American Journal of Psychiatry*, *144*, 1288-1292.
- Andreasen, N.C. & Glick I.D. (1988). Bipolar affective disorder and creativity, *Comprehensive Psychiatry*, *29*, 207-217.
- Andreasen, N.J.C. & Canter, A. (1974). The creative writer: Psychiatric symptoms and family history. *Comprehensive Psychiatry*, *15*, 123-131.

- Andreasen, N.J.C. & Powers, P.S. (1974). Overinclusive thinking in mania and schizophrenia. *British Journal of Psychiatry*, 125, 452-456.
- Barron, F. (1976) The psychology of creativity. In Rothenberg, A. & Hausman, C. (Eds.) *The Creativity Question* (pp.). Durham, N.C.: Duke University Press.
- Becker, G. (1978). *The mad genius controversy*. Beverly Hills, CA: Sage Publications.
- Bosman, E.A. & Charness, N. (1996). Age-related differences in skilled performance and skill acquisition. In Blanchard-Fields, F. & Hess, T.M. (Eds.) *Perspectives on Cognitive Change in Adulthood and Aging* (pp.). New York, NY: McGraw-Hill.
- Carreno, T. & Goodnick, P.J. (1998). Creativity and mood disorder. In Goodnick, P.J. (Ed.) *Mania: Clinical and Research Perspectives* (pp. 11-35). Washington D.C.: American Psychiatric Press, Inc.
- Cassandro, V.J. & Simonton, D.K. (2003). Creativity and genius. In C.L.M Keyes and J. Haidt (Eds.) *Flourishing: Positive Psychology and the Life Well-Lived* (pp. 163 – 183). Washington, D.C.: American Psychological Association.
- Cohen-Shalev, A. (1986). Artistic creativity across the adult life span: An alternative approach. *Interchange*, 17, 1-16.
- Costa, P.T., Jr., & McCrae, R.R. (1992). *NEO-PI-R professional manual*. Odessa, FL: Psychological Assessment.
- Cox, A. & Leon, J. (1999). Negative schizotypal traits in the relation of creativity of psychopathology. *Creativity Research Journal*, 12, 25-36.
- Crosson, C., & Robertson-Tchabo, E. (1982). Age and preference for complexity among manifestly creative women. *Human Development*, 26, 149-155.
- Csikszentmihalyi, M. (1990). *Flow*. New York: Harper & Row.

- Davis, G. (1975). In frumious pursuit of the creative person. *The Journal of Creative Behavior*, 9, 75-87.
- Davis, G. (1977). *The How Do You Think? Test, Form E*. Unpublished manuscript, The University of Wisconsin, Madison.
- Denmark, F., Rabinowitz, V., Sechzer, J. (2000). *Engendering psychology: Bringing women into focus*. Needham Heights, MA: Allyn & Bacon.
- DeMoss, K., Milich, R., & DeMers, S. (1993). Gender, creativity, depression, and attributional style in adolescents with high academic ability. *Journal of Abnormal Child Psychology*, 21, 455-467.
- Dudek, S.Z., Berneche, R., Berube, H., & Royer, S. (1991). Personality determinants of the commitment to the profession of art. *Creativity Research Journal*, 4, 367-389.
- Eckblad, M. & Chapman, L. (1986). Development and validation of a scale for hypomanic personality. *Journal of Abnormal Psychology*, 95, 214-222.
- Eckblad, M.L., Chapman, L.J., Chapman, J.P., & Mishlove, M. (1982), Social Anhedonia Scale. Unpublished test. Reported in Mishlove, M., & Chapman, L.J. 1985). *Journal of Abnormal Psychology*, 94, 384-396
- Eisenman, R. (1990). Creativity, preference for complexity, and physical and mental illness. *Creativity Research Journal*, 3, 231-236.
- Eysenck, H.J. (1997). Creativity and personality. In Runco, M.A. (Ed.), *The Creativity Research Handbook* (pp.). Creskill, NJ: Hampton Press.
- Feist, G.J. (1999). Affect in artistic and scientific creativity. In Russ, S.W. (Ed.), *Affect, Creative Experience and Psychological Adjustment* (pp.). Philadelphia, PA: Brunner/Mazel.
- Feist, G.J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, 2, 290-309.

- Feist, G.J. (1994). The affective consequences of artistic and scientific problem solving. *Cognition and Emotion*, 8, 489-502.
- Feldman, D.H. & Benjamin, A.C. (1998). Creativity and gifted education: an unsettled relationship. *Roepers Review*, 21, 82-84.
- Fishkin, A.S., & Johnson, A.S. (1998). Who is creative? Identifying children's creative abilities. *Roepers Review*, 21, 40-46.
- Fodor, E.M. (1995). Subclinical manifestations of psychosis-proneness, ego strength and creativity. *Personality and Individual Differences*, 18, 635-642.
- Frantom, C. & Sherman, M. (1999). At what price art? Affective instability within a visual art population. *Creativity Research Journal*, 12, 15-23.
- Gallucci, N.T., Middleton, G. & Kline, A. (1999). The independence of creative potential and behavior disorders in gifted children. *Gifted Child Quarterly*, 43, 194-203.
- Gardner, H. (1993). *Creating minds*. New York, NY: Basic Books.
- Gershon, E.S. (1990). Genetics. In Goodwin, F. & Jamison, K. (Eds.) *Manic-Depressive Illness* (pp.). New York, NY: Oxford University Press.
- Ghadirian, A.M, Gregoire, P., & Kosmidis, H. (2001). Creativity and the evolution of psychopathologies. *Creativity Research Journal*, 13, 145-148.
- Goff, K. & Torrance, E.P. (2000). *Brief Demonstrator Form of the Torrance Tests of Creative Thinking*. Scholastic Testing Service, Inc., Bensenville, IL
- Goldfinch, J.L. (1993). The relation between bipolar spectrum disorders and creativity. *Dissertation Abstracts*, 54/02, August, 1097.
- Goodwin, F.K. & Jamison, K.R. (1990). *Manic-depressive illness*. New York, NY: Oxford University Press.

- Green, L.R., Richardson, D.S., Lago, T. Schatten-Jones, E.C. (2001). Network correlates of social and emotional loneliness in young and older adults. *Personality and Social Psychology Bulletin*, 27, 281-288.
- Gust-Brey, K. & Cross, T. (1999). An examination of the literature base on the suicidal behaviors of gifted students. *Roeper Review*, 22, 28-32.
- Helson, R., Roberts, B. & Agronick, G. (1995). Enduringness and change in creative personality and the prediction of occupational creativity. *Journal of Personality and Social Psychology*, 69, 1173-1183.
- Hershman, D.J. & Lieb, J. (1988). *The key to genius: Manic depression and the creative life*. Buffalo, NY: Prometheus Books.
- Holden, R.R. & Fekken, G.C. (1994). The NEO Five-Factor Inventory in a Canadian context: Psychometric properties among university women. *Personality and Individual Differences*, 17, 441-444.
- Holland, J.L. (1999). Why interest inventories are also personality inventories. In Savickas, M.L. & Spokane, A.R. (Eds.) *Vocational interests: Meaning, measurement and counseling use* (pp. 87 - 101) Palo Alto, CA: Davies-Black Publishing/Consulting Psychologist's Press, Inc.
- Horn, J.L. (1975). *Gf-Gc Sampler*. Denver, CO: University of Denver.
- Horn, J.L., & Cattell, R.B. (1966). Refinement and test of the theory of fluid and crystallized general intelligences. *Journal of Educational Psychology*, 57, 253-270.
- Hoyer, W.J. & Rybash, J.M. (1994). Characterizing adult cognitive development. *Journal of Adult Development*, 1, 7-12.
- Hunsaker, S.L. & Callahan, C.M. (1995). Creativity and giftedness: published instrument uses and abuses. *Gifted Child Quarterly*, 39, 110-114.

- Jamison, K.R. (1989). Mood disorders and patterns of creativity in British writers and artists. *Psychiatry*, 52, 125-134.
- Jamison, K.R. (1990). Manic-depressive illness, creativity and leadership. In F. Goodwin & K. Jamison (Eds.) *Manic-Depressive Illness* (pp.). New York, NY: Oxford University Press.
- Jamison, K.R. (1993). *Touched with fire: Manic-depressive illness and the artistic temperament*. New York, NY: Free Press.
- Jamison, K.R. (1996). Mood disorders, creativity and the artistic temperament. In Schildkraut, J.J. & Otero, A. (Eds.) *Depression and the spiritual in modern art: homage to Miro* (pp.). Chichester, West Sussex England: John Wiley & Sons.
- Juda, A. (1949). The relationship between highest mental capacity and psychic abnormalities. *American Journal of Psychiatry*, 106, 296-307.
- Kenny, D.A. (1975). Cross-lagged panel correlation: A test for spuriousness. *Psychology Bulletin*, 82, 887-903.
- Kenny, D.A. & Harckiewicz, J.M. (1979). Cross-lagged panel correlation: Practice and promise. *Journal of Applied Psychology*, 64, 372-379.
- Koenig, H.G. & Blazer, D.G. (1990). Mood disorders and suicide. In Birren, J.E., Sloane, R.B., & Cohen, G.D. (Eds.) *Handbook of Mental Health and Aging (2nd Ed.)* (pp. 379-599). San Diego, CA: Academic Press.
- Kwapil, T.R., Miller, M.B., Zinser, M.C., Chapman, L.J., Chapman, J. & Eckblad, M. (2000). A longitudinal study of high scorers on the hypomanic personality scale. *Journal of Abnormal Psychology*, 109, 222-226.
- Leak, G.K. (1991). An examination of the construct validity of the social anhedonia scale. *Journal of Personality Assessment*, 56, 84-95.

- Lindauer, M.S. (1998). Artists, art, and arts activities: What do they tell us about aging? In Adams-Price, C.E. (Ed.). *Creativity and Successful Aging: Theoretical and Empirical Approaches* (pp. 237-250). New York, NY: Springer Publishing.
- Lindauer, M.S., Orwoll, L. & Kelley, M.C. (1997). Aging artists on the creativity of their old age. *Creativity Research Journal*, *10*, 133-152
- Lubart, T.I. & Sternberg, R.J. (1998). Life span creativity: An investment theory approach. In Adams-Price, C.E. (Ed.). *Creativity and Successful Aging: Theoretical and Empirical Approaches* (pp. 21-42). New York, NY: Springer.
- Ludwig, A.M. (1989). Reflections on creativity and madness. *American Journal of Psychotherapy*, *53*, 4 - 14.
- Ludwig, A.M. (1992). Creative achievement and psychopathology: Comparison among professions. *American Journal of Psychotherapy*, *46*, 330-356.
- Ludwig, A.M. (1994). Mental illness and creative activity in female writers. *American Journal of Psychiatry*, *151*, 1650-1656.
- Ludwig, A.M (1995). *The price of greatness: resolving the creativity and madness controversy*. New York, NY: The Guilford Press.
- Ludwig, A.M. (1998). Method and madness in the arts and sciences. *Creativity Research Journal*, *11*, 93-101.
- Marsiske & Willis (1998).
- McDonald, W.M. (2001). Epidemiology, etiology and treatment of geriatric mania. *Journal of Clinical Psychiatry*, 61, 3-11.
- McCrae, R. (1987). Creativity, divergent thinking and openness to experience. *Journal of Personality and Social Psychology*, *52*, 1258-1265.

- McCrae, R., Arenberg, D., & Costa, Jr., P. (1987). Declines in divergent thinking with age: Cross sectional, longitudinal and cross-sequential analysis. *Psychology and Aging, 2*, 130-137.
- Milgram, R. (1990). Creativity: an idea whose time has come and gone? In Runco, M. & Albert, R. (Eds.), *Theories of Creativity* (pp. 215-233). Sage Publications: Newbury Park, CA.
- Milgram & Hong (1993). Creative thinking and creative performance in adolescents as predictors of creative attainments in adults: a follow-up study after 18 years. *Roepers Review, 15*, 135-139.
- Miller, P.H. (1993). *Theories of developmental psychology (3rd Ed.)*. W.H. Freeman and Company: New York, NY.
- Petzel, T. & Rado, E. (1990). Divergent validity evidence for Eckblad and Chapman's hypomanic personality scale. *Journal of Clinical Psychology, 46*, 43-46.
- Piirto, J. (1991). Encouraging creativity and talent in adolescents. In Bireley, M., & Genshaft, J. (Eds.). *Understanding the gifted adolescent* (pp. 104-121). New York, NY: Teachers College Press.
- Pillemer, K. & Glasgow, N. (2000). Social integration and aging: Background and trends. In Pillemer, K.; Moen, P.; Wethington, E.; & Glasgow, N. (Eds). *Social Integration in the Second Half of Life* (pp.19-47). Baltimore, MD: Johns Hopkins University Press.
- Plucker, J. (1999). Is the proof in the pudding? Reanalysis of Torrance's (1958 to present) longitudinal data. *Creativity Research Journal, 12*, 103-114.
- Plucker, J.A. & Runco, M.A. (1998). The death of creativity measurement has been greatly exaggerated: Current issues, recent advances, and future directions in creativity assessment. *Roepers Review, 21*, 36-39.
- Prentky, R.A. (1980). *Creativity and Psychopathology*. New York, NY: Praeger Publishers.

Reiman, D.H. & Powers, S.B. (Eds.) (1977). *Shelley's Poetry and Prose*. New York, NY: W.W. Norton & Company.

Richards, R. (2001). Creativity and the schizophrenia spectrum: More and more interesting. *Creativity Research Journal*, 13, 111-132.

Richards, R. (1999a). Affective Disorders. In Runco, M.A. & Pritzker, S.R. (Eds.). *Encyclopedia of Creativity, Volume 1* (pp.). San Diego, CA: Academic Press.

Richards, R. (1999b). Five-Part Typology. In Runco, M.A. & Pritzker, S.R. (Eds.). *Encyclopedia of Creativity, Volume 1* (pp.). San Diego, CA: Academic Press.

Richards, R. (1999c). The subtle attraction: beauty as a force in awareness, creativity and survival. In Russ, S.W. (Ed.), *Affect, Creative Experience, and Psychological Adjustment* (pp.). Philadelphia, PA: Bruner/Mazel.

Richards, R. (1998). Creativity, everyday. In H.S. Friedman (Ed.) *Encyclopedia of Mental Health, Volume 1* (pp.). San Diego, CA: Academic Press.

Richards, R. (1997). Conclusions: When illness yields creativity. In Runco, M.A. & Richards, R. (Eds.). *Eminent creativity, Everyday Creativity, and Health* (pp.). Greenwich, CT: Ablex.

Richards, R. (1996). Does the lone genius ride again? Chaos, creativity and community. *Journal of Humanistic Psychology*, 36, 44-60.

Richards, R. (1994). Creativity and bipolar mood swings: Why the association? In Runco, M.A. & Shaw, M.P. (Eds.). *Creativity and Affect* (pp.44-72). Norwood, NJ: Ablex.

Richards, R. (1993a). Everyday creativity, eminent creativity, and psychopathology. *Psychological Inquiry*, 4, 212-217.

Richards, R. (1993b). Seeing beyond: issues of creative awareness and social responsibility. *Creativity Research Journal*, 6, 165-183.

- Richards, R. (1992). Mood swings and everyday creativity. In *Harvard Mental Health newsletter*, April. Retrieved June 15, 1999 from the World Wide Web:
<http://www.mentalhealth.com/mag1/>.
- Richards, R. (1990). Everyday creativity, eminent creativity, and health: "Afterview" for CRJ issues on creativity and health. *Creativity Research Journal*, 3, 300-326.
- Richards, R. (1981). Relationship between creativity and psychopathology: An evaluation and interpretation of the evidence. *Genetic Psychological Monographs*, 103, 261-324.
- Richards, R. & Kinney, D.K. (1990). Mood swings and creativity. *Creativity Research Journal*, 3, 202-217.
- Richards, R., Kinney, D.K., Benet, M., & Merzel, A.P. (1988a). Assessing everyday creativity: characteristics of the lifetime creativity scales and validation with three large samples. *Journal of Personality and Social Psychology*, 54, 476-485.
- Richards, R., Kinney, D.K., Lunde, I., Benet, M. & Merzel, A.P. (1988b). Creativity in manic-depressives, cyclothymes, their normal relatives, and control subjects. *Journal of Abnormal Psychology*, 97, 281-288.
- Romaniuk, J.G & Romaniuk, M. (1981). Creativity across the lifespan: A measurement perspective. *Human Development*, 24, 366-381.
- Rothenberg, A. (1990). *Creativity and Madness: New Findings and Old Stereotypes*. Baltimore, MA: The Johns Hopkins University Press.
- Rothenberg, A. & Hausman, C.H. (1976). *The Creativity Question*. Durham, NC: Duke University Press.
- Runco, M.A (1999). A longitudinal study of exceptional giftedness and creativity. *Creativity Research Journal*, 12, 161-164.

- Runco, M.A. (1994). Creativity and its discontents. In Runco, M.A. & Shaw, M.P. (Eds.) *Creativity and Affect* (pp. 102-123). Norwood, NJ: Ablex.
- Runco, M.A. (1991). *Divergent thinking*. Norwood, NJ: Ablex.
- Runco, M.A. & Bahleda, M.D. (1986). Implicit theories of artistic, scientific, and everyday creativity. *Journal of Creative Behavior*, 20, 93-98.
- Runco, M.A. & Shaw, M.P. (1994). *Creativity and Affect*. Norwood, NJ: Ablex.
- Ruscio, J., Whitney, D.M., & Amabile, T.M. (1998). Looking inside the fishbowl of creativity: Verbal and behavioral predictors of creative performance. *Creativity Research Journal*, 11, 243 – 264.
- Russell, D.W. (1996). UCLA loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20-40.
- Ruth, J.E. & Birren, J.E. (1985). Creativity in adulthood and old age: Relations to intelligence, sex, and modes of testing. *International Journal of Aging and Human Development*, 8, 99-110.
- Rysiew, K.J., Shore, B.M., & Leeb, R.T. (1999). Multipotentiality, giftedness, and career choice: A review. *Journal of Counseling & Development*, 77, 423-430.
- Salthouse, T.A. (1990). Cognitive competence and expertise in aging. In Birren, J.E. & Schaie, K.W. (Eds), *Handbook of the Psychology of Aging* (3rd Ed.) (pp. 310-319). San Diego, CA: Academic Press.
- Sasser-Coen, J.R. (1993). Qualitative changes in creativity in the second half of life: A life-span developmental perspective. *Journal of Creative Behavior*, 27, 18-27.
- Schaie, K.W., Willis, S.L., & O'Hanlon, A.M. (1994). Perceived intellectual performance change over seven years. *Journals of Gerontology*, 49, 108-118.

- Schildkraut, J.J., Hirshfeld, A.J., & Murphy, J.M. (1994). Mind and mood in modern art, II: Depressive disorders, spirituality, and early deaths in the abstract expressionist artists of the New York School. *American Journal of Psychiatry*, *151*, 482-488.
- Schulberg, D. (2001). Six subclinical spectrum traits in normal creativity. *Creativity Research Journal*, *13*, 5-16.
- Schulberg, D. (1999). Creativity, bipolarity, and dynamics of style. In Russ, S.W. (Ed.) *Affect, Creative Experience, and Psychological Adjustment* (pp.). Philadelphia, PA: Brunner/Mazel.
- Schulberg, D. (1994). Giddiness and horror in the creative process. In Shaw, M.P & Runco, M.A. (Eds.), *Creativity and Affect* (pp. 87-101). Norwood, N.J., Ablex.
- Schulberg, D. (1990). Schizotypal and hypomanic traits, creativity, and psychological health. *Creativity Research Journal*, *3*, 218-230.
- Schulberg, D., French, C., Stone, B.L., & Heberle, J. (1988). Creativity and schizotypal traits: creativity test scores and perceptual aberration, magical ideation, and impulsive nonconformity. *The Journal of Nervous and Mental Disease*, *176*, 648 - 657.
- Shaw, M.P (1999). On the role of affect in scientific discovery. In Russ, S.W. (Ed.) *Affect, Creative Experience, and Psychological Adjustment* (pp.). Philadelphia, PA: Brunner/Mazel.
- Simonton, D.K. (1975). Interdisciplinary creativity over historical time: A correlational analysis of generational fluctuations. *Social Behavior and Personality*, *3*, 181-188.
- Simonton, D.K. (1977). Creative productivity, age and stress: A biographical time-series analysis of 10 classical composers. *Journal of Personality and Social Psychology*, *35*, 791-804.
- Simonton, D.K. (1989). The swan-song phenomenon: Last-works effects for 172 classical composers. *Psychology and Aging*, *4*, 42-47.

- Simonton, D.K. (1990a). Creativity in the later years: Optimistic prospects for achievement. *The Gerontologist*, 30, 626-631.
- Simonton, D.K. (1990b). Creativity and wisdom in aging. In Birren, J.E. & Schaie, K.W. (Eds.). *Handbook of the Psychology of Aging (3rd Ed.)* (pp. 320-329). San Diego, CA: Academic Press.
- Simonton, D.K. (1991). Creative productivity through the adult years. *Generations*, 3, 13-16.
- Simonton, D.K. (1998). Career paths and creative lives: A theoretical perspective on late life potential. In Adams-Price, C.E. (Ed.). *Creativity and Successful Aging: Theoretical and Empirical Approaches* (pp. 3-18). New York, NY: Springer Publishing.
- Simonton, D.K. (1999). Creativity from a historiometric perspective. In Sternberg, R.J. (Ed.), *Handbook of Creativity* (pp. 116-133). New York, NY: Cambridge University Press.
- Sinnott, J.D. (1996). The developmental approach: Postformal thought as adaptive intelligence. In Blanchard-Fields, F. & Hess, T.M. (Eds.). *Perspectives on Cognitive Change in Adulthood and Aging* (pp.). New York, NY: McGraw-Hill.
- Sinnott, J.D. (1998a). Creativity and postformal thought: Why the last stage is the creative stage. In Adams-Price, C.E. (Ed.), *Creativity and Successful Aging: Theoretical and Empirical Approaches* (pp. 43-72). New York, NY: Springer Publishing.
- Sinnott, J.D. (1998b). *The development of logic in adulthood: Postformal thought and its applications*. New York, NY: Plenum Press.
- Stack, S. (1997). Suicide among artists. *Journal of Social Psychology*, 137, 129-130.
- Sternberg, R.J. (1990). *Wisdom: Its Nature, Origins, and Development*. New York, NY: Cambridge University Press.

- Sternberg, R.J. & Lubart, T.I. (2001). Wisdom and creativity. In Birren, J.E. & Schaie, K.W. (Eds). *Handbook of the Psychology of Aging (4th Ed.)* (pp. 500 - 522). San Diego, CA: Academic Press.
- Strong, E.K., Campbell, D.P., & Hansen, J.C. (1995). *Strong Interest Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Tokar, D.M., Fischer, A.R., Snell, A.F., & Harik-Williams, N. (1999). Efficient assessment of the five-factor model of personality: Structural validity analyses of the NEO-FFI (Form S). *Measurement & Evaluation in Counseling & Development, 32*, 14 – 30.
- Torrance, E.P. (1994). *Torrance Tests of Creative Thinking: Norms-technical manual*. Lexington, MA: Ginn and Company.
- Torrance, E.P. (1998). From E. Paul Torrance. *Roeper Review, 21*, 87-88.
- Twiss, I.R. (1999). Contagious empowerment: students speak and act out about manic depression. *Michigan Today, The University of Michigan News & Information Services, 31*, 20-21.
- Wakefield, J.F. (1986). Creativity and the TAT blank card. *Journal of Creative Behavior, 20*, 127-133.
- Weisberg, R.W. (1994). Genius and madness? A quasi-experimental test of the hypothesis that manic-depression increases creativity. *Psychological Science, 5*, 361-367.
- Wethington, E., Moen, P., Glasgow, N. & Pillemer, K. (2000). Multiple roles, social integration and health. In Pillemer, K.; Moen, P.; Wethington, E.; & Glasgow, N. (Eds.). *Social Integration in the Second Half of Life* (pp. 48 - 71). Baltimore, MD: Johns Hopkins University Press.
- Wohl, E.C. (2001). *Predicting creativity in talented adolescents: The role of*

vocational interest and hypomanic traits. Unpublished thesis, Denton, TX: University of North Texas.

Zarit, S.H. & Zarit, J.M. (1998). *Mental disorders in older adults*. New York, NY: Guilford Press.