

A dimensional analysis of creativity and mental illness: Do anxiety and depression symptoms predict creative cognition, creative accomplishments, and creative self-concepts?

By Paul J. Silvia and Nathan A. Kimbrel

Silvia, P. J., & Kimbrel, N. A. (in press). A dimensional analysis of creativity and mental illness: Do anxiety and depression symptoms predict creative cognition, creative accomplishments, and creative self-concepts? *Psychology of Aesthetics, Creativity, and the Arts*.

Made available courtesy of American Psychological Association: <http://www.apa.org/journals/aca/>

*****Note: Figures may be missing from this format of the document**

TABLES AND FIGURES CAN BE FOUND AT THE END OF THE ARTICLE.

Abstract:

The link, if any, between creativity and mental illness is one of the most controversial topics in modern creativity research. The present research assessed the relationships between anxiety and depression symptom dimensions and several facets of creativity: divergent thinking, creative self-concepts, everyday creative behaviors, and creative accomplishments. Latent variable models estimated effect sizes and their confidence intervals. Overall, measures of anxiety, depression, and social anxiety predicted little variance in creativity. Few models explained more than 3% of the variance, and the effect sizes were small and inconsistent in direction. Keywords: creativity, mood disorders, depression, anxiety, social anxiety, latent variable models

Article:

Asking if creativity is linked to mental illness is like asking if there is a dog breed that fits your personality or if there is a journal that will publish your dissertation study—the sheer number of possibilities makes us reluctant to simply say *no*. Both creativity and mental illness are vast, abstract concepts. There are many disorders and many domains of creativity: crossing the different disorders with the different creative domains yields a massive Disorder by Creativity matrix. This huge matrix can be multiplied if researchers believe that both mental illness and creativity can vary in amount, not just in kind.

For these reasons, Silvia and Kaufman (in press) suggest that the typical question—“Is creativity linked to mental illness?”—is too broad to be productive. More focused questions— such as questions concerning specific disorders, domains, developmental periods, and levels— are more likely to illuminate how creativity and mental illness intersect, if at all. Over time, this brick-by-brick approach will yield the raw material for meta-analyses, which will provide a quantitative grounding for this controversial area.

In the present research, we focused on the dimensions of depression and anxiety because major depression and the anxiety disorders have high base rates and are among the most common mental disorders (American Psychiatric Association, 2000; Kessler et al., 1994). Moreover, despite their widespread prevalence, anxiety and unipolar depression have attracted relatively little interest from creativity researchers, as shown in recent reviews of this topic (Kaufman, 2009; Silvia & Kaufman, in press; Weisberg, 2006). Thus, one of the primary goals of this project was to explore whether symptom dimensions of the most common mental disorders are associated with dimensions of creativity.

Our work was exploratory in two senses. First, we cast a broad net by assessing several dimensions of anxiety and depression and by including a wide range of creativity tasks and measures. Second, we didn't have predictions, commitments, or prejudices about what we would find—we don't have a horse (or a stoic, exploited greyhound) in this race. (Indeed, our indifference to whether creativity covaries with mental illness is unseemly for a creativity researcher and a clinical psychologist.) This important problem arouses strong feelings in creativity researchers, but we think it would benefit from a disinterested and pragmatic approach. Exploratory

research of high methodological quality can build a base of knowledge for future meta-analyses. To foster such synthesis, we emphasize effect sizes and their confidence intervals in our research.

Depression and Creativity

Despite its prevalence, unipolar depression hasn't received much attention in creativity research. In contrast, the dimensions associated with disorders of thought and with mood variability—particularly positive-symptom schizotypy and the bipolar spectrum—have received much more attention (see Batey & Furnham, 2008; Jamison, 1989; Kinney & Richards, 2007), even though these disorders are far less common in the general population (American Psychiatric Association, 2000; Kessler et al., 1994). Moreover, the findings from the limited research that has been conducted on the relationship between creativity and depression have been inconsistent.

For example, in a broad study of creativity and subclinical spectrum traits, Schulberg (2000-2001) found evidence that depressive symptoms were negatively related to creativity. Depression was measured with the MMPI-2 Depression scale; creativity was measured with many measures of creative traits and everyday creativity. Small negative effects (r s around $-.15$ to $-.20$) appeared for several of the creativity measures. In a later study, however, past depressive symptoms modestly predicted higher divergent thinking scores and more creative interests, and self-reflective rumination mediated these effects (Verhaeghen, Joorman, & Khan, 2005).

Studies of clinical samples and creative samples are just as mixed. In a classic study, Andreasen (1987) found that creative writers were more likely to have had “any affective disorder” than a sample of matched controls. Santosa et al. (2007), however, found no differences between people diagnosed with major depression and people classified as “healthy controls” on the Barron–Welsh Art Scale, the figural and verbal components of the Torrance Tests, or the ACL creative personality scale. Taken together, the evidence for a depression–creativity link is clearly inconsistent.

Anxiety and Creativity

Even less is known about the relationship between anxiety and creativity, perhaps because anxiety falls outside of the “mad genius” stereotype. Rubinstein (2008) reported that patients diagnosed with anxiety, depression, or personality disorders had higher divergent-thinking fluency scores than schizophrenic patients. Unfortunately, this study did not distinguish among patients with anxiety, depression, or personality disorders, making it difficult to draw conclusions about the relationship between anxiety and creativity. Fluency is also a controversial indicator of creativity (Silvia et al., 2008).

Other studies have examined shyness, a common and subclinical region of the social anxiety spectrum (McNeil, 2001). For example, in a study of preschoolers, Kemple, David, and Wang (1996) found that teachers' ratings of “curiosity and creativity” covaried with teachers' and mothers' ratings of the child's shyness: shy preschoolers, on average, received lower ratings of creative and curious behaviors. Similarly, in a small-sample study of female college students, Cheek and Stahl (1986) found that shyness predicted less creativity in a poem-writing task. Taken together, these studies suggest that shyness (and by extension social anxiety) may be associated with less creativity.

Negative Affect and Creativity

A different way to look at negative mood disorders is to consider what they have in common. Depression, anxiety, and social anxiety have unique symptoms that distinguish them from each other. Their shared features, however, can be equally interesting. Clark and Watson (1991) proposed that depression and anxiety can be modeled in terms of unique and common features. In this tripartite model, depression's anhedonic symptoms and anxiety's somatic activation symptoms are distinct, and feelings of global distress and negative affect are shared by depression and anxiety (and several other disorders; Watson et al., 1995). The global negative affect dimension and the disorder-specific dimensions can thus relate differently to other constructs.

The higher-order negative affect spectrum may relate to creativity in ways that the lower-order spectrums do not. So far, this kind of hierarchical model has not been tested in creativity research, but indirect evidence comes from research on neuroticism and creativity. Neuroticism represents a broad disposition to experience negative emotional states (McCrae & Costa, 1999). It strongly predicts clinical and subclinical manifestations of mood disorders, among many other disorders (Kimbrel, 2008; Watson, 2000), and it can serve as a proxy for the global negative affect factor described by Clark and Watson (1991; see Silvia & Warburton, 2006).

In recent studies (Batey, Chamorro-Premuzic, & Furnham, 2009; Furnham & Bachtiar, 2008), openness and extraversion predicted divergent-thinking fluency, everyday creative behaviors, and self-rated creativity, but neuroticism did not. This study seems to be typical. In a wide-ranging review, Batey and Furnham (2006) found only scattered examples of neuroticism as a predictor of creativity; they suggest that neuroticism may be important in only some creative domains, such as the fine arts, whereas openness to experience and extraversion consistently predict creativity despite differences in domains, tasks, and designs.

The Present Study

The present study explored the relationships between the dimensions of depression, anxiety, and social anxiety and many aspects of creativity. Dimensional models, also known as spectrum or continuum models, presume meaningful variability along a continuum of impairment. Clinical psychology's long-running debate over types versus dimensions isn't something we can settle here—or something that clinical psychologists can settle over there (De Boeck, Wilson, & Acton, 2005)—but it is important to be clear about the assumptions and commitments that a dimensional approach makes (Schuldtberg, 2000-2001).

For most disorders, few people will meet clinical criteria for a diagnosis, but many people will show some of the disorder's symptoms and features, albeit less often and less intensely. For example, relatively few people have clinical levels of social phobia, but most people report occasional feelings of shyness and nervousness around other people, ruminative thoughts about rejection, irrational social fears, and anxious feelings when faced with an audience. Similarly, full-blown schizophrenia has a low base rate, but many people experience aberrant thoughts and deviant sensory experiences (Kwapil, Barrantes-Vidal, & Silvia, 2008). Thus, one of the primary advantages of dimensional models over categorical models is that categorical clinical-subclinical models lose much of the variability in people's behavior and experience.

For our outcomes, we explored many senses of creativity. Theories of creativity don't agree on much, but they do agree that there is no one sense in which someone is creative (Beghetto & Kaufman, 2007). Creativity can be viewed in terms of everyday "little c" creative behaviors, "Big C" creative accomplishments, creative cognitive styles and thought processes, creative beliefs, creative personality traits, and creative contexts and cultures (Kaufman & Beghetto, 2009; Richards, 2007; Sawyer, 2006; Weisberg, 2006). We measured several of these facets, including creative cognition (assessed with divergent thinking tasks; Silvia et al., 2008), everyday creative behaviors (Dollinger, 2007), creative accomplishments in different domains (Carson, Peterson, & Higgins, 2005), and creative self-beliefs (whether people viewed themselves as creative people; Kaufman & Baer, 2004). By casting a broad net, we hoped to give each side in the debate a fair shot.

Our statistical analyses emphasized two things that haven't received enough attention in past creativity research. First, we estimated most of the constructs as latent variables rather than observed variables. As quantitative psychologists point out, most variables that can be modeled as latent variables should be (e.g., Coffman & McCallum, 2005; Skrondal & Rabe-Hesketh, 2004). By modeling error variance, latent variable models can separate true scores from error, thereby increasing our confidence in the accuracy of the estimates.

Second, we emphasized effect sizes rather than statistical significance. Instead of answering the "yes or no" question of significance, research in this area should answer the "how big" question. Significance tests are heavily influenced by sample size: with a large sample, even small effects will be statistically significant. Because latent variable studies require large samples, they tend to find many tiny-but-significant effects. To enhance the information provided by effect sizes, researchers can estimate confidence intervals for the effects.

These intervals illustrate the range of effect sizes that researchers could realistically expect in similar studies with similar samples.

Method

Participants

A total of 202 students enrolled in General Psychology at the University of North Carolina at Greensboro participated and received credit toward a research option. We excluded non-native English speakers, people with extensive missing data, and participants with predefined patterns of aberrant responses (e.g., marking the midpoint for all items). Our final sample thus consisted of 189 people, which was made up of 150 women (79%) and 39 men (21%). Based on self-identified ethnicity, the sample consisted mostly of Caucasian (69%) and African-American (26%) students.

Procedure

People took part in groups of 2 to 10 people. After arriving at the lab and completing a consent form, they learned that the study was about creativity and different aspects of people's backgrounds, personalities, and attitudes. People expected to complete some creativity tasks and then fill out a questionnaire. The study took around 45 minutes.

Tasks and Measures

Divergent Thinking

People completed three divergent thinking tasks. We used the administration and scoring procedure described by Silvia et al. (2008). People were asked to generate unusual uses for a brick, a knife, and a box. They were told that the tasks concerned creativity and that they should try to come up with "unusual, creative, and uncommon" uses. Each task lasted three minutes. After the task, the experimenter asked people to look at their responses and then circle their two most creative ones.

These tasks yield two scores. First, *fluency* is scored by simply counting the number of responses. Second, *creativity* is scored by having raters score each response on a 1–5 scale. This study used four raters, who were undergraduate research assistants who had been trained in the scoring method developed by our research group (Silvia et al., 2008). The responses are entered into a spreadsheet, corrected for spelling errors, and then sorted alphabetically. The raters are thus unaware of who gave a response, the number of other responses the person gave, whether the response was picked as a "top two" response, the person's scores on any other task or scale, or even the person's handwriting. Each rater scored each response. The creativity score uses only the responses picked as the top two: people are judged based on what they saw as their best responses (Michael & Wright, 1989; Silvia, 2008b). In our recent work, we have found that the top-two scores have larger effect sizes than other scoring methods, such as scoring all of the responses and using their average score (Silvia et al., 2008) or simply giving the entire set of responses a single holistic score (Silvia, Martin, & Nusbaum, 2009).

The scoring details are reported in the text and appendix of the earlier paper (Silvia et al., 2008). To date, research has provided solid evidence for the validity of this approach: the creativity scores predict dimensions of personality (e.g., openness to experience; Silvia et al., 2008; Silvia, Nusbaum, Berg, Martin, & O'Conner, in press), fluid intelligence (Silvia, 2008a), and whether students have declared a creative college major or a conventional major (Silvia et al., 2008).

Creative Self-Concepts

To measure people's creative self-concepts, we used Kaufman and Baer's (2004) 9-item Creativity Scale for Different Domains (CSDD). This scale asks people to report their level of creativity in eight domains, such as "How creative are you in the area of art?" and "How creative are you in the area of interpersonal communication?" Eight items assess specific domains; a final item—"How creative would you say you are in general?"—measures global self-views of creativity. People respond to each item on a 1–5 scale (endpoints: *Not at all creative*, *Very creative*). Kaufman and Baer (2004) suggested that the domain items form three factors: a math/science factor, an empathy/communication factor, and a hands-on creativity factor.

Everyday Creativity

To measure everyday creative behaviors, we used a version of Hocevar's Creative Behavior Inventory (CBI) that was abbreviated by Dollinger (2007; Dollinger, Burke, & Gump 2007). This 28-item scale asks people to report how often, in their "adolescent and adult life," they have done various creative behaviors, such as *wrote a short story*, *designed and made a costume*, *wrote the lyrics to a song*, and *built a hanging mobile*. On the whole, the items capture the domains of arts, crafts, and creative writing. For most of the items, people are instructed not to count behaviors done to meet a course requirement. People use a 4-point ordinal scale: A = *Never did this*, B = *Did this once or twice*, C = *Did this 3 to 5 times*, and D = *More than 5 times*.

Creative Achievement

To measure lifetime creative achievements, we used the Creative Achievement Questionnaire (CAQ), a 10-domain scale that measures self-reported accomplishments (Carson, Peterson, & Higgins, 2005). For each domain, people respond to items that increase in the level of accomplishment. The items emphasize objective, public, and observable accomplishments. Although new, this scale has performed well in several studies (Hirsh & Peterson, 2008; Mar, DeYoung, Higgins, & Peterson, 2006; Silvia, Kaufman, & Pretz, in press). The scoring of the CAQ is innovative and complex; for details, see Carson et al. (2005). The scale was designed to yield highly skewed distributions, in which most people have no or few accomplishments, and it captures a broader range of creative accomplishment than the CBI.

Mood Disorder Symptoms

We measured depression and anxiety symptoms with the Depression and Anxiety subscales of the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). The DASS is a widely-used tool for measuring the distinct symptoms of anxiety and depression in both clinical and subclinical samples (e.g., Antony, Beiling, Cox, Enns, & Swinson, 1998; Brown, Chorpita, Korotitsch, & Barlow, 1997; Lovibond, 1998). The depression subscale has 14 items (e.g., "I felt that I had lost interest in just about everything"; "I felt sad and depressed") that emphasize depressive anhedonia. The anxiety subscale has 14 items (e.g., "I felt scared without any good reason"; "I found myself in situations which made me so anxious I was most relieved when they ended") that emphasize somatic feelings of tension and nervousness. The DASS is recommended in several reviews because it discriminates between anxiety and depression reasonably well (Beuke, Fischer, & McDowall, 2003). People were instructed to rate how well the statements described how they felt during the past week (1 = *disagree strongly*, 5 = *agree strongly*).

We measured the social anxiety spectrum with the Social Interaction Anxiety Scale, a 20-item self-report scale (Mattick & Clarke, 1998). This scale is widely-used in both clinical and non-clinical samples (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Herbert, Rheingold, & Brandsma, 2001; Osman, Gutierrez, Barrios, Kopper, & Chiros, 1998), and it is a standard tool in research on the social anxiety spectrum (e.g., Kashdan & Roberts, 2004; Silvia, Allan, Beauchamp, Maschauer, & Workman, 2006). The items capture feelings of awkwardness, tension, and anxiety around other people (e.g., "I become tense if I have to talk about myself or my feelings"; "When mixing in a group, I find myself worrying I will be ignored"). People completed the scale using a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*).

Results

Statistical Models

The statistical models were estimated using Mplus 5.2, with full-information maximum likelihood and robust standard errors (MLR). Few observations were missing: for most analyses, the covariance coverage was 100%.

We modeled depression, anxiety, and social anxiety as latent variables. For depression and anxiety, we formed 3 parcels (two 5-item parcels and one 4-item parcel) from the 14 items. For social anxiety, we formed four 5-item parcels from the 20 items. The parcels were formed via item order (e.g., the first five items formed the first parcel). Analyses of internal consistency for the scales as a whole and for the parcels showed that parceling didn't seem to introduce local dependence (Coffman & McCallum, 2005; Sass & Smith, 2006).¹ We fixed the

latent variances to 1. We modeled negative affect as a higher-order latent variable indicated by the latent anxiety, depression, and social anxiety variables. The path to social anxiety was fixed to 1. A confirmatory factor analysis (CFA) found evidence for good fit (CFI = .975, RMSEA = .064, SRMR = .032), based on standard fit cutoffs (e.g., Kline, 2005).

Divergent Thinking

Did anxiety and depression symptoms predict divergent thinking? We estimated effects for both fluency (the number of responses) and creativity (the rated quality of the top-two responses). People completed three tasks, so fluency was treated as a latent variable with three indicators. Table 1 shows the standardized effects, which represent effect sizes, and their 95% confidence intervals. The first fluency model estimated the effects of depression, anxiety, and social anxiety on fluency. These three variables explained only 2.1% of the variance in fluency, and the effect sizes were generally small. A second fluency model estimated the effect of the higher-order negative affect variable on fluency. Negative affect explained only 1.3% of the variance in fluency (see Table 1).

To analyze the creativity of the responses, we formed three latent variables, one for each divergent thinking task (i.e., brick, knife, and box). Each variable had four indicators, one for each rater's "top two" ratings. The path to the first rater was fixed at 1. These three latent variables served as indicators for a higher-order "creativity" variable, which had a variance fixed to 1. In short, we estimated the higher-order variable that explained why the three divergent thinking tasks covaried. A CFA of this measurement model showed good fit (CFI = .971, RMSEA = .049, SRMR = .045).

The faceted design—four raters crossed by three tasks—makes traditional reliability statistics (e.g., Cronbach's alpha) inappropriate (Drewes, 2000). Moreover, there is controversy over whether divergent thinking tasks are interchangeable—they seem to represent fixed rather than random effects (Almeida, Prieto, Ferrando, Oliveira, & Ferrándiz, 2008; Silvia et al., 2008, Study 1). For the present design, an analogous and appropriate reliability statistic is *maximal reliability* (Drewes, 2000), known as *H*, which represents "the degree to which the indicators can capture information about the underlying factor" (Gagné & Hancock, 2006, p. 68). Like Cronbach's alpha, *H* expresses reliability in a 0 to 1 range, with higher values indicating higher reliability. Unlike alpha, *H* does not require tau-equivalent (equally weighted) items—instead, it estimates the reliability of the most reliable weighted composite that could be estimated from the data. The *H* reliability estimates were good: they were larger than .80 for the brick ($H = .89$), knife ($H = .89$), and box ($H = .81$) tasks.

The first model estimated the effects of depression, anxiety, and social anxiety on creativity ratings. These three variables explained only 2.2% of the variance, and the effect sizes were small. A model that estimated the effect of the higher-order negative affect variable showed equally small effects. Negative affect explained only 1.5% of the variance in creativity (see Table 1).

Creative Self-Concept

Did mood disorder symptoms predict people's beliefs about whether they are creative? We analyzed the effects of the symptom variables on Kaufman and Baer's (2004) CSDD scale. We formed subscale scores for the three factors suggested by Kaufman and Baer—a math–science factor, an empathy–communication factor, and a hands-on creativity factor—by averaging the items associated with each factor. The global self-judgment item ("How creative would you say you are in general?") was analyzed separately.

We estimated a multivariate model: the symptom dimensions were predictors, and the four CSDD scores (three domains and one global item) were outcomes. Table 1 displays the effects. The depression, anxiety, and social anxiety variables explained small amounts of variance in global self-judgments of creativity (1.1%) and in the math–science (2.8%) and hands-on creativity domains (2.5%). In contrast, for the empathy–communication domain, 16.6% of the variance was explained. Social anxiety was the major predictor: people high in social anxiety rated themselves as less creative in this domain ($\sim\beta\sim\beta = -.364$).

The higher-order negative affect variable explained little variance in global self-judgments of creativity (0.1%) or in the domains of math–science (2.8%), hands-on activities (0.4%), and empathy–communication (9.8%), although the last domain had the highest percentage (see Table 1).

Everyday Creativity

Did mood disorder symptoms predict everyday creative behaviors? We explored how the symptom dimensions predicted the Creative Behavior Inventory (CBI). Because the CBI's response format is ordinal, we modeled the scale as a latent variable indicated by 28 ordered-categorical (ordinal) items. To simplify the model, we constrained the items' factor loadings to be equal and fixed the factor's variance to 1. (IRT fans will recognize this as a one-parameter graded-response model; Samejima, 1997.)

Depression, anxiety, and social anxiety explained 5.0% of the variance in everyday creative behaviors. The effect sizes were small (see Table 1), although the effect size for anxiety was in the small-to-medium range. Global negative affect explained 3.5% of the variance and had a small effect size.

Creative Achievements

So far, we have not seen strong relations between mood disorder dimensions and creative cognition, self-concepts, and behaviors. What about creative achievements? We explored whether the symptom dimensions predicted scores on the Creative Achievement Questionnaire (CAQ). Analyzing the CAQ is tricky because its scores are non-normal. Some researchers have created an overall score by averaging the 10 domain scores and applying a natural-log transformation (Hirsh & Peterson, 2008). Table 1 shows the effects of the symptom dimensions on the CAQ average. Depression, anxiety, and social anxiety explained only 1.5% of the variance in CAQ scores; global negative affect explained only 1.3%.

But a problem with a simple average is that the 10 domains do not hang together. Exploratory factor analyses find two or three factors (Carson et al., 2005), and latent class analyses find three major profiles of achievement (Silvia et al., in press). Because the present study is exploratory, we analyzed the 10 CAQ domains individually. The domain scores are highly skewed: zero is the modal score for most of the domains. The distributions thus resemble Poisson (count) distributions with too many zeros, known as overdispersed Poisson distributions. Such distributions violate conventional regression assumptions of normal residuals and homoscedasticity, so other models are needed. Negative binomial models can model count processes for overdispersed outcomes (Hilbe, 2007; Long, 1997), so they are useful models for analyzing the CAQ domain scores.²

Table 2 displays the relationships between the mood disorder variables and CAQ scores. (Note that the coefficients are unstandardized Poisson coefficients, which lack the intuitive interpretation of conventional raw and standardized regression weights.) Only two significant relationships were found between any of the mood disorder dimensions and any of the 10 domains of creative achievement. First, social anxiety predicted fewer achievements in Dance and marginally fewer in Theater and Film. These effects are consistent with research showing that people with high scores in the performing arts domains are more extraverted (Silvia et al., in press, Study 1). Second, global negative affect predicted fewer achievements in Architectural Design. We suspect, however, that this effect is spurious—93% of the scores were zeros, and only five people had scores greater than 1. Any relationship is thus carried by a tiny part of the sample. Consistent with our interpretation, an analysis that treated the scores as ordered categories found no significant effects.

Coherence of Predictors and Outcomes

The analyses of anxiety and depression dimensions and facets of creativity present a clear picture, albeit a blank one: neither the specific dimensions nor the higher-order dimension has much to do with any of the facets of creativity measured in the present research. The models explain little variance, and the effect sizes are very small, with only a few exceptions. When a multivariate study finds few effects, it is worth considering if the measurement went horribly awry. The null effects may represent measurement failures rather than genuine null effects. For example, a bias in sampling, a lack of variability, or a violation of a scale's valid use could lead to null effects.

We can triangulate on the null effects by examining the internal coherence of the set of predictors and the set of outcomes (cf. Silvia, Eichstaedt, & Phillips, 2005). First, the measures of negative mood symptoms covaried as they should. The latent social anxiety variable correlated highly with the latent depression ($r = .456$) and anxiety variables ($r = .452$), which in turn correlated highly with each other ($r = .745$). Both the effect sizes and their pattern are consistent with past work: anxiety and depression should (and do) covary more with each other than with other mood symptoms (Watson, 2000).

Second, the measures of creativity covaried as they should, based on past research. The latent CBI variable and the averaged CAQ scores—the two measures of creative achievement— correlated $r = .598$. The CSDD scale's global creativity item correlated with the CBI scale ($r = .515$) and with the CAQ ($r = .434$), so people's creative self-concepts covaried with rated behaviors and achievements. Finally, the latent divergent-thinking creativity scores correlated with CSDD self-ratings ($r = .147$) and with CBI ($r = .167$) and CAQ scores ($r = .214$). The relations between divergent thinking and creative achievement are consistent with a recent meta-analysis (Kim, 2008), which found an overall relationship of $r = .22$ between divergent thinking and accomplishments. This pattern is coherent: the two measures of creative behavior have the highest correlation, consistent with their shared trait and method, and the constructs that differ in trait and method (i.e., divergent thinking and self-rated achievement) have lower effects.

In sum, the predictor variables covary internally and the outcome variables covary internally. Thus, it is unlikely that something went awry with the assessment, sampling, or variance because major mistakes or flaws would not be limited to predictor–outcome covariance. Instead, it seems more likely that the consistently small effects are good estimates of the true effect sizes. Consequently, researchers studying similar samples should expect that anxiety and depression symptoms will have small (if any) effects on measures of creativity.

General Discussion

Do anxiety and depression predict creativity? The findings from the present study clearly favored the skeptical camp (Schlesinger, in press; Weisberg, 2006). The dimensions of anxiety and depression explained small amounts of variance in creativity, regardless of whether creativity was viewed as divergent thinking, creative self-concepts, everyday creative behaviors, or public creative achievements. Moreover, the few notable effects we found were not especially shocking: people high in social anxiety viewed themselves as less creative in the interpersonal domain and reported fewer achievements in areas requiring public performance.

We should note, however, that our research attempted to address this question by employing an uncommon approach. Specifically, we chose to examine anxiety and depression as continuous dimensions of symptoms rather than as clinical categories. We also measured multiple facets of creativity, and we modeled the variables with robust methods: latent variable models for all analyses, negative binomial models for the CAQ, ordinal CFA for the CBI, and multivariate SEM for the CSDD. Finally, we emphasized effect sizes and their confidence intervals, which offer more information than simple significance levels.

Looking Where the Light is Dimmest

Creativity research has not spent much time examining the anxiety and depression dimensions relative to the bipolar and schizotypal dimensions. Our findings show that this neglect is probably reasonable. Motivational models of creativity would suggest that we were looking where the light was dimmest. Creative behavior, viewed broadly, is appetitive and approach-oriented: creative people seek out people and activities that afford novel, unusual, and complex behaviors. People who find behavioral novelty and variability rewarding will have a motivational architecture that promotes approaching new, unusual things (Silvia, 2006). In contrast, depressive anhedonia essentially represents the absence of appetitive behavior, whereas anxiety and social anxiety would be expected to inhibit appetitive and novelty-seeking behavior (Kimbrel, 2008). Thus, from a motivational perspective, it is not surprising that anxiety and depression didn't predict higher levels of creative action. Indeed, from this perspective, one might actually expect to find a negative relationship between certain

forms of creative behavior and the constructs of anxiety and depression, and, in fact, our findings suggest this may be the case in a few instances (e.g., the negative relationship between social anxiety and dance). Generally speaking, though, the results were clear—the dimensions of anxiety and depression explained fairly small amounts of variance in creativity, regardless of how it was measured.

Although there is not much work on anxiety and depression in the creativity literature, there is a large body of work examining the relationship between the Big Five and creativity (Batey & Furnham, 2006). This literature, particularly the findings for neuroticism and creativity, is a clue that researchers should not expect to find strong effects for anxiety and depression. Neuroticism is a good proxy for Watson's (2000) notion of negative affect, a global variable representing distress and proneness to negative emotional states. According to Batey and Furnham's (2006) review, few studies have found links between neuroticism and creativity. Instead, the traits associated with appetitive motivation (extraversion) and behavioral variability (openness to experience) show large, consistent effects across creative domains.

Some Perspective

Research on creativity and mental illness has occasionally succumbed to grandiosity, in which too much is made of the findings of a single study. The framework suggested by Silvia and Kaufman (in press) provides some perspective on our findings. First, the question "Is creativity related to mental illness?" is too big to answer. There are many forms of creativity, and there are many types of mental illness. These facts make a simple "yes" or "no" answer to such a broad question untenable. Thus, we would not claim that anxiety and depression have nothing to do with creativity. Instead, we would claim that in samples of young adults, the effects of anxiety and depression symptoms on dimensional measures of creative thought and action range from small to non-significant.

Second, Silvia and Kaufman pointed out classes of methods that correspond to different questions. One method samples creative people and assesses mental illness; it asks "Do creative people tend to be mentally ill?" A second method samples mentally ill people and assesses creativity; it asks "Do mentally ill people tend to be creative?" And a third method assesses the covariance of creativity and mental illness in broad, unselected samples; it asks "Do creativity variables and mental health variables covary?" These methods correspond to different statistical models—Bayesian conditional probabilities for the first two, and covariance structure models for the third. Hence, each method affords different claims and conclusions. It's possible for the different methods to yield conflicting findings. For example, a study of clinical samples may find less creativity (Rubenstein, 2008), but a study of creative samples may find more mental illnesses (Andreasen, 1987).

In considering the boundaries of the present research, then, researchers should keep in mind the kinds of claims that the spectrum method can address. It seems unlikely, based on our findings, that the dimensions of depression, anxiety, and social anxiety have strong relationships with dimensions of creativity. We found small effects; moreover, the confidence intervals around these effects usually included zero (indicating a non-significant effect) and rarely included large effects (indicating that observing large effects is unlikely). In similar research with similar samples, we doubt that researchers will find appreciably different effects. We would, however, anticipate different findings with clinical samples or with creative samples. We would not expect these differences simply because "different things are different," but because spectrum models answer a different kind of question.

References

- Almeida, L. S., Prieto, L. P., Ferrando, M., Oliveira, E., & Ferrándiz, C. (2008). Torrance Test of Creative Thinking: The question of its construct validity. *Thinking Skills and Creativity*, 3, 53–58.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision). Washington, DC: Author.
- Andreasen, N. C. (1987). Creativity and mental illness: Prevalence rates in writers and their first-degree relatives. *American Journal of Psychiatry*, 144, 1288–1292.

- Antony, M. M., Beiling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales (DASS) in clinical groups and a community sample. *Psychological Assessment, 10*, 176–181.
- Batey, M., & Furnham, A. (2006). Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs, 132*, 355–429.
- Batey, M., & Furnham, A. (2008). The relationship between measures of creativity and schizotypy. *Personality and Individual Differences, 45*, 816–821.
- Batey, M., Chamorro-Premuzic, T., & Furnham, A. (2009). Intelligence and personality as predictors of divergent thinking: The role of general, fluid and crystallised intelligence. *Thinking Skills and Creativity, 4*, 60–69.
- Beghetto, R. A., & Kaufman, J. C. (2007). Toward a broader conception of creativity: A case for “mini-c” creativity. *Psychology of Aesthetics, Creativity, and the Arts, 1*, 73–79.
- Beuke, C. J., Fischer, R., & McDowall, J. (2003). Anxiety and depression: Why and how to measure their separate effects. *Clinical Psychology Review, 23*, 831–848.
- Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy, 35*, 79–89.
- Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, validity, and factor structure of the Creative Achievement Questionnaire. *Creativity Research Journal, 17*, 37–50.
- Cheek, J. M., & Stahl, S. S. (1986). Shyness and verbal creativity. *Journal of Research in Personality, 20*, 51–61.
- Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*, 316–336.
- Coffman, D. L., & McCallum, R. C. (2005). Using parcels to convert path analysis models into latent variable models. *Multivariate Behavioral Research, 40*, 235–259.
- De Boeck, P., Wilson, M., & Acton, G. S. (2005). A conceptual and psychometric framework for distinguishing categories and dimensions. *Psychological Review, 112*, 129–158.
- Dollinger, S. J. (2007). Creativity and conservatism. *Personality and Individual Differences, 43*, 1025–1035.
- Dollinger, S. J., Burke, P. A., & Gump, N. W. (2007). Creativity and values. *Creativity Research Journal, 19*, 91–103.
- Drewes, D. W. (2000). Beyond the Spearman-Brown: A structural approach to maximal reliability. *Psychological Methods, 5*, 214–227.
- Epstein, S. (1973). The self-concept revisited: Or a theory of a theory. *American Psychologist, 28*, 404–416.
- Furnham, A., & Bachtiar, V. (2008). Personality and intelligence as predictors of creativity. *Personality and Individual Differences, 45*, 613–617.
- Gagné, P., & Hancock, G. R. (2006). Measurement model quality, sample size, and solution propriety in confirmatory factor models. *Multivariate Behavioral Research, 41*, 65–83.
- Heimberg, R. G., Mueller, G. P., Holt, C. S., Hope, D. A., & Liebowitz, M. R. (1992). Assessment of anxiety in social interaction and being observed by others: The Social Interaction Anxiety Scale and the Social Phobia Scale. *Behavior Therapy, 23*, 53–73.
- Herbert, J. D., Rheingold, A. A., & Brandsma, L. L. (2001). Assessment of social anxiety and social phobia. In S. G. Hofmann & P. Marten (Eds.), *From social anxiety to social phobia* (pp. 20–45). Boston: Allyn & Bacon.
- Hilbe, J. M. (2007). *Negative binomial regression*. New York: Cambridge University Press.
- Hirsh, J. B., & Peterson, J. B. (2008). Predicting creativity and academic success with a “fake-proof” measure of the Big Five. *Journal of Research in Personality, 42*, 1323–1333.
- Jamison, K. R. (1989). Mood disorders and patterns of creativity in British writers and artists. *Psychiatry, 52*, 125–134.

- Kashdan, T. B., & Roberts, J. E. (2004). Trait and state curiosity in the genesis of intimacy: Differentiation from related constructs. *Journal of Social and Clinical Psychology, 23*, 792–816.
- Kaufman, J. C. (2009). *Creativity 101*. New York: Springer.
- Kaufman, J. C., & Baer, J. (2004). Sure, I'm creative—but not in mathematics! Self-reported creativity in diverse domains. *Empirical Studies of the Arts, 22*, 143–155.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology, 13*, 1–12.
- Kemple, K. M., David, G. M., & Wang, Y. (1996). Preschoolers' creativity, shyness, and self-esteem. *Creativity Research Journal, 9*, 317–326.
- Kessler, R. C., McGonagle, K., Zhao, S., Nelson, C., Hughes, M., Eschlemann, S., Wittchen, H.-U., & Kendler, K. S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: Results from the National Comorbidity Study. *Archives of General Psychiatry, 51*, 8–19.
- Kim, K. H. (2008). Meta-analyses of the relationship of creative achievement to both IQ and divergent thinking test scores. *Journal of Creative Behavior, 42*, 106–130.
- Kimbrel, N. A. (2008). A model of the development and maintenance of generalized social phobia. *Clinical Psychology Review, 28*, 592–612.
- Kinney, D. K., & Richards, R. L. (2007). Artistic creativity and affective disorders: Are they connected? In C. Martindale, P. Locher, & V. M. Petrov (Eds.), *Evolutionary and neurocognitive approaches to aesthetics, creativity, and the arts* (pp. 225–237). Amityville, NY: Baywood.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford.
- Kwapil, T. R., Barrantes-Vidal, N., & Silvia, P. J. (2008). The dimensional structure of the Wisconsin schizotypy scales: Factor identification and construct validity. *Schizophrenia Bulletin, 34*, 444–457.
- Long, J. S. (1997). *Regression models for categorical and limited dependent variables*. Thousand Oaks, CA: Sage.
- Lovibond, P. F. (1998). Long-term stability of depression, anxiety, and stress syndromes. *Journal of Abnormal Psychology, 107*, 520–526.
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*, 335–343.
- Mar, R. A., DeYoung, C. G., Higgins, D. M., & Peterson, J. B. (2006). Self-liking and self-competence separate self-evaluation from self-deception: Associations with personality, ability, and achievement. *Journal of Personality, 74*, 1047–1078.
- Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy, 36*, 455–470.
- McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality* (2nd ed., pp. 139–153). New York: Guilford.
- McNeil, D. W. (2001). Terminology and evolution of constructs in social anxiety and social phobia. In S. G. Hofmann & P. Marten (Eds.), *From social anxiety to social phobia* (pp. 8–19). Boston: Allyn & Bacon.
- Michael, W. B., & Wright, C. R. (1989). Psychometric issues in the assessment of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 33–52). New York: Plenum.
- Osman, A., Gutierrez, P. M., Barrios, F. X., Kopper, B. A., & Chiros, C. E. (1998). The Social Phobia and Social Interaction Anxiety Scales: Evaluation of psychometric properties. *Journal of Psychopathology and Behavioral Assessment, 20*, 249–264.
- Richards, R. (2007). Everyday creativity: Our hidden potential. In R. Richards (Ed.), *Everyday creativity and new views of human nature: Psychological, social, and spiritual perspectives* (pp. 25–53). Washington, DC: American Psychological Association.
- Rubenstein, G. (2008). Are schizophrenic patients necessarily creative? A comparative study between three groups of psychiatric inpatients. *Personality and Individual Differences, 45*, 806–810.
- Samejima, F. (1997). Graded response model. In W. J. van der Linden, & R. K. Hambleton

- (Eds.), *Handbook of modern item response theory* (pp. 85–100). New York: Springer. Santosa, C. M., Strong, C. M., Nowakowska, C., Wang, P. O., Rennicke, C. M., & Ketter, T. A.
- (2007). Enhanced creativity in bipolar disorder patients: A controlled study. *Journal of Affective Disorders, 100*, 31–39.
- Sass, D. A., & Smith, P. L. (2006). The effects of parceling unidimensional scales on structural parameter estimates in structural equation modeling. *Structural Equation Modeling, 13*, 566–586.
- Sawyer, R. K. (2006). *Explaining creativity: The science of human innovation*. New York: Oxford University Press.
- Schlesinger, J. (in press). Creative mythconceptions: A closer look at the evidence for the “mad genius” hypothesis. *Psychology of Aesthetics, Creativity, and the Arts*.
- Schuldberg, D. (2000–2001). Six subclinical spectrum traits in normal creativity. *Creativity Research Journal, 13*, 5–16.
- Silvia, P. J. (2006). *Exploring the psychology of interest*. New York: Oxford University Press.
- Silvia, P. J. (2008a). Another look at creativity and intelligence: Exploring higher-order models and probable confounds. *Personality and Individual Differences, 44*, 1012–1021. Silvia, P. J.
- (2008b). Discernment and creativity: How well can people identify their most creative ideas? *Psychology of Aesthetics, Creativity, and the Arts, 2*, 139–146.
- Silvia, P. J., Allan, W. D., Beauchamp, D. L., Maschauer, E. L., & Workman, J. O. (2006). Biased recognition of happy facial expressions in social anxiety. *Journal of Social and Clinical Psychology, 25*, 585–602.
- Silvia, P. J., Eichstaedt, J., & Phillips, A. G. (2005). Are rumination and reflection types of self-focused attention? *Personality and Individual Differences, 38*, 871–881.
- Silvia, P. J., & Kaufman, J. C. (in press). Creativity and mental illness. *Cambridge Handbook of Creativity*.
- Silvia, P. J., Kaufman, J. C., & Pretz, J. E. (in press). Is creativity domain-specific? Latent class models of creative accomplishments and creative self-descriptions. *Psychology of Aesthetics, Creativity, and the Arts*.
- Silvia, P. J., Martin, C., & Nusbaum, E. C. (2009). *A snapshot of creativity: Evaluating a quick and simple method for assessing divergent thinking*. Unpublished manuscript.
- Silvia, P. J., Nusbaum, E. C., Berg, C., Martin, C., & O’Conner, A. (in press). Openness to experience, plasticity, and creativity: Exploring lower-order, higher-order, and interactive effects. *Journal of Research in Personality*.
- Silvia, P. J., & Warburton, J. B. (2006). Positive and negative affect: Bridging states and traits. In J. C. Thomas & D. L. Segal (Eds.) *Comprehensive handbook of personality and psychopathology, Vol. 1: Personality and everyday functioning* (pp. 268–284). New York: Wiley.
- Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., Martinez, J. L., & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: Exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts, 2*, 68–85.
- Skronidal, A., & Rabe-Hesketh, S. (2004). *Generalized latent variable modeling: Multilevel, longitudinal, and structural equation models*. Boca Raton, FL: Chapman & Hall/CRC.
- Verhaeghen, P., Joorman, J., & Khan, R. (2005). Why we sing the blues: The relation between self-reflective rumination, mood, and creativity. *Emotion, 5*, 226–232.
- Watson, D. (2000). *Mood and temperament*. New York: Guilford.
- Watson, D., Weber, K., Assenheimer, J. A., Clark, L. A., Strauss, M. E., & McCormick, R. A. (1995). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology, 104*, 3–14.
- Weisberg, R. W. (2006). *Creativity: Understanding innovation in problem solving, science, invention, and the arts*. Hoboken, NJ: Wiley.

Author Note

Paul J. Silvia & Nathan A. Kimbrel, Department of Psychology, University of North Carolina at Greensboro.

We thank Stephen Dollinger for providing his version of the Creative Behavior Inventory and Chris Berg, Chris Martin, Emily Nusbaum, and Alejandra O’Conner for scoring the divergent thinking tasks. Some of the dependent variables were analyzed in a separate and non- overlapping study (Silvia, Nusbaum, Berg, Martin, & O’Conner, in press).

Please address correspondence to Paul J. Silvia, Department of Psychology, P. O. Box 26170, University of North Carolina at Greensboro, Greensboro, NC, 27402-6170. [E-mail: p_silvia@uncg.edu](mailto:p_silvia@uncg.edu).

Footnotes

1. Studies of mood disorders commonly find positively skewed distributions of scores: people tend to have low values on measures of negative affective symptoms. Our sample showed this skew, which can pose a problem for model convergence and parameter estimation. We explored many modeling options, such as specifying the individual items as indicators, treating the items as ordinal and estimating the latent variables via 1PL Rasch models, bootstrapping the standard errors, and using weighted least squares (e.g., mean and variance adjusted WLS) instead of maximum likelihood. These methods didn’t appreciably change the structure, interpretation, or covariance of the latent variables, although several of them caused convergence problems of their own.

2. For all models, we examined measures of outliers and influence. One outlier was excluded for the analysis of the CAQ Architectural Design subscale; two outliers were excluded for the Creative Writing subscale. Normal Poisson regression was used for the Humor subscale because a negative binomial model would not converge.

Table 1

Relationships Between Creative Outcomes and Mood Disorder Symptoms

	Depression		Anxiety		Social Anxiety		Negative Affect	
	β	CI	β	CI	β	CI	β	CI
DT Fluency	-.083	-.415 to .248	.174	-.133 to .481	.041	-.175 to .258	.116	-.059 to .291
DT Quality	.115	-.230 to .460	-.062	-.400 to .275	.102	-.182 to .387	.124	-.074 to .322
CSDD Global Creativity	-.032	-.270 to .206	.079	-.171 to .330	-.109	-.305 to .088	-.026	-.165 to .113
CSDD Hands-On	-.136	-.419 to .147	.158	-.121 to .437	-.128	-.299 to .042	-.066	-.231 to .098
CSDD Empathic	-.132	-.372 to .108	.059	-.159 to .277	-.364	-.509 to -.218	-.313	-.457 to -.170
CSDD Math–Science	-.010	-.284 to .264	-.102	-.350 to .146	-.087	-.265 to .090	-.167	-.318 to -.016
CBI Scale	.064	-.224 to .351	.203	-.104 to .510	-.126	-.312 to .059	.187	.020 to .353
CAQ Scale Average	.083	-.137 to .303	.055	-.180 to .289	-.049	-.208 to .111	.174	-.049 to .398

Note. $n = 189$. The coefficients are standardized regression weights, which represent effect sizes. The confidence intervals display the symmetric 95% limits (i.e., upper and lower 2.5%).

Table 2

Relationships Between the Creative Achievement Questionnaire Domains and Mood Disorder Symptoms

	Depression		Anxiety		Social Anxiety		Negative Affect	
	<i>b</i>	CI	<i>b</i>	CI	<i>b</i>	CI	<i>b</i>	CI
Visual Arts	-.161	-.458 to .135	.267	-.094 to .627	.001	-.303 to .305	.167	-.292 to .627
Music	.055	-.346 to .456	-.136	-.478 to .207	.131	-.135 to .398	.026	-.356 to .408
Dance	.059	-.651 to .770	.513	-.155 to 1.181	-.600	-1.081 to -.118	.270	-.331 to .871
Architectural Design	-.623	-1.755 to .508	-.472	-1.459 to .514	.025	-.664 to .715	-1.59	-2.888 to -.293
Creative Writing	.370	-.071 to .811	-.330	-.759 to .100	.077	-.173 to .327	.197	-.195 to .590
Humor	.045	-.149 to .239	.00	-.205 to .205	-.127	-.280 to .025	-.057	-.269 to .155
Inventions	-.122	-.860 to .616	.236	-.538 to 1.010	-.163	-.635 to .309	.007	-.705 to .719
Scientific Discovery	.133	-.395 to .662	-.288	-.822 to .246	-.001	-.389 to .387	-.244	-.759 to .270
Theater and Film	.400	-.155 to .955	.064	-.444 to .572	-.309	-.705 to .087	.433	-.160 to 1.027
Culinary Arts	-.077	-.442 to .289	.141	-.210 to .493	-.018	-.195 to .160	.086	-.151 to .323

Note. $n = 189$ for most analyses. The coefficients are Poisson regression weights. The confidence intervals display the symmetric 95% limits (i.e., upper and lower 2.5%).