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When, How, and for Whom Does Creativity Predict Well-Being?

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When, How, and for Whom Does Creativity Predict Well-Being?

Abstract

Past research suggests that creative thinking and behavior, defined as the generation of ideas or products that are both original and valuable, may enhance well-being. The present studies aimed to further investigate when, how, and for whom creativity predicts well-being. First, this research assessed whether creativity predicted well-being in a number of contexts and domains, as past scholarship in this area has mainly focused on the arts. Second, this research examined a number of mechanisms that may account for the benefits of creativity. Third, this research investigated whether individual differences in personality and motivation predict the extent to which individuals engage in creative behavior, and the extent to which creative behavior is associated with positive outcomes. Chapter 1 showed that experiences of adversity predicted perceptions of increased creativity in a sample of adults. This relationship was mediated by reports of posttraumatic growth. In addition, the personality trait of openness to experience moderated the extent to which experiences of adversity predicted perceptions of increased creativity. Chapter 2 showed that retrospective reports of extracurricular involvement during high school predicted higher levels of psychological adjustment at the beginning of college in a sample of emerging adults. This relationship was mediated by feelings of mastery and creative self-efficacy associated with extracurricular activities. In addition, feelings of creative self-efficacy predicted higher levels of creative achievement. Chapter 3, Study 1, provided an in-depth qualitative analysis of the motivations and processes driving the work of a sample of professional artists and scientists. Chapter 3, Study 2, found that these could be reduced to three main types of motivations (prosocial, intellectual, and emotional) and one process (the degree to which creators think about others during their work - i.e., their sense of audience). In a sample of aspiring artists and scientists, prosocial and intellectual motivations predicted higher levels of well-being, and this relationship was explained by a greater sense of audience and self-efficacy. Overall, results of the present studies suggested that creative behavior may enhance well-being through both general and creativity-specific mechanisms, and important individual differences may determine the extent to which creative behavior is beneficial.

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WHEN, HOW, AND FOR WHOM DOES CREATIVITY PREDICT WELL-BEING?

Marie Julie Cécile Forgeard

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WHEN, HOW, AND FOR WHOM DOES CREATIVITY PREDICT WELL-BEING?

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Marie Julie Cécile Forgeard

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ABSTRACT**WHEN, HOW, AND FOR WHOM DOES CREATIVITY PREDICT WELL-BEING?**

Marie Julie Cécile Forgeard

Martin E. P. Seligman

Past research suggests that creative thinking and behavior, defined as the generation of ideas or products that are both original and valuable, may enhance well-being. The present studies aimed to further investigate when, how, and for whom creativity predicts well-being. First, this research assessed whether creativity predicted well-being in a number of contexts and domains, as past scholarship in this area has mainly focused on the arts. Second, this research examined a number of mechanisms that may account for the benefits of creativity. Third, this research investigated whether individual differences in personality and motivation predict the extent to which individuals engage in creative behavior, and the extent to which creative behavior is associated with positive outcomes. Chapter 1 showed that experiences of adversity predicted perceptions of increased creativity in a sample of adults. This relationship was mediated by reports of posttraumatic growth. In addition, the personality trait of openness to experience moderated the extent to which experiences of adversity predicted perceptions of increased creativity. Chapter 2 showed that retrospective reports of extracurricular involvement during high school predicted higher levels of psychological adjustment at the beginning of college in a sample of emerging adults. This relationship

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GENERAL INTRODUCTION

One of the most striking differences between humans and other species is the extent to which they deliberately come up with new ideas, behaviors, or things – in other words, their creativity. Accordingly, creativity is often viewed as one of the main forces driving the advancement of human culture (Gabora, 1997; Mithen, 1998), and “manifest[s] itself in new types of behavior, going beyond mere re-applications of established scripts or action-patterns” (Carruthers, 2002, p. 226). Creativity therefore contributes to an optimally functioning society by, for example, inspiring great works of arts, as well as by driving technological and political progress. In addition to its positive societal and historical impact at the macro level, creativity also benefits individuals at the micro level (Simonton, 2002) by enhancing individuals’ well-being and psychological adjustment. After providing a definition of creativity, I review evidence supporting the claim that creative behavior may enhance well-being, as well as evidence bearing on the specific mechanisms that could explain these effects. Finally, I highlight a number of gaps in this literature in order to introduce the research questions addressed by the studies included in this dissertation.

Defining Creativity

Creativity refers to *the generation of ideas or products that are both novel (i.e., original, unusual) and useful (i.e., valuable, helpful)* (Stein, 1953; Sternberg & Lubart, 1999). Creative thinking can be judged subjectively (i.e., novel and useful to the self) and/or in comparison to others (i.e., novel and useful to all) (Kaufman & Beghetto, 2009). It is also not reserved to prototypical creative domains (e.g., the arts and the

sciences), but is present to varying degrees in almost all areas of life – excelling at work, solving thorny interpersonal problems, managing painful emotions, or cooking dinner are all tasks that benefit from effective creative thinking. Related to this, creative thinking takes place not only in “creative therapies” (e.g., art therapy), but to some degree also in all forms of psychotherapy.

Creativity is generally conceptualized as an ability or character strength—a somewhat stable positive trait manifested to varying degrees and frequencies by different individuals (Cropley, 1997; Nicholls, 1972). Accordingly, creativity has become a topic of interest for the field of positive psychology, which is concerned with the study of human flourishing and attempts to delineate what individual, situational, and institutional factors allow individuals to thrive (Seligman & Csikszentmihalyi, 2000).

The Relationship between Creativity and Well-Being

Creativity and well-being. Researchers have highlighted the numerous benefits that creativity may have for well-being (Cropley, 1990, 1997; Richards, 2010).

Csikszentmihalyi commented that although

Personal creativity may not lead to fame and fortune, it can do something that from the individual’s point of view is even more important: make day-to-day experiences more vivid, more enjoyable, and more rewarding. When we live creatively, boredom is banished and every moment holds the possibility of a fresh discovery. (1996, p. 344).

The empirical literature on “everyday creativity” has begun to document benefits of engaging in day-to-day creative activities (Richards, 2007). In a recent experience-

sampling study, Silvia et al. (2014) asked a sample of young adults to report on their feelings and their activities at random times during a period of seven days. Results showed that within participants, participants were more likely to be engaged in creative activities than other activities when they reported feeling happy and active. Between participants, personality (but not affect) predicted whether participants were engaging in creative activities. These correlational findings support the claim that creative behavior may both reflect and/or enhance well-being (Richards, 2007).

As such, creative activities may constitute “positive interventions” defined as “treatment methods or intentional activities that aim to cultivate positive feelings, behaviors, or cognitions” (Sin & Lyubomirsky, 2009, p. 468). Positive interventions therefore aim to build character strengths (such as creativity) and promote well-being, as opposed to simply fixing what is deficient or maladaptive (Duckworth, Steen, & Seligman, 2005; Forgeard, Jayawickreme, Kern, & Seligman, 2011; Jayawickreme, Forgeard, & Seligman, in press; Seligman, 2011).

Creativity and psychopathology. Given the potential benefits of creativity for well-being, it is perhaps surprising that many studies have documented associations between creativity and psychopathology, and in particular, mood disorders including bipolar disorder and unipolar depression (Andreasen, 1987; Jamison, 1993; Johnson et. al., 2012; Kaufman, 2009; Ludwig, 1995). Much (if not most) of past research dedicated to explaining these findings has explored the following hypothesis: that features of some disorders may be beneficial for creative cognition (especially in the arts) – for example, the racing thoughts, energy, and openness characteristic of hypomania in bipolar disorder

(Johnson et al., 2012), or the rumination observed in depression (Verhaeghen, Joormann, & Khan, 2005). Some researchers have also suggested that creative work may under some circumstances exacerbate psychopathology. For example, the short form and high levels of emotions generally seen in poetry may not allow poets to process their experiences in as much depth as prose permits. As a result, writing emotionally-focused poetry may increase rather than decrease distress (Kaufman & Baer, 2002).

Conversely, and leaving aside third variable explanations which also deserve further research, psychopathology may motivate individuals to engage in creative activities as a way to alleviate their suffering and enhance their well-being, the hypothesis explored in this dissertation. By engaging in creative work, individuals may find opportunities to heal and grow from the challenges that have befallen them. The writer Virginia Woolf for example commented:

Odd how the creative power at once brings the whole universe to order. I can see the day whole, proportioned – even after a long flutter of the brain such as I’ve had this morning[;] it must be a physical, moral, mental necessity, like setting the engine off. (Woolf, 1934/2003, p. 213).

Woolf, known to suffer from bipolar disorder (Caramagno, 1992), expressed her belief that writing was essential to her well-being. Other eminent artists echoed a similar feeling with regards to either physical or psychological health. For example, the painter Paul Klee, who suffered from a severe autoimmune disorder, explained during the last stages of his disease: “I create - in order not to cry” (Sandblom, 1997, p. 187). The novelist and screenwriter Graham Greene, who also suffered from bipolar disorder, called

writing “a form of therapy” (p. 37). Finally, the French writer Antonin Artaud, who suffered from clinical depression, chronic pain, and addiction to opiates throughout his life (Rowlands, 2004) commented that “No one has ever written, painted, sculpted, modeled, built, or invented except literally to get out of hell” (Jamison, 1993, p. 121).

Empirical Evidence on the Benefits of Creative Activities

Given these anecdotal reports and psychological theories supporting the value of creativity for well-being, what empirical evidence supports these claims? To date, the main body of literature that has sought to verify the benefits of creativity for well-being is the art therapy literature. In 1812, Benjamin Rush described patients who had discovered hidden artistic talents upon developing a psychiatric illness (Beveridge, 2001). The promotion of creative activities as part of clinical, therapeutic practice, however, came into being relatively recently in the mid-20th century (Vick, 2003). Although originally born out of the psychoanalytic tradition, the field of art therapy now encompasses a range of theoretical approaches, and most art therapists primarily define their practice as “eclectic” rather than aligning themselves with any specific therapeutic discipline or technique (Vick, 2003). Art therapy encompasses interventions that use visual arts, dance, theater, or music, among other media. According to the American Art Therapy Association (AATA), the practice of art therapy “is based on the belief that the creative process involved in artistic self-expression helps people to resolve conflicts and problems, develop interpersonal skills, manage behavior, reduce stress, increase self-esteem and self-awareness, and achieve insight” (AATA, 2011, para. 7). In practice, clients often engage in both art therapy (used as an adjunctive) and traditional (“talk”)

therapy simultaneously, though reflection and discussion are often significant components of art therapy as well (Malchiodi, 2003).

Art therapy frequently takes place in a group setting, and can therefore focus more specifically on building relationships between the client, therapist, and other members of the group (Crawford et al., 2012; Gussak, 2006). In addition, art therapy is thought to facilitate self-expression and growth (Fisher & Specht, 1999). By using and creating concrete images (or other creative media such as music or dance), individuals can explore difficult thoughts and emotions in a pleasurable, nonthreatening manner (Malchiodi, 2003). Art therapy has been used to treat a variety of conditions including (but not limited to) eating disorders (Frisch, Franko, & Herzog, 2006), learning disabilities (Safran, 2003), or addiction (Wilson, 2003). Art therapy may also be particularly beneficial for individuals whose age (e.g., children) or disorders (e.g., autism, schizophrenia) cause them to have difficulty communicating verbally and would therefore benefit from the nonverbal communication tools used in art therapy (Crawford & Patterson, 2007; Malchiodi, 2003; Richardson, Jones, Evans, Stevens, & Rowe, 2007).

More research is needed in order to establish art therapy as an effective, empirically supported, form of treatment (Holmkvist & Persson, 2012; Kaplan, 2000; Ruddy & Milnes, 2005). Few trials of art therapy, for example, follow established clinical guidelines (e.g., Chambless & Hollon, 1998). Instead, some art therapists have argued for the use of different standards of evidence for this discipline (e.g., Gilroy, 1996), which may unfortunately lead to skepticism from other researchers. Recent reviews of research on the efficacy of art therapy nevertheless found such interventions overall lead to small

but usually statistically significant improvements on a range of psychological measures (Maujean, Pepping, & Kendall, 2014; Slayton, D'Archer & Kaplan, 2010).

Mechanisms Underlying the Therapeutic Effects of Creative Work and Activities

Given these results, how do researchers explain the potential benefits of creative activities? Several mechanisms have been proposed and investigated to explain the therapeutic benefits of creative activities, including engagement and flow, catharsis, increases in positive affect, meaning-making, and psychological growth.

Engagement and Flow. Engagement in creative activities may promote psychological adjustment by promoting experiences of absorption with the task at hand. Csikszentmihalyi's (1990) concept of flow therefore provides one mechanism explaining how creativity may increase well-being. Csikszentmihalyi developed the construct of flow in the 1960s as a result of observing artists paint (Csikszentmihalyi, 2000). Flow is a psychological state defined by the presence of both high skills and high challenges, giving individuals a sense of control over the activity at hand. It is characterized by intense focus and concentration, a merging of action and awareness, the feeling that the passage of time may be distorted in some way, and intrinsic reward. Given that flow may facilitate learning, this experience may help explain how creative activities could benefit other facets of psychological well-being including a sense of personal competence, accomplishment, positive emotion, and meaning in life (Csikszentmihalyi, 1996).

Catharsis. The concept of catharsis, from the Greek for "cleansing" or "purging," was first used by Aristotle and refers to the emotional release one gets by expending pent-up negative energy, thoughts, and emotions, allowing the human soul to be purged

of its “excessive passions” (Lucas, 1928, p. 24). Creative activities may therefore give individuals a vehicle through which to express their painful emotions (De Petrillo & Winner, 2005; Sloan & Marx, 2004). As illustration, Virginia Woolf reported that writing the novel *To the Lighthouse* (Woolf, 1927) allowed her to express her feelings about, and recover from, losing her mother, who died when Woolf was 13:

I wrote the book very quickly; and when it was written, I ceased to be obsessed with my mother. I no longer hear her voice; I do not see her. I suppose that I did for myself what psycho-analysts do for their patients. I expressed some very long felt and deeply felt emotions. And in expressing it I explained it and then laid it to rest. (Woolf, 1985, p. 81)

As noted below however, little empirical research supports the notion that creative activities increase well-being by promoting catharsis (Dalebroux, Goldstein, & Winner, 2008).

Distraction and positive emotion. In contrast, creative activities may promote healing by simply distracting individuals using an enjoyable activity that promotes the exploration and expression of positive emotions. Drawing on Fredrickson’s (1998, 2001) “broaden-and-build” model, activities that increase positive emotions (such as creative activities, which are often reported to be intrinsically enjoyable) produce a broadening of attention that allows individuals to “pursue novel, creative, and often unscripted paths of thought and action” (1998, p. 304). Experiences of positive emotion and creativity may therefore reinforce each other in a virtuous “broaden-and-build” cycle, in which engaging in a pleasurable creative activity encourages individuals to think of new ways to

understand and deal with their psychological symptoms. The positive emotions induced by creative activities may also ameliorate the deleterious health effects of negative emotions and stress on the cardiovascular and immune systems (Fredrickson, 1998, 2001; Salovey, Rothman, Detweiler, & Steward, 2000), though more research is needed to test these claims. By distracting individuals from negative emotions and promoting novel ways of thinking, creative activities and positive emotions may work hand-in-hand to promote healing. During the painter's stay in a psychiatric hospital in the South of France, Van Gogh (1889) wrote in a letter to his brother Theo: "Work distracts me infinitely better than anything else, and if I could once really throw myself into it with all my energy that might possibly be the best remedy."

A few studies have compared the effects of creative activities that promote either catharsis or positive emotion. Dalebroux et al. (2008) found that an artistic activity that focused on the expression of positive feelings was more effective at repairing short-term negative mood (induced in healthy subjects by watching a sad movie clip) than an equivalent artistic activity that focused on the expression of negative feelings (catharsis). In support of this conclusion, other studies have shown that distracting individuals from their negative emotional states may alleviate symptoms of depression (Nolen-Hoeksema, 1991) and effectively repair short-term negative moods (Drake et al., 2011). In addition, the promotion of positive emotions may strengthen individuals' resilience for future stressful events (Keltner & Bonanno, 1997; Tugade & Fredrickson, 2007).

Meaning-making. In addition to promoting flow experiences, catharsis, and positive emotion, creative activities may also promote healing by engaging individuals in

a process of making meaning out of difficult experiences. The Irish writer Colm Toibin, for example, described the writer's need to build a coherent narrative to make sense of one's experience in the following terms:

It seems that the essential impulse in working at all is to rehaunt your own house, or to allow what haunts you to have a voice, to chart what is deeply private and etched on the soul, and find form and structure for it (Eugenides & Toibin, 2011, para. 7).

The hypothesis that creative activities help create meaning for painful experiences has primarily been investigated with regards to expressive writing, although meaning-making may certainly occur with other forms of creative expression. These studies have usually followed the expressive writing paradigm put forward by Pennebaker and colleagues. In a typical expressive writing study, participants are asked to write about an emotionally salient topic for 15-20 minute sessions over the course of several days or weeks. They are then compared to a control condition in which participants are asked to write about a non-emotional topic (Sexton & Pennebaker, 2009). Overall, engaging in expressive writing has been shown to improve outcomes in a wide range of domains such as physical health (including blood pressure, medication use, or recovery time from medical procedures), psychological health (including depression and rumination), occupational outcomes (including work attendance and shorter periods of unemployment), and cognitive outcomes (such as working memory) (for reviews see Frattaroli, 2006; Sexton & Pennebaker, 2009; Smyth, 1998). Although expressive writing does not resemble typical creative writing activities, as the main focus of the writing is on

real past events, participants are nonetheless asked to write about these events in a way that allows for the expression of original ideas. Thus, it is possible that writing done in this paradigm falls on a continuum of creativity, depending on the degree to which writers express novel and useful insights about their experiences.

The benefits of creative activities may result from the fact that these activities do not just entail recording or expressing ideas, but also interacting with them, leading one's thinking to evolve as a direct result of the creative activity. Writing may constitute an especially beneficial form of creativity, as it provides clear opportunities for self-disclosure, self-expression, and problem-resolution (Runco, 2009). In particular, the formation of a narrative may assist individuals in making meaning out of their experiences by shifting perspectives and restructuring their cognitions around difficult events (Sexton & Pennebaker, 2009). In keeping with this, the beneficial effects of writing have been related to the degree to which participants use cognitive words (e.g., "know," "understand") (Pennebaker & Seagal, 1999).

Limitations and Research Questions

Four important limitations limit the conclusions that can be drawn from existing research on the benefits of creativity for well-being, as well as on the mechanisms underlying these effects. I describe them below, and in parallel outline the research questions addressed by the studies included in this dissertation.

Life contexts and domains. Past research has for the most part focused on the benefits of artistic creativity for healthy adults experiencing temporary negative moods, or for individuals suffering from psychopathology. It is therefore unclear whether the

effects reported are attributable to creativity per se (rather than the arts), and would generalize to other contexts or domains. The present studies examined multiple life contexts during which creativity may be beneficial, including following experiences of adversity (Chapter 1), during adolescence and emerging adulthood (Chapter 2), as well as during the everyday life of aspiring and professional creators (Chapter 3). The present set of studies also investigated the relationship between various domains of creativity (including the arts, the sciences, and others) and well-being.

Mechanisms. Little research has investigated the specific mechanisms that may account for the beneficial effects of creative behavior, aside from the findings reviewed above. Yet, such research is needed in order to both understand how creative behavior exerts its benefits, and whether these mechanisms are general or creativity-specific. Indeed, to the best of my knowledge, little empirical evidence has demonstrated that creative thinking (defined as the generation of novel and useful ideas or products) is one of the specific active ingredients accounting for the benefits of creative activities. Research addressing this important question will help determine whether creative activities provide unique benefits for those who partake in them, and will help refine interventions to maximize their effectiveness. The present studies examine a number of potential general and creativity-specific mechanisms that may account for the benefits of creative activities, including feelings of general and/or creative self-efficacy (Chapters 2 and 3) as well as the time creators devote to creative work and their sense of the audience (Chapter 3).

Individual Differences. Little research has examined the role of individual

differences in explaining the benefits of creative behavior. Important individual differences likely affect whether people engage in creative behavior to begin with. In addition, the degree to which creative behavior predicts well-being may differ according to pre-existing differences in personality or motivation, among other possibilities. Indeed, *who* people are and *why* people engage in creative activities may have as much as an effect on outcomes as *how* they do so. The present studies examine the role of the personality trait of openness to experience (Chapter 1) and individual differences in motivation (Chapters 2 and 3).

Facets of Well-Being. Past research examining the benefits of creative activities has tended to focus on very limited sets of outcome variables generally related to short-term mood and/or symptoms of psychopathology. Yet, anecdotal evidence suggests that the benefits of creative activities may extend to other important facets of well-being, including aspects of eudaimonic well-being capturing not just how people feel, but also how they do (Forgeard et al., 2011; Ryan & Deci, 2001; Ryff, 1989; Seligman, 2011). The present studies examined relationships between creative behavior and posttraumatic growth (Chapter 1), depression, anxiety, well-being, as well as achievement (Chapters 2 and 3).

The Present Studies

In Chapter 1, I investigated the relationship between perceptions of creativity and posttraumatic growth following experiences of adversity. This study demonstrated that in a sample of 373 adults recruited online, perceptions of increased creativity were associated with reports of posttraumatic growth. In addition, this study showed that the

personality trait of openness to experience moderated the relationship between adversity and perceptions of increased creativity.

In Chapter 2, I investigated the relationship between involvement in extracurricular activities (ECAs) during high school and psychological adjustment at the beginning of college. This study demonstrated that in a sample of 520 freshman and sophomore college students, retrospective reports of high school involvement in ECAs predicted greater psychological adjustment (including both higher levels of well-being and lower levels of psychopathology). The relationships found were mediated by feelings of mastery and creative self-efficacy associated with high school ECAs. In turn, feelings of creative self-efficacy also predicted greater levels of creative achievement.

In Chapter 3, Study 1, I explored the motivations driving 56 creative professionals in two artistic and two scientific fields to engage in creative work. In Chapter 3, Study 2, I created and validated a self-report scale based on the results of Study 3 in order to measure conscious motivations underlying creative work. Following this, I investigated whether specific forms of motivation (including intellectual, emotional, and prosocial motivations) are associated with enhanced achievement and well-being outcomes, and tested possible mechanisms accounting for the relationships found.

References

- American Art Therapy Association. (2011). *History and background*. Retrieved from <http://www.arttherapy.org/aata-history-background.html>.
- Andreasen, N. (1987). Creativity and mental illness: Prevalence in writers and their first-degree relatives. *American Journal of Psychiatry*, *144*, 1288-1292.
- Beveridge, A. (2001). A disquieting feeling of strangeness? The art of the mentally ill. *Journal of the Royal Society of Medicine*, *94*, 595-599.
- Caramagno, T. C. (1992). *The flight of the mind: Virginia Woolf's art and manic-depressive illness*. Los Angeles: University of California Press.
- Carruthers, P. (2002). Human creativity: Its cognitive basis, its evolution, and its connections with childhood pretence. *British Journal for the Philosophy of Science*, *53*, 225-249.
- Chambless, D., & Hollon, S. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology*, *66*, 7-18.
- Crawford, M. J., Killaspy, H., Barnes, T. R., Barrett, B., Byford, S., Clayton, K., . . . Waller, D. (2012). Group art therapy as an adjunctive treatment for people with schizophrenia: A randomised controlled trial (MATISSE). *Health Technology Assessment*, *16*, 1-76.
- Crawford, M. J., & Patterson, S. (2007). Arts therapies for people with schizophrenia: An emerging evidence base. *Evidence-Based Mental Health*, *10*, 69-70.
- Cropley, A. J. (1969). Creativity, intelligence, and intellectual style. *Australian Journal of Education*, *13*, 3-7.

- Cropley, A. J. (1990). Creativity and mental health. *Creativity Research Journal*, 3, 167-178.
- Cropley, A. J. (1997) Creativity and mental health in everyday life. In M. A. Runco & R. Richards (Eds.), *Eminent creativity, everyday creativity, and health*. Greenwich, CT: Ablex Publishing Corporation.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins Publishers.
- Csikszentmihalyi, M. (2000). *Beyond boredom and anxiety: Experiencing flow in work and play*. San Francisco: Jossey-Bass.
- Dalebroux, A., Goldstein, T. R., & Winner, E. (2008). Short-term mood repair through art-making: Positive emotion is more effective than venting. *Motivation and Emotion*, 32, 288-295.
- DePetrillo, L., & Winner, E. (2005). Does art improve mood? A test of a key assumption underlying art therapy. *Art Therapy: Journal of the American Art Therapy Association*, 22, 205-212.
- Drake, J. E., Coleman, K., & Winner, E. (2011). Short-term mood repair through art: Effects of medium and strategy. *Art Therapy: Journal of the American Art Therapy Association*, 28, 26-30.
- Duckworth, A., Steen, T. A., & Seligman, M. E. P. (2005). Positive psychology in clinical practice. *Annual Review of Clinical Psychology*, 1, 629-651.

- Eugenides, J., & Toibin, C. (2011, October 1, 2011). The stuff that won't go away, *New York Times*.
- Fisher, B. J., & Specht, D. K. (1999). Successful aging and creativity in later life. *Journal of Aging Studies, 13*, 457-472.
- Forgeard, M. J. C., Jayawickreme, E., Kern, M. L., & Seligman, M. E. P. (2011). Doing the right thing: Measuring well-being for public policy. *International Journal of Wellbeing, 1*, 79-106.
- Fratraroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin, 132*, 823-865.
- Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology, 2*, 300-319.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*, 218-226.
- Frisch, M. J., Franko, D. L., & Herzog, D. B. (2006). Arts-based therapies in the treatment of eating disorders. *Eating Disorders, 14*, 131-142.
- Gabora, L. (1997). The origin and evolution of culture and creativity. *Journal of Memetics, Evolutionary Models of Information Transmission, 1*. Retrieved from <http://cogprints.org/794/1/oecc.html>.
- Gilroy, A. (1996). Our own kind of evidence. *Inscape: The Journal of the British Association of Art Therapists, 1*, 52-60.

- Gussak, D. (2006). Effects of art therapy with prison inmates: A follow-up study. *The Arts in Psychotherapy, 33*, 188-198.
- Holmkvist, G., & Persson, C. L. (2012). Is there evidence for the use of art therapy in treatment of psychosomatic disorders, eating disorders, and crisis? A comparative study of two different systems for evaluation. *Scandinavian Journal of Psychology, 53*, 47-53.
- Jamison, K. (1993). *Touched with fire*. New York: Free Press.
- Jayawickreme, E., Forgeard, M. J. C., & Seligman, M. E. P. (in press). The engine of well-being. *Review of General Psychology*.
- Johnson, S. L., Murray, G., Fredrickson, B., Youngstrom, E. A., Hinshaw, S., Malbrancq Bass, J., Deckersbach, T., Schooler, J., & Salloum, I. (2012). Creativity and bipolar disorder: Touched by fire or burning with questions? *Clinical Psychology Review, 32*, 1-12.
- Kaplan, F. F. (2000). *Art, science, and art therapy*. London: Jessica Kingsley Publishers.
- Kaufman, J. C. (2009). *Creativity 101*. New York: Springer.
- Kaufman, J. C., & Baer, J. (2002). Could Steven Spielberg manage the Yankees? Creative thinking in different domains. *Korean Journal of Thinking and Problem Solving, 12*, 5-14.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology, 13*, 1-12.

- Keltner, D., & Bonanno, G. A. (1997). A study of laughter and dissociation: Distinct correlates of laughter and smiling during bereavement. *Journal of Personality and Social Psychology, 73*, 687-702.
- Lucas, F. L. (1928). *Tragedy in relation to Aristotle's Poetics*. New York: Harcourt, Brace, and Company.
- Ludwig, A. (1995). *The price of greatness: Resolving the creativity and madness controversy*. New York: Guilford Press.
- Malchiodi, C. A. (Ed.). (2003). *Handbook of art therapy*. New York, NY: Guilford Press.
- Maujean, A., Pepping, C. A., & Kendall, E. (2014). A systematic review of randomized controlled studies of art therapy. *Art Therapy: Journal of the American Art Therapy Association, 31*, 37-44.
- Mithen, S. (1998). *Creativity in human evolution and history*. London, England: Routledge.
- Nicholls, J. G. (1972). Creativity in the person who will never produce anything original and useful: The concept of creativity as a normally distributed trait. *American Psychologist, 27*, 717-727.
- Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100*, 569-582.
- Pennebaker, J. W., & Seagal, J. D. (1999). Forming a story: The health benefits of narrative. *Journal of Clinical Psychology, 55*, 1243-1254.
- Richards, R. R. (2007). *Everyday creativity and new views of human nature*. Washington, DC: American Psychological Association.

- Richards, R. R. (2010). Everyday creativity: Process and way of life – Four key issues. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 180-215). New York: Cambridge University Press.
- Richardson, P., Jones, K., Evans, C., Stevens, P., & Rowe, A. (2007). Exploratory RCT of art therapy as an adjunctive treatment in schizophrenia. *Journal of Mental Health, 16*, 483-491.
- Rowlands, E. (2004). *Redefining resistance: The poetic wartime discourses of Francis Ponge, Benjamin Péret, Henri Michaux, and Antonin Artaud*. New York: Rodopi BV.
- Ruddy, R., & Milnes, D. (2005). Art therapy for schizophrenia or schizophrenia-like illnesses (Review). *Cochrane Database of Systematic Reviews, 4*, CD003728.
- Runco, M. A. (2009). Writing as an interaction with ideas. In S. B. Kaufman & J. C. Kaufman (Eds.), *The psychology of creative writing* (pp. 180-195). New York: Cambridge University Press.
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141-166.
- Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social psychology, 57*, 1069-1081.

- Safran, D. S. (2003). An art therapy approach to attention-deficit/hyperactivity disorder. In C. A. Malchiodi (Ed.), *Handbook of art therapy* (pp. 181-192). New York: Guilford Press.
- Salovey, P., Rothman, A. J., Detweiler, J. B., & Steward, W. T. (2000). Emotional states and physical health. *American Psychologist*, *55*, 110-121.
- Sandblom, P. (1997). *Creativity and disease: How illness affects literature, art and music*. New York: Marion Boyars.
- Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York: Free Press.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*, 5-14.
- Sexton, J. D., & Pennebaker, J. W. (2009). The healing powers of expressive writing. In S. B. Kaufman & J. C. Kaufman (Eds.), *The psychology of creative writing* (pp. 264-273). New York: Cambridge University Press.
- Silvia, P. J., Beaty, R. E., Nusbaum, E. C., Eddington, K. M., Levin-Aspenson, H., & Kwapil, T. R. (2014). Everyday creativity in daily life: An experience-sampling study of “little c” creativity. *Psychology of Aesthetics, Creativity, and the Arts*. Advance Online Publication.
- Simonton, D. K. (2002). Creativity. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 189-201). New York: Oxford University Press.

- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology: In Session, 65*, 467-487.
- Slayton, S. C., D'Archer, J., & Kaplan, F. (2010). Outcome studies on the efficacy of art therapy: A review of findings. *Art Therapy: Journal of the American Art Therapy Association, 27*, 108-119.
- Sloan, D. M., & Marx, B. P. (2004). Taking pen to hand: Evaluating theories underlying the written disclosure paradigm. *Clinical Psychology: Science and Practice, 11*, 121-137.
- Smyth, J. M. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting and Clinical Psychology, 66*, 174-184.
- Stein, M. I. (1953). Creativity and culture. *Journal of Psychology, 36*, 31-322.
- Sternberg, R., & Lubart, T. (1999). The concept of creativity: Prospects and paradigms. In R. Sternberg (Ed.), *Handbook of creativity* (pp. 3-15). New York: Cambridge University Press.
- Tugade, M. M., & Fredrickson, B. L. (2007). Regulation of positive emotions: Emotion regulation strategies that promote resilience. *Journal of Happiness Studies, 8*, 311-333.
- Van Gogh, V. (1889). *Letter to Theo*. Retrieved from <http://vangoghletters.org/vg/letters/let798/letter.html>.

- 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.
- Vick, R. M. (2003). A brief history of art therapy. In C. A. Malchiodi (Ed.), *Handbook of art therapy* (pp. 5-15). New York: Guilford Press.
- Wilson, M. (2003). Art therapy in addictions treatment: Creativity and shame reduction. In C. A. Malchiodi (Ed.), *Handbook of art therapy* (pp. 281-293). New York: Guilford Press.
- Woolf, V. (1927). *To the lighthouse*. London: Hogarth.
- Woolf, V. (1934/2003). Friday, July 27th 1934. In L. Woolf (Ed.), *A writer's diary* (p. 213). Orlando, FL: Harcourt.
- Woolf, V. (1985). In Schulkind, J. (Ed.), *Moments of being: A collection of autobiographical writing*. Orlando, FL: Harcourt.

CHAPTER 1:

Perceiving Benefits after Adversity:

The Relationship between Self-Reported Posttraumatic Growth and Creativity

Abstract

Anecdotal and scientific evidence has documented the existence of a relationship between the experience of adversity and creativity. Accounts of the challenges endured by creative individuals suggest that they may have been able to channel their negative experiences into sources of inspiration and motivation for their work. Increased creativity may therefore constitute a manifestation of *posttraumatic growth*, defined as retrospective perceptions of positive psychological change that take place following the experience of highly challenging life circumstances. To investigate this hypothesis, the present study tested whether scores on a measure of posttraumatic growth and depreciation related to scores on self-reported measures of creativity in the aftermath of adversity. Results of a path analysis showed that adversity-induced distress predicted self-reported creative growth and breadth of creativity in a sample of online participants. Cognitive processing (intrusive/deliberative rumination) as well as domains of posttraumatic growth/depreciation - in particular, self-reported changes in interpersonal relationships and in the perception of new possibilities for one's life - mediated the link between self-reported distress and creativity outcomes. In addition, the personality trait of openness to experience moderated the extent to which adversity predicted self-reported creativity. This study is the first focused investigation showing that self-reported posttraumatic growth may be manifested through perceptions of increased creativity.

Keywords: creativity, posttraumatic growth, adversity, openness to experience

Perceiving Benefits after Adversity:

The Relationship between Self-Reported Posttraumatic Growth and Creativity

Posttraumatic growth (PTG) has been defined as the retrospective perceptions of positive psychological change that take place following the experience of highly challenging life circumstances (Tedeschi & Calhoun, 2004). Research on positive changes in the aftermath of adversity has highlighted the tendency for people to report growth in five domains: interpersonal relationships, the perception of new possibilities for one's life, personal strength, spirituality, and appreciation for life (Tedeschi & Calhoun, 1996, 2004). In addition, the unique life experiences often reported by highly creative individuals suggest that adversity may have played a critical role in fostering their creativity, and that increased creativity could therefore constitute a manifestation of PTG.

Anecdotal reports suggest that the experience of adversity is a recurrent theme in the lives of eminent creative individuals, and examples of great creative achievements following traumatic or very difficult experiences come to mind easily. To give one example, Mexican painter Frida Kahlo survived polio, a severe traffic accident, and three miscarriages, experiences which may have exerted an important influence on her art (Herrera, 1983). These reports suggest an intimate connection between the experience of adversity and creative thinking, and point to the possibility, *inter alia*, that these individuals may have been able to channel their negative experiences into sources of inspiration and motivation for their work (which may, in turn, have contributed to the healing process).

In keeping with this, scientists interested in the determinants of creative thinking and achievement have begun to study the adversity-creativity link empirically (Simonton, 1994), although much remains to be learned about the specific mechanisms explaining this association. In parallel to this growing area of research, clinical psychologists have over the past few decades developed a large body of literature documenting and examining ways in which adverse experiences may promote psychological growth. One label for this phenomenon is *posttraumatic growth* (Tedeschi & Calhoun, 2004), the term used in the present paper. This construct has also been termed *stress-related growth* (Park, Cohen, & Murch, 1996), *benefit finding* (Tennen & Affleck, 2002), or *growth through adversity* (Joseph & Linley, 2005). The present study aimed to bridge these two areas of research by investigating whether perceptions of increased creativity constitute a way in which PTG may be expressed. As the first focused empirical investigation of the relationship between self-reported PTG and creativity, the present study can help shed light on whether and how creative processes emerge and can be used adaptively in the aftermath of adversity.

The Link between Adversity and Creativity

Beyond anecdotal reports, empirical studies have provided preliminary support for the existence of a link between adversity (in the form of adverse life events, psychological disorders and physical illness) and subsequent creativity. These studies have for the most part focused on the lives of eminent creators, and little is therefore known about the relationship between adversity and everyday creativity.

Life events. Simonton (1994), for example, reviewed the body of scientific literature pointing to the existence of an “orphanhood effect.” Studies demonstrating this effect have shown that accomplished individuals tend to have experienced early parental loss at higher rates than the normal population and at equal rates with individuals receiving psychiatric treatment for depressive and/or suicidal symptoms. For example, the lives of celebrated writers Charlotte, Emily, and Anne Brontë were marked by the loss of their mother and older sisters in early childhood (Barker, 1995). The orphanhood effect appears to be particularly strong in writers, for which rates as high as 55% have been found (Simonton, 1994). Csikszentmihalyi (1996) also noted the recurrent theme of the missing father in his interviews of creative individuals. Csikszentmihalyi hypothesized that while early parental loss can lead to negative outcomes, it can also lead a child to take on adult responsibilities early and grow beyond what would normally be expected. In addition, Aldwin and Sutton (1998) proposed that individuals exposed to adversity early in life may have suffered from social isolation, and as a result developed the ability to “step outside of social conventions” (p. 53) and to see the world differently. In keeping with this, Kim, Vincent, and Goncalo (2012) showed that the experience of social rejection fostered creative thinking in individuals holding an independent (as opposed to interdependent) self-concept by heightening the feeling of being different from others.

Psychological disorders. In addition to life events, adversity may also come in the form of psychological disorders, as these constitute very difficult circumstances to which individuals need to adapt. In addition, if an individual experiences the onset of a

psychological disorder as sudden and acute, the disorder may be perceived as a highly traumatic event that profoundly and radically changes one's life. Findings suggest that the lifetime rates of psychological disorders in individuals in the creative arts exceed the rates of individuals in other fields (including scientific fields) (for reviews see Jamison, 1993; Kaufman, 2009; Ludwig, 1995; Simonton, 1994). The most common disorders found in creative individuals are affective in nature (depression or bipolar disorder) (Andreasen, 1987; Jamison, 1989; Johnson et al., 2012). These results overall suggest that psychological disorders may be more associated with particular creative domains (usually artistic domains) than with creativity per se. The highly domain-specific nature of the mental illness – creativity link is further supported by the finding that even within the domain of creative writing, poets present more psychopathology than other kinds of writers (Kaufman, 2001).

Several explanations have been proposed for the link between psychological disorders and creativity. First, self-selection may lead individuals prone to psychological disorders to gravitate towards creative careers as a result of their abilities or particular ways of thinking (Jamison, 1995). Alternatively, they may engage in creative endeavors as a way to heal and grow from their experience (the hypothesis examined by the present study). Additionally, creative work may cause, maintain or exacerbate psychological symptoms, as has been suggested for poets (Kaufman & Sexton, 2006). Finally, third variables may of course explain this relationship.

Physical illness. Past research has also suggested that physical illness may meaningfully transform both creative individuals and their work. Zausner (1998)

conducted a qualitative study of the biographies of 21 visual artists having suffered from a physical illness (including Botticelli, Michelangelo, Dürer, Monet, Munch, and others), and concluded that the experience of illness may have the power to break habits, provoke disequilibrium, and lead to the emergence and pursuit of new possibilities for one's art. Commenting on her own experience with ovarian cancer, Zausner (2007, p. 3) reflected that "an illness that feels like an impassible barrier can become a doorway to a new and more creative existence." In addition to Zausner's findings, Reynolds (2004) conducted a qualitative study of 24 female textile artists coping with a variety of chronic illnesses (e.g., multiple sclerosis, rheumatoid arthritis, chronic fatigue syndrome, cancer, etc.). Participants in this sample reported that the experience of illness contributed to inspiring their creative practice by sharpening their perceptions, by increasing their emotional sensitivity, and by confronting them with deep issues surrounding life.

Perceptions of Increased Creativity as a Manifestation of PTG

The studies discussed above provide preliminary support for the hypothesis of the present study: that perceptions of increased creativity following the experience of adversity constitute a manifestation of PTG. These studies however mostly focused on the lives of eminent creators, and the present study therefore attempted to expand the scientific understanding of this phenomenon by examining a sample of non-eminent creators. In addition, the present study used a correlational design to investigate the relationship between self-reported PTG and creativity following the experience of adversity. As with most existing studies on PTG, the term "growth" therefore refers to retrospective *perceptions* of change, as opposed to objective manifestations of such

change. As a result, reports of PTG may only constitute subjective beliefs that do not correspond to changes in psychological and/or behavioral markers. In addition, if change indeed occurred, it may not actually be causally related to the adverse event(s) it followed (see also Ford, Tennen, & Albert, 2008; Park & Helgeson, 2006)¹.

Theories of posttraumatic growth. In light of the variety of psychological processes which may explain how perceptions of positive change occur following stressful events, three main theories have been developed, each offering a unique perspective on the nature of PTG, including on whether this construct truly represents “growth.” Indeed, these theories underlie an important debate around the genuine or illusory nature of PTG. First, *cognitive adaptation theory* (Taylor, 1983) proposed that individuals faced with threatening events cope by developing and maintaining self-enhancing positive illusions that do not, in fact, relate to real positive changes. In contrast, *organismic valuing theory* proposed that humans have an innate tendency to integrate experiences (including traumatic or difficult experiences) into one’s unified sense of self, a process through which genuine growth occurs (Joseph & Linley, 2005). Third, *assumptive world theory* (which is closely related to organismic valuing theory) proposed that adverse events have the power to shatter individuals’ assumptions about themselves and about the world. In other words, adverse experiences force individuals to

¹ These limitations, which apply to a majority of past studies investigating the relationship between PTG and outcomes other than creativity, are presented here so the reader can keep them in mind when interpreting results. They are further examined in the Discussion section.

question the core beliefs they had been taking for granted (for instance, the benevolence, predictability, and controllability of the world) (Janoff-Bulman, 1992, 2006; Tedeschi & Calhoun, 2004). These assumptions must then be rebuilt. Growth following adversity occurs through cognitive processing, allowing individuals to make sense of their experience, and to modify their assumptive world by integrating new information.

Cognitive processing. The role of cognitive processing has received an increasing amount of attention from researchers, as it seems to be the key ingredient determining whether an individual might grow and/or deteriorate following adversity. According to assumptive world theory (Calhoun, Cann, & Tedeschi, 2010; Tedeschi & Calhoun, 2004), individuals engage in two forms of rumination (i.e., repetitive thinking) following the experience of adversity. Intrusive rumination refers to the occurrence of unwanted, or unsolicited, thoughts related to the event. Deliberate rumination refers to voluntary and purposeful thinking about the occurrence and implications of the event. Intrusive rumination is thought of as a precursor to deliberate rumination, prompting individuals to carefully explore their experience. Intrusive rumination tends to predict higher levels of distress (Taku, Calhoun, Cann, & Tedeschi, 2008; Taku, Cann, Tedeschi, & Calhoun, 2009), while deliberate rumination tends to predict growth (Calhoun et al., 2010; Cann et al., 2011). Long-term growth may therefore follow or coincide with the experience of distress. Thus, the model explains why individuals engaged in cognitive processing may concurrently, or at close time points, experience posttraumatic growth and depreciation.

In addition, recent research has established a link between rumination and creative thinking, as long as the rumination does not focus on one's negative emotional states. When participants engaged in rumination that focused on their negative emotional states (i.e., dysphoric rumination), rumination has been found to predict poorer problem-solving and to be associated with self-criticism, self-blame, as well as reduced self-confidence and willingness to engage in problem-solving (Lyubomirsky, Tucker, Caldwell, & Berg, 1999). In addition, dysphoric rumination appears to be characterized by decreased cognitive flexibility (Davis & Nolen-Hoeksema, 2000), which is an important predictor of creative thinking as it involves the ability to seek out and apply alternative strategies to solve problems, as well as the capacity to find relationships between concepts generally thought to be unrelated (Isen, Johnson, Mertz, & Robinson, 1985; Murray, Sujan, Hirt, & Sujan, 1990).

In contrast, research on the relationship between non-dysphoric rumination (i.e., repetitive thinking that does not focus on one's negative emotional states) has revealed that such deliberate rumination may actually be helpful for creative thinking. Verhaeghen, Joorman and Khan (2005) for example found that rumination fully accounted for the relationship between depression and creativity in a sample of undergraduate students, by increasing both fluency and seriousness about one's creative activities. In a content analysis study of the works of eminent writers, Forgeard (2008) found that writers known to have suffered from depression were more likely to use words describing cognitive mechanisms (e.g., "think," "know") than other groups, suggesting that they may have been able to use ruminative processes to their advantage by using

them as a tool for creativity. Finally, in a sample of adult participants, Cohen and Ferrari (2010) found that rumination predicted creative ideation in participants who also reported being high in indecision. Evidence from this literature therefore supports the hypothesis that deliberate rumination may foster PTG outcomes including creativity. Indeed, researchers in this field have already noted the possibility that creativity may constitute one way in which PTG is expressed (Aldwin & Sutton, 1998; Bloom, 1998; Forgeard, Mecklenburg, Lacasse, & Jayawickreme, 2012).

Mechanisms explaining the hypothesized link between self-reported PTG and creativity. In addition to past research on the relationship between adversity and creativity, as well as on cognitive processing and creativity, other possible mechanisms may explain why PTG could be manifested by perceptions of increased creativity. First, it is possible that the experience of adversity provides important material, ideas, and motivation for the realization of creative projects: for example, artists may describe their emotional experiences through their work, entrepreneurs may develop products or services designed to solve or counteract the difficulties they encountered, or scientists may seek to understand the causes of the circumstances they experienced. Such creative callings motivated by past adverse experiences may therefore constitute a form of “survivor mission” (Eskreis-Winkler, Duckworth, & Shulman, 2012).

Second, particular domains of PTG may explain how this construct could relate to perceptions of increased creativity. As mentioned above, the positive and negative changes described by individuals in the aftermath of trauma generally fall into one of five domains (interpersonal relationships, the perception of new possibilities for one’s life,

personal strength, spirituality, and appreciation for life) (Tedeschi & Calhoun, 1996, 2004). Two of these domains could explain an association with self-reported PTG and creativity. Indeed, research on the personality predictors of PTG has found that the trait of openness to experience predicted the identification of new possibilities for one's life, and perceptions of increased personal strength (Tedeschi & Calhoun, 1996). In addition, the personality trait of openness to experience - which refers to active imagination, aesthetic and intellectual curiosity, as well as a willingness to try new things and experiences - is one of the most well-known predictors of creative thinking (Feist, 1998; King, Walker, & Broyles, 1996; McCrae, 1987). The perception of new possibilities seems intuitively linked to creativity, since identifying new possibilities for one's life requires creative thinking. In addition, an increased sense of personal strength may promote feelings of initiative beneficial to creativity, or, alternatively, creative involvement may confer a sense of mastery and strength to individuals (Zausner, 1997). The present study therefore hypothesized that perceptions of increased creativity would be related to these two domains of PTG (see below), and that the personality trait of openness to experience would moderate the extent to which experiences of adversity predict perceptions of increased creativity.

Hypotheses of the Present Study

To date, only one study has examined the relationship between PTG and creativity. Using the Values in Action Inventory of Strength (VIA-IS; Peterson, Park, & Seligman, 2005), Peterson, Park, Pole, D'Andrea, and Seligman (2008) found that the character strength of creativity correlated significantly ($r = .21$) with PTG. In addition,

there was a significant linear association between the number of traumatic events experienced and participants' score on the VIA-IS creativity scale. However, since creativity was only one out of many character strengths included as outcomes in this study, the precise nature of the association between PTG and creativity was not investigated further or explained. Nevertheless, Peterson and colleagues' finding provides preliminary support for the main hypothesis of the present study.

This study used path analysis to look at the relationship between the experience of adversity, rumination, self-reported posttraumatic growth (PTG) and posttraumatic depreciation (PTD), as well as self-reported creativity, in a sample of online participants. The path model tested was based on the theoretical relationships between variables outlined in the introduction, and illustrated in Figure 1. In particular, the model focused on the effect of the most traumatic/difficult event experienced by participants at any point in their lives. This main independent variable was selected in light of assumptive world theory (Tedeschi & Calhoun, 2004), which proposes that PTG occurs when an event is powerful enough to shatter a person's core beliefs about the world (e.g., assumptions about the safety, predictability, and controllability of the world) (Janoff-Bulman, 1992, 2006). Thus, the model posits that "seismic" events bring about perceptions of change. What results from this theoretical position is that PTG follows discrete but powerful experiences, rather than prolonged exposure to stressors/traumas (although such discrete experiences may happen in the context of a more chronic exposure to stress), which taken individually may not be strong enough to shatter one's core beliefs. In keeping with this,

instruments designed to assess PTG typically ask participants to refer to one major event in order to assess perceptions of change (e.g., Tedeschi & Calhoun, 1996).

The main statistical analyses tested the following hypotheses:

- The amount of distress experienced by participants at the time of the main traumatic/difficult event of their lives predicts both the amount of Intrusive and Deliberate Rumination they engaged in after the event; Intrusive and Deliberate Rumination are correlated.
- Intrusive Rumination predicts PTD domains (including self-reported negative changes in Relationships, perception of New Possibilities, Personal Strength, Spirituality, and Appreciation for Life).
- Deliberate Rumination predicts PTG domains (including self-reported positive changes in Relationships, perception of New Possibilities, Personal Strength, Spirituality, and Appreciation for Life).
- It was also predicted that Intrusive Rumination would not predict PTG, and Deliberate Rumination would not predict PTD, although these paths were still included and tested in our model based on some contradictory findings in the literature showing, for example, that recent intrusive rumination may predict reduced levels of PTG (Cann, Calhoun, Tedeschi, & Solomon, 2010).
- Self-reported positive changes in the perception of New Possibilities for one's life and in Personal Strength are positively correlated to self-reported creativity; self-reported negative changes in the perception of New Possibilities and in Personal Strength are negatively correlated to self-reported creativity.

In addition, multiple regression analyses tested whether the personality trait of openness to experience moderated the relationship between adversity and self-reported creativity, and whether self-reported creativity is correlated with creative achievement. Finally, a set of exploratory analyses examined whether the main creative domain endorsed, features of the adverse events considered, and the lifetime number of adverse events reported predicted creativity outcomes.

Method

Participants

Three hundred and seventy three participants were recruited online using two websites, Amazon Mechanical Turk ($n = 137$) and authentichappiness.org ($n = 236$). Participants were 39.63 years old on average ($SD = 13.64$), and mostly female (78%). Most participants in our sample were Caucasian (75%), followed by Asian (7.80%), of mixed ethnicity (6.40%), Latino (4.40%), African American (3.40%) and other (3%). Participants also indicated their country of origin: 76.70% of our sample originated from North America, 8.10% from Europe, 6% from Australia or New Zealand, 4.40% from Asia, 2% from Africa, and 3% from other parts of the world. The modal level of education attained (34% of participants) was a Bachelor's degree (1% of participants did not finish high school; 6% had a high school diploma; 23% completed some college education; 6% had an Associate's degree; 27% had a graduate degree). Participants were told that this was a study on "Life Events, Personality, and Behavior" (creativity was not included in the study description), and there were no inclusion or exclusion criteria. Participants were volunteers and did not receive compensation.

Materials and Procedures

Participants filled out a 20-minute survey administered online using Qualtrics. This survey included seven questionnaires (in addition to the demographic questions listed above). The variables extracted from each questionnaire are described below.

Life Events Checklist. Participants completed the Life Events Checklist (Gray, Litz, Hsu, & Lombardo, 2004), a questionnaire designed to identify traumatic events participants may have experienced in the past. Participants were presented with different kinds of traumatic events, and indicated whether they had *personally experienced* or *witnessed* such events, or whether they had *learned* about such events happening to someone close to them. In addition to the 16 categories of events usually included in this checklist, one additional category, “psychological disorders,” was added, as this form of difficult experience may also be associated with self-reported creativity (as explained above).

In addition, since participants often reported having experienced more than one traumatic event, participants were asked to indicate which one event (whether personally experienced, witnessed, or learned about) had the greatest impact on their lives, and how old (in years) they were at the time of this “Main Event.” Participants who did not experience any of the events proposed were asked to describe in a few words the most difficult event they had ever experienced in their lives. All participants were asked to consider this Main Event as reference for the rest of the questionnaires. All participants also indicated on a 5-point Likert-type scale (1 = not at all, 5 = extremely) how distressing the event was to them when it first happened.

Events were categorized into 9 meaningful categories to facilitate analysis and interpretation of results: *natural disasters*, *accidents* (including fire, explosions, transportation accidents, other serious accidents or exposure to toxic substances), *physical assault* (including unarmed and armed assault), *sexual assault* (including sexual assault and other unwanted sexual experiences), *combat* (including combat and captivity), *illness/suffering* (including physical illnesses or injuries, psychological disorders, and severe human suffering), *death of other* (including sudden violent deaths, or death of someone close), *harm to someone else*, and *other* (this category which grouped the difficult events reported by participants who had not experienced any of the traumatic events proposed by the Life Events Checklist).

Thus, five variables resulted from the administration of the LEQ and were used in statistical analyses:

- Lifetime Number of Events: the total number of traumatic/difficult events participants reported having experienced in their lifetime.
- Main Event Kind: the type of event corresponding to the Main Event indicated by participants.
- Type of Main Event Involvement: whether participants personally experienced, witnessed, or learned about the Main Event they reported.
- Age at Main Event: the age (in years) at which participants experienced the Main Event they reported.
- Distress at Main Event: the level of distress (on a 5-point scale) experienced during the Main Event they reported.

Posttraumatic Growth Inventory. Participants completed the paired format Posttraumatic Growth Inventory (PTGI-42; Baker, Kelly, Calhoun, Cann, & Tedeschi, 2008), a 42-item questionnaire designed to measure both positive changes (PTG) and negative changes (PTD) that occur in the aftermath of difficult events. Participants used a 6-point Likert scale to rate 21 pairs of statements describing such changes. Statements are presented in pairs in order to encourage participants to consider both positive and negative changes at the same time, and to use the same scale for both kinds of changes. The PTGI-42 yields two composite scores corresponding to participants' posttraumatic growth (PTG) ($\alpha = .94$) and posttraumatic depreciation (PTD) ($\alpha = .94$). Replicating past findings (e.g., Cann, Calhoun, Tedeschi, & Solomon, 2010), the correlation between PTG and PTD in this sample was low and nonsignificant ($r = -.08, p = .13$), and participants reported significantly more PTG ($M = 70.72, SD = 26.31$) than PTD ($M = 42.99, SD = 21.19$), $t(372) = 15.29, p < .001$. The PTG and PTD subscales were further subdivided into five domains (the respective reliabilities of test scores on the PTG and PTD domains are reported in parentheses): Relationships ($\alpha = .87$ and $\alpha = .86$), New Possibilities ($\alpha = .85$ and $\alpha = .84$), Personal Strength ($\alpha = .84$ and $\alpha = .80$), Spirituality ($\alpha = .81$ and $\alpha = .69$), and Appreciation for Life ($\alpha = .79$ and $\alpha = .74$). As the present study hypothesized that self-reported creativity would differentially relate to these domains of PTG, domain scores were used in statistical analyses rather than the composite PTG and PTD scores. Thus, 10 variables were extracted from the PTGI-42, corresponding to the 5 domains of both PTG and PTD.

Event Related Rumination Inventory. Participants used a 3-point scale (1 = not at all; 3 = often) to complete the Event Related Rumination Inventory (ERRI; Cann et al., 2011; Triplett, et al., 2011), a self-report instrument which includes two 10-item subscales assessing Intrusive ($\alpha = .97$) and Deliberate Rumination ($\alpha = .92$) in the weeks following the Main Event. Thus, two variables were extracted from the ERRI (Intrusive and Deliberate Rumination composite scores).

Creative Domains Questionnaire. Participants completed a modified version of the Creative Domains Questionnaire (CDQ; Silvia, Kaufman, & Pretz, 2009), an instrument designed to assess self-reported creativity in a wide range of domains. Participants selected a subset of 56 domains in which they had demonstrated creativity. To increase the objectivity of this self-report measure, participants were asked to think about whether other people had commented on their ability or talent in the domains listed. This yielded a score describing the number of creative domains endorsed by participants, which reflected the breadth of their creativity.

In addition, participants selected the domain they felt most creative in (among the ones they previously selected), and indicated the age at which they started engaging in this activity, as well as the age at which they felt that they reached their peak in this activity. Domains selected were categorized according to the seven empirically derived overarching areas described by Kaufman, Cole, and Baer (2009): Artistic/Verbal, Artistic/Visual, Entrepreneur, Interpersonal, Math/Science, Performance, and Problem-Solving. Because Kaufman and colleagues identified a number of domains which did not fall cleanly into one of these categories (they either did not load onto any area or loaded

onto multiple areas), a few participants ($n = 29$) could not be included in the analyses that included this variable (see below).

Finally, participants described in a textbox what accomplishments they had achieved in this domain at the peak of their creativity. These achievements were then coded by three independent raters on a 5-point scale (1 = little or no creativity, mostly subjective in nature; 5 = very high levels of creativity with objective indicators of accomplishment and recognition by others) in order to determine the peak level of creative achievement reached by participants. The interrater agreement was excellent ($\alpha = .93$), suggesting that a reliable estimate of their creative achievement could be reached by averaging the scores produced by raters.

Thus, five variables resulted from the administration of the CDQ and were used in statistical analyses:

- **Breadth of Creativity:** the number of creative domains endorsed by participants.
- **Main Creative Area:** the area corresponding to the domain in which participants reported being most creative (Artistic/Verbal, Artistic/Visual, Entrepreneur, Interpersonal, Math/Science, Performance, or Problem-Solving).
- **Peak Creative Achievement Scores:** the scores corresponding to the peak creative achievement reported by participants (as coded by raters).
- **Age at Peak:** the age at which participants reported reaching their peak creative achievement in their Main Creative Area.

- **Event-Peak Interval:** the interval (in years) between participants' Main Event and their peak creative achievement.

Openness to experience. Participants completed the International Personality Item Pool (IPIP) Openness to Experience Scale (Goldberg, 1999), a 20-item self-report measure of the Big-Five personality trait of openness to experience, using a 5-point Likert scale.

Perceived Creative Growth Scale. Participants completed a brief self-report instrument including 8 items developed for the purpose of this study using a 5-point Likert scale (1 = not at all; 5 = extremely). This scale aimed to measure the extent to which participants perceived that their creativity increased as a result of having experienced the Main Event they reported on the Life Events Checklist. Four items described general changes in one's creativity or in one's motivation to engage in creative activities. The remaining four items described the use of creative activities as a way to cope with the experience of adversity. As a result, it was hypothesized that the scale would yield two factors (*creative growth* and *creative coping*). The reliability of scores, factor structure, and final version of this scale are described in the Results section. Thus, one variable was extracted from this scale corresponding to participants' Perceived Creative Growth in the aftermath of the Main Event they reported.

Results

Perceived Creative Growth Scale

The 8-item scale created for the purpose of this study (see Appendix A) had adequate internal consistency ($\alpha = .85$), but two items had unacceptably low corrected

item-total correlations ($<.20$). These corresponded to the two items phrased negatively (which were reverse scored before performing the reliability analysis). These items were therefore excluded from the final version of the scale. The internal consistency of the resulting 6-item scale was good ($\alpha = .93$), with all corrected item-total correlations ranging from .68 to .83. Next, the scale was submitted to exploratory factor analysis, to verify whether items loaded onto two separate factors, *creative growth* and *creative coping* (see Method section). Principal axis factoring was carried out using promax rotation, since creative growth and creative coping would likely be correlated constructs. The Scree plot as well as the Kaiser criterion indicated a one-factor solution accounting for 73.50% of the variance. Item communalities ranged from .50 to .76. Factor loadings of all six items ranged from .71 to .87. Contrary to hypotheses, the scale constructed yielded only one factor corresponding to the general construct of creative growth. This one-factor solution was retained, and a composite score was calculated by adding the scores of the 6 items.

Exposure to Traumatic/Difficult Events

On the Life Events Checklist, 91.90% of participants had personally experienced at least one traumatic/difficult event ($M = 3.46$, $SD = 2.57$, median = 3, mode = 1); 78% of participants had witnessed at least one such event ($M = 2.83$, $SD = 2.73$, median = 2, mode = 0); finally, 89.20% had learned about such an event happening to someone close to them at least once ($M = 4.84$, $SD = 3.94$, median = 4, mode = 4). These estimates are consistent with epidemiological studies indicating that a majority of individuals living in the United States have experienced at least one traumatic event in their lifetime (Breslau,

2009; Breslau & Alvarado, 2007), and estimates as high as 92% in males and 87% in females have been found (Breslau et al., 1998). Nevertheless, the results of this study fall on the high end of what has been previously reported. This may be explained by the fact that the present study did not strictly apply DSM-IV-TR (American Psychiatric Association, 2000) criteria for determining what constitutes a traumatic/difficult event (for example, participants were not asked whether their response to the trauma involved fear, helplessness, or horror), but rather simply asked whether participants had experienced particular types of events. This may have resulted in somewhat higher estimates than would have been found using DSM-IV-TR criteria. The choice not to use these criteria was based on the necessity to include participants falling on a spectrum of levels of distress (and to avoid possible restriction of range in the main exogenous variable included in the path analysis below).

The Main Event Kind reported by participants fell into the following categories: illness/suffering (26%), death of other (22.80%), sexual assault (15%), accidents (12%), physical assault (7.50%), natural disasters (4%), combat (1.30%), harming someone else (1.30%), and other (10.20%). Participants were on average 24.22 years old when the event occurred ($SD = 14.25$). The mean level of Distress at Main Event was 4.30 ($SD = 0.95$, min = 1, max = 5) (out of 5 points).

Path Analysis

The main analyses for this study were conducted in MPlus 7 (Muthén & Muthén, 2012) using full information maximum likelihood in order to test the path model and hypotheses outlined in the Introduction and illustrated in Figure 1. Error terms of

Intrusive and Deliberate Rumination² were allowed to covary. Similarly, error terms of all PTD and PTG domains were allowed to covary. Six direct paths from Distress at Main Event and from Intrusive/Deliberate Rumination to Perceived Creative Growth and Breadth of Creativity were also included in order to test a nested mediation model (in which these six paths were constrained to zero). This nested model, if superior to the model in which the path coefficients were allowed to vary, would suggest that the effect of Distress at Main Event on Perceived Creative Growth and Breadth of Creativity was fully accounted for by mediators (Rumination and PTD/PTG domains). The model tested also controlled for the effect of other important variables. Age, gender, education level, ethnicity, Age at Main Event, and Lifetime Number of Events were treated as covariates. Table 1 includes all means and standard deviations for all continuous variables included in this analysis. Appendix B describes correlations among variables.

The unconstrained model (in which the six direct paths from Distress at Main Event, Intrusive and Deliberate Rumination to Perceived Creative Growth and Breadth of Creativity were allowed to vary) had a very good fit, examined using multiple indices. The chi-square fit statistic was nonsignificant, $\chi^2(10) = 10.73, p = .38$, suggesting that no significant discrepancy existed between the observed covariance matrix and the one

² For the sake of concision and clarity, scores on all measures described in the Method section are simply referred to by the name of the relevant construct (e.g., “Intrusive Rumination” corresponds to scores on the Intrusive Rumination subscale of the ERRI, “Perceived Creative Growth” corresponds to scores on the Perceived Creative Growth Scale, etc.).

implied by the model. Three additional fit indices supported the model as a very good fit for the data: the Standardized Root Mean Squared Residual (SRMR; summary of the average covariance residual) = .01, the Root Mean Square Error of Approximation (RMSEA; estimate of the “misfit” of the model based on a noncentral index) = .01 [90% CI = .00-.06], and the Comparative Fit Index (CFI; another noncentral index of fit) = 1.00. This model explained 44.60% of the variance in Perceived Creative Growth, and 18.70% of the variance in Breadth of Creativity. The nested model in which the six direct paths described above were constrained to zero was a poorer fit for the data according to a chi-square difference test, $\Delta\chi^2(6) = 14.43, p = .03$. The unconstrained model was therefore retained for further examination.

Path coefficients of this unconstrained model were examined to verify whether the hypothesized relationships between variables were confirmed (see Figure 2). In addition, the joint significance of indirect effects was assessed using bootstrapping (MacKinnon, 2008). Table 2 lists all unstandardized estimates, standard errors, standardized estimates, and p-values for regression and covariance paths tested. Table 3 lists all unstandardized estimates, standard errors, p-values, and standardized estimates for the indirect effects tested.

Results of the path analysis showed that:

- The direct paths from Distress at Main Event to Perceived Creative Growth and Breadth of Creativity were nonsignificant. Contrary to hypotheses, however, Deliberate Rumination directly predicted Perceived Creative Growth. Intrusive and Deliberate Rumination otherwise only indirectly predicted outcomes.

- Intrusive rumination predicted all PTD outcomes. Deliberate rumination predicted all PTG outcomes.
- The effect of Intrusive Rumination on Perceived Creative Growth was fully mediated by two PTD domains. Negative changes in Relationship predicted greater Perceived Creative Growth, whereas negative changes in New Possibilities predicted lower Perceived Creative Growth. The indirect effect for Relationships was significant; the indirect effect for New Possibilities approached significance.
- The effect of Intrusive Rumination on Breadth of Creativity was fully mediated by two PTD domains. Negative changes in New Possibilities predicted greater Breadth of Creativity. Negative changes in Appreciation for Life predicted reduced Breadth of Creativity. The indirect effect for New Possibilities was significant; the indirect effect for Appreciation for Life approached significance.
- The effect of Deliberate Rumination on Perceived Creative Growth was fully mediated by two PTG domains. Positive changes in Relationships and New Possibilities predicted greater Perceived Creative Growth. Both indirect effects were significant.
- The effect of Deliberate Rumination on Breadth of Creativity was fully mediated by one PTG domain. Positive changes in personal strength predicted greater Breadth of Creativity, and the corresponding indirect effect was significant. Positive changes in spirituality predicted reduced Breadth of Creativity, but the corresponding indirect effect was nonsignificant.

- The correlation between the two self-reported creativity outcomes, Perceived Creative Growth and Breadth of Creativity, was small but significant ($r = .13, p = .01$).

Openness to Experience

Two multiple regression analyses assessed whether the relationships between Distress at Main Event and Perceived Creative Growth as well as Breadth of Creativity were moderated by the personality trait of Openness to Experience. Variables were mean centered in order to create and test interaction terms. Regression analyses controlled for Age at Main Event, gender, ethnicity, education level, Main Event Kind, and Lifetime Number of Events. Results are presented in Table 3.

Perceived Creative Growth. Both Distress at Main Event, $\beta = .05, p = .04$, and Openness to Experience, $\beta = .07, p = .001$, directly predicted Perceived Creative Growth. In addition, the interaction term was also significant, $\beta = .05, p = .02$. Simple slopes' analyses using Preacher, Curran, and Bauer's (2006) computational tools for probing interaction effects in multiple regression showed that the simple slopes for the low openness group was not significant ($t = -.14, p > .10$), whereas the simple slopes for the medium openness ($t = 2.08, p = .04$) and high openness ($t = 2.98, p = .003$) were both significant. Thus, higher levels of distress were associated with greater Perceived Creative Growth for participants medium or high in openness to experience only (See Figure 3a).

Breadth of Creativity. Openness to experience, but not Distress at Main Event ($p > .10$) predicted Breadth of Creativity, $\beta = .19, p < .001$. In addition, the interaction term was also significant, $\beta = .05, p = .04$. Simple slopes' analyses showed that the simple

slopes for the low openness ($t = -.78, p > .10$) and medium openness ($t = 1.00, p > .10$) groups were not significant, whereas the simple slope for the high openness ($r = 2.03, p = .04$) group was significant. Thus, higher levels of distress were associated with greater Breadth of Creativity for participants high in openness to experience only (See Figure 3b).

Peak Creative Achievement

Additional analyses were conducted in order to examine whether participants' Perceived Creative Growth as well as Breadth of Creativity (both self-reported and therefore mostly subjective in nature) related to higher Peak Creative Achievement Scores (a somewhat more objective indicator of creativity). Participants' Peak Creative Achievement Scores could not be included in the main path analysis because 20.60% of participants reported that their peak creative achievement occurred before the Main Event they encountered. These participants were therefore excluded from the prior analysis, as their Peak Creative Achievement Scores would not have been influenced by the Main Event they experienced.

A multiple regression analysis tested whether Perceived Creative Growth as well as Breadth of Creativity predicted Peak Creative Achievement Scores, controlling for age, gender, ethnicity, education, Age at Peak, Main Creative Area (excluding 29 participants whose creative domain did not fall into the seven main areas, see Method section), and the Event-Peak Interval ($n = 275$). Results showed that Perceived Creative Growth did not predict Peak Creative Achievement Scores, $\beta = -.05, p = .46$. In contrast,

Breadth of Creativity did Peak Creative Achievement Scores, $\beta = .14$, $p = .02$ (see Table 4).

Exploratory Analyses

Additional exploratory analyses were conducted to investigate whether the Main Creative Area endorsed, particular features of the Main Event considered, and the Lifetime Number of Events reported predicted Perceived Creative Growth, Breadth of Creativity, and Peak Creative Achievement Scores.

Main Creative Area. Three ANCOVAs (covarying age, gender, ethnicity, and education) were conducted to determine whether the Main Creative Area endorsed by participants predicted levels of Perceived Creative Growth, Breadth of Creativity, or Peak Creative Achievement Scores (again excluding 29 participants whose creative domain did not fall into the seven main areas, see Method section). There were no differences between Main Creative Areas for Perceived Creative Growth and Breadth of Creativity (both $n_s = 344$, both $p_s > .10$). Peak Creative Achievement Scores ($n = 275$, also excluding participants who reported that their peak creative achievement occurred before the Main Event) differed significantly according to the Main Creative Area endorsed, $F(6, 264) = 4.12$, $p = .001$, partial $\eta^2 = .09$. Table 5 provides estimated marginal means, standard errors, and sample sizes for each area. Participants who reported that their Main Creative Area was Entrepreneurship had the highest Peak Creative Achievement Scores, followed by the Artistic/Verbal, Math/Science, Performance, Artistic/Visual, Interpersonal, and Problem-Solving areas (see Figure 4). Posthoc tests using Bonferroni-Holm corrections however only showed that the Artistic/Verbal group had higher levels

of Peak Creative Achievement Scores than the Interpersonal group ($p = .01$, Cohen's $d = .69$). All other comparisons were nonsignificant ($ps > .10$).

Features of the Main Event considered. Three mixed-design ANCOVAs (covarying age, gender, ethnicity, education, Age at Main Event and Distress at Main Event) were conducted to examine whether characteristics of the Main Event experienced predicted Perceived Creative Growth, Breadth of Creativity, or Peak Creative Achievement Scores. Independent variables included the Main Event Kind considered (natural disaster, accident, physical assault, sexual assault, combat, illness, death, harm to others, other difficult events) as well as the Type of Main Event Involvement (whether the person personally experienced, witnessed, or learned about the event).

For Breadth of Creativity ($n = 373$) and Peak Creative Achievement Scores ($n = 296$, excluding participants who reported that their peak creative achievement occurred before their Main Event), both main effects and the interaction were nonsignificant (all $ps > .10$).

For Perceived Creative Growth ($n = 373$), results showed that the main effect of the Type of Main Event Involvement as well as the Main Event Kind x Type of Main Event Involvement interaction were nonsignificant (both $ps > .10$). In contrast, the main effect of the Main Event Kind considered was significant, $F(8, 342) = 2.61$, $p = .01$, partial $\eta^2 = .06$ (See Figure 5). Table 6 reports means, standard errors and sample sizes for each Main Event Kind. Pairwise comparisons using Bonferroni-Holm corrections showed that participants who experienced accidents reported significantly less creative growth than participants who reported physical assaults (Cohen's $d = .93$), illnesses

(Cohen's $d = .68$), witnessing/learning about the death of someone else (Cohen's $d = .64$), other difficult events (Cohen's $d = .64$) and natural disasters (Cohen's $d = .75$) (all $ps < .05$). Participants who experienced accidents did not differ significantly from participants who experienced sexual assault (Cohen's $d = .20$), combat (Cohen's $d = .57$), or harming others (Cohen's $d = .98$) (perhaps as a result of small sample sizes for some of these types of events), and all comparisons between other Main Event Kinds were nonsignificant (all $ps > .05$).

Lifetime Number of Events. Three multiple regressions analyses were conducted to determine whether the Lifetime Number of Events reported by participants predicted Perceived Creative Growth, Breadth of Creativity, and Peak Creative Achievement Scores, controlling for age, gender, ethnicity, and education. Lifetime Number of Events was a significant predictor of Perceived Creative Growth, $\beta = .15$, $p = .004$ and Breadth of Creativity, $\beta = .28$, $p < .001$, but not of Peak Creative Achievement Scores, $\beta = .03$, $p = .65$ (also controlling for Age at Peak, in addition to other variables listed above) (see Table 7). Two additional quadratic trend analyses showed that both the relationships between Lifetime Number of Events and Perceived Creative Growth, as well as Breadth of Creativity, were linear in nature - both linear trend components were significant (both $ps < .01$), whereas both quadratic trend components were nonsignificant (both $ps > .10$).

Discussion

The present study provided support for the existence of a relationship between the experience of adversity and self-reported creativity, and for the hypothesis that perceptions of increased creativity constitute a manifestation of PTG. A path analysis

supported a model based on assumptive world theory (Janoff-Bulman, 1992, 2006; Tedeschi & Calhoun, 2004). This model demonstrated that the relationship between adversity-induced distress and self-reported creativity outcomes was mediated by two main sets of paths: the first set of paths showed that this relationship was mediated by Intrusive Rumination and a subset of PTD domains; the second set of paths showed that this relationship was also mediated by Deliberate Rumination and a subset of PTG domains.

In the first set of paths, Intrusive Rumination predicted all five PTD domains. In turn, self-reported negative changes in the perception of New Possibilities for one's life predicted reduced levels of Perceived Creative Growth, but, contrary to hypotheses, increased Breadth of Creativity (perhaps reflecting an attempt to cope through increased engagement in creative activities, among other possibilities). Also contrary to hypotheses, self-reported negative changes in Personal Strength were not related to creativity outcomes. Self-reported negative changes in Appreciation for Life however also predicted reduced Breadth of Creativity. In addition, self-reported negative changes in Relationships predicted increased Perceived Creative Growth. This finding, while somewhat surprising, does make sense in light of the fact that both positive and negative interpersonal events have provided rich raw material for creative works, especially in artistic domains. For example, Tennessee Williams' plays such as *The Glass Menagerie* (1944) are thought to be inspired by his own dysfunctional family, whereas Louisa May Alcott's novel *Little Women* (1868) was likely influenced by the novelist's strong bond with her own sisters.

In the second set of paths, Deliberate Rumination directly predicted Perceived Creative Growth (but not Breadth of Creativity), as well as all five PTG domains. In turn, self-reported positive changes in Relationships and in the perception of New Possibilities for one's life predicted increased Perceived Creative Growth. Self-reported positive changes in Personal Strength predicted increased Breadth of Creativity.

Additional analyses showed that the personality trait of openness to experience moderated the relationships between distress and self-reported creativity outcomes. Individuals high in openness to experience who reported high levels of distress were significantly more likely to endorse perceptions of increased creativity than others. In addition, Perceived Creative Growth did not predict Peak Creative Achievement Scores, whereas Breadth of Creativity did have a small relationship to this outcome. Furthermore, creativity outcomes were in general not related to the Main Creative Area endorsed, although the lack of significant differences may have been due to sample size considerations (the only exception to this result was that participants who endorsed the Artistic/Verbal area had significantly higher Peak Creative Achievement Scores than participants who endorsed the Interpersonal area). In addition, participants who experienced accidents were somewhat less likely to report Perceived Creative Growth than others. Finally, the Lifetime Number of Events reported by participants linearly predicted Perceived Creative Growth and Breadth of Creativity, but not Peak Creative Achievement Scores.

Limitations and Future Directions

This study had a number of limitations. First, and as noted earlier, the cross-sectional nature of its design made it impossible to establish whether the relationships found were causal in nature. This study employed either retrospective reports of change (e.g., the Perceived Creative Growth scale) or measures assessing outcomes at one time point only (e.g., the Breadth of Creativity and Peak Creative Achievement measures). Longitudinal investigations are needed in order to determine whether scores on these measures validly represent actual growth in creativity. Frazier et al. (2009), for example, recently demonstrated that self-reported retrospective reports of PTG did not relate to growth assessed longitudinally in the same domains using other self-report scales (administered before and after the occurrence of adverse events).

Second, the conclusions of this study are limited by the nature of the outcome measures used, which were mostly subjective. As explained above, it is therefore unclear whether participants' subjective reports of creativity correspond to objective creative behavior and performance, and (as with all face valid self-report measures), answers may have been influenced by demand characteristics and/or social desirability. The examination of participants' Peak Creative Achievement Scores (evaluated by raters) provided preliminary information regarding the nature of the relationship between subjective and more objective measures of creativity. Results showed that Breadth of Creativity had a small but significant association with Peak Creative Achievement Scores. In contrast, Perceived Creative Growth did not relate to Peak Creative Achievement Scores. Perceived Creative Growth could however still be associated with intraindividual changes (as opposed to between-individual differences) in creative

achievement, a hypothesis which was not tested by the present study and which should be examined by further research.

The need to distinguish between creativity construed as a subjective judgment and creativity construed as an objectively measurable behavior ties in to an important controversy in the field of research on PTG. As mentioned earlier, researchers have questioned whether retrospective reports of growth reflect actual psychological change or only constitute motivated positive illusions used as a coping strategy (Taylor, 1983). Individuals may therefore be inclined to report positive changes in any domain queried following the experience of adversity. This study however found that only a subset of PTG/PTD domains predicted creativity outcomes, weakening the possibility that the effect found was the result of nonspecific positive illusions.

In addition, given the nature of the questionnaires used, the construct of “growth” was operationalized as a quantity (with higher scores reflecting “more” of something). Future research however needs to adopt more nuanced approaches to assessing growth by examining this construct both from qualitative and quantitative points of view. Growth can refer not only to *how much* of a construct (e.g., creativity) occurs, but also *how* it occurs (emphasizing the nature of the process, as opposed to the magnitude of change). In more concrete terms, positive changes in creativity could indeed correspond to experiencing an increased subjective sense of creativity, to engaging in creative activities more frequently, to taking part in a wider range of activities, or to making objectively more imaginative products or ideas, etc. Positive changes in creativity could also however correspond to developing a new relationship towards one’s creativity – for

example, by discovering new motivations, goals, or preferred ways of creating – changes that would not be captured by quantitative measures such as the ones used in the present study. Further research is needed to explore the various ways in which positive changes in creativity may be experienced and expressed.

Other researchers have argued that subjective growth (such as the growth documented in the present study) may be the precursor to more genuine psychological or behavioral growth (Calhoun & Tedeschi, 2006; for a review see Zoellner & Maercker, 2006). In agreement with the view proposed by Tedeschi, Calhoun and Cann (2006), the present study considered that subjective growth is an important and valuable outcome in its own right. A person could indeed “feel” creative even if others disagree, or even if the subjective feeling of creativity is not accompanied by commensurate changes in behavior (assessed either intra- or inter-individually). As mentioned earlier, this study departed from previous research on the adversity-creativity link (which has mostly focused on eminent individuals) by focusing on a sample of non-eminent creators, and it is possible that the relationship between subjective and objective markers of creativity could be stronger in eminent individuals as a result of other factors (e.g., expertise, skill, etc.). Kaufman and Beghetto’s (2009) four-c model of creativity can help place the results of the present study within the context of existing knowledge on the development of creativity. The peak creative achievements reported by participants (which represented creative achievements at *one timepoint*, as opposed to change in creativity) in this study appeared to range from “mini-c” creativity (which is generally subjective in nature and inherent in the learning process), through “little-c” creativity (observable everyday

creativity), to “Pro-c” (which represents professional levels of expertise and achievement that do not reach “Big-C,” or eminent, creativity). However, as the present study found that Perceived Creative Growth did not relate to Peak Creative Achievement, it is possible that the perceptions of *changes* in creativity were mostly subjective in nature (i.e., mini-c changes). Mini-c creativity, although typically not manifested by observable accomplishments, is thought to represent an important step in the developmental process of creativity, and researchers have called for its recognition and promotion to make sure that all creative potential is nurtured (Kaufman & Beghetto, 2009). This position is in line with Vygotsky’s (1967/2004, p. 7) claim that “any human act that gives rise to something new is referred to as a creative act, regardless of whether what is created is a physical object or some mental or emotional construct that lives within the person who created it and is known only to him.”

Nevertheless, future studies using behavioral measures of creative growth are needed in order to look at the relationship between changes in subjective and objective markers of creativity following the experience of adversity. In addition to using behavioral tasks, future studies should also use a wide range of measures in order to investigate the particular psychological processes at play. PTG may have differential relationships to scores on tasks assessing divergent-thinking, associative thinking, insight and convergent-thinking, evaluative processes, or creativity-relevant personality traits, among other aspects of creativity (Kaufman, Plucker, & Baer, 2008).

Furthermore, future studies should also look at other relationships between variables at hand. For example, the present study hypothesized that adversity predicted

both PTG/PTD and Perceived Creative Growth (conceptualizing particular domains of PTG/PTD as mediators between adversity and Perceived Creative Growth). Another possibility is that adversity may foster Perceived Creative Growth, which may in turn enhance PTG as a whole – indeed, the therapeutic potential of creative activities has for example been noted by researchers in the field of creative arts therapies (Forgeard & Eichner, 2012; Slayton, D’Archer, & Kaplan, 2009). Future studies should investigate under which conditions creative involvement may lead to increased PTG.

Finally, demographic characteristics of the sample used should be kept in mind when interpreting the results of the present study. This sample was mostly Caucasian, female, educated, and from North America, and future research is therefore needed to look at the generalizability of these findings, as well as to explore the role of other demographic factors (e.g., professional affiliations, rural vs. urban locations, etc.). The construct of PTG, and its relationship with aspects of creativity may not constitute a cultural universal (Forgeard et al., 2012; Splevins, Cohen, Bowley, & Joseph, 2010).

Conclusion

The present study constitutes the first empirical demonstration that perceptions of increased creativity constitute a manifestation of PTG. What this study did *not* show, however, is that adversity is *needed* for creativity. Creativity is a multiply determined psychological construct, and many levers of change can be acted upon to foster both subjective and objective manifestations of creativity. Results of this study therefore do not imply that suffering is necessary for creativity. Other environmental influences,

including non-adverse life events, for example, may contribute just as much to perceptions of growth and creativity (e.g., Roepke, 2012).

What this study did suggest is the following: Given that a majority of individuals unfortunately experience adverse events at some point in their lives, individuals may be able to use their experience - alone or with the help of a competent clinician (Calhoun & Tedeschi, 1999) - in order to heal, grow, and fulfill their creative potential. This first study will hopefully stimulate further research to refine our understanding of the ways in which adversity contributes to both subjective and objective manifestations of creativity.

References

- Alcott, L. M. (1868). *Little women*. Boston, MA: Roberts Brothers.
- Aldwin, C. M., & Sutton, K. J. (1998). A developmental perspective on posttraumatic growth. In R. G. Tedeschi, C. L. Park & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 43-64). Mahwah, NJ: Erlbaum.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th Ed., Text Revision). Washington, DC: American Psychiatric Association.
- Andreasen, N. (1987). Creativity and mental illness: Prevalence in writers and their first-degree relatives. *American Journal of Psychiatry*, *144*, 1288-1292.
- Baker, J. M., Kelly, C., Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2008). An examination of posttraumatic growth and posttraumatic depreciation: Two exploratory studies. *Journal of Loss and Trauma*, *13*, 450-465.
- Barker, J. (1995). *The Brontës*. London: Phoenix House.
- Bloom, S. L. (1998). By the crowd they have been broken, by the crowd they shall be healed: The social transformation of trauma. In R. G. Tedeschi, C. L. Park & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 173-208). Mahwah, NJ: Erlbaum.
- Breslau, N. (2009). The epidemiology of trauma, PTSD, and other posttrauma disorders. *Trauma, Violence, & Abuse*, *10*, 198-210.

- Breslau, N., & Alvarado, G. F. (2007). The clinical significance criterion in DSM-IV post-traumatic stress disorder. *Psychological Medicine, 37*, 1437-1444.
- Breslau, N., Kessler, R. C., Chilcoat, H. D., Schultz, L. R., Davis, G. C., & Andreski, P. (1998). Trauma and posttraumatic stress disorder in the community: The 1996 Detroit Area Survey of Trauma. *Archives of General Psychiatry, 55*, 626-632.
- Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2010). The Posttraumatic Growth Model: Sociocultural considerations. In T. Weiss & R. Berger (Eds.), *Posttraumatic growth and culturally competent practice* (chapter 1, pp. 1-14). Hoboken, NJ: Wiley & Sons.
- Calhoun, L. G., & Tedeschi, R. G. (2006). *Facilitating posttraumatic growth: A clinician's guide*. Mahwah, NJ: Erlbaum.
- Calhoun, L. G., & Tedeschi, R. G. (2006). The foundations of posttraumatic growth: An expanded framework. In L. Calhoun & R. Tedeschi (Eds.), *Handbook of posttraumatic growth: Research and practice* (pp. 1-23). New York: Routledge.
- Cann, A., Calhoun, L. G., Tedeschi, R. G., & Solomon, D. T. (2010). Posttraumatic growth and depreciation as independent experiences and predictors of well-being. *Journal of Loss and Trauma, 15*, 151-166.
- Cann, A., Calhoun, L. G., Tedeschi, R. G., Kilmer, R. P., Gil-Rivas, V., Vishnevsky, T., & Danhauer, S. C. (2010). The Core Beliefs Inventory: A brief measure of disruption in the assumptive world. *Anxiety, Stress, & Coping, 23*, 19-34.

- Cann, A., Calhoun, L. G., Tedeschi, R. G., Triplett, K. N., Vishnevsky, T., & Lindstrom, C. M. (2011). Assessing posttraumatic cognitive processes: The Event Related Rumination Inventory. *Anxiety, Stress, & Coping, 24*, 137-156.
- Cohen, J. R., & Ferrari, J. R. (2010). Take some time to think this over: The relation between rumination, indecision, and creativity. *Creativity Research Journal, 22*, 68-73.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
- Davis, R. N., & Nolen-Hoeksema, S. (2000). Cognitive inflexibility among ruminators and non-ruminators. *Cognitive Therapy and Research, 24*, 699-711.
- Eskreis-Winkler, L., Duckworth, A., & Shulman, E. P. (2012). *Survivor mission: Do those who survive have a drive to thrive at work?* Manuscript in preparation.
- Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review, 2*, 290-309.
- Ford, J. D., Tennen, H., & Albert, D. (2008). A contrarian view of growth following adversity. In S. Joseph & P. A. Linley (Eds.), *Trauma, recovery and growth: Positive psychological perspectives on posttraumatic stress* (pp. 297-324). Hoboken, NJ: Wiley.
- Forgeard, M. (2008). Linguistic styles of eminent writers suffering from unipolar and bipolar mood disorder. *Creativity Research Journal, 20*, 81-92.
- Forgeard, M. J. C., & Eichner, K. V. (in press). Creativity as a target and tool for positive interventions. In A. C. Parks (Ed.), *Handbook of positive psychological*

interventions. Oxford: Wiley-Blackwell.

Forgeard, M. J. C., Mecklenburg, A. C., Lacasse, J. J., & Jayawickreme, E. (in press).

“Bringing the whole universe to order:” Creativity, healing, and posttraumatic growth. Invited chapter in J. Kaufman (Ed.), *New ideas about an old topic: Creativity and mental illness*. New York: Cambridge University Press.

Frazier, P., Tennen, H., Gavian, M., Park, C., Tomich, P., & Tashiro, T. (2009). Does self-reported posttraumatic growth reflect genuine positive change? *Psychological Science, 20*, 912-919.

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe*, Vol. 7 (pp. 7-28). Tilburg, The Netherlands: Tilburg University Press.

Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the Life Events Checklist. *Assessment, 11*, 330-341.

Herrera, H. (1983). *Frida: A biography of Frida Kahlo*. New York: Harper Row.

Isen, A. M., Johnson, M., Mertz, E., & Robinson, G. (1985). The influence of positive affect on the unusualness of word associations. *Journal of Personality and Social Psychology, 48*, 1413-1426.

Jamison, K. R. (1989). Mood disorders and patterns of creativity in British writers and artists. *Psychiatry, 52*, 125-134.

Jamison, K. R. (1993). *Touched with fire: manic-depressive illness and the artistic temperament*. New York: Free Press.

- Jamison, K. R. (1995). Manic-depressive illness and creativity. *Scientific American*, 272(2), 62-67.
- Janoff-Bulman, R. (1992). *Shattered assumptions*. New York: Free Press.
- Janoff-Bulman, R. (2006). Schema-change perspectives on posttraumatic growth. In L.G. Calhoun & R. G. Tedeschi (Eds.), *Handbook of posttraumatic growth* (pp. 81-99). Mahwah, NJ: Erlbaum.
- Johnson, S. L., Murray, G., Fredrickson, B., Youngstrom, E. A., Hinshaw, S., Malbrancq Bass, J., Deckersbach, T., Schooler, J., & Salloum, I. (2012). Creativity and bipolar disorder: Touched by fire or burning with questions? *Clinical Psychology Review*, 32, 1-12.
- Joseph, S., & Linley, P. A. (2005). Positive adjustment to threatening events: An organismic valuing theory of growth through adversity. *Review of General Psychology*, 9, 262-280.
- Kaufman, J. C. (2001). The Sylvia Plath effect: Mental illness in eminent creative writers. *The Journal of Creative Behavior*, 35, 37-50.
- Kaufman, J. C. (2009). *Creativity 101*. New York: Springer.
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond Big and little: The four-c model of creativity. *Review of General Psychology*, 13, 1-12.
- Kaufman, J. C., Cole, J. C., & Baer, J. (2009). The construct of creativity: Structural model for self-reported creativity ratings. *Journal of Creative Behavior*, 43, 119-134.

- Kaufman, J. C., Plucker, J. A., & Baer, J. (2008). *Essentials of creativity assessment*. Hoboken, NJ: John Wiley & Sons.
- Kaufman, J. C., & Sexton, J. D. (2006). Why doesn't the writing cure help poets? *Review of General Psychology, 10*, 268-282.
- Kim, S. H., Vincent, L. C., & Goncalo, J. A. (2012, August 13). Outside advantage: Can social rejection fuel creative thought? *Journal of Experimental Psychology: General*. Advance online publication.
- King, L. A., McKee, L. W., & Broyles, S. J. (1996). Creativity and the five-factor model. *Journal of Research in Personality, 30*, 189-203.
- Ludwig, A. M. (1995). *The price of greatness: Resolving the creativity and madness controversy*. New York: Guilford Press.
- Lyubomirsky, S., Tucker, K. L., Caldwell, N. D., & Berg, K. (1999). Why ruminators are poor problem solvers: Clues from the phenomenology of dysphoric rumination. *Journal of Personality and Social Psychology, 77*, 1041-1060.
- MacKinnon, D. (2008). *Introduction to statistical mediation analysis*. New York: Erlbaum.
- McCrae, R. R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology, 52*, 1258-1265.
- Murray, N., Sujan, H., Hirt, E., & Sujan, M. (1990). The influence of mood on categorization: A cognitive flexibility interpretation. *Journal of Personality and Social Psychology, 59*, 411-425.

- Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus user's guide* (7th edition). Los Angeles, CA: Muthén & Muthén.
- Park, C. L., Cohen, L. H., & Murch, R. L. (1996). Assessment and prediction of stress-related growth. *Journal of Personality*, *64*, 71–105.
- Park, C. L., & Helgeson, V. S. (2006). Introduction to the special section: Growth following highly stressful life events – Current status and future directions. *Journal of Consulting and Clinical Psychology*, *74*, 791-796.
- Peterson, C., Park, N., & Seligman, M. E. P. (2005). Assessment of character strengths. In G. P. Koocher, J. C. Norcross, & S. S. Hill, III (Eds.), *Psychologists' desk reference* (2nd ed., pp. 93–98). New York: Oxford University Press.
- Peterson, C., Park, N., Pole, N., D'Andrea, W., & Seligman, M. E. P. (2008). Strengths of character and posttraumatic growth. *Journal of Traumatic Stress*, *21*, 214-217.
- Reynolds, F. (2004). Conversations about creativity and chronic illness II: Textile artists coping with long-term health problems reflect on the creative process. *Creativity Research Journal*, *16*, 79-89.
- Roepke, A. M. (2011, July 26). *Elevation as an opportunity for growth*. Paper presented at the World Congress of Positive Psychology, Philadelphia PA.
- Silvia, P. J., Kaufman, J. C., & Pretz, J. E. (2009). Is creativity domain-specific? Latent class models of creative accomplishments and creative self-descriptions. *Psychology of Aesthetics, Creativity, and the Arts*, *3*, 136-148.
- Simonton, D. K. (1994). *Greatness: Who makes history and why*. New York: Guilford Press.

- Slayton, S., D'Archer, J., & Kaplan, F. (2010). Outcome studies on the efficacy of art therapy: A review of findings. *Art Therapy: Journal of the American Art Therapy Association, 27*, 108-118.
- Splevins, K., Cohen, K., Bowley, J., & Joseph, S. (2010). Theories of posttraumatic growth: Cross-cultural perspectives. *Journal of Loss and Trauma, 15*, 259-277.
- Taku, K., Calhoun, L. G., Cann, A., & Tedeschi, R. G. (2008). The role of rumination in the coexistence of distress and posttraumatic growth among bereaved Japanese university students. *Death Studies, 32*, 428–444.
- Taku, K., Cann, A., Tedeschi, R. G., & Calhoun, L. G. (2009). Intrusive versus deliberate rumination in posttraumatic growth across US and Japanese samples. *Anxiety, Stress, & Coping, 22*, 129–136.
- Taylor, S. (1983). Adjustment to threatening events: A theory of cognitive adaptation. *American Psychologist, 38*, 1161-1173.
- Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9*, 455-471.
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*, 1-18.
- Tennen, H., & Affleck, G. (2002). Benefit-finding and benefit-reminding. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 584-598). New York: Oxford University Press.
- Triplett, K. N., Tedeschi, R. G., Cann, A., Calhoun, L. G., & Reeve, C. L. (2011, July 4). Posttraumatic growth, meaning in life, and life satisfaction in response to trauma.

Psychological Trauma: Theory, Research, Practice, and Policy. Advance online publication.

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.

Vygotsky, L. S. (1967/2004). Imagination and creativity in childhood. *Journal of Russian and East European Psychology, 42*, 7-97.

Williams, T. (1944). *The glass menagerie*. New York: Random House.

Zausner, T. (1998). When walls become doorways: Creativity, chaos theory, and physical illness. *Creativity Research Journal, 11*, 21-28.

Zausner, T. (2007). *When walls become doorways: Creativity and the transforming illness*. New York: Crown Archetype.

Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology – A critical review and introduction of a two-component model. *Clinical Psychology Review, 26*, 626-653.

Table 1

Means and Standard Deviations for All Continuous Variables Included in the Main Path Model.

Variable	<i>M</i>	<i>SD</i>
Age	39.63	13.64
Education	4.68	1.53
Age at Main Event	24.22	14.25
Distress at Main Event	4.30	0.95
Lifetime Number of Events	11.13	6.92
Intrusive Rumination	3.90	1.53
Deliberate Rumination	3.51	1.32
PTG Relationships	22.65	9.22
PTG New Possibilities	15.95	7.55
PTG Personal Strength	14.41	6.01
PTG Spirituality	6.13	3.60
PTG Appreciation for Life	11.58	4.37
PTD Relationships	15.91	8.29
PTD New Possibilities	9.57	5.81
PTD Personal Strength	8.15	4.86
PTD Spirituality	3.68	2.68
PTD Appreciation for Life	5.68	3.58
Breadth of Creativity	12.11	7.64
Perceived Creative Growth	17.13	7.41

Table 2a

Unstandardized Estimates, Standard Errors, p-values, and Standardized Estimates for Regression and Covariance Paths Included in the Main Path Model.

			<i>Unstd</i>	<i>SE</i>	<i>p</i>	<i>Std</i>
Regression Paths						
Age	→	Distress at Main Event	0.00	0.01	.77	-.02
Gender	→	Distress at Main Event	0.46	0.12	<.01	.20
Education	→	Distress at Main Event	-0.01	0.03	.80	-.01
Ethnicity	→	Distress at Main Event	0.15	0.13	.26	.06
Age at Main Event	→	Distress at Main Event	0.01	0.00	<.01	.20
Lifetime # Events	→	Distress at Main Event	0.00	0.01	.85	.01
Distress at Main Event						
	→	Intrusive Rumination	0.43	0.09	<.01	.27
Age	→	Intrusive Rumination	0.02	0.01	<.01	.17
Gender	→	Intrusive Rumination	0.68	0.17	<.01	.19
Education	→	Intrusive Rumination	-0.09	0.05	.09	-.09
Ethnicity	→	Intrusive Rumination	0.02	0.18	.92	.01
Age at Main Event	→	Intrusive Rumination	-0.01	0.01	.21	-.07
Lifetime # Events	→	Intrusive Rumination	0.04	0.01	<.01	.18
Distress at Main Event						
	→	Deliberate Rumination	0.16	0.07	.03	.11
Age	→	Deliberate Rumination	0.00	0.01	.71	.02
Gender	→	Deliberate Rumination	0.24	0.17	.15	.08
Education	→	Deliberate Rumination	0.04	0.05	.38	.05
Ethnicity	→	Deliberate Rumination	-0.12	0.17	.46	-.04
Age at Main Event	→	Deliberate Rumination	0.01	0.01	.02	.14
Lifetime # Events	→	Deliberate Rumination	0.05	0.01	<.01	.25
Intrusive Rumination						
	→	PTG Relationships	-0.12	0.36	.75	-.02
Deliberate Rumination						
	→	PTG Relationships	2.85	0.42	<.01	.41
Age	→	PTG Relationships	0.04	0.04	.28	.06
Gender	→	PTG Relationships	0.74	1.06	.49	.03
Education	→	PTG Relationships	-0.29	0.30	.34	-.05
Ethnicity	→	PTG Relationships	-2.19	1.10	.05	-.10
Age at Main Event	→	PTG Relationships	0.03	0.04	.43	.05
Lifetime # Events	→	PTG Relationships	0.04	0.07	.60	.03
Intrusive Rumination						
	→	PTG Possibilities	-0.09	0.26	.75	-.02
Deliberate Rumination						
	→	PTG Possibilities	2.71	0.29	<.01	.48
Age	→	PTG Possibilities	0.03	0.03	.26	.06

Gender	→	PTG Possibilities	0.83	0.85	.33	.05
Education	→	PTG Possibilities	0.09	0.24	.72	.02
Ethnicity	→	PTG Possibilities	-1.38	0.89	.12	-.08
Age at Main Event	→	PTG Possibilities	-0.03	0.03	.36	-.05
Lifetime # Events	→	PTG Possibilities	0.11	0.06	.05	.11
Intrusive Rumination Deliberate	→	PTG Strength	0.10	0.24	.67	.03
Rumination	→	PTG Strength	1.69	0.27	<.01	.37
Age	→	PTG Strength	0.02	0.03	.45	.04
Gender	→	PTG Strength	0.67	0.71	.35	.05
Education	→	PTG Strength	0.17	0.21	.42	.04
Ethnicity	→	PTG Strength	-0.61	0.69	.37	-.04
Age at Main Event	→	PTG Strength	-0.03	0.03	.19	-.08
Lifetime # Events	→	PTG Strength	0.06	0.04	.20	.07
Intrusive Rumination Deliberate	→	PTG Spirituality	-0.08	0.15	.62	-.03
Rumination	→	PTG Spirituality	0.81	0.16	<.01	.30
Age	→	PTG Spirituality	0.04	0.02	.01	.14
Gender	→	PTG Spirituality	0.23	0.40	.57	.03
Education	→	PTG Spirituality	0.03	0.12	.80	.01
Ethnicity	→	PTG Spirituality	-1.33	0.44	<.01	-.15
Age at Main Event	→	PTG Spirituality	0.00	0.02	.82	-.01
Lifetime # Events	→	PTG Spirituality	0.05	0.03	.09	.09
Intrusive Rumination Deliberate	→	PTG Appreciation	0.04	0.15	.81	.01
Rumination	→	PTG Appreciation	1.47	0.17	<.01	.45
Age	→	PTG Appreciation	0.00	0.02	.96	.00
Gender	→	PTG Appreciation	0.18	0.51	.73	.02
Education	→	PTG Appreciation	-0.20	0.14	.14	-.07
Ethnicity	→	PTG Appreciation	-0.71	0.49	.15	-.07
Age at Main Event	→	PTG Appreciation	0.00	0.02	.88	.01
Lifetime # Events	→	PTG Appreciation	0.04	0.03	.25	.06
Intrusive Rumination Deliberate	→	PTD Relationships	1.51	0.33	<.01	.28
Rumination	→	PTD Relationships	0.01	0.37	.98	.00
Age	→	PTD Relationships	0.02	0.03	.51	.04
Gender	→	PTD Relationships	1.36	0.97	.16	.07
Education	→	PTD Relationships	0.09	0.29	.76	.02
Ethnicity	→	PTD Relationships	-0.83	0.95	.38	-.04
Age at Main Event	→	PTD Relationships	-0.10	0.03	<.01	-.18
Lifetime # Events	→	PTD Relationships	0.24	0.06	<.01	.20
Intrusive Rumination Deliberate	→	PTD Possibilities	1.23	0.24	<.01	.32
Rumination	→	PTD Possibilities	-0.17	0.26	.51	-.04

Age	→	PTD Possibilities	-0.01	0.02	.77	-.02
Gender	→	PTD Possibilities	-0.18	0.73	.81	-.01
Education	→	PTD Possibilities	-0.01	0.22	.97	.00
Ethnicity	→	PTD Possibilities	-1.09	0.67	.11	-.08
Age at Main Event	→	PTD Possibilities	0.00	0.02	.95	.00
Lifetime # Events	→	PTD Possibilities	0.07	0.04	.15	.08
Intrusive Rumination Deliberate	→	PTD Strength	0.76	0.19	<.01	.24
Rumination	→	PTD Strength	0.04	0.22	.84	.01
Age	→	PTD Strength	0.01	0.02	.55	.04
Gender	→	PTD Strength	0.38	0.61	.53	.03
Education	→	PTD Strength	-0.22	0.20	.27	-.07
Ethnicity	→	PTD Strength	-1.19	0.59	.04	-.10
Age at Main Event	→	PTD Strength	-0.02	0.02	.34	-.06
Lifetime # Events	→	PTD Strength	0.07	0.04	.06	.10
Intrusive Rumination Deliberate	→	PTD Spirituality	0.42	0.10	<.01	.24
Rumination	→	PTD Spirituality	0.03	0.11	.82	.01
Age	→	PTD Spirituality	0.00	0.01	.88	.01
Gender	→	PTD Spirituality	-0.64	0.33	.05	-.10
Education	→	PTD Spirituality	-0.02	0.10	.80	-.01
Ethnicity	→	PTD Spirituality	-0.08	0.31	.80	-.01
Age at Main Event	→	PTD Spirituality	-0.03	0.01	.03	-.13
Lifetime # Events	→	PTD Spirituality	0.03	0.02	.22	.06
Intrusive Rumination Deliberate	→	PTD Appreciation	0.70	0.15	<.01	.30
Rumination	→	PTD Appreciation	-0.25	0.16	.12	-.09
Age	→	PTD Appreciation	0.01	0.02	.40	.05
Gender	→	PTD Appreciation	-0.38	0.46	.40	-.05
Education	→	PTD Appreciation	-0.09	0.15	.55	-.04
Ethnicity	→	PTD Appreciation	-0.95	0.45	.04	-.11
Age at Main Event	→	PTD Appreciation	-0.01	0.02	.38	-.06
Lifetime # Events	→	PTD Appreciation	0.05	0.03	.05	.11
Distress at Main Event	→	Perceived Creative Growth	0.43	0.31	.17	.06
Intrusive Rumination Deliberate	→	Perceived Creative Growth	0.06	0.24	.80	.01
Rumination	→	Perceived Creative Growth	0.75	0.29	.01	.13
PTG Relations	→	Perceived Creative Growth	0.14	0.06	.03	.17
PTG Possibilities	→	Perceived Creative Growth	0.36	0.08	<.01	.37
PTG Strength	→	Perceived Creative Growth	0.05	0.10	.61	.04
PTG Spirituality	→	Perceived Creative Growth	0.00	0.13	.99	.00
PTG Appreciation	→	Perceived Creative Growth	0.04	0.12	.77	.02
PTD Relations	→	Perceived Creative Growth	0.16	0.06	.01	.18
PTD Possibilities	→	Perceived Creative Growth	-0.20	0.11	.06	-.16

PTD Strength	→	Perceived Creative Growth	-0.05	0.12	.67	-.04
PTD Spirituality	→	Perceived Creative Growth	-0.07	0.14	.60	-.03
PTD Appreciation	→	Perceived Creative Growth	0.22	0.16	.18	.11
Age	→	Perceived Creative Growth	0.00	0.03	1.00	.00
Gender	→	Perceived Creative Growth	0.50	0.69	.47	.03
Education	→	Perceived Creative Growth	-0.06	0.21	.79	-.01
Ethnicity	→	Perceived Creative Growth	0.08	0.80	.92	.00
Age at Main Event	→	Perceived Creative Growth	-0.06	0.02	.02	-.11
Lifetime # Events	→	Perceived Creative Growth	-0.04	0.04	.35	-.04
Distress at Main Event						
Distress at Main Event	→	Breadth of Creativity	0.42	0.41	.31	.05
Intrusive Rumination Deliberate	→	Breadth of Creativity	0.39	0.30	.20	.08
Rumination	→	Breadth of Creativity	0.23	0.38	.54	.04
PTG Relations	→	Breadth of Creativity	-0.07	0.08	.37	-.08
PTG Possibilities	→	Breadth of Creativity	0.04	0.09	.61	.04
PTG Strength	→	Breadth of Creativity	0.39	0.14	<.01	.31
PTG Spirituality	→	Breadth of Creativity	-0.24	0.14	.09	-.11
PTG Appreciation	→	Breadth of Creativity	-0.10	0.13	.42	-.06
PTD Relations	→	Breadth of Creativity	-0.07	0.09	.43	-.07
PTD Possibilities	→	Breadth of Creativity	0.31	0.13	.02	.24
PTD Strength	→	Breadth of Creativity	0.07	0.17	.67	.05
PTD Spirituality	→	Breadth of Creativity	-0.24	0.18	.17	-.09
PTD Appreciation	→	Breadth of Creativity	-0.40	0.19	.04	-.19
Age	→	Breadth of Creativity	0.05	0.03	.12	.09
Gender	→	Breadth of Creativity	1.67	0.84	.05	.09
Education	→	Breadth of Creativity	0.20	0.27	.45	.04
Ethnicity	→	Breadth of Creativity	0.87	0.88	.32	.05
Age at Main Event	→	Breadth of Creativity	-0.06	0.03	.08	-.10
Lifetime # Events	→	Breadth of Creativity	0.27	0.06	<.01	.25
Covariance Paths						
Gender	↔	Age	0.57	0.32	.08	.10
Education	↔	Age	4.39	1.07	<.01	.21
Ethnicity	↔	Age	1.32	0.28	<.01	.24
Age at Main Event	↔	Age	90.07	11.22	<.01	.47
Lifetime # Events	↔	Age	11.25	4.76	.02	-.12
Education	↔	Gender	0.06	0.03	.06	.10
Ethnicity	↔	Gender	0.01	0.01	.17	.08
Age at Main Event	↔	Gender	0.48	0.31	.12	.08
Lifetime # Events	↔	Gender	-0.22	0.15	.14	-.08
Ethnicity	↔	Education	-0.01	0.03	.76	-.02
Age at Main Event	↔	Education	-0.94	1.17	.42	-.04
Lifetime # Events	↔	Education	-1.35	0.54	.01	-.13

Age at Main Event	↔	Ethnicity	0.66	0.28	.02	.11
Lifetime # Events	↔	Ethnicity	-0.01	0.15	.94	.00
			-			
Lifetime # Events	↔	Age at Main Event	11.67	4.82	.02	-.12
Deliberate Rumination	↔	Intrusive Rumination	0.68	0.09	<.01	.40
PTG Possibilities	↔	PTG Relationships	32.79	2.93	<.01	.61
PTG Strength	↔	PTG Relationships	26.86	2.53	<.01	.59
PTG Spirituality	↔	PTG Relationships	12.84	1.46	<.01	.46
PTG Appreciation	↔	PTG Relationships	19.01	1.74	<.01	.60
			-			
PTD Relations	↔	PTG Relationships	16.27	3.46	<.01	-.26
PTD Possibilities	↔	PTG Relationships	-5.35	2.34	.02	-.12
PTD Strength	↔	PTG Relationships	-4.45	2.04	.03	-.12
PTD Spirituality	↔	PTG Relationships	-1.73	1.09	.11	-.08
PTD Appreciation	↔	PTG Relationships	-3.14	1.54	.04	-.11
			-			
PTG Strength	↔	PTG Possibilities	25.30	2.01	<.01	.72
PTG Spirituality	↔	PTG Possibilities	9.98	1.16	<.01	.46
PTG Appreciation	↔	PTG Possibilities	15.89	1.40	<.01	.64
PTD Relations	↔	PTG Possibilities	2.06	2.37	.39	.04
PTD Possibilities	↔	PTG Possibilities	-5.77	1.94	<.01	-.16
PTD Strength	↔	PTG Possibilities	-5.63	1.65	<.01	-.19
PTD Spirituality	↔	PTG Possibilities	0.35	0.89	.70	.02
PTD Appreciation	↔	PTG Possibilities	-2.97	1.25	.02	-.14
			-			
PTG Spirituality	↔	PTG Strength	9.15	0.94	<.01	.50
PTG Appreciation	↔	PTG Strength	13.00	1.21	<.01	.62
PTD Relations	↔	PTG Strength	-0.55	2.13	.80	-.01
PTD Possibilities	↔	PTG Strength	-6.86	1.71	<.01	-.23
			-			
PTD Strength	↔	PTG Strength	10.27	1.61	<.01	-.41
PTD Spirituality	↔	PTG Strength	-1.21	0.71	.09	-.09
PTD Appreciation	↔	PTG Strength	-3.75	1.12	<.01	-.20
			-			
PTG Appreciation	↔	PTG Spirituality	5.79	0.66	<.01	.45
PTD Relations	↔	PTG Spirituality	-0.74	1.22	.54	-.03
PTD Possibilities	↔	PTG Spirituality	-0.66	1.00	.51	-.04
PTD Strength	↔	PTG Spirituality	-1.72	0.78	.03	-.11
PTD Spirituality	↔	PTG Spirituality	-2.86	0.46	<.01	-.34
PTD Appreciation	↔	PTG Spirituality	-0.65	0.59	.27	-.06
			-			
PTD Relations	↔	PTG Appreciation	-5.15	1.54	<.01	-.18
PTD Possibilities	↔	PTG Appreciation	-5.91	1.14	<.01	-.28
PTD Strength	↔	PTG Appreciation	-4.89	1.01	<.01	-.28
PTD Spirituality	↔	PTG Appreciation	-1.44	0.51	.01	-.15

PTD Appreciation	↔	PTG Appreciation	-4.23	0.73	<.01	-.33
PTD Possibilities	↔	PTD Relationships	25.81	2.56	<.01	.63
PTD Strength	↔	PTD Relationships	19.77	2.09	<.01	.57
PTD Spirituality	↔	PTD Relationships	8.03	1.16	<.01	.42
PTD Appreciation	↔	PTD Relationships	15.21	1.63	<.01	.60
PTD Strength	↔	PTD Possibilities	19.31	1.91	<.01	.76
PTD Spirituality	↔	PTD Possibilities	4.94	0.87	<.01	.35
PTD Appreciation	↔	PTD Possibilities	14.87	1.48	<.01	.80
PTD Spirituality	↔	PTD Strength	4.12	0.70	<.01	.35
PTD Appreciation	↔	PTD Strength	10.62	1.22	<.01	.68
PTD Appreciation	↔	PTD Spirituality	3.19	0.57	<.01	.37
Breadth of Creativity	↔	Perceived Creative Growth	4.77	1.90	.01	.13

Table 2b

Unstandardized Estimates, Standard Errors, p-values, and Standardized Estimates for Indirect Effects Tested in the Main Path Model.

			<i>Unstd</i>	<i>SE</i>	<i>p</i>	<i>Std</i>
Sum	Intrusive Rumination	→ Perceived Creative Growth	0.03	0.17	.84	.01
Intrusive Rumination	→ PTD Relationships	→ Perceived Creative Growth	0.25	0.11	.02	.05
Intrusive Rumination	→ PTD Possibilities	→ Perceived Creative Growth	-0.25	0.14	.08	-.05
Intrusive Rumination	→ PTD Strength	→ Perceived Creative Growth	-0.04	0.10	.68	-.01
Intrusive Rumination	→ PTD Spirituality	→ Perceived Creative Growth	-0.03	0.06	.62	-.01
Intrusive Rumination	→ PTD Appreciation	→ Perceived Creative Growth	0.15	0.12	.21	.03
Intrusive Rumination	→ PTG Relationships	→ Perceived Creative Growth	-0.02	0.05	.77	.00
Intrusive Rumination	→ PTG Possibilities	→ Perceived Creative Growth	-0.03	0.10	.75	-.01
Intrusive Rumination	→ PTG Strength	→ Perceived Creative Growth	0.01	0.03	.85	.00
Intrusive Rumination	→ PTG Spirituality	→ Perceived Creative Growth	0.00	0.02	.99	.00
Intrusive Rumination	→ PTG Appreciation	→ Perceived Creative Growth	0.00	0.02	.95	.00
Sum	Deliberate Rumination	→ Perceived Creative Growth	1.48	0.22	.00	.27
Deliberate Rumination	→ PTD Relationships	→ Perceived Creative Growth	0.00	0.07	.98	.00
Deliberate Rumination	→ PTD Possibilities	→ Perceived Creative Growth	0.04	0.06	.58	.01
Deliberate Rumination	→ PTD Strength	→ Perceived Creative Growth	0.00	0.03	.94	.00
Deliberate Rumination	→ PTD Spirituality	→ Perceived Creative Growth	0.00	0.02	.92	.00
Deliberate Rumination	→ PTD Appreciation	→ Perceived Creative Growth	-0.05	0.06	.37	-.01
Deliberate Rumination	→ PTG Relationships	→ Perceived Creative Growth	0.38	0.18	.03	.07
Deliberate Rumination	→ PTG Possibilities	→ Perceived Creative Growth	0.98	0.25	.00	.18
Deliberate Rumination	→ PTG Strength	→ Perceived Creative Growth	0.09	0.17	.62	.02
Deliberate Rumination	→ PTG Spirituality	→ Perceived Creative Growth	0.00	0.10	.99	.00
Deliberate Rumination	→ PTG Appreciation	→ Perceived Creative Growth	0.05	0.18	.77	.01
Sum	Intrusive Rumination	→ Breadth of Creativity	0.01	0.14	.93	.00

Intrusive Rumination	→ PTD Relationships	→ Breadth of Creativity	-0.10	0.13	.44	-.02
Intrusive Rumination	→ PTD Possibilities	→ Breadth of Creativity	0.39	0.18	.03	.08
Intrusive Rumination	→ PTD Strength	→ Breadth of Creativity	0.06	0.14	.69	.01
Intrusive Rumination	→ PTD Spirituality	→ Breadth of Creativity	-0.10	0.08	.20	-.02
Intrusive Rumination	→ PTD Appreciation	→ Breadth of Creativity	-0.28	0.15	.05	-.06
Intrusive Rumination	→ PTG Relationships	→ Breadth of Creativity	0.01	0.04	.84	.00
Intrusive Rumination	→ PTG Possibilities	→ Breadth of Creativity	0.00	0.03	.88	.00
Intrusive Rumination	→ PTG Strength	→ Breadth of Creativity	0.04	0.10	.69	.01
Intrusive Rumination	→ PTG Spirituality	→ Breadth of Creativity	0.02	0.04	.67	.00
Intrusive Rumination	→ PTG Appreciation	→ Breadth of Creativity	0.00	0.03	.88	.00
Sum	Deliberate Rumination	→ Breadth of Creativity	0.29	0.19	.14	.05
Deliberate Rumination	→ PTD Relationships	→ Breadth of Creativity	0.00	0.04	.99	.00
Deliberate Rumination	→ PTD Possibilities	→ Breadth of Creativity	-0.05	0.09	.56	-.01
Deliberate Rumination	→ PTD Strength	→ Breadth of Creativity	0.00	0.04	.94	.00
Deliberate Rumination	→ PTD Spirituality	→ Breadth of Creativity	-0.01	0.03	.85	.00
Deliberate Rumination	→ PTD Appreciation	→ Breadth of Creativity	0.10	0.09	.26	.02
Deliberate Rumination	→ PTG Relationships	→ Breadth of Creativity	-0.19	0.22	.39	-.03
Deliberate Rumination	→ PTG Possibilities	→ Breadth of Creativity	0.12	0.24	.61	.02
Deliberate Rumination	→ PTG Strength	→ Breadth of Creativity	0.67	0.26	.01	.12
Deliberate Rumination	→ PTG Spirituality	→ Breadth of Creativity	-0.19	0.12	.11	-.03
Deliberate Rumination	→ PTG Appreciation	→ Breadth of Creativity	-0.15	0.19	.43	-.03

Table 3

Results of Multiple Regression Analyses Testing Whether the Personality Trait of Openness to Experience Moderated the Relationship Between Distress at Main Event and Self-Reported Creativity Outcomes Including Unstandardized B Estimates, Standard Errors, Standardized B Estimates, t- and p-Values.

Variables	Perceived Creative Growth					Breadth of Creativity				
	B	SE	β	<i>t</i>	<i>p</i>	B	SE	β	<i>T</i>	<i>p</i>
Constant	16.76	2.61	.90	6.42	<.001	5.43	2.51	.38	2.16	.03
Age	0.04	0.03	.08	1.10	.27	0.05	0.03	.14	1.56	.12
Gender	1.42	0.93	.14	1.53	.13	1.58	0.89	.20	1.77	.08
Ethnicity	-1.03	0.92	-.05	-1.11	.27	0.64	0.89	.04	0.72	.47
Education	-0.17	0.26	-.05	-0.66	.51	-0.05	0.25	-.02	-0.21	.83
Age at Main Event	-0.06	0.03	-.09	-1.82	.07	-0.02	0.03	-.04	-0.72	.47
Life Number of Events	0.11	0.05	.07	1.93	.05	0.23	0.05	.21	4.44	<.001
Main Event Kind: Natural Disaster	-0.62	2.16	-.01	-0.29	.77	-0.37	2.08	-.01	-0.18	.86
Main Event Kind: Accidents	-5.79	1.55	-.11	-3.73	<.001	-2.51	1.50	-.06	-1.68	.09
Main Event Kind: Physical Assault	0.31	1.80	.00	0.17	.86	-0.30	1.73	-.01	-0.17	.86
Main Event Kind: Sexual Assault	-3.01	1.59	-.06	-1.89	.06	0.50	1.54	.01	0.33	.74
Main Event Kind: Combat	-1.19	3.35	-.01	-0.35	.72	-1.76	3.22	-.01	-0.55	.58
Main Event Kind: Illness	-1.12	1.36	-.03	-0.83	.41	0.14	1.31	.00	0.11	.92
Main Event Kind: Death	-1.74	1.41	-.04	-1.23	.22	-1.18	1.36	-.04	-0.87	.38
Main Event Kind: Harm to Others	-0.96	3.34	-.01	-0.29	.77	-0.63	3.22	-.01	-0.20	.84
Distress at Main Event (centered)	0.87	0.42	.04	2.08	.04	0.41	0.40	.03	1.01	.32
Openness to Experience (centered)	0.12	0.04	.07	3.46	<.001	0.24	0.03	.19	7.14	<.001
Distress x Openness Interaction	0.08	0.04	.05	2.34	.02	0.07	0.03	.05	2.11	.04

Table 4

Results of the Multiple Regression Analysis Examining the Relationship Between Self-Reported Creativity Outcomes and Peak Creative Achievement Scores, Including Unstandardized B Coefficients, Standard Errors, Standardized B Coefficients, t- and p-Values.

Variables	B	SE	β	<i>t</i>	<i>p</i>
Constant	2.92	0.37		7.96	<.001
Age	0.01	0.01	.09	0.98	.33
Gender	0.06	0.13	.03	0.49	.63
Education	0.03	0.04	.05	0.74	.46
Age at Peak	0.00	0.01	-.01	-0.13	.90
Event-Peak Interval	-0.01	0.01	-.13	-1.75	.08
Ethnicity	0.02	0.14	.01	0.13	.90
Main Creative Area: Entrepreneurship	0.15	0.30	.03	0.49	.63
Main Creative Area: Performance	-0.12	0.23	-.04	-0.52	.60
Main Creative Area: Math/Science	-0.03	0.38	-.01	-0.08	.94
Main Creative Area: Artistic/Visual	-0.17	0.19	-.07	-0.88	.38
Main Creative Area: Problem Solving	-0.68	0.24	-.21	-2.82	.01
Main Creative Area: Interpersonal	-0.60	0.17	-.32	-3.50	<.001
Breadth of Creativity	0.02	0.01	.14	2.30	.02
Perceived Creative Growth	-0.01	0.01	-.05	-0.74	.46

Table 5

Estimated Marginal Means, Standard Errors, and Sample Sizes for Main Creative Area Endorsed (Covarying Age, Gender, Ethnicity, and Education).

Main Creative Area	<i>M</i>	<i>SE</i>	<i>n</i>
Entrepreneur	3.43	0.27	12
Artistic/Verbal	3.37	0.15	37
Math/Science	3.33	0.35	7
Performance	3.30	0.18	26
Artistic/Visual	3.18	0.12	55
Interpersonal	2.76	0.09	114
Problem Solving	2.73	0.19	24

Table 6

Estimated Marginal Means, Standard Errors, and Sample Sizes for Main Event Kind (Covarying Age, Gender, Ethnicity, Education, Age at Main Event and Distress at Main Event).

Type of Event	<i>M</i>	<i>SE</i>	<i>n</i>
Physical Assault	21.14	2.17	28
Harm to Others	19.86	3.40	5
Natural Disasters	17.75	1.89	15
Illnesses	17.59	0.91	97
Other	17.28	1.47	38
Death	17.00	0.90	85
Combat	16.25	3.46	5
Sexual Assault	14.47	2.69	56
Accidents	11.25	1.47	44

Table 7

Results of Multiple Regression Analyses Examining Relationships Between Lifetime Number of Events and Creativity Outcomes, Including Unstandardized B Estimates, Standard Errors, Standardized B Estimates, t- and p-Values.

	B	SE	β	t	p
7a. Perceived Creative Growth (n = 373)					
(Constant)	11.65	2.33		5.01	<.01
Age	0.01	0.03	.02	0.33	.74
Gender	2.06	0.92	.12	2.24	.03
Ethnicity	-0.96	0.96	-.05	-1.01	.31
Education	0.09	0.26	.02	0.35	.73
Lifetime # Events	0.16	0.06	.15	2.88	<.01
7b. Breadth of Creativity (n = 373)					
(Constant)	0.16	2.31		0.07	.94
Age	0.03	0.03	.05	0.94	.35
Gender	2.68	0.91	.15	2.94	<.01
Ethnicity	1.19	0.95	.06	1.25	.21
Education	0.36	0.26	.07	1.42	.16
Lifetime # Events	0.31	0.06	.28	5.63	<.01
7c. Peak Creative Achievement (n = 296)					
(Constant)	2.53	0.33		7.77	<.01
Age	0.01	0.01	.11	1.26	.21
Gender	0.05	0.13	.02	0.40	.69
Ethnicity	0.01	0.14	.01	0.08	.93
Education	0.06	0.04	.09	1.42	.16
Age at Peak	-0.01	0.01	-.10	-1.16	.25
Lifetime # Events	0.00	0.01	.03	0.45	.65

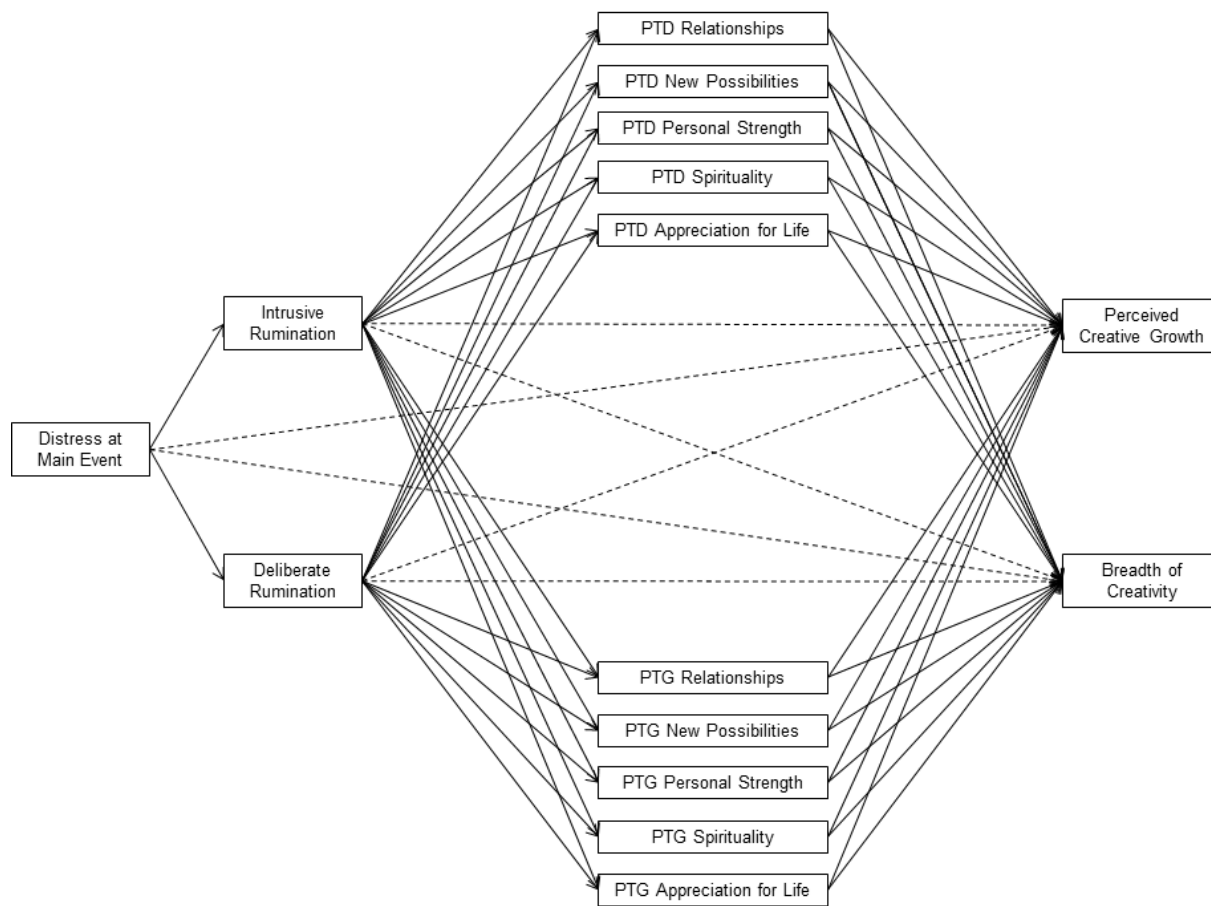


Figure 1. Main path model tested. Dotted lines represent the six direct paths constrained to zero in the nested mediation model.

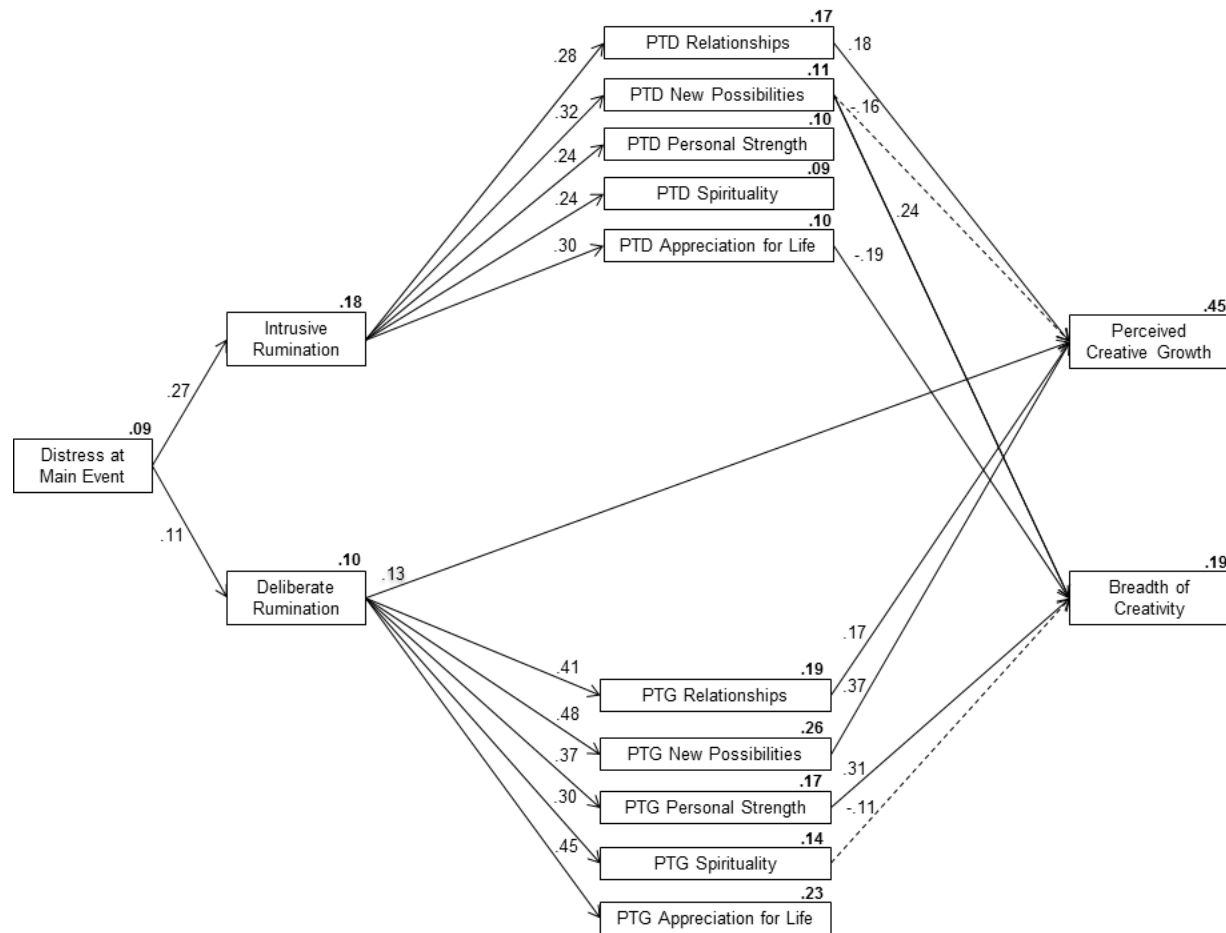
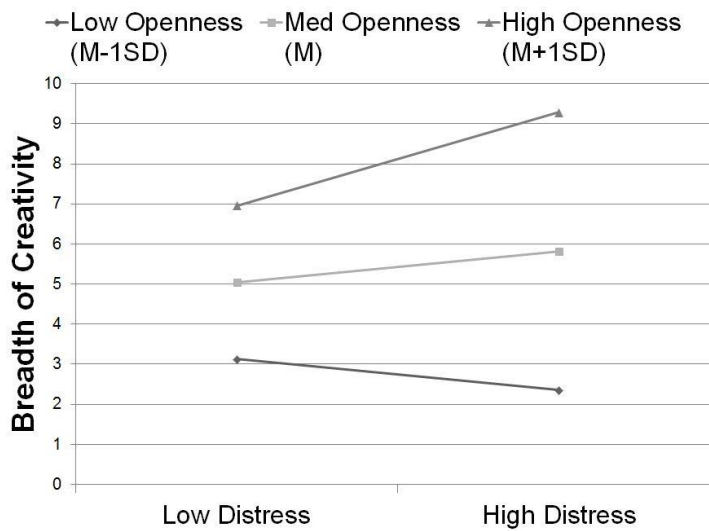
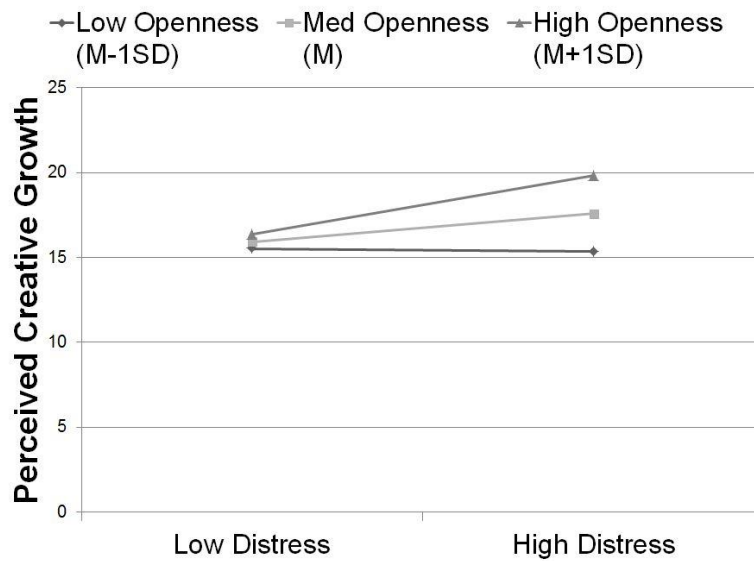


Figure 2. Results of the path analysis (including standardized path coefficients and squared multiple correlations). Regression paths approaching significance appear in dotted lines.



Figures 3a and 3b. Moderation effects depicted using Preacher et al.'s (2006) computational tool for probing interaction effects. Low and high distress represent M-1SD and M+1SD respectively.

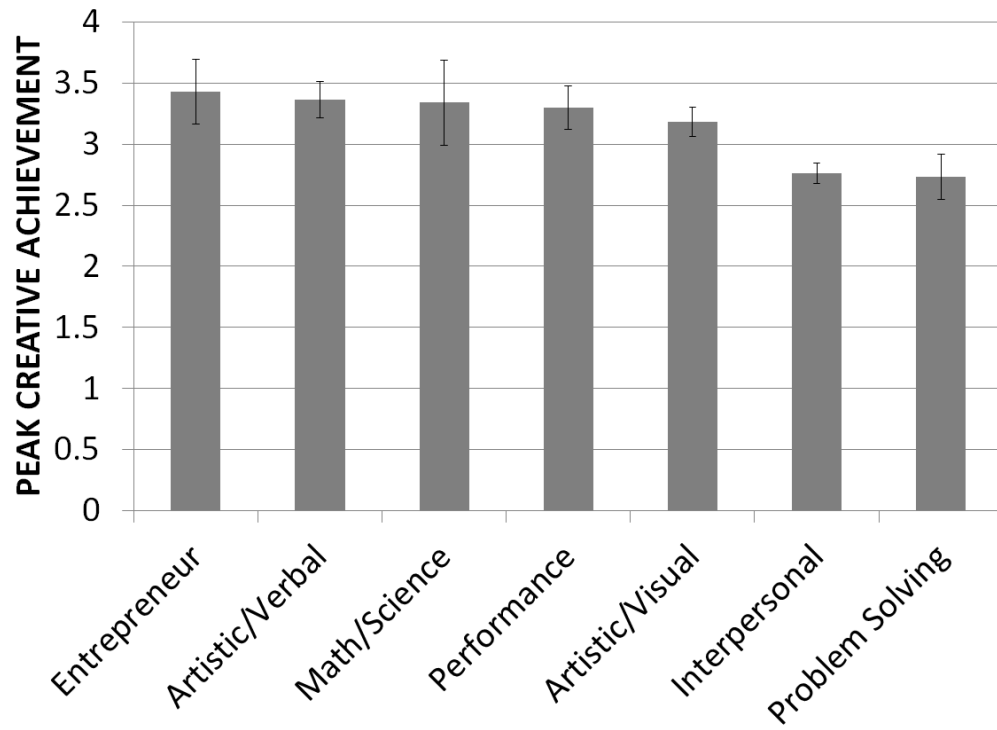


Figure 4. Peak Creative Achievement Scores by Main Creative Area endorsed (covarying age, gender, ethnicity, and education). Error bars represent standard errors.

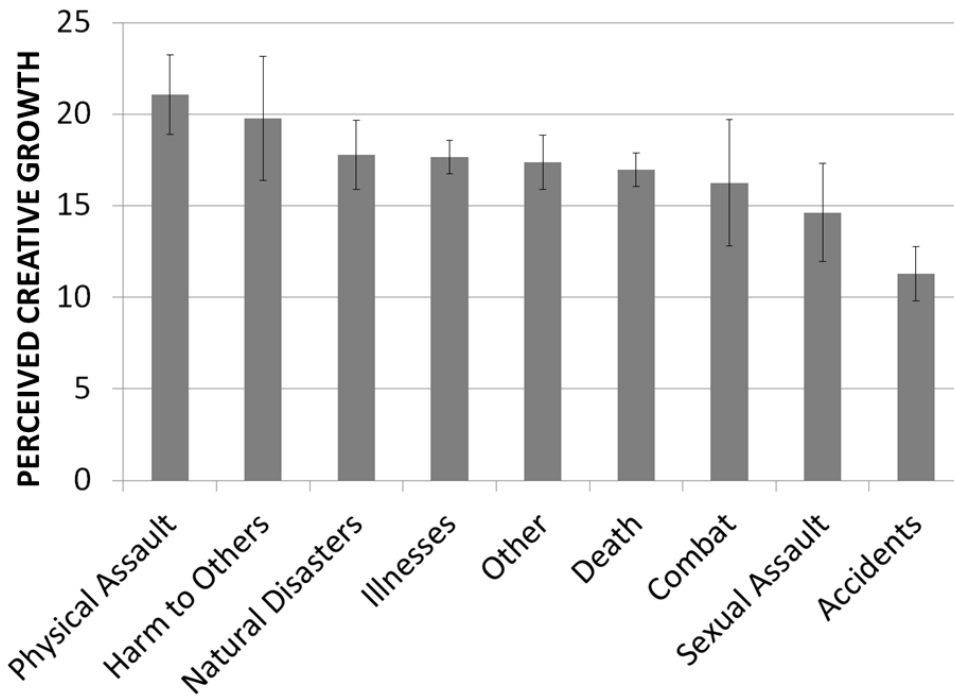


Figure 5. Perceived Creative Growth by Main Event Kind (covarying age, gender, ethnicity, education, Age at Main Event and Distress at Main Event). Error bars represent standard errors.

Appendix A*Perceived Creative Growth Scale*

Items included in the final version of the scale:

1. The difficult event I experienced made me a more creative person.
2. Engaging in a creative activity helped me cope with the difficult event I went through.
3. The pain I felt after experiencing the difficult event gave me an urge to become more creative.
4. The difficult event I went through allowed me to be more open to new ideas.
5. Creative activities helped me deal with the feelings I developed as a result of the difficult event I went through.
6. The difficult event I went through gave me a greater appreciation for the personal benefits of creative activities.

Items excluded from the final version of the scale:

1. The difficult event I went through made me question the point of engaging in creative activities.
2. The difficult event I went through discouraged me from pursuing creative activities

Appendix B

Correlations (Pearson's r) and p -values for All Continuous Variables Included in the Main Path Model

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 Age	r	1.00	.21	.46	.10	-.12	.15	.08	.08	.05	.04	.11	.01	-.03	.00	.00	-.04	.01	.00	.06
	p		<.001	<.001	.05	.02	<.001	.13	.14	.33	.48	.03	.89	.59	.98	1.00	.42	.89	.96	.24
2 Education	r	.21	1.00	-.04	-.01	-.13	-.06	.02	-.03	.04	.06	.05	-.07	.00	-.04	-.08	-.04	-.06	.01	.06
	p	<.001		.41	.86	.01	.26	.68	.62	.49	.26	.38	.20	.96	.50	.12	.47	.24	.77	.25
3 Age at Main Event	r	.46	-.04	1.00	.21	-.12	.06	.15	.12	.03	-.01	.07	.07	-.16	-.01	-.04	-.13	-.05	-.07	-.05
	p	<.001	.41		<.001	.02	.21	<.001	.02	.55	.84	.20	.21	<.001	.89	.46	.01	.30	.20	.34
4 Distress at Main Event	r	.10	-.01	.21	1.00	-.02	.31	.15	.10	.09	.11	.06	.16	.06	.01	.01	.03	-.01	.13	.10
	p	.05	.86	<.001		.64	<.001	<.001	.04	.08	.03	.25	<.001	.22	.78	.91	.57	.86	.01	.05
5 Lifetime Number of Events	r	-.12	-.13	-.12	-.02	1.00	.15	.22	.10	.20	.14	.13	.17	.25	.12	.14	.13	.14	.14	.26
	p	.02	.01	.02	.64		<.001	<.001	.04	<.001	.01	.01	<.001	<.001	.02	.01	.01	.01	.01	<.001
6 Intrusive Rumination	r	.15	-.06	.06	.31	.15	1.00	.44	.18	.22	.21	.12	.22	.31	.31	.26	.22	.26	.23	.20
	p	<.001	.26	.21	<.001	<.001		<.001	<.001	<.001	<.001	.02	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
7 Deliberate Rumination	r	.08	.02	.15	.15	.22	.44	1.00	.42	.49	.39	.32	.47	.15	.12	.13	.10	.05	.41	.19
	p	.13	.68	<.001	<.001	<.001	<.001		<.001	<.001	<.001	<.001	<.001	<.001	.02	.01	.05	.32	<.001	<.001
8 PTG Relationships	r	.08	-.03	.12	.10	.10	.18	.42	1.00	.69	.65	.54	.68	-.15	-.05	-.03	-.04	-.07	.48	.12
	p	.14	.62	.02	.04	.04	<.001	<.001		<.001	<.001	<.001	<.001	<.001	.37	.51	.48	.20	<.001	.02
9 PTG New Possibilities	r	.05	.04	.03	.09	.20	.22	.49	.69	1.00	.77	.54	.72	.14	-.06	-.07	.08	-.07	.62	.20
	p	.33	.49	.55	.08	<.001	<.001	<.001	<.001		<.001	<.001	<.001	.01	.23	.17	.14	.19	<.001	<.001
10 PTG Personal Strength	r	.04	.06	-.01	.11	.14	.21	.39	.65	.77	1.00	.56	.68	.09	-.13	-.28	-.02	-.13	.54	.25
	p	.48	.26	.84	.03	.01	<.001	<.001	<.001	<.001		<.001	<.001	.10	.01	<.001	.71	.01	<.001	<.001
11 PTG Spirituality	r	.11	.05	.07	.06	.13	.12	.32	.54	.54	.56	1.00	.53	.04	.01	-.04	-.27	-.02	.37	.10
	p	.03	.38	.20	.25	.01	.02	<.001	<.001	<.001	<.001		<.001	.48	.79	.42	<.001	.74	<.001	.07
12 PTG Appreciation for Life	r	.01	-.07	.07	.16	.17	.22	.47	.68	.72	.68	.53	1.00	-.05	-.16	-.15	-.07	-.23	.49	.15
	p	.89	.20	.21	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001		.30	<.001	<.001	.20	<.001	<.001	<.001
13 PTSD Relationships	r	-.03	.00	-.16	.06	.25	.31	.15	-.15	.14	.09	.04	-.05	1.00	.65	.61	.47	.62	.18	.11
	p	.59	.96	<.001	.22	<.001	<.001	<.001	<.001	<.001	.01	.10	.48	.30		<.001	<.001	<.001	<.001	<.001
14 PTSD New	r	.00	-.04	-.01	.01	.12	.31	.12	-.05	-.06	-.13	.01	-.16	.65	1.00	.78	.40	.82	-.02	.07

	Possibilities	<i>p</i>	.98	.50	.89	.78	.02	<.001	.02	.37	.23	.01	.79	<.001	<.001		<.001	<.001	<.001	.77	.21
15	PTD Personal Strength	<i>r</i>	.00	-.08	-.04	.01	.14	.26	.13	-.03	-.07	-.28	-.04	-.15	.61	.78	1.00	.39	.70	-.01	.01
		<i>p</i>	1.00	.12	.46	.91	.01	<.001	.01	.51	.17	<.001	.42	<.001	<.001	<.001		<.001	<.001	.85	.83
16	PTD Spirituality	<i>r</i>	-.04	-.04	-.13	.03	.13	.22	.10	-.04	.08	-.02	-.27	-.07	.47	.40	.39	1.00	.41	.07	.00
		<i>p</i>	.42	.47	.01	.57	.01	<.001	.05	.48	.14	.71	<.001	.20	<.001	<.001	<.001		<.001	.17	.93
17	PTD Appreciation for Life	<i>r</i>	.01	-.06	-.05	-.01	.14	.26	.05	-.07	-.07	-.13	-.02	-.23	.62	.82	.70	.41	1.00	.02	-.01
		<i>p</i>	.89	.24	.30	.86	.01	<.001	.32	.20	.19	.01	.74	<.001	<.001	<.001	<.001	<.001		.75	.81
18	Perceived Creative Growth	<i>r</i>	.00	.01	-.07	.13	.14	.23	.41	.48	.62	.54	.37	.49	.18	-.02	-.01	.07	.02	1.00	.23
		<i>p</i>	.96	.77	.20	.01	.01	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001	.77	.85	.17	.75		<.001
19	Breadth of Creativity	<i>r</i>	.06	.06	-.05	.10	.26	.20	.19	.12	.20	.25	.10	.15	.11	.07	.01	.00	-.01	.23	1.00
		<i>p</i>	.24	.25	.34	.05	<.001	<.001	<.001	.02	<.001	<.001	.07	<.001	.03	.21	.83	.93	.81	<.001	

CHAPTER 2:
Extracurricular Involvement and Psychological Adjustment
in the Transition from Adolescence to Emerging Adulthood:
The Role of Mastery and Creative Self-Efficacy

Abstract

Research investigating the benefits of extracurricular activities (ECAs) for adolescents' psychological adjustment has produced inconsistent findings. A better understanding of the mechanisms underlying the effects of ECAs is needed in order to maximize the benefits of participation. We hypothesized that these benefits may be at least partially explained by opportunities for youths to develop feelings of mastery and creative self-efficacy. In this correlational study, 512 freshman and sophomore college students retrospectively reported information about their ECA involvement in high school. In addition, participants completed measures assessing their current psychological adjustment, conceptualized as depression, anxiety and well-being. Results showed that feelings of mastery and creative self-efficacy associated with ECAs explained the relationships between multiple indicators of involvement and psychological adjustment. Results differed by the type of ECA examined (athletic, academic, artistic, and prosocial). In addition, separate analyses demonstrated that feelings of creative self-efficacy across high school ECAs predicted creative achievement but not divergent-thinking abilities at the beginning of college. Results of this preliminary correlational study support the importance of studying the specific mechanisms that may account for the benefits of ECA involvement. Future studies using longitudinal designs are needed to assess the causal nature of these findings.

Keywords: extracurricular activities, mastery, creative self-efficacy, creativity, psychological adjustment, depression, anxiety, well-being, adolescence

**Extracurricular Involvement and Psychological Adjustment
in the Transition from Adolescence to Emerging Adulthood:
The Role of Mastery and Creative Self-Efficacy**

The transition from adolescence to emerging adulthood is an important developmental period that presents significant challenges for the psychological adjustment of youths. During this time of increasing freedom and exploration, emerging adults can for the first time make important life choices on their own, yet do not have many enduring responsibilities (Arnett, 2000). This period can be highly stressful for youths who have not yet fine-tuned the skills needed to make decisions on their own, choose among the paths offered to them, and cope with the lack of structure and uncertainty afforded by their newfound freedom (Schulenberg, Sameroff, & Cichetti, 2004). Given these considerations, life experiences that prepare adolescents to become independent and competent adults may play a particularly important role in fostering psychological adjustment (i.e., low levels of depression and anxiety, as well as high levels of well-being) during this time period. A large body of research suggests that involvement in extracurricular activities (ECAs) during adolescence may provide such opportunities, yet, little is known about the specific mechanisms underlying the benefits of ECAs (Feldman, Farb, & Matjasko, 2012). The present study used a correlational design to assess whether two specific mechanisms – mastery and creative self-efficacy – explain the relationship between ECA involvement during adolescence and psychological adjustment during emerging adulthood.

**Psychological Adjustment in the Transition from Adolescence to Emerging
Adulthood**

Why is it important to understand factors that promote psychological adjustment in youths? The time period ranging from adolescence to emerging adulthood represents an important window of risk for the development of internalizing disorders, including depressive and anxiety disorders (Cleary, Walter, & Jackson, 2011). Empirical evidence indicates that approximately three fourths of individuals who develop a psychological disorder in their lifetime experienced the first onset of their difficulties by age 24 (Kessler et al., 2005; Kessler et al., 2007). At any given time, more than 20% of youths aged 11 to 19 years meet criteria for a psychological disorder, and these are often accompanied by comorbid diagnoses (Costello, Copeland, & Angold, 2011; Kessler, Avenevoli, & Merikangas, 2001).

Although many youths recover, understanding, preventing, and treating psychopathology in adolescence and emerging adulthood is especially important because the early onset of psychopathology predicts worse outcomes in the long-run (Kessler et al., 2007), including higher risks of recurrence (e.g., Fergusson, Boden, & Horwood, 2007; Fergusson, Horwood, Ridder, & Beautrais, 2005; Fombonne, Wostear, Cooper, Harrington, & Rutter, 2001; Lewinsohn, Rohde, Klein, & Seeley, 1999; Woodward & Fergusson, 2001; Weissman et al., 1999), lower educational and occupational attainment, interpersonal and social difficulties, as well as higher levels of exposure to stress and adversity (Breslau, Lane, Sampson, & Kessler, 2008; Fergusson et al., 2007; Fergusson & Woodward, 2002; Kessler et al., 1994; Kessler, Foster, Saunders, & Stang, 1995; Lewinsohn, Rohde, Seeley, Klein, & Gotlib, 2003; Woodward & Fergusson, 2001).

Beyond the prevention of psychopathology, researchers and clinicians have also emphasized the importance of fostering well-being through positive youth development

(e.g., Park, 2004). Well-being encompasses positive subjective states (including feelings and cognitions), as well as desirable and meaningful behaviors (Forgeard, Jayawickreme, Kern, & Seligman, 2011; Ryan & Deci, 2001). Well-being and positive youth development in adolescence are linked to positive social, intellectual, emotional and health outcomes which may have lasting benefits throughout the lifespan (e.g., Gilman & Huebner, 2006; Huebner, 2004; Lerner, Phelps, Forman, & Bowers, 2009; Park, 2004).

Extracurricular Involvement and Psychological Adjustment

In light of the prevalence and impact of psychopathology among youths, as well as the importance of fostering well-being, it is important to understand what experiences predict successful adjustment during this period of life. The present correlational study examined whether and how extracurricular activity (ECA) involvement in high school predicted psychological adjustment during the transition to college. College students suffer from psychopathology at the same rates as youths who do not attend college (Blanco et al., 2008; Eisenberg, Golberstein, & Gollust, 2007; Hunt & Eisenberg, 2010). Given that their difficulties generally go untreated during their academic studies (Zivin, Eisenberg, Gollust, & Golberstein, 2009), researchers should seek to better understand and protective factors that may enhance psychological adjustment during this risk period.

Drawing from both the developmental psychopathology and positive youth development perspectives, we conceptualized ECAs in high school as an important context providing youths with opportunities for growth that may prepare them for the challenges of transitioning to college (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004; Cichetti & Rogosch, 2002; Damon, 2004; Lerner, Dowling, & Anderson, 2003; Sameroff, 2000). Indeed, as we review below, ECAs may help adolescents with

important age-appropriate developmental tasks including strengthening achievement, building autonomy, forging identity, and forming close relationships (Masten & Coatsworth, 1998).

Prior research regarding the relationship between ECA involvement and psychological adjustment has yielded mixed results (for comprehensive reviews see Feldman & Matjasko, 2005; Feldman, et al., 2012; Holland & Andre, 1987). Some studies have found that overall ECA involvement was associated with reduced levels of depression (Bartko & Eccles, 2003; Mahoney, Schweder, & Statin, 2002; Mason, Schmidt, Abraham, Walker, & Tercyak, 2009) and greater levels of well-being, conceptualized as greater life satisfaction, resilience, self-esteem, and feelings of self-worth (Blomfield & Barber, 2011; Coladarci & Cobb, 1996; Dotterer, McHale, & Crouter, 2007; Fredricks & Eccles, 2006a; Gilman, 2001; Palen & Coatsworth, 2007; Rose-Krasnor, Busseri, Willoughby, & Chalmers, 2006; Zhang, 2001). In contrast, other cross-sectional and longitudinal studies have not found a relationship between ECA participation and psychological adjustment (Barber, Eccles, & Stone, 2001; Darling, 2005; Melman, Little, & Akin-Little, 2007; Palen & Coatsworth, 2007).

Several explanations can account for these mixed results. First, the benefits of ECAs may depend on the domain considered. However, evidence examining the benefits of specific kinds of activities (such as athletic or artistic activities) has also yielded contradictory findings, as studies find positive, negative, or non-significant effects within each one of these domains (Barber et al., 2001; Bartko & Eccles, 2003; Bohnert & Garber, 2007; Denault, Poulin, & Pedersen, 2009; Fauth, Roth, & Brooks-Gunn, 2007; Fredricks & Eccles, 2006b; Gore, Farrell, & Gordon, 2001; Fletcher, Nickerson, &

Wright, 2003; Fredricks & Eccles, 2005; McHale, Crouter, & Tucker, 2001; Schumacher-Dimech & Seiler, 2011; Young, Winner, & Cordes, 2012). Thus, examining only type of activity as a moderator has led to more confusion rather than clarity.

Second, associations between extracurricular involvement and psychological adjustment may be influenced from self-selection effects, highlighting the need to conduct longitudinal studies in order to understand the nature of these relationships. Youths with certain levels or types of psychological adjustment may choose to participate in specific activities. Additionally, their adjustment may influence the duration, intensity, and/or breadth of their participation. Better adjusted youths may be more active and involved in ECAs overall. In contrast, youths suffering from depressive symptoms appear to be more likely to self-select into artistic activities, perhaps as a way to cope with their symptoms (Young, Winner, & Cordes, 2012). Importantly, other background variables such as ethnicity or socioeconomic status may exert influences on the extent to which youth participate in and benefit from activities (Fredricks & Eccles, 2006b; Marsh & Kleitman, 2002). As a result of these self-selection factors, longitudinal studies have tended to display smaller or nonsignificant effects than cross-sectional investigations (Fredricks & Eccles, 2006b; Holland & Andre, 1987; Marsh & Kleitman, 2002).

Third, the relationship between ECA involvement and psychological adjustment may not be linear, as too little or too much involvement may be negatively related to psychological adjustment (Marsh, 1992; Marsh & Kleitman, 2002).

Fourth, the relationship between ECA involvement and psychological adjustment depends on the extent to which activities can provide the right psychological growth opportunities for participants. Thus, assessing the mechanisms accounting for the

relationship between ECA participation and psychological adjustment is a promising approach that may help explain inconsistent findings and maximize the benefits of ECAs (Brown, 1988; Eccles et al., 2003).

Mechanisms Accounting for the Benefits of Extracurricular Involvement

A number of mechanisms have been proposed to explain how ECAs may promote psychological adjustment in youths. To do so, researchers have explored reasons youths give to explain their participation (e.g., Dworkin, Larsen, & Hansen, 2003; Hansen, Larson, & Dworkin, 2003). Although many of these reasons may constitute mechanisms underlying the benefits of ECAs, to date only positive relationships have been tested as a mediator of the relationship between ECAs and psychological adjustment. We describe here research examining the role of adult and peer relationships as an example of the importance of studying mediators. We then review research suggesting that other mechanisms may play an important role in explaining the benefits of ECAs, and we focus in particular on the role of the two mechanisms that will be investigated in the present study: mastery and creative self-efficacy.

Positive relationships. ECA participation may enhance psychological adjustment in youths by promoting positive interactions and relationships with both adults and peers. Students who participate in activities have higher levels of access to important adults (i.e., teachers, counselors, coaches, etc.) than students who do not participate (Eccles, Barber, Stone, & Hunt, 2003). In addition, relationships with adults who lead structured activities may be particularly important for youths who have detached relationships with their parents (Mahoney et al., 2002). Detached relationships are characterized by low

levels of parental knowledge about and interest in the child's life, verbal communication, and shared time and activities.

In addition, ECAs likely allow youths to build meaningful relationships with peers who have similar interests, and these relationships may in turn enhance their well-being (Eccles & Barber, 1999). Two studies including both cross-sectional and longitudinal designs found that the extent to which ECA involvement led to psychological adjustment (including depression and self-worth) was partially explained by the positive character traits of peers (e.g., prosocial behaviors, kindness, respect, intellectual interests) (Fredricks & Eccles, 2005; Simpkins, Eccles, & Becnel, 2008). In contrast, peers with negative characteristics exerted a negative influence on psychological adjustment (Simpkins et al., 2008). Thus, the effect of various activities may largely depend on the extent to which they provide opportunities for the development of positive relationships (Larson, Hansen, & Moneta, 2006).

Mastery. In addition to positive relationships, ECA involvement may promote psychological adjustment through a number of other mechanisms that have yet to be explored empirically. An important psychological process that may explain the positive effects of ECA is the development of mastery (or self-efficacy), broadly defined as the extent to which people perceive their lives as under their own control, and the degree to which they believe they can cope with challenges and take action that will lead to successful outcomes in their lives³ (Bandura, 1997; Luszczynska; Scholz, & Schwarzer,

³ Although we consider here that the terms mastery and self-efficacy both capture the construct we are interested in, we use the term mastery in the remainder of the paper to

2005; Pearlin & Schooler, 1978). Past research has indicated that mastery, self-efficacy, and closely related constructs (e.g., perceived control, locus of control, learned helplessness, attributional style, etc.) are important predictors of depression, anxiety, and well-being (Bandura, Pastorelli, Barbaranelli, & Caprara, 1999; Chorpita & Barlow, 1998; Chorpita, Brown, & Barlow, 1998; Joiner & Wagner, 1995; Maciejewski, Prigerson, & Mazure, 2000; Seligman et al., 1984; Zalta & Chambless, 2012).

Researchers have also investigated the role of two very closely related constructs: the development of initiative and competence. ECAs provide youths with opportunities to take initiative by independently choosing to pursue challenging and intrinsically motivating goals (Larson, 2000; Larson et al., 2006). Youths who engage in goal-directed behavior consistent with their identity experience higher levels of well-being (Palen & Coatsworth, 2007). ECAs also likely provide opportunities for youth to build a sense of competence in particular domains by developing valuable skills and gaining confidence in their abilities (Cicchetti & Rogosch, 2002; Masten & Coatsworth, 1998). Cole, Martin, and Powers (1997) for example found that children's perceptions of competence in multiple domains predicted subsequent changes in depressive symptoms over a period of six months (controlling for baseline levels of depression)

Creative self-efficacy. In the present study, we were also interested in assessing and testing the effect of another related mechanism known as creative self-efficacy. Creative self-efficacy is broadly defined as the subjective sense that one is able to come up with novel and useful (i.e., creative) ideas, products, or behaviors (Beghetto, 2006;

prevent confusion with our other construct of interest, creative self-efficacy.

Sternberg & Lubart, 1999; Tierney & Farmer, 2002). Creative self-efficacy has generally been studied in order to assess its impact on creative performance. Studies have shown that creative self-efficacy predicts higher levels of creativity as rated by employers (Gong, Huang, & Farh, 2009; Tierney & Farmer, 2002, 2011) and teachers (Beghetto, 2006; Beghetto, Kaufman, & Baxter, 2011; Choi, 2004). Given that creativity is not always encouraged within the school context (Westby & Dawson, 1995), ECAs may constitute a particularly fertile ground for the development of creative self-efficacy and creative thinking skills.

Investigating the relationship between creative self-efficacy and psychological adjustment is especially important given the results of past research suggesting that creative activities may enhance well-being (e.g., Forgeard & Eichner, in press; Richards, 2007; Silvia et al., 2014; Maujean, Pepping, & Kendall, 2014). In spite of these findings, little data speaks to the mechanisms underlying the benefits of creative activities (Forgeard, Mecklenburg, Lacasse, & Jayawickreme, in press), besides studies suggesting that art-making may promote adaptive emotion regulation strategies (Dalebroux, Goldstein, & Winner, 2008; DePettillo & Winner, 2005; Drake, Coleman, & Winner, 2011; Drake & Winner, 2012). In addition, this body of research has tended to focus on artistic activities. Opportunities to engage in creative thinking are however not limited to the arts and occur on a continuum in a wide range of domains (Kaufman, 2012). For the purpose of the present study, we were interested in exploring whether certain kinds of ECA (e.g., artistic) provide youth with more opportunities to develop creative thinking skills and creative self-efficacy than others (e.g., academic).

Hypotheses of the Present Study

The main goal of the present study was to provide a preliminary correlational investigation of the role of two mechanisms (mastery and creative self-efficacy) that may explain the benefits of ECA involvement for psychological adjustment (including depression, anxiety, and well-being outcomes). In addition, we followed recommendations previously made by researchers in this field (e.g., Feldman et al., 2012) in order to: (1) assess and compare the effect of different kinds of ECAs, (2) examine the effects of duration, intensity, and breadth of ECAs separately, (3) focus on a particular period of risk (the transition to college) for the development of psychopathology, and (4) examine possible factors affecting whether or not youths become involved in ECAs to begin with. Past research has shown that intrinsic motivation and parental behaviors may be particularly important in this respect (Fletcher, Elder, & Mekos, 2000; Fredricks et al., 2002; Larson, 2000; Zalta & Chambless, 2011).

We developed a structural equation model based on the following hypotheses depicted in Figure 1:

- Youths' levels of intrinsic motivation, as well as the degree to which their parents did not overprotect them and encouraged them to seek challenges, will positively predict the duration, intensity, and breadth of their involvement in ECAs during high school (Hypothesis 1).
- The duration, intensity, and breadth of youths' involvement in ECAs during high school will predict feelings of mastery and creative self-efficacy derived from ECAs (Hypothesis 2). In addition, the extent to which ECA involvement is associated with mastery and creative self-efficacy may depend on the kind of ECA considered.

- Feelings of mastery and creative self-efficacy derived from ECAs will predict reduced levels of psychopathology and increased levels of well-being at the beginning of college (Hypothesis 3).

In addition to testing this model, which focuses on understanding the links between ECA involvement and psychological adjustment, we also conducted separate regression analyses to test the hypothesis that overall levels of creative self-efficacy derived from ECAs during high school will be positively associated with creative thinking skills and creative achievement at the beginning of college, indicating that subjective judgments of creative ability at least partially reflect actual creative behavior and performance (Hypothesis 4).

Method

Participants

Five hundred and twelve freshman (55.90%) and sophomore (44.10%) undergraduate students (64.50% female) from a large university in the northeast of the United States participated in the present study. Participants were 18.96 years old on average ($SD = .78$). Nearly half of the sample identified as Caucasian (49.60%), followed by Asian (25.80%), mixed ethnicity or other (11.50%), Hispanic/Latino (9%), and Black/African-American (4.10%).

Materials and Procedures

Participants completed a 30-minute only survey consisting of the questionnaires and tasks described below (in the order in which participants completed them). Participants earned research credits counting towards their research participation requirement as part of introductory psychology courses. This study was approved by the

Institutional Review Board of our university and participants provided informed consent prior to completing the survey.

Demographics. Participants indicated their age, gender, ethnicity, as well as current year in college (freshman or sophomore).

High School Extracurricular Involvement. Participants completed a questionnaire designed to retrospectively assess the nature and degree of their participation in ECAs during high school. We defined ECAs as “any activities that either happened outside of school, or did not count for school credit.” We grouped ECAs according to the four categories: *athletic* (e.g., soccer, track and field, skiing, etc.), *academic* (e.g., foreign language club, debate club, etc.), *artistic* (e.g., theater, painting, ceramics, etc.) and *prosocial* (e.g., service club, tutoring, etc.) (Eccles & Barber, 1999).

For each category of activities (athletic, academic, artistic and prosocial), participants retrospectively reported:

- Breadth: the approximate number of activities they engaged in activities during high school
- Duration: the approximate number of months they participated in activities during high school
- Intensity: the approximate number of hours per week they dedicated to activities (during months of participation)
- Intrinsic motivation: participants answered the item “How much did you enjoy athletic/academic/artistic/prosocial activities overall? How interested were you in these activities for their own sake?”

In preparation for analyses examining ECA participation across all categories endorsed, we summed Breadth scores and averaged Duration, Intensity, and Intrinsic Motivation scores in order to produce overall scores.

Mastery and Creative Self-Efficacy Scale. Participants completed a brief 12-item scale designed for the purpose of this study in order to assess subjective feelings of mastery and creative self-efficacy derived from participation in athletic/academic/artistic/prosocial activities. We created a new measure because existing instruments assess these constructs as a general trait, rather than as a state specific to particular activities (with the exception of Beghetto et al., 2011). We drew on previous scales (e.g., Beghetto et al., 2011; Perlin & Schooler, 1978; Schwarzer & Jerusalem, 1995; Tierney & Farmer, 2002) to generate items for the new scale. Participants indicated the extent to which statements described them accurately (in the context of participation in a specific category of ECAs) on a 5-point scale. The 6 items pertaining to mastery asked about problem solving, confidence in success, dealing with challenges, maintaining control over situations, achieving goals, and resourcefulness. The 6 items pertaining to creative self-efficacy asked about imagination, coming up with novel ideas, uniqueness, innovation, and confidence in originality. This scale is included in Appendix A.

Measures of convergent and discriminant validity. Participants completed the following measures in order to assess the convergent and discriminant validity of the Mastery and Creative Self-Efficacy Scale.

Self-Mastery Scale (SMS). Participants completed the SMS ($\alpha = .81$), a seven-item self-report scale designed to assess current levels of mastery, defined as the extent to which participants perceived their lives as being under their own control (Perlin &

Schooler, 1978). Examples of items (rated on a 4-point Likert scale) include, “I can do just about anything I really set my mind to,” and “I have little control over the things that happen to me” (reverse-coded).

Runco Ideational Behavior Scale (RIBS). Participants completed the RIBS ($\alpha = .93$), a 23-item self-report scale designed to assess creative ideation (i.e., the use of, appreciation of, and skill of generating creative ideas) (Kaufman, Plucker, & Baer, 2008; Runco, Plucker, & Lim, 2001). Instructions for this scale were adapted for participants to retrospectively report on their ideational behavior during high school. Examples of items (rated on a 5-point Likert scale) include “I often got excited by my own new ideas,” and “friends asked me to help them think of ideas and solutions.”

Parental Facilitation of Mastery (PFMS). Participants completed the PFMS (Zalta & Chambless, 2011), a nine-item self-report scale designed to assess parenting behaviors that promote mastery experiences in childhood and adolescence. These parental behaviors can be broken down into two subscales: Low Protection ($\alpha = .68$, 5 items) and Challenge ($\alpha = .76$, 4 items). Examples of items (rated on a 5-point Likert scale) include, “I was encouraged to develop a difficult skill” (Challenge), and “I was protected from unknown experiences” (reverse-scored) (Low Protection).

Psychological adjustment. Participants completed the following measures of depression, anxiety, and well-being, selected to construct three latent variables (as described below).

Center for Epidemiological Studies Depression Scale (CES-D). Participants completed the CES-D ($\alpha = .94$), a 20-item self-report scale measuring current levels of

depression over the past week (Radloff, 1977). Examples of items (rated on a 4-point Likert scale) include, “I thought my life had been a failure,” and “I felt lonely.”

Scale of Positive and Negative Experience (SPANE). The SPANE is a 12-item self-report scale measuring Negative ($\alpha = .81$) and Positive Affect ($\alpha = .87$) experienced over the past month (Diener et al., 2009). Participants rated the extent to which they experienced specific feelings including “pleasant,” “joyful,” (Positive Affect), “angry,” and “afraid” (Negative Affect).

Depression Anxiety Stress Scales (DASS-21). Participants completed the DASS-21 (Antony, Bieling, Cox, Enns, & Swinson, 1998; Henry & Crawford, 2005; Lovibond & Lovibond, 1995), which includes three seven-item self-report scales assessing the negative emotional states of Depression ($\alpha = .94$), Anxiety ($\alpha = .91$), and Stress ($\alpha = .92$) over the past week. Examples of items (rated on a 4-point Likert scale) include “I felt that I wasn’t worth much as a person” (Depression), “I felt scared without any good reason” (Anxiety), and “I found it hard to wind down” (Stress).

Penn State Worry Questionnaire (PSWQ). Participants completed the PSWQ ($\alpha = .93$), a 16-item measure assessing the trait of worry, an important predictor of anxiety (Meyer, Miller, Metzger, & Borkovec, 1990). Participants reported the extent to which particular behaviors are typical of them. Examples of items (rated on a 5-point Likert scale) include, “I am always worrying about something,” and “I find it easy to dismiss worrisome thoughts.”

Satisfaction with Life Scale (SWLS). Participants completed the SWLS ($\alpha = .89$), a five-item self-report scale designed to assess how satisfied individuals currently are with their lives (Diener, Emmons, Larsen, & Griffin, 1985). Examples of items (rated on

a 7-point Likert scale) include, “I am satisfied with my life,” and “The conditions of my life are excellent.” **Flourishing Scale (FS).** Participants completed the Flourishing Scale ($\alpha = .91$), an 8-item self-report scale assessing participants’ current self-perceived success in important areas of well-being such as relationships, self-esteem, purpose, and optimism (Diener et al., 2009). Examples of items (rated on a 7-point Likert scale) include, “I lead a purposeful and meaningful life,” and “I am optimistic about my future.”

Creativity. Participants completed the following measures of creative achievement and divergent-thinking.

Creative Achievement Questionnaire (CAQ). Participants completed the CAQ, (Carson, Peterson, & Higgins, 2005), a 96-item questionnaire that assesses creative achievement across 10 domains (drama, writing, humor, music, visual arts, dance, invention, science, and culinary arts). Because scores on the CAQ were not normally distributed (skewness = 3.15, kurtosis = 17.94), this variable was log transformed (using a log base 10) for use in statistical analyses (skewness = -.337, kurtosis = .44).

Divergent-Thinking Task. A divergent-thinking task was designed for the purpose of this study. In this task, participants were asked to come up with creative solutions for a real-life problem relevant to college students described as follows:

Sarah and Paul are sophomores, both majoring in Film Studies. They have decided to create a Cinema Society at their university, an on-campus organization dedicated to promoting the making and viewing of films. Sarah and Paul would like to organize their first on-campus event soon. The main goals of this event will be to recruit new members and to stimulate the interest of their fellow students in films of all genres. They want to organize a special, innovative event that will

draw attention to their society. The Film Studies department has already agreed to sponsor this event by covering up to \$1000 in costs. Sarah and Paul have been brainstorming for the past few days, but haven't yet figured out what event they would like to organize to achieve their goals. Please help Sarah and Paul come up with creative ideas for this event. What kind(s) of event(s) could Sarah and Paul organize in order to achieve their goals? Use the following textbox to list as many ideas as you can. This should take no more than 5-10 minutes (but you can take as much time as you want).

All ideas ($n = 1717$) were then rated for creativity by a team of three trained research assistants who achieved good levels of interrater reliability ($\alpha = .77$). Raters followed instructions based on Baer (1993) and Kaufman, Plucker, & Baer (2008) (see Appendix B). The three raters' scores were averaged in order to produce a creativity score for each idea. For each participant, the idea with the maximum creativity score was retained to serve as the dependent variable in statistical analyses.

Results

We conducted three sets of statistical analyses in order to: test the reliability and validity of the Mastery and Creative Self-Efficacy Scale, test the model summarizing hypotheses put forward in the Introduction (Hypotheses 1, 2, and 3), and examine the relationships between ECA involvement, mastery, creative self-efficacy, and creative performance (Hypothesis 4).

Reliability and Validity of the Mastery and Creative Self-Efficacy Scale

Factor structure and reliability. We conducted an exploratory factor analysis (EFA) to examine the factor structure of the 12-item Mastery and Creative Self-Efficacy

Scale. We used overall scores (averaging responses across categories of ECAs endorsed). There were no missing values for the variables used in this analysis. We tested a one-, two-, and three-factor solution using principal axis factoring and promax rotation, as factors extracted from the scale should theoretically be correlated. Upon determining the factor structure ensuring reliability of all factors (all Cronbach's α s $> .70$), EFA was repeated to test promax rotations at $k = 2, 3,$ and 4 (Tataryn, Wood, & Gorsuch, 1999). The k value which maximized the hyperplane count was retained. The quality of all factor solutions examined was judged according to: (1) the amount of variance explained by each factor, (2) the number of items loading on each factor ($>.40$), aiming for a minimum of three to ensure reliability across samples (Velicer & Fava, 1998), (3) hyperplane counts (in percentages), (4) the reliability of extracted factors, and finally (5) the meaningfulness of extracted factors. According to these criteria, a two-factor solution ($k = 2$) including all 12 items was retained. As expected the two factors corresponded to Mastery ($\alpha = .95$) and Creative Self-Efficacy ($\alpha = .93$). The correlation between the two factors was $r = .72$. Table 1 describes the final factor solution including factor loadings for all items, as well as the amount of variance explained and reliability for each factor.

Convergent and Discriminant Validity. We assessed the convergent and discriminant validity of the Mastery and Creative Self-Efficacy Scale by examining correlations between the Mastery and Creative Self-Efficacy subscales, the SMS, and the RIBS. We hypothesized that the Mastery subscale should correlate more with the SMS than with the RIBS, and that the Creative Self-Efficacy subscale should correlate more with the RIBS than with the SMS.

Although the Mastery subscale's correlation with the SMS ($r = .38$) was higher than with the RIBS ($r = .31$), this difference was not significant ($z = 1.13$, 1-tailed $p = .13$). When correlation coefficients were corrected for attenuation (to account for the reliability of the scales), the correlation with the SMS (corrected $r = .43$) became significantly higher than the correlation with the RIBS (corrected $r = .33$), $z = 1.91$, 1-tailed $p = .03$.

As predicted, the Creative Self-Efficacy's subscale correlation with the RIBS ($r = .44$) was higher than with the SMS ($r = .28$), and this difference reached significance, $z = 3.03$, 1-tailed $p = .001$. When correlation coefficients were corrected for attenuation, the correlation with the RIBS (corrected $r = .47$) remained significantly higher than with the SMS (corrected $r = .32$), $z = 2.84$, 1-tailed $p = .002$.

Results of the EFA, convergent and discriminant validity analyses thus provided support for the existence of two separate constructs, though also suggested that Mastery and Creative Self-Efficacy are very closely related.

Structural Equation Modeling

Model Specification and Fit. We tested the hypotheses outlined in the introduction using structural equation modeling in Mplus 7 (Muthén & Muthén, 2012). We used psychological adjustment measures to construct three latent variables serving as outcomes. The CES-D, the Negative Affect subscale of the SPANE, and the Depression subscale of the DASS-21 loaded on a latent Depression variable. The PSWQ as well as the Anxiety and Stress subscales of the DASS-21 loaded on a latent Anxiety variable. The Flourishing Scale, Positive Affect subscale of the SPANE, and the SWLS loaded on a latent Well-Being variable.

We tested the same full mediation model depicted in Figure 1 for: (a) overall ECA involvement ($n = 512$), (b) athletic ECAs ($n = 432$), (c) academic ECAs ($n = 422$), (d) artistic ECAs ($n = 255$), and (e) prosocial ECAs ($n = 368$). Table 2 lists descriptive statistics for continuous variables included in the overall model. In this full mediation model, we hypothesized that Mastery and Creative Self-Efficacy would explain the relationships between ECA participation and psychological adjustment. For all models tested, we allowed error terms of variables included on the same level to covary. These included (a) the Challenge and Low Protection subscales of the PFMS, as well as Intrinsic Motivation, (b) Duration, Intensity, and Breadth, (c) Mastery and Creative Self-Efficacy, (d) Depression, Anxiety, and Well-Being. We also included age, gender, and ethnicity (Caucasian/ Other) as covariates. We implemented full-information maximum likelihood (FIML) estimation for all models (the percentage of missing values for each model is reported in Table 3).

In addition, each full mediation model was compared to an alternate partial mediation model which specified direct paths from participation variables (Duration, Intensity, and Breadth) to psychological adjustment outcomes (Depression, Anxiety, and Well-Being). We compared full and partial mediation models using chi-square difference tests. For the final models retained, we followed existing recommendations to assess model fit using multiple indices given that sample size has an important effect on the significance of chi-square tests (Kline, 2005). These indices included: the Standardized Root Mean Squared Residual (summary of the average covariance residual: SRMR = or < .10 indicates acceptable fit), the Root Mean Square Error of Approximation (estimate of the “misfit” of the model based on a noncentral index: RMSEA = or < .08 indicates

adequate fit), and the Comparative Fit Index (another noncentral index of fit: CFI = or > .90 indicates adequate fit) (Browne & Cudeck, 1993; Hu & Bentler, 1999; Kline, 2005).

Path coefficients and mediation analyses. We examined path coefficients for all models to verify whether the hypothesized relationships between variables were confirmed (see Figures 2a-2e). Appendix C lists all unstandardized estimates, standard errors, p-values, and standardized estimates for the main paths and covariates tested in the five final models. In addition, we tested the joint significance of indirect effects using bootstrapping (MacKinnon, 2008). Appendix D lists all unstandardized estimates, standard errors, p-values, and standardized estimates for the indirect effects tested.

Overall extracurricular involvement (Figure 2a). The model fits of the Full Mediation and Partial Mediation models did not differ significantly ($p > .10$). We therefore retained the Full Mediation Model for further examination. This model was an acceptable fit for the data (see Table 3).

Predictors of ECA participation. The Challenge subscale of the PFMS predicted greater Duration and Breadth. Intrinsic Motivation predicted greater Duration and Intensity.

Mediation paths and indirect effects. Longer Duration predicted a greater sense of Mastery, which in turn predicted lower levels of Depression and Anxiety and higher levels of Well-Being. The three corresponding indirect effects were all significant. Greater Intensity also predicted a greater sense of Mastery, which in turn predicted lower levels of Depression and Anxiety and higher levels of Well-Being. The two indirect effects for Depression and Well-Being were significant; the indirect effect for Anxiety approached significance ($p = .06$).

Longer Duration and Intensity also predicted greater Creative Self-Efficacy, which in turn predicted greater Well-Being. The corresponding indirect effect from Duration was significant, whereas the indirect effect from Intensity was nonsignificant ($p = .12$).

None of the paths and indirect effects from Breadth to any of the psychological adjustment outcomes were significant, though the relationship between Breadth and Creative Self-Efficacy approached significance ($p = .09$).

Athletic ECAs (See Figure 2b). The model fits of the Full Mediation and Partial Mediation models did not differ significantly ($p > .10$). We therefore retained the Full Mediation Model for further examination. This model was an acceptable fit for the data (see Table 3).

Predictors of ECA participation. The Challenge subscale of the PFMS predicted longer Duration and greater Breadth. Intrinsic Motivation predicted longer Duration, higher Intensity, and greater Breadth.

Mediation paths and indirect effects. Longer Duration and Intensity of ECA participation predicted a greater sense of Mastery, which in turn predicted lower levels of Depression and Anxiety and higher levels of Well-Being. The corresponding indirect effects were all significant.

Longer Duration of ECA participation also predicted greater Creative Self-Efficacy, which in turn predicted greater Well-Being. The corresponding indirect effect approached significance ($p = .06$). Creative Self-Efficacy did not predict Depression or Anxiety. Although Intensity also predicted greater Creative Self-Efficacy, the corresponding indirect effect on Well-Being was nonsignificant ($p = .12$).

Breadth of ECA participation predicted greater Creative Self-Efficacy but not Mastery. The indirect effect from Breadth through Creative Self-Efficacy to Well-Being, approached significance ($p = .07$).

Academic ECAs (Figure 2c). The Partial Mediation model was a significantly better fit for the data than the Full Mediation model, and was therefore retained for further examination. This model was an acceptable fit for the data (see Table 3).

Predictors of ECA participation. Intrinsic Motivation predicted longer Duration, higher Intensity and greater Breadth. The Challenge subscale of the PFMS predicted lower Intensity.

Mediation paths and indirect effects. Longer Duration and Intensity predicted greater Mastery, which in turn predicted lower levels of Depression and Anxiety and higher levels of Well-Being. All of the corresponding indirect effects were either significant ($p < .05$) or approached significance ($p < .10$).

Duration and Intensity also predicted a greater sense of Creative Self-Efficacy, but this in turn did not predict Depression, Anxiety, or Well-Being. None of the corresponding indirect effects were significant. Breadth did not predict Mastery or Creative Self-Efficacy.

Direct paths from participation to adjustment. Greater Intensity directly predicted lower levels of Well-Being.

Artistic ECAs (Figure 2d). The Partial Mediation model was a significantly better fit for the data than the Full Mediation model, and was therefore retained for further examination. This model was an acceptable fit for the data (see Table 3).

Predictors of ECA participation. Intrinsic Motivation predicted greater Duration, Intensity, and Breadth. The Challenge subscale of the PFMS near-significantly predicted greater Breadth and Intensity ($p < .10$).

Mediation paths and indirect effects. Duration and Intensity predicted a greater sense of Mastery. Mastery did not predict any of the psychological adjustment outcomes, and all of the corresponding indirect effects were nonsignificant.

Intensity, Breadth, and Duration predicted a greater sense of Creative Self-Efficacy, although this effect only approached significance for Duration ($p = .07$). Creative Self-Efficacy in turn predicted greater Well-Being. The indirect effect from Intensity, through Creative Self-Efficacy, to Well-Being approached significance ($p < .10$). All of the other indirect effects were nonsignificant ($p > .10$).

Direct paths from participation to adjustment. In addition, Breadth directly predicted lower levels of Well-Being.

Prosocial ECAs (See Figure 2e). The Partial Mediation model was a significantly better fit for the data than the Full Mediation model, and was therefore retained for further examination. This model was an acceptable fit for the data (see Table 3).

Predictors of ECA participation. Intrinsic motivation predicted longer Duration, higher Intensity, and greater Breadth. The Challenge subscale of the PFMS predicted longer Duration and higher Intensity.

Mediation paths and indirect effects. Longer Duration and higher Intensity predicted greater Mastery, which in turn higher levels of Well-Being only. The indirect

effect from Intensity approached significance ($p = .08$). The indirect effect from Duration was nonsignificant.

Longer Duration and Intensity also predicted greater Creative Self-Efficacy, which in turn predicted higher levels of Well-Being only. The two corresponding indirect effects were significant. Breadth did not predict any psychological adjustment outcomes.

Direct paths from participation to adjustment. Intensity directly predicted both higher levels of Anxiety and Depression. The effect only approached significance for Depression ($p = .06$).

Relationships between Creative Self-Efficacy and Creative Performance

Two blockwise multiple regression analyses tested whether overall feelings of Mastery and Creative Self-Efficacy derived from high school ECAs predicted current levels of Creative Achievement (as assessed by the CAQ) and creative thinking abilities (as measured by the divergent-thinking task), over and above other predictors.

Independent variables entered in Block 1 included age, gender, ethnicity, Duration, Intensity, and Breadth. Variables included in Block 2 included Mastery and Creative Self-Efficacy. Results are presented in Tables 4a and 4b.

Creative achievement. In Block 1, only Breadth significantly predicted CAQ scores, $\beta = .21, p < .001$. In Block 2, Creative Self-Efficacy, $\beta = .24, p < .001$, significantly predicted CAQ scores over and above Breadth, $\beta = .20, p < .001$, which remained a significant predictor.

Divergent thinking. In Block 1, both Breadth, $\beta = .13, p = .005$, and Intensity, $\beta = -.10, p = .04$, significantly predicted the creativity of the best idea produced by each participant during the divergent-thinking task (see Method section). In Block 2, Mastery

and Creative Self-Efficacy did not significantly predict creative thinking scores over and above Breadth, $\beta = .13, p = .006$, and Intensity, $\beta = -.10, p = .04$.

Discussion

Results of the present study highlighted the value of investigating mechanisms that may account for relationships between ECA involvement and psychological adjustment in adolescence and emerging adulthood. Findings demonstrated that mastery and creative self-efficacy were two separate but very closely related constructs that may account for the benefits of ECAs. Feeling of mastery mediated the relationship between duration and intensity of participation and depression, anxiety, and well-being. Feelings of creative self-efficacy also mediated the relationship between duration of participation and well-being.

The present study followed recent recommendations to disentangle different aspects of participation (duration, intensity, and breadth) and to examine the role of different kinds of ECAs independently (rather than examine only overall participation) (Feldman et al., 2012). Our results demonstrated that the mediating role of mastery and self-efficacy differed according to the category of ECA considered. For example, mastery (but not creative self-efficacy) accounted for the relationship between duration and intensity of participation in academic ECAs and all three psychological adjustment outcomes. In contrast, both feelings of mastery and creative self-efficacy accounted for the relationship between participation in prosocial ECAs and well-being.

Given that participation in all categories of ECAs predicted greater feelings of mastery and creative self-efficacy, further research should seek to explain why mastery and creative self-efficacy in turn differentially predicted psychological adjustment

according to the category considered. It is possible that mastery and creative self-efficacy are fostered by all ECAs (as all activities may provide opportunities to develop general and creative competence), yet are only put to use in promoting positive psychological outcomes in certain domains. For example, a teenager who develops high levels of creative self-efficacy within the context of prosocial and artistic activities may obtain more reinforcement from the environment (e.g., group leaders and peers) than a teenager who develops similar levels of creative self-efficacy within the context of academic activities, since creativity may be more highly encouraged and rewarded within some activities than others.

The relationship found between overall feelings of mastery and all psychological adjustment outcomes (depression, anxiety, and well-being) was not surprising given past research demonstrating the importance of developing a stable sense of control over one's environment and actions (e.g., Bandura et al., 1999; Burt, Obradovic, Long, & Masten, 2008; Chorpita et al., 1998; Zalta & Chambless, 2012). The fact that creative self-efficacy only predicted well-being (but not depression or anxiety) was somewhat unexpected given research examining the therapeutic effects of creative activities (Forgeard et al., in press). These results however make sense considering that statistical analyses controlled for feelings of mastery. Participation in creative activities may therefore be associated with lower levels of depression and anxiety *insofar as these activities also promote general feelings of mastery*, and may also be associated with higher levels of well-being through creative self-efficacy. These results highlight the need to conduct additional research using sophisticated methodologies in order to assess

whether involvement in creative activities exerts beneficial effects through general (e.g., mastery) or creativity-specific mechanisms (e.g., creative self-efficacy).

Given that participants reported retrospectively on their high school experiences in order to examine relationships with current levels of psychological adjustment at the beginning of college, it is crucial to keep in mind the cross-sectional nature of these data when interpreting results. First, participants' retrospective self-reports on their high school experiences may not be as accurate as reports on current experiences. Second, without longitudinal assessments examining how changes in independent variables and mediators predict changes in dependent variables (controlling for baseline levels of all variables), results likely reflect self-selection effects in addition to possible causal relationships (Feldman et al., 2012; Fredricks & Eccles, 2006b). In the present study, it is also likely that participants with higher levels of psychological adjustment at the beginning of college had higher levels of adjustment in high school to begin with, and as a result were more likely to participate in ECAs and to experience feelings of mastery and creative self-efficacy during these activities. Given the lack of previous research on this topic, a cross-sectional study based on an informed theoretical and developmental model however constituted a good starting point for examining the value of testing these mechanisms in future research using longitudinal assessments that can rule out self-selection effects.

This study also aimed to provide a comprehensive analysis of the correlates of ECA involvement by examining two key antecedents: intrinsic motivation and parenting behaviors. Results confirmed that intrinsic motivation is a key psychological asset predicting participation across and within all categories of activities (Fredricks et al.,

2002; Larson, 2000; Mahoney, Vandell, Simpkins, & Zarrett, 2009; Shernoff & Vandell, 2007). Results pertaining to parental behaviors showed that encouraging youths to take on challenging activities predicted ECA involvement whereas not overprotecting youths did not predict participation (Zalta and Chambless, 2011).

In addition, this study examined whether feelings of creative self-efficacy during high school activities related to more objective indicators of creative performance at the beginning of college. Creative self-efficacy across ECAs predicted higher levels of creative achievement, but not higher creativity scores on a divergent-thinking task. Future research should examine whether feelings of creative self-efficacy prospectively predict greater creative achievement to rule out self-selection effects (as participants with higher levels of creative achievement may have been more likely to retrospectively endorse feelings of creative self-efficacy). These results nevertheless suggest that ECAs may provide a beneficial environment for youths to build competencies fostering creative achievement. Why did creative self-efficacy not predict divergent-thinking scores? Scientists have argued that divergent-thinking skills constitute a subset of general cognitive ability (e.g., Silvia, 2008). Given this, general *creative cognition* may be less malleable than *creative achievement*, which relies on many more components including domain-specific skills and knowledge (Jauk, Benedek, Dunst, & Neubauer, 2013; Kaufman, Kaufman, & Lichtenberger, 2011). In addition, the specific prompt we used in our divergent-thinking task (organizing an event for college students) may not have been relevant to all students, and it is therefore possible that creative self-efficacy may only predict creative cognition in participants' preferred creative domains.

Future research should continue to examine the role of various mechanisms in order to enrich our understanding of the development of competence and psychological adjustment in youths. Such efforts can help researchers, clinicians, and families better understand when ECA involvement is beneficial as well as when it might be harmful. Research on the mediating role of peer relationships has for example shown that making friends within the context of ECAs can either increase or decrease psychological adjustment depending on the specific characteristics of peers (Simpkins et al., 2008). These concerns are especially important given results suggesting that ECA involvement is sometimes associated with negative outcomes. For instance, sports participation has been associated with higher than average levels of alcohol use (Denault et al., 2009; Eccles & Barber, 1999; Hoffman, 2006; Lorente, Souville, Griffet, & Grélot, 2004).

Future research should also look at additional mechanisms besides peer relationships, mastery and creative self-efficacy. Although past scholarship has explored reasons why youths participate in ECAs (e.g., Dworkin et al., 2003), studies have for the most part not empirically assessed whether these reasons mediate the relationship between ECA participation and psychological assessment. For example, a large literature has shown that ECA involvement allowed youths to engage in identity exploration and reinforcement, and that this process may affect their well-being (Barber et al., 2001; Berzonsky, 2003; Coatsworth, Palen, Sharp, & Ferrer-Wreder, 2006) including during the transition to college (Berzonsky & Kuk, 2000). In other words, ECAs may help adolescents find out who they are and who they want to become, which may facilitate the transition into a new stage of life. Future research could assess whether identity development processes mediate the relationship between participation in particular ECAs

and psychological adjustment outcomes using both cross-sectional and longitudinal designs.

A long list of other possible mechanisms that may explain the benefits of ECAs deserve further examination, including the development of purpose (Damon, Menon, & Bronk, 2003), spirituality/religiosity (Dowling et al., 2004; Furrow, King, & White, 2004), psychological flexibility (Kashdan & Rottenberg, 2010), grit (Duckworth, Peterson, Matthews, & Kelly, 2007), emotion regulation (Dworkin et al., 2003), flow and engagement (Nakamura & Csikszentmihalyi, 2005), optimism (Carver, Scheier, & Segestrom, 2010; Seligman, 1991) wisdom (Pasupathi, Staudinger, & Baltes, 2001), kindness (Gillham et al., 2011), or gratitude (Froh, Sefick, & Emmons, 2008). Pre-existing levels of these traits may also moderate the benefits of ECAs.

Conclusion

Adolescents and emerging adults are at risk for the development of psychological disorders including depression and anxiety. The mental health and well-being of youths is a priority for public health not just because of associated distress and impairment, but also because of the potential lasting consequences they may endure as a result (Patel, Flisher, Hetrick, McGorry, 2007). Given this, more research is needed to understand how early experiences may enhance well-being and resilience during stressful situations such as the transition to college. The results of this study suggested that ECA involvement is associated with increased levels of mastery and creative self-efficacy, and in turn better psychological adjustment. Having established these relationships cross-sectionally, future research using longitudinal designs is needed to assess the causal nature of these findings. Given that recent research has suggested that adolescents in postindustrial countries

spend an increasing amount of time involved in ECAs (Larson & Verma, 1999), science can inform the ways in which these activities are offered in order to maximize their benefits (Hansen & Larson, 2007). Researchers within the field of developmental psychopathology have argued for the importance of better understanding the nature and effects of specific contexts in which youths operate, and have called for a developmental approach to intervention that does not assume that adult models can be used for youths (Cicchetti & Rogosch, 2002). Understanding when and how these activities lead to enhanced psychological adjustment therefore constitutes a promising and developmentally appropriate approach to intervention. Empirically informed ECAs that incorporate insights from clinical and educational research can help to protect against the onset of psychological difficulties, as well promote well-being by placing youths in environments that provide crucial opportunities to build and strengthen their competence (Weissberg, Caplan, & Harwood, 1991).

References

- Antony, M. M., Bieling, 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 in clinical groups and a community sample. *Psychological Assessment, 10*, 176-181.
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*, 469-480.
- Baer, J. (1993). *Divergent thinking and creativity: A task-specific approach*. Hillsdale, NJ: Erlbaum.
- Bandura, A., Pastorelli, C., Barbaranelli, C., & Caprara, G. V. (1999). Self-efficacy pathways to childhood depression. *Journal of Personality and Social Psychology, 79*, 258-269.
- Barber, B. L., Eccles, J. S., & Stone, M. R. (2001). Whatever happened to the jock, the brain, and the princess? Young adult pathways linked to adolescent activity involvement and social identity. *Journal of Adolescent Research, 16*, 429-455.
- Bartko, W. T., & Eccles, J. S. (2003). Adolescent participation in structured and unstructured activities: A person-oriented analysis. *Journal of Youth and Adolescence, 32*, 233-241.
- Beghetto, R. A. (2006). Creative self-efficacy: Correlates in middle and secondary students. *Creativity Research Journal, 18*, 447-457.
- Beghetto, R. A., Kaufman, J. C., & Baxter, J. (2011). Answering the unexpected questions: Exploring the relationship between students' creative self-efficacy and

teacher ratings of creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 5, 342-349.

Berzonsky, M. D. (2003). Identity style and well-being: Does commitment matter?

Identity: An International Journal of Theory and Research, 3, 131-142.

Berzonsky, M. D., & Kuk, L. S. (2000). Identity status, identity processing style, and the transition to university. *Journal of Adolescent Research*, 15, 81-98.

Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B. F., Liu, S. M., & Olfson, M.

(2008). Mental health of college students and their non-college-attending peers: Results from the National Epidemiologic Study on Alcohol and Related Conditions. *Archives of General Psychiatry*, 65, 1429-1437.

Blomfield, C. J., & Barber, B. L. (2011). Developmental experiences during

extracurricular activities and Australian adolescents' self-concept: Particularly important for youth from disadvantaged schools. *Journal of Youth and Adolescence*, 40, 582-594.

Bohnert, A. M., & Garber, J. (2007). Prospective relations between organized activity

participation and psychopathology during adolescence. *Journal of Abnormal Child Psychology*, 35, 1021-1033.

Breslau, J., Lane, M., Sampson, N., & Kessler, R. C. (2008). Mental disorders and

subsequent educational attainment in a US national sample. *Journal of Psychiatric Research*, 42, 708-716.

Brown, B. B. (1988). The vital agenda for research on extracurricular influences: A reply

to Holland and Andre. *Review of Educational Research*, 58, 107-111.

- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K.A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage Publications.
- Burt, K. B., Obradović, J., Long, J. D., & Masten, A. S. (2008). The interplay of social competence and psychopathology over 20 years: Testing transactional and cascade models. *Child Development, 79*, 359-374.
- Carson, S., Peterson, J. B., & Higgins, D. (2005). Validity, reliability, and factor structure of the Creative Achievement Questionnaire. *Creativity Research Journal, 17*, 37-50.
- Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. *Clinical Psychology Review, 30*, 879-889.
- Catalano, R. F., Berglund, M. L., Ryan, J. A., Lonczak, H. S., & Hawkins, J. D. (2004). Positive youth development in the United States: Research findings on evaluations of positive youth development programs. *The Annals of the American Academy of Political and Social Science, 591*, 98-124.
- Choi, J. N. (2004). Individual and contextual predictors of creative performance: The mediating role of psychological processes. *Creativity Research Journal, 16*, 187-199.
- Chorpita, B. F., & Barlow, D. H. (1998). The development of anxiety: The role of control in the early environment. *Psychological Bulletin, 124*, 3-21.
- Chorpita, B. F., Brown, T. A., & Barlow, D. H. (1998). Perceived control as a mediator of family environment in etiological models of childhood anxiety. *Behavior Therapy, 29*, 457-476.

- Cicchetti, D., & Rogosch, F. A. (2002). A developmental psychopathology perspective on adolescence. *Journal of Consulting and Clinical Psychology, 70*, 6-20.
- Cleary, M., Walter, G., & Jackson, D. (2011). "Not always smooth sailing": Mental health Issues associated with the transition from high school to college. *Issues in Mental Health Nursing, 32*, 250-254.
- Coatsworth, J. D., Palen, L. A., Sharp, E. H., & Ferrer-Wreder, L. (2006). Self-defining activities, expressive identity, and adolescent wellness. *Applied Developmental Science, 10*, 157-170.
- Coladarci, T., & Cobb, C. D. (1996). Extracurricular participation, school size, and achievement and self-esteem among high school students: A national look. *Journal of Research in Rural Education, 12*, 92-106.
- Cole, D. A., Martin, J. M., & Powers, B. (1997). A competency-based model of child depression: A longitudinal study of peer, parent, teacher, and self-evaluations. *Journal of Child Psychology and Psychiatry, 38*, 505-514.
- Costello, E. J., Copeland, W., & Angold, A. (2011). Trends in psychopathology across the adolescent years: What changes when children become adolescents, and when adolescents become adults? *Journal of Child Psychology and Psychiatry, 52*, 1015-1025.
- Dalebroux, A., Goldstein, T. R., & Winner, E. (2008). Short-term mood repair through art-making: Positive emotion is more effective than venting. *Motivation and Emotion, 32*, 288-295.
- Damon, W. (2004). What is positive youth development? *Annals of the American Academy of Political and Social Science, 591*, 13-24.

- Damon, W., Menon, J., & Cotton Bronk, K. (2003). The development of purpose during adolescence. *Applied Developmental Science, 7*, 119-128.
- Darling, N. (2005). Participation in extracurricular activities and adolescent adjustment: Cross-sectional and longitudinal findings. *Journal of Youth and Adolescence, 34*, 493-505.
- Denault, A. S., Poulin, F., & Pedersen, S. (2009). Intensity of participation in organized youth activities during the high school years: Longitudinal associations with adjustment. *Applied Developmental Science, 13*, 74-87.
- DePetrillo, L., & Winner, E. (2005). Does art improve mood? A test of a key assumption underlying art therapy. *Art Therapy: Journal of the American Art Therapy Association, 22*, 205-212.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71-75.
- Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2009). New measures of well-being: Flourishing and positive and negative feelings. *Social Indicators Research, 39*, 247-266.
- Dotterer, A. M., McHale, S. M., & Crouter, A. C. (2007). Implications of out-of-school activities for school engagement in African American adolescents. *Journal of Youth and Adolescence, 36*, 391-401.
- Dowling, E. M., Gestsdottir, S., Anderson, P. M., Von Eye, A., Almerigi, J., & Lerner, R. M. (2004). Structural relations among spirituality, religiosity, and thriving in adolescence. *Applied Developmental Science, 8*, 7-16.

- Drake, J. E., & Winner, E. (2012). Confronting sadness through art-making: Distraction is more beneficial than venting. *Psychology of Aesthetics, Creativity, and the Arts*, 6, 255-261.
- Drake, J. E., Coleman, K., & Winner, E. (2011). Short-term mood repair through art: Effects of medium and strategy. *Art Therapy: Journal of the American Art Therapy Association*, 28, 26-30.
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, 92, 1087-1011.
- Dworkin, J. B., Larson, R., & Hansen, D. (2003). Adolescents' accounts of growth experiences in youth activities. *Journal of Youth and Adolescence*, 32, 17-26.
- Eccles, J. S., & Barber, B. L. (1999). Student council, volunteering, basketball, or marching band: What kind of extracurricular involvement matters? *Journal of Adolescent Research*, 14, 10-43.
- Eccles, J. S., Barber, B. L., Stone, M., & Hunt, J. (2003). Extracurricular activities and adolescent development. *Journal of Social Issues*, 59, 865-889.
- Eisenberg, D., Golberstein, E., & Gollust, S. E. (2007). Help-seeking and access to mental health care in a university student population. *Medical Care*, 45, 594-601.
- Farb, A. F., & Matjasko, J. L. (2012). Recent advances in research on school-based extracurricular activities and adolescent development. *Developmental Review*, 32, 1-48.

- Fauth, R. C., Roth, J. L., & Brooks-Gunn, J. (2007). Does the neighborhood context alter the link between youth's after-school time activities and developmental outcomes? A multilevel analysis. *Developmental Psychology, 43*, 760-777.
- Feldman, A. F., & Matjasko, J. L. (2005). The role of school-based extracurricular activities in adolescent development: A comprehensive review and future directions. *Review of Educational Research, 75*, 159-210.
- Fergusson, D. M., & Woodward, L. J. (2002). Mental health, educational, and social role outcomes of adolescents with depression. *Archives of General Psychiatry, 59*, 225-231.
- Fergusson, D. M., Boden, J. M., & Horwood, L. J. (2007). Recurrence of major depression in adolescence and early adulthood, and later mental health, educational and economic outcomes. *The British Journal of Psychiatry, 191*, 335-342.
- Fergusson, D. M., Horwood, L. J., Ridder, E. M., & Beautrais, A. L. (2005). Subthreshold depression in adolescence and mental health outcomes in adulthood. *Archives of General Psychiatry, 62*, 66-72.
- Fletcher, A. C., Elder, G. H. J., & Mekos, D. (2000). Parental influences on adolescent involvement in community activities. *Journal of Research on Adolescence, 10*, 29-48.
- Fletcher, A. C., Nickerson, P., & Wright, K. L. (2003). Structured leisure activities in middle childhood: Links to well-being. *Journal of Community Psychology, 31*, 641-659.
- Fombonne, E., Wostear, G., Cooper, V., Harrington, R., & Rutter, M. (2001). The

Maudsley long-term follow-up of child and adolescent depression 1. Psychiatric outcomes in adulthood. *The British Journal of Psychiatry*, 179, 210-217.

Forgeard, M. J. C., & Eichner, K. V. (in press). Creativity as a target and tool for positive interventions. In A. C. Parks & S. M. Schueller (Eds.), *Handbook of positive psychological interventions*. Oxford: Wiley-Blackwell.

Forgeard, M. J. C., Jayawickreme, E., Kern, M. L., & Seligman, M. E. P. (2011). Doing the right thing: Measuring wellbeing for public policy. *International Journal of Wellbeing*, 1, 79-106.

Forgeard, M. J. C., Mecklenburg, A. C., Lacasse, J. J., & Jayawickreme, E. (in press). Bringing the whole universe to order: Creativity, healing, and posttraumatic growth. In J. C. Kaufman (Ed.), *New ideas about an old topic: Creativity and mental illness*. New York: Cambridge University Press.

Fredricks, J. A., & Eccles, J. S. (2005). Developmental benefits of extracurricular involvement: Do peer characteristics mediate the link between activities and youth outcomes? *Journal of Youth and Adolescence*, 34, 507-520.

Fredricks, J. A., & Eccles, J. S. (2006a). Is extracurricular participation associated with beneficial outcomes? Concurrent and longitudinal relations. *Developmental Psychology*, 42, 698-713.

Fredricks, J. A., & Eccles, J. S. (2006b). Extracurricular involvement and adolescent adjustment: Impact of duration, number of activities, and breadth of participation. *Applied Developmental Science*, 10, 132-146.

- Froh, J. J., Sefick, W. J., & Emmons, R. A. (2008). Counting blessings in early adolescents: An experimental study of gratitude and subjective well-being. *Journal of School Psychology, 46*, 213-233.
- Furrow, J. L., King, P. E., & White, K. (2004). Religion and positive youth development: Identity, meaning, and prosocial concerns. *Applied Developmental Science, 8*, 17-26.
- Gillham, J., Adams-Deutsch, Z., Werner, J., Reivich, K., Coulter-Heindl, V., Linkins, M., ... & Seligman, M. E. (2011). Character strengths predict subjective well-being during adolescence. *The Journal of Positive Psychology, 6*, 31-44.
- Gilman, R. (2001). The relationship between life satisfaction, social interest, and frequency of extracurricular activities among adolescent students. *Journal of Youth and Adolescence, 30*, 749-767.
- Gilman, R., & Huebner, E. S. (2006). Characteristics of adolescents who report very high life satisfaction. *Journal of Youth and Adolescence, 35*, 293-301.
- Gong, Y., Huang, J. C., & Farh, J. L. (2009). Employee learning orientation, transformational leadership, and employee creativity: The mediating role of employee creative self-efficacy. *Academy of Management Journal, 52*, 765-778.
- Gore, S., Farrell, F., & Gordon, J. (2001). Sports involvement as protection against depressed mood. *Journal of Research on Adolescence, 11*, 119-130.
- Hansen, D. M., & Larson, R. W. (2007). Amplifiers of developmental and negative experiences in organized activities: Dosage, motivation, lead roles, and adult-youth ratios. *Journal of Applied Developmental Psychology, 28*, 360-374.

- Hansen, D. M., Larson, R. W., & Dworkin, J. B. (2003). What adolescents learn in organized youth activities: A survey of self-reported developmental experiences. *Journal of Research on Adolescence, 13*, 25-55.
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44*, 227-239.
- Hoffmann, J. P. (2006). Extracurricular activities, athletic participation, and adolescent alcohol use: Gender-differentiated and school-contextual effects. *Journal of Health and Social Behavior, 47*, 275-290.
- Holland, A., & Andre, T. (1987). Participation in extracurricular activities in secondary school: What is known, what needs to be known? *Review of Educational Research, 57*, 437-466.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1-55.
- Huebner, E. S. (2004). Research on assessment of life satisfaction of children and adolescents. *Social Indicators Research, 66*, 3-33.
- Hunt, J., & Eisenberg, D. (2010). Mental health problems and help-seeking behavior among college students. *Journal of Adolescent Health, 46*, 3-10.
- Jauk, E., Benedek, M., Dunst, B., & Neubauer, A. C. (2013). The relationship between intelligence and creativity: New support for the threshold hypothesis by means of empirical breakpoint detection. *Intelligence, 41*, 212-221.

- Joiner Jr, T. E., & Wagner, K. D. (1995). Attributional style and depression in children and adolescents: A meta-analytic review. *Clinical Psychology Review, 15*, 777-798.
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review, 30*, 865-878.
- Kaufman, J. C. (2012). Counting the muses: Development of the Kaufman Domains of Creativity Scale (K-DOCS). *Psychology of Aesthetics, Creativity, and the Arts, 6*, 298-308.
- Kaufman, J. C., Kaufman, S. B., & Lichtenberger, E. O. (2011). Finding creative potential on intelligence tests via divergent production. *Canadian Journal of School Psychology, 26*, 83-106.
- Kaufman, J. C., Plucker, J. A., & Baer, J. (2008). *Essentials of creativity assessment* (Vol. 53). Hoboken, NJ: Wiley & Sons.
- Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustun, T. B. (2007). Age of onset of mental disorders: A review of recent literature. *Current Opinion in Psychiatry, 20*, 359-364.
- Kessler, R. C., Avenevoli, S., & Ries Merikangas, K. (2001). Mood disorders in children and adolescents: An epidemiologic perspective. *Biological Psychiatry, 49*, 1002-1014.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 593-602.

- Kessler, R. C., Foster, C. L., Saunders, W. B., & Stang, P. E. (1995). Social consequences of psychiatric disorders, I: Educational attainment. *American Journal of Psychiatry*, *152*, 1026-1032.
- Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., ... & Kendler, K. S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Archives of General Psychiatry*, *51*, 8-19.
- Kline, R. B. (2005). *Principles and practice of structural equation modeling*. Guilford press.
- Larson, R. W. (2000). Toward a psychology of positive youth development. *American Psychologist*, *55*, 170-183.
- Larson, R. W., & Verma, S. (1999). How children and adolescents spend time across the world: Work, play, and developmental opportunities. *Psychological Bulletin*, *125*, 701-736.
- Larson, R. W., Hansen, D. M., & Moneta, G. (2006). Differing profiles of developmental experiences across types of organized youth activities. *Developmental Psychology*, *42*, 849-863.
- Lerner, R. M., Dowling, E. M., & Anderson, P. M. (2003). Positive youth development: Thriving as the basis of personhood and civil society. *Applied Developmental Science*, *7*, 172-180.
- Lerner, J. V., Phelps, E., Forman, Y. E., & Bowers, E. P. (2009). Positive youth development. In R. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (vol. 2, pp. 524-558). Hoboken, NJ: Wiley & Sons.

- Lewinsohn, P. M., Rohde, P., Klein, D. N., & Seeley, J. R. (1999). Natural course of adolescent major depressive disorder: I. Continuity into young adulthood. *Journal of the American Academy of Child & Adolescent Psychiatry, 38*, 56-63.
- Lewinsohn, P. M., Rohde, P., Seeley, J. R., Klein, D. N., & Gotlib, I. H. (2003). Psychosocial functioning of young adults who have experienced and recovered from major depressive disorder during adolescence. *Journal of Abnormal Psychology, 112*, 353-363.
- Lorente, F. O., Souville, M., Griffet, J., & Grélot, L. (2004). Participation in sports and alcohol consumption among French adolescents. *Addictive Behaviors, 29*, 941-946.
- Lovibond, S. H. & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales*. (2nd. Ed.) Sydney: Psychology Foundation.
- Maciejewski, P. K., Prigerson, H. G., & Mazure, C. M. (2000). Self-efficacy as a mediator between stressful life events and depressive symptoms: Differences based on history of prior depression. *The British Journal of Psychiatry, 176*, 373-378.
- MacKinnon, D. (2008). *Introduction to statistical mediation analysis*. New York: Erlbaum.
- Mahoney, J. L., Schweder, A. E., & Stattin, H. (2002). Structured after-school activities as a moderator of depressed mood for adolescents with detached relations to their parents. *Journal of Community Psychology, 30*, 69-86.
- Mahoney, J. L., Vandell, D. L., Simpkins, S., & Zarrett, N. (2009). Adolescent out-of-school activities. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent*

- psychology: Contextual influences on adolescent development* (vol. 2, pp. 228-269). Hoboken, NJ: Wiley & Sons.
- Marsh, H. W., & Kleitman, S. (2002). Extracurricular school activities: The good, the bad, and the nonlinear. *Harvard Educational Review, 72*, 464-515.
- Mason, M. J., Schmidt, C., Abraham, A., Walker, L., & Tercyak, K. (2009). Adolescents' social environment and depression: Social networks, extracurricular activity, and family relationship influences. *Journal of Clinical Psychology in Medical Settings, 16*, 346-354.
- Masten, A. S., & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: Lessons from research on successful children. *American Psychologist, 53*, 205-220.
- Maujean, A., Pepping, C. A., & Kendall, E. (2014). A systematic review of randomized controlled studies of art therapy. *Art Therapy: Journal of the American Art Therapy Association, 31*, 37-44.
- McHale, S. M., Crouter, A. C., & Tucker, C. J. (2001). Free-time activities in middle childhood: Links with adjustment in early adolescence. *Child Development, 72*, 1764-1778.
- Melman, S., Little, S. G., & Akin-Little, K. A. (2007). Adolescent overscheduling: The relationship between levels of participation in scheduled activities and self-reported clinical symptomology. *The High School Journal, 90*, 18-30.
- Meyer, T. J., Miller, M. L., Metzger, R. L., Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*, 487-495.

- Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus user's guide* (7th edition). Los Angeles, CA: Muthén & Muthén.
- Nakamura, J., & Csikszentmihalyi, M. (2005). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 89-105). New York: Oxford University Press.
- Palen, L. A., & Coatsworth, J. D. (2007). Activity-based identity experiences and their relations to problem behavior and psychological well-being in adolescence. *Journal of Adolescence, 30*, 721-737.
- Pasupathi, M., Staudinger, U. M., & Baltes, P. B. (2001). Seeds of wisdom: Adolescents' knowledge and judgment about difficult life problems. *Developmental Psychology, 37*, 351-361.
- Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental health of young people: A global public-health challenge. *The Lancet, 369*, 1302-1313.
- Park, N. (2004). The role of subjective well-being in positive youth development. *The Annals of the American Academy of Political and Social Science, 591*, 25-39.
- Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior, 19*, 2-21.
- Radloff, L.S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.
- Randall, E. T., & Bohnert, A. M. (2009). Organized activity involvement, depressive symptoms, and social adjustment in adolescents: Ethnicity and socioeconomic status as moderators. *Journal of Youth and Adolescence, 38*, 1187-1198.

- Richards, R. E. (2007). *Everyday creativity and new views of human nature: Psychological, social, and spiritual perspectives*. American Psychological Association.
- Rose-Krasnor, L., Busseri, M. A., Willoughby, T., & Chalmers, H. (2006). Breadth and intensity of youth activity involvement as contexts for positive development. *Journal of Youth and Adolescence*, *35*, 365-379.
- Runco, M. A., Plucker, J. A., & Lim, W. (2001). Development and psychometric integrity of a measure of ideational behavior. *Creativity Research Journal*, *13*, 393-400.
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, *52*, 141-166.
- Sameroff, A. J. (2000). Developmental systems and psychopathology. *Development and Psychopathology*, *12*, 297-312.
- Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, *66*, 507-514.
- Schulenberg, J. E., Sameroff, A. J., & Cicchetti, D. (2004). The transition to adulthood as a critical juncture in the course of psychopathology and mental health. *Development and Psychopathology*, *16*, 799-806.
- Schumacher Dimech, A., & Seiler, R. (2011). Extra-curricular sport participation: A potential buffer against social anxiety symptoms in primary school children. *Psychology of Sport and Exercise*, *12*, 347-354.

- Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). Windsor, UK: NFER-NELSON.
- Seligman, M. E. P. (1991). *Learned optimism*. New York: Knopf.
- Seligman, M. E., Kaslow, N. J., Alloy, L. B., Peterson, C., Tanenbaum, R. L., & Abramson, L. Y. (1984). Attributional style and depressive symptoms among children. *Journal of Abnormal Psychology, 93*, 235-238.
- Shernoff, D. J., & Vandell, D. L. (2007). Engagement in after-school program activities: Quality of experience from the perspective of participants. *Journal of Youth and Adolescence, 36*, 891–903.
- Silvia, P. J. (2008). Another look at creativity and intelligence: Exploring higher-order models and probable confounds. *Personality and Individual Differences, 44*, 1012-1021.
- Silvia, P. J., Beaty, R. E., Nusbaum, E. C., Eddington, K. M., Levin-Aspenson, H., & Kwapil, T. R. (2014). Everyday creativity in daily life: An experience-sampling study of “little c” creativity. *Psychology of Aesthetics, Creativity, and the Arts*. Advance Online Publication.
- Simpkins, S. D., Eccles, J. S., & Becnel, J. N. (2008). The mediational role of adolescents' friends in relations between activity breadth and adjustment. *Developmental Psychology, 44*, 1081.
- Sternberg, R. J., & Lubart, T. I. (1999). The concept of creativity: Prospects and paradigms. *Handbook of creativity, 1*, 3-15.

- Tataryn, D. J., Wood, J. M., & Gorsuch, R. L. (1999). Setting the value of k in promax: A Monte Carlo study. *Educational and Psychological Measurement, 59*, 384-391.
- Tierney, P., & Farmer, S. M. (2002). Creative self-efficacy: Its potential antecedents and relationship to creative performance. *Academy of Management Journal, 45*, 1137-1148.
- Tierney, P., & Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *Journal of Applied Psychology, 96*, 277.
- Velicer, W. F., & Fava, J. L. (1998). Effects of variable and subject sampling on factor pattern recovery. *Psychological Methods, 3*, 231-251.
- Weissberg, R. P., Caplan, M., & Harwood, R. L. (1991). Promoting competent young people in competence-enhancing environments: a systems-based perspective on primary prevention. *Journal of Consulting and Clinical Psychology, 59*, 830-841.
- Weissman, M. M., Wolk, S., Goldstein, R. B., Moreau, D., Adams, P., Greenwald, S., ... & Wickramaratne, P. (1999). Depressed adolescents grown up. *Journal of the American Medical Association, 281*, 1707-1713.
- Westby, E. L., & Dawson, V. L. (1995). Creativity: Asset or burden in the classroom? *Creativity Research Journal, 8*, 1-10.
- Woodward, L. J., & Fergusson, D. M. (2001). Life course outcomes of young people with anxiety disorders in adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*, 1086-1093.
- Young, L. N., Winner, E., & Cordes, S. (2013). Heightened incidence of depressive symptoms in adolescents involved in the arts. *Psychology of Aesthetics, Creativity, and the Arts, 7*, 197-202.

- Zalta, A. K., & Chambless, D. L. (2011). Testing a developmental model of anxiety with the parental facilitation of mastery scale. *Journal of Anxiety Disorders, 25*, 352-361.
- Zhang, L. F. (2001). Thinking styles, self-esteem, and extracurricular experiences. *International Journal of Psychology, 36*, 100-107.

Table 1

Final 2-Factor Solution for the Exploratory Factor Analysis (k = 4) examining the Mastery and Creative Self-Efficacy Scale.

Item	Mastery	Creative Self-Efficacy
I felt that I could solve any problem I encountered	.80	.11
I remained confident that I could succeed	.90	.00
I trusted my abilities to deal with challenges	.87	-.01
I felt that I had control over what was happening	.82	-.03
I thought that I could achieve just about any goal I set my mind to	.84	.03
I felt resourceful enough to handle any situation	.81	.08
I was able to use my imagination	-.01	.81
I was confident that I could come up with great novel ideas	-.09	.95
I made unique contributions	.12	.77
I came up with ideas others had never thought of	-.06	.90
When problems or challenges arose, I was able to find innovative solutions	.22	.71
I felt confident about expressing my own original thoughts and opinions	.25	.57
<i>Variance Explained</i>	66.46%	10.84%
<i>Reliability (α)</i>	.95	.93

Table 2

Descriptive Statistics for all Continuous Variables Included in the Overall Model

[PFMS = Parental Facilitation of Mastery Scale; SWLS = Satisfaction with Life Scale; FS = Flourishing Scale; SPANE-P and SPANE-N = Scale of Positive and Negative Experience, Positive and Negative Affect subscales; DASS-D, DASS-A, and DASS-S = Depression Anxiety Stress Scales – 21, Depression, Anxiety and Stress subscales; CES-D = Center for Epidemiological Studies – Depression scale; PSWQ = Penn State Worry Questionnaire]

	<i>n</i>	Min	Max	<i>M</i>	<i>SD</i>
Age	512	17	22	18.96	.78
PFMS – Low Protection	511	6	25	16.41	3.32
PFMS – Challenge	511	4	20	16.07	2.85
Intrinsic Motivation	512	1	5	4.06	.65
Duration (in months)	512	6	48	29.85	9.01
Intensity (in hours/week)	512	1	50	8.06	5.22
Breadth	512	2	29	9.69	4.55
Mastery	512	11	30	23.44	3.49
Creative Self-Efficacy	512	6	30	22.11	3.95
SWLS	506	5	35	26.58	5.77
FS	506	14	56	46.44	6.19
SPANE-P	506	10	30	23.04	3.49
DASS-D	506	0	54	14.88	11.25
SPANE-N	506	6	26	15.88	3.77
CES-D	506	0	65	21.35	11.77
PSWQ	506	20	80	49.29	11.56
DASS-A	506	0	52	13.51	10.11
DASS-S	506	0	50	18.23	11.07

Table 3

Sample Size, Percentage of Missing Data, and Fit Statistics for all Structural Equation Models Examined.

[FMM = Full Mediation Model; PMM = Partial Mediation Model; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Squared Residual]

	All Activities	Athletic ECAs	Academic ECAs	Artistic ECAs	Prosocial ECAs
Sample Size (<i>n</i>)	512	433	422	255	369
Missing Data (%)	0.55%	0.44%	0.64%	1.06%	0.61%
FMM χ^2 (df), <i>p</i>	$\chi^2(114) = 545.348$	$\chi^2(114) = 514.181$	$\chi^2(114) = 533.09$	$\chi^2(114) = 523.10$	$\chi^2(114) = 525.95$
FMM <i>p</i> -value	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001
PMM χ^2 (df),	$\chi^2(105) = 532.60$	$\chi^2(105) = 505.94$	$\chi^2(105) = 418.66$	$\chi^2(105) = 464.05$	$\chi^2(105) = 506.847$
PMM <i>p</i> -value	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001	<i>p</i> < .001
$\Delta\chi^2$ (df)	$\Delta\chi^2(9) = 12.75$	$\Delta\chi^2(9) = 8.24$	$\Delta\chi^2(9) = 114.43$	$\Delta\chi^2(9) = 59.05$	$\Delta\chi^2(9) = 19.03$
<i>p</i> -value for $\Delta\chi^2$ (df)	.17	.51	<.001	<.001	.02
Final Model Retained	FMM	FMM	PMM	PMM	PMM
RMSEA [90% CI]	.09 [.08-.09]	.08 [.08-.09]	.09 [.08-1.00]	.08 [.07-.09]	.09 [.08-.09]
CFI	.90	.91	.90	.91	.91
SRMR	.07	.07	.07	.07	.07

Table 4

Results of The Blockwise Multiple Regression Analyses Including Unstandardized B Coefficients, Standard Errors, Standardized B Coefficients, t- and p-Values.

4a. Creative Achievement Questionnaire		Unstd B	SE	Std β	t	p
Block 1	Constant	0.33	0.37		0.89	.37
	Age	0.02	0.02	.05	1.15	.25
	Gender	0.00	0.03	.00	0.08	.93
	Ethnicity	-0.05	0.03	-.08	-1.74	.08
	Duration	0.00	0.00	.07	1.51	.13
	Intensity	0.00	0.00	.06	1.26	.21
	Breadth	0.02	0.00	.21	4.75	.00
Block 2	Constant	0.16	0.38		0.43	.66
	Age	0.02	0.02	.04	1.04	.30
	Gender	0.00	0.03	.01	0.12	.90
	Ethnicity	-0.05	0.03	-.08	-1.78	.07
	Duration	0.00	0.00	.03	0.64	.53
	Intensity	0.00	0.00	.04	0.83	.41
	Breadth	0.01	0.00	.20	4.47	.00
	Mastery	-0.01	0.01	-.07	-1.17	.24
	Creative Self-Efficacy	0.02	0.01	.24	3.78	.00
4b. Divergent-Thinking Task Creativity Score		Unstd B	SE	Std β	t	p
Block 1	Constant	1.62	0.95		1.71	.09
	Age	0.05	0.05	.04	0.96	.34
	Gender	0.12	0.08	.07	1.44	.15
	Ethnicity	0.09	0.08	.06	1.24	.21
	Duration	0.00	0.00	-.03	-0.61	.54
	Intensity	-0.02	0.01	-.10	-2.09	.04
	Breadth	0.02	0.01	.13	2.81	.01

Block 2	Constant	1.61	0.97		1.66	.10
	Age	0.05	0.05	.04	0.95	.34
	Gender	0.12	0.08	.07	1.43	.15
	Ethnicity	0.09	0.08	.06	1.24	.22
	Duration	0.00	0.00	-.03	-0.62	.53
	Intensity	-0.02	0.01	-.10	-2.07	.04
	Breadth	0.02	0.01	.13	2.78	.01
	Mastery	0.00	0.02	.00	-0.08	.94
	Creative Self-Efficacy	0.00	0.01	.01	0.15	.88

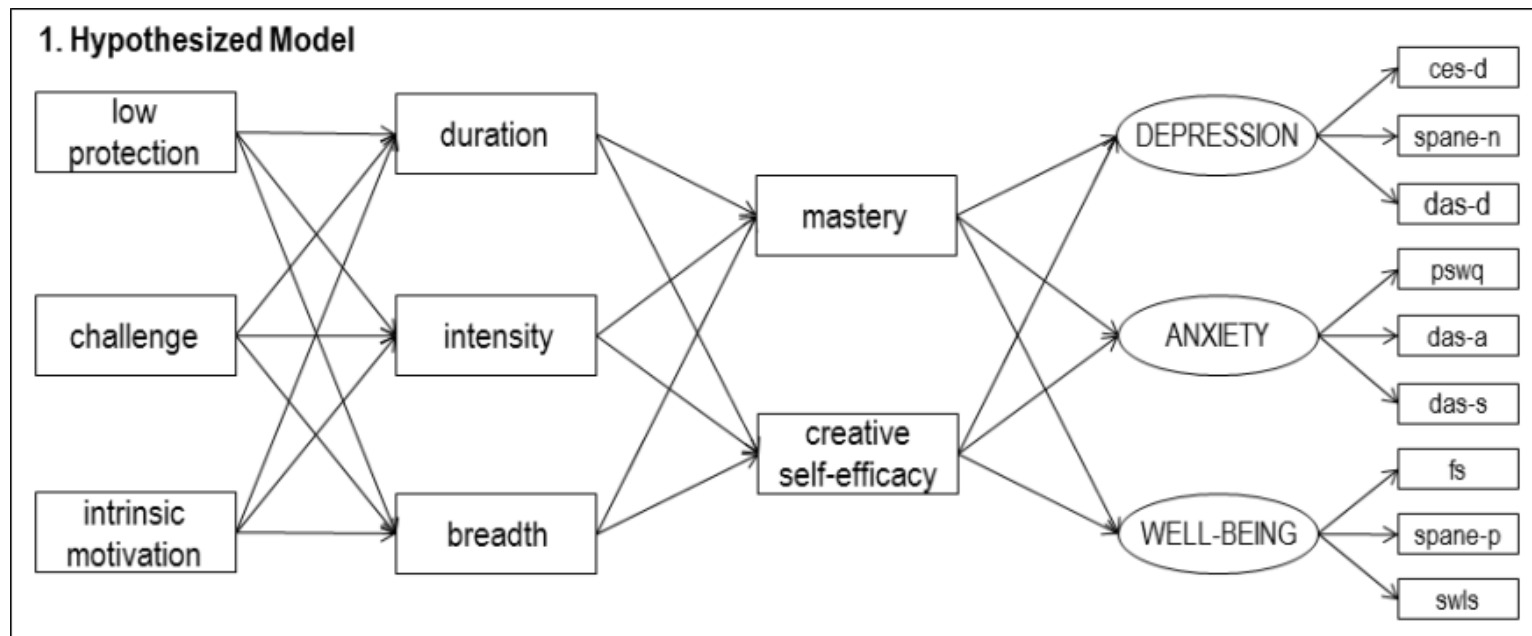


Figure 1. Hypothesized full mediation model tested using Structural Equation Modeling. The model tested also included age, gender, and ethnicity as covariates (not pictured). The following errors were allowed to covary: (a) low protection, challenge, and intrinsic motivation, (b) duration, intensity, and breadth, (c) mastery and creative self-efficacy, and (d) depression, anxiety, and well-being. This model was compared to a partial mediation model specifying direct paths between participation variables (duration, intensity, and breadth) and psychological adjustment outcomes (depression, anxiety, and well-being).

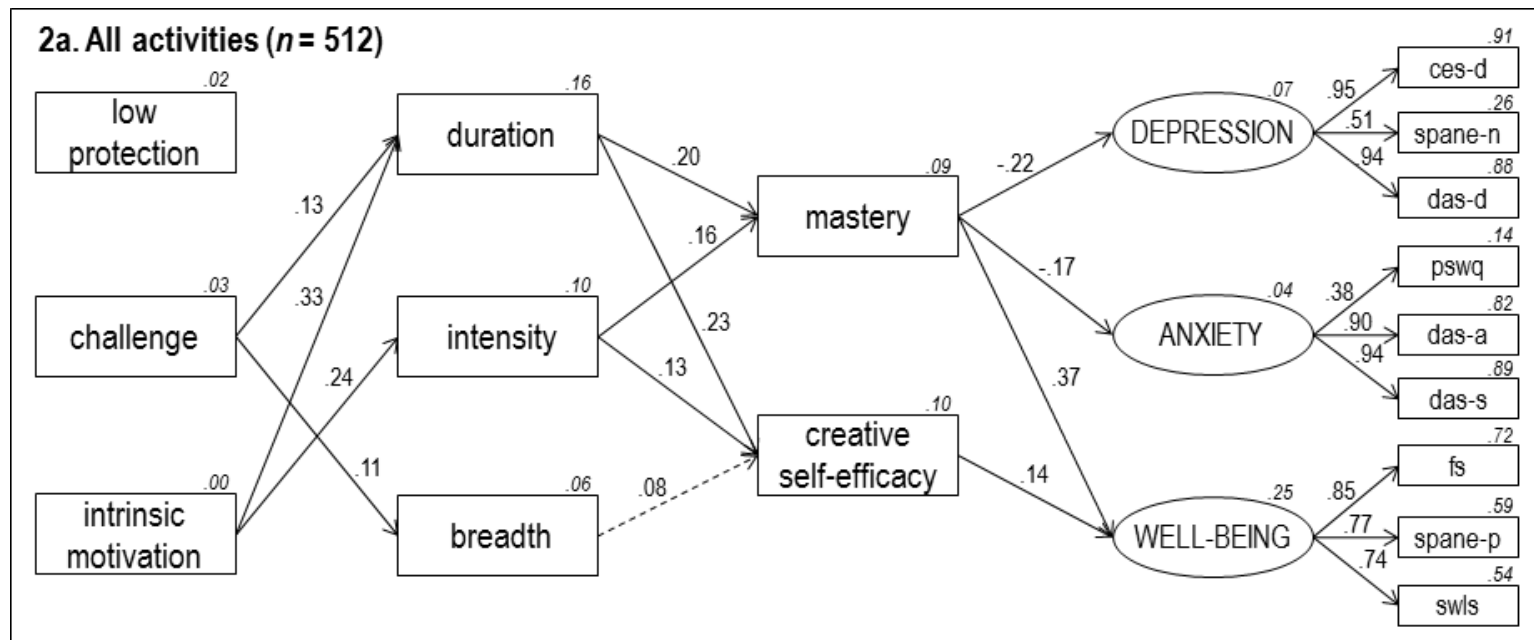


Figure 2a. Results of the full mediation model for overall ECA participation, including significant ($p < .05$) and near-significant ($p < .10$) standardized path coefficients, as well as squared multiple correlations (dotted lines indicate near-significant paths).

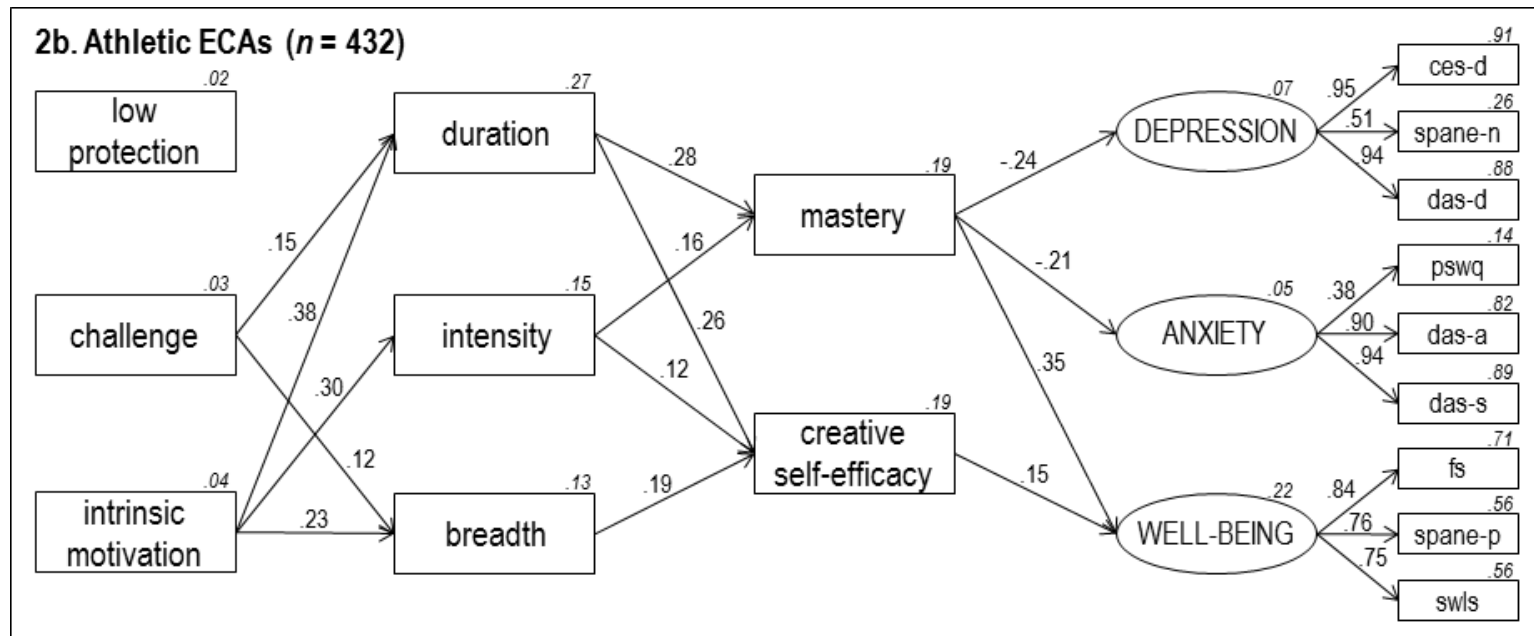


Figure 2b. Results of the full mediation model for athletic ECAs, including significant ($p < .05$) and near-significant ($p < .10$) standardized path coefficients, as well as squared multiple correlations (dotted lines indicate near-significant paths).

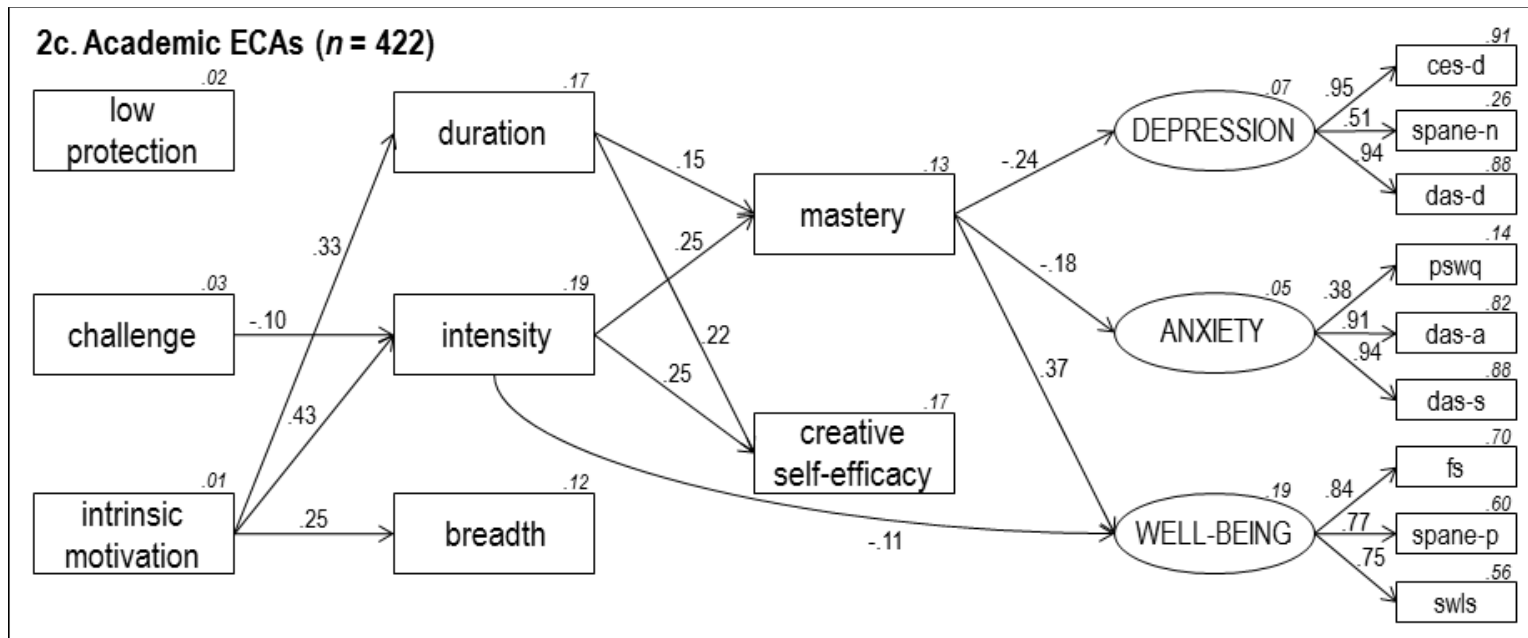


Figure 2c. Results of the partial mediation model for academic ECAs, including significant ($p < .05$) and near-significant ($p < .10$) standardized path coefficients, as well as squared multiple correlations (dotted lines indicate near-significant paths).

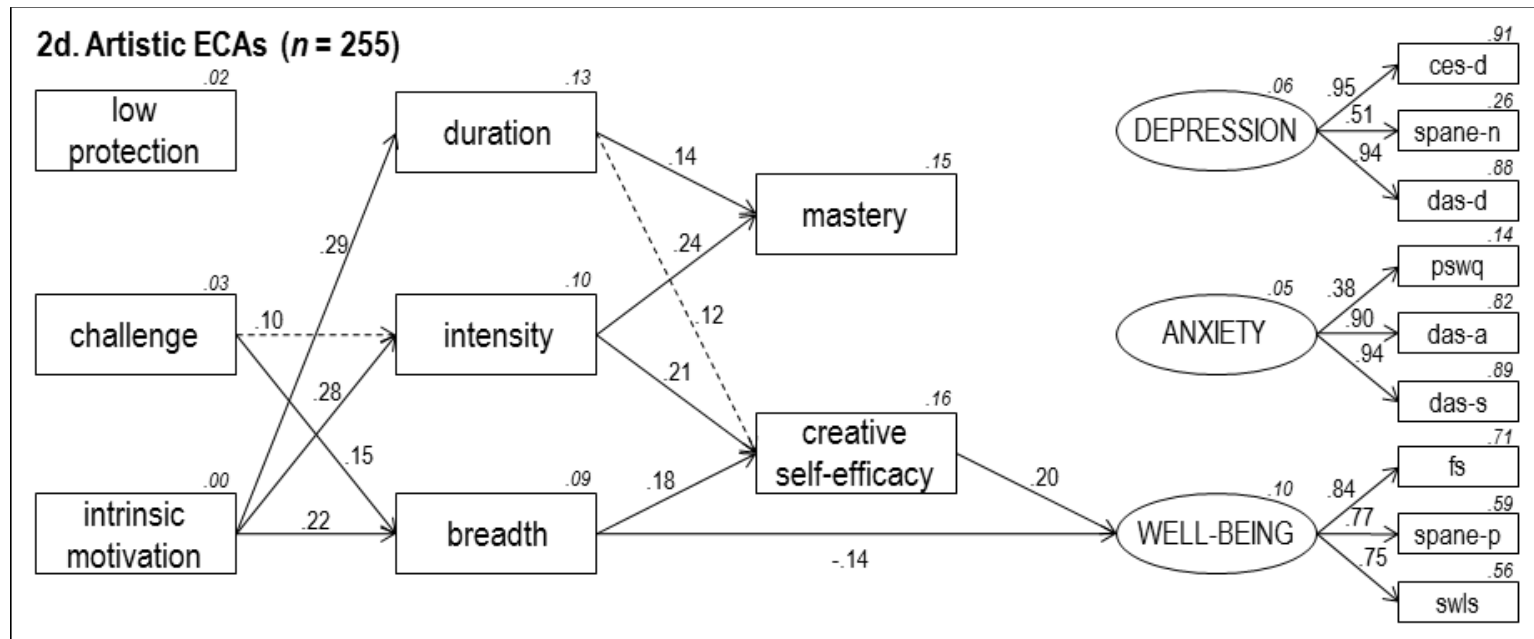


Figure 2d. Results of the partial mediation model for artistic ECAs, including significant ($p < .05$) and near-significant ($p < .10$) standardized path coefficients, as well as squared multiple correlations (dotted lines indicate near-significant paths).

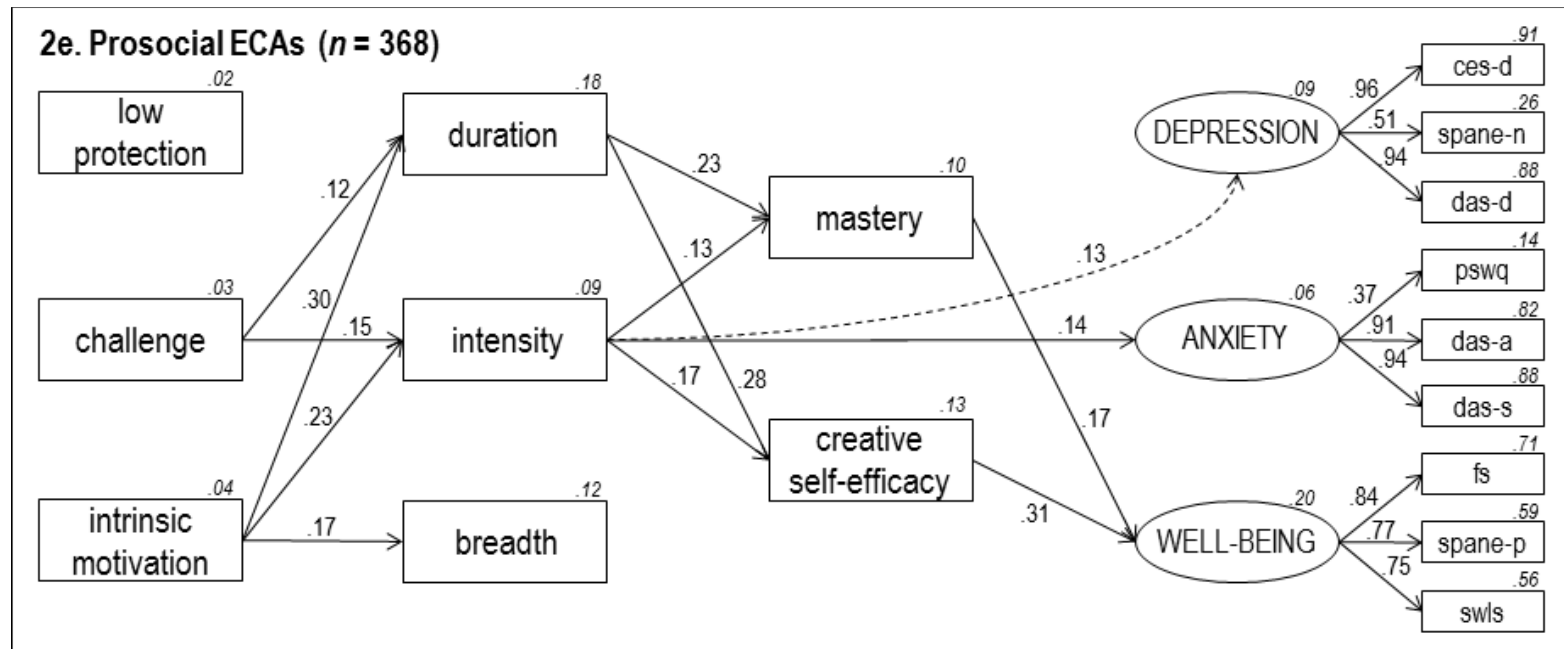


Figure 2e. Results of the partial mediation model for prosocial ECAs, including significant ($p < .05$) and near-significant ($p < .10$) standardized path coefficients, as well as squared multiple correlations (dotted lines indicate near-significant paths).

Appendix A*Mastery and Creative Self-Efficacy Scale*

We would like to learn more about your personal experience during [athletic / academic / artistic / prosocial] activities. To what extent were the following statements true or not true of your experience during the time that you participated in [athletic / academic / artistic / prosocial] activities?

Scale: 1 = Never or almost never; 2 = Rarely; 3 = Sometimes; 4 = Frequently; 5 = Very Often

Mastery Items:

1. I felt that I could solve any problem I encountered
2. I remained confident that I could succeed
3. I trusted my abilities to deal with challenges
4. I felt that I had control over what was happening
5. I thought that I could achieve just about any goal I set my mind to
6. I felt resourceful enough to handle any situation

Creative Self-Efficacy:

7. I was able to use my imagination
8. I was confident that I could come up with great novel ideas
9. I made unique contributions
10. I came up with ideas others had never thought of
11. When problems or challenges arose, I was able to find innovative solutions
12. I felt confident about expressing my own original thoughts and opinions

Appendix B

Instructions for Raters (adapted from Baer, 1993; Kaufman, Plucker, & Baer, 2008)

You are in charge of judging ideas for creativity, using the following 5-point Likert scale:

- 1- Not creative at all
- 2- Not creative
- 3- Average
- 4- Fairly creative
- 5- Very creative

There is only one criterion for rating these ideas: creativity. We realize that creativity doesn't exist in a vacuum, and to some extent creativity probably overlaps other criteria one might apply, but we ask you to rate the ideas solely on the basis of your thoughtful-but-subjective opinions of their creativity. The point is, you are the expert, and you don't need to defend your choices or articulate a definition of creativity. What creativity means to you can remain a mystery - what we want you to do is use that mysterious expert sense to rate the ideas for creativity.

Appendix C

Results of the Structural Equation Models (Final Models Retained),

Including Unstandardized Path Coefficients, Standard Errors, p-values, and Standardized Path Coefficients, for All Direct Effects

[FMM = Full Mediation Model; PMM = Partial Mediation Model; WB = Well-Being; DEP = Depression; ANX = Anxiety; pfms-lp and pfms-c = Parental Facilitation of Mastery Scale - Low Protection and Challenge subscales; swls = Satisfaction with Life Scale; fs = Flourishing Scale; spane-p and spane-n = Scale of Positive and Negative Experience, Positive and Negative Affect subscales; das-d, das-a, and das-s = Depression Anxiety Stress Scales – 21, Depression, Anxiety and Stress subscales; ces-d = Center for Epidemiological Studies – Depression scale; pswq = Penn State Worry Questionnaire; intrinsic = Intrinsic motivation; duration = Duration of participation; intensity = intensity of participation; breadth = breadth of participation; mastery = mastery ; cse = creative self-efficacy]

			Overall (n = 512) FMM				Athletic (n = 432) FMM				Academic (n = 422) PMM				Artistic (n = 255) PMM				Prosocial (n = 368) PMM			
			Unstd	SE	p	Std	Unstd	SE	p	Std	Unstd	SE	p	Std	Unstd	SE	p	Std	Unstd	SE	p	Std
WB	→	Swls	1.00	0.00		.74	1.00	0.00		.75	1.00	0.00		.75	1.00	0.00		.75	1.00	0.00		.75
WB	→	Fs	1.24	0.09	<.01	.85	1.21	0.09	<.01	.84	1.20	0.09	<.01	.84	1.21	0.09	<.01	.84	1.21	0.09	<.01	.84
WB	→	spane-p	0.63	0.05	<.01	.77	0.62	0.05	<.01	.76	0.63	0.05	<.01	.77	0.62	0.05	<.01	.77	0.62	0.05	<.01	.77
DEP	→	das-d	1.00	0.00		.94	1.00	0.00		.94	1.00	0.00		.94	1.00	0.00		.94	1.00	0.00		.94
DEP	→	spane-n	0.18	0.02	<.01	.51	0.18	0.02	<.01	.51	0.18	0.02	<.01	.51	0.18	0.02	<.01	.51	0.18	0.02	<.01	.51
DEP	→	ces-d	1.07	0.03	<.01	.95	1.07	0.03	<.01	.95	1.07	0.03	<.01	.95	1.06	0.03	<.01	.95	1.07	0.03	<.01	.96
ANX	→	pswq	1.00	0.00		.38	1.00	0.00		.38	1.00	0.00		.38	1.00	0.00		.38	1.00	0.00		.37
ANX	→	das-a	2.10	0.27	<.01	.90	2.10	0.27	<.01	.90	2.11	0.27	<.01	.91	2.11	0.27	<.01	.90	2.12	0.28	<.01	.91
ANX	→	das-s	2.40	0.27	<.01	.94	2.39	0.27	<.01	.94	2.40	0.27	<.01	.94	2.40	0.27	<.01	.94	2.41	0.28	<.01	.94
mastery	→	WB	0.45	0.09	<.01	.37	0.32	0.07	<.01	.35	0.36	0.09	<.01	.37	0.12	0.09	.16	.13	0.17	0.08	.04	.17
cse	→	WB	0.15	0.07	.03	.14	0.12	0.06	.03	.15	0.09	0.07	.23	.10	0.15	0.08	.05	.20	0.27	0.07	<.01	.31
duration	→	WB	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-0.01	0.03	.59	-0.04	-0.01	0.03	.85	-0.02	-0.02	0.02	.29	-0.07

DEP	↔	WB	-20.36	2.56	<.01	-.54	-20.78	2.72	<.01	-.54	-21.29	2.74	<.01	-.54	-24.91	2.97	<.01	-.60	-21.23	2.71	<.01	-.55
ANX	↔	WB	-5.02	1.07	<.01	-.32	-5.17	1.08	<.01	-.32	-5.10	1.16	<.01	-.31	-6.41	1.23	<.01	-.37	-5.36	1.14	<.01	-.33
ANX	↔	DEP	40.11	5.23	<.01	.93	39.89	5.10	<.01	.93	39.74	5.25	<.01	.93	40.18	5.25	<.01	.93	39.35	5.15	<.01	.93
gender	↔	age	-0.04	0.02	.02	-.11	-0.04	0.02	.02	-.11	-0.04	0.02	.02	-.11	-0.04	0.02	.02	-.11	-0.04	0.02	.02	-.11
ethnicity	↔	age	0.01	0.02	.58	.03	0.01	0.02	.58	.03	0.01	0.02	.58	.03	0.01	0.02	.58	.03	0.01	0.02	.58	.03
ethnicity	↔	gender	-0.02	0.01	.07	-.08	-0.02	0.01	.07	-.08	-0.02	0.01	.07	-.08	-0.02	0.01	.07	-.08	-0.02	0.01	.07	-.08
pfms-c	↔	pfms-lp	2.78	0.45	<.01	.30	2.78	0.45	<.01	.30	2.78	0.45	<.01	.30	2.78	0.45	<.01	.30	2.78	0.45	<.01	.30
Intrinsic	↔	pfms-lp	0.13	0.09	.16	.06	-0.11	0.14	.45	-.04	0.19	0.17	.25	.06	0.26	0.18	.15	.09	0.16	0.17	.35	.05
Intrinsic	↔	pfms-c	0.44	0.08	<.01	.24	0.61	0.13	<.01	.24	0.30	0.15	.04	.10	0.23	0.18	.19	.09	0.58	0.15	<.01	.22
intensity	↔	duration	10.65	2.42	<.01	.26	24.49	4.33	<.01	.29	11.97	2.43	<.01	.25	22.39	4.84	<.01	.33	-1.83	6.63	.78	-.03
breadth	↔	duration	2.57	1.82	.16	.07	4.12	0.91	<.01	.20	7.39	1.13	<.01	.34	6.15	1.48	<.01	.30	7.32	1.36	<.01	.32
breadth	↔	intensity	-3.21	1.04	<.01	-.15	2.02	0.67	<.01	.17	1.79	0.53	<.01	.19	2.90	0.70	<.01	.33	0.60	0.62	.33	.07
cse	↔	mastery	8.65	0.75	<.01	.70	11.51	1.35	<.01	.56	12.92	1.18	<.01	.71	15.63	1.57	<.01	.70	12.98	1.20	<.01	.70

Appendix D

Results of the Joint Significance Tests for Indirect Effects

Including Unstandardized Coefficients, Standard Errors, p-values, and Standardized Coefficients

[FMM = Full Mediation Model; PMM = Partial Mediation Model; WB = Well-Being; DEP = Depression; ANX = Anxiety; pfms-lp and pfms-c = Parental Facilitation of Mastery Scale - Low Protection and Challenge subscales; swls = Satisfaction with Life Scale; fs = Flourishing Scale; spane-p and spane-n = Scale of Positive and Negative Experience, Positive and Negative Affect subscales; das-d, das-a, and das-s = Depression Anxiety Stress Scales – 21, Depression, Anxiety and Stress subscales; ces-d = Center for Epidemiological Studies – Depression scale; pswq = Penn State Worry Questionnaire; intrinsic = Intrinsic motivation; duration = Duration of participation; intensity = intensity of participation; breadth = breadth of participation; mastery = mastery ; cse = creative self-efficacy]

				Overall (n = 512) FMM				Athletic (n = 432) FMM				Academic (n = 422) PMM				Artistic (n = 255) PMM				Prosocial (n = 368) PMM				
				Unstd	SE	p	Std	Unstd	SE	p	Std	Unstd	SE	p	Std	Unstd	SE	p	Std	Unstd	SE	p	Std	
sum	duration	→	DEP	-0.04	0.02	.01	-.04	-0.04	0.01	<.01	-.06	-0.03	0.02	.13	-.03	0.00	0.01	.82	.00	-0.05	0.02	<.01	-.06	
duration	→	mastery	→	DEP	-0.05	0.02	.01	-.04	-0.05	0.02	<.01	-.06	-0.03	0.02	.05	-.04	-0.01	0.01	.36	-.02	-0.02	0.02	.26	-.02
duration	→	cse	→	DEP	0.01	0.02	.60	.01	0.01	.58	.01	0.01	0.02	.65	.01	0.01	0.01	.41	.01	-0.03	0.02	.14	-.04	
sum	intensity	→	DEP	-0.06	0.03	.03	-.03	-0.05	0.02	.02	-.03	-0.10	0.04	.01	-.05	-0.01	0.04	.79	-.01	-0.08	0.03	.03	-.04	
intensity	→	mastery	→	DEP	-0.07	0.03	.04	-.03	-0.05	0.02	.02	-.04	-0.12	0.05	.01	-.06	-0.05	0.05	.34	-.03	-0.03	0.03	.31	-.01
intensity	→	cse	→	DEP	0.01	0.02	.61	.01	0.01	.62	.00	0.02	0.04	.64	.01	0.04	0.05	.36	.02	-0.05	0.04	.22	-.02	
sum	breadth	→	DEP	-0.02	0.03	.33	-.01	-0.08	0.08	.35	-.01	-0.03	0.07	.72	-.01	0.05	0.10	.65	.01	-0.08	0.10	.39	-.02	
breadth	→	mastery	→	DEP	-0.03	0.03	.27	-.01	-0.11	0.08	.18	-.02	-0.04	0.08	.63	-.01	-0.07	0.09	.44	-.01	-0.05	0.07	.44	-.01
breadth	→	cse	→	DEP	0.01	0.01	.64	.00	0.04	0.07	.61	.01	0.01	0.03	.73	.00	0.12	0.13	.37	.02	-0.03	0.07	.61	-.01
sum	duration	→	ANX	-0.01	0.01	.11	-.02	-0.01	0.01	.07	-.03	-0.01	0.01	.22	-.02	0.00	0.01	.96	.00	-0.01	0.01	.07	-.04	
duration	→	mastery	→	ANX	-0.02	0.01	.04	-.03	-0.02	0.01	.01	-.06	-0.01	0.01	.10	-.03	0.00	0.01	.46	-.01	-0.01	0.01	.35	-.02
duration	→	cse	→	ANX	0.01	0.01	.46	.01	0.01	.20	.02	0.00	0.01	.75	.01	0.00	0.01	.41	.01	-0.01	0.01	.39	-.02	
sum	intensity	→	ANX	-0.02	0.01	.07	-.02	-0.01	0.01	.08	-.02	-0.03	0.02	.03	-.04	0.00	0.02	.97	.00	-0.02	0.01	.12	-.02	
intensity	→	mastery	→	ANX	-0.02	0.01	.06	-.03	-0.02	0.01	.03	-.03	-0.04	0.02	.04	-.05	-0.02	0.02	.45	-.02	-0.01	0.01	.38	-.01
intensity	→	cse	→	ANX	0.01	0.01	.49	.01	0.01	.28	.01	0.01	0.02	.74	.01	0.02	0.02	.35	.02	-0.01	0.01	.44	-.01	
sum	breadth	→	ANX	-0.01	0.01	.45	-.01	0.00	0.03	.97	.00	-0.01	0.02	.73	.00	0.03	0.04	.53	.01	-0.02	0.03	.43	-.01	

breadth	→	mastery	→	ANX	-0.01	0.01	.30	-.01	-0.04	0.03	.20	-.02	-0.01	0.03	.64	-.01	-0.02	0.04	.54	-.01	-0.02	0.02	.51	-.01
breadth	→	cse	→	ANX	0.00	0.01	.52	.00	0.04	0.03	.24	.02	0.00	0.01	.79	.00	0.05	0.06	.36	.02	-0.01	0.02	.70	.00
sum		duration	→	WB	0.05	0.01	<.01	.11	0.04	0.01	<.01	.13	0.03	0.01	.01	.08	0.01	0.01	.07	.04	0.04	0.01	<.01	.13
duration	→	mastery	→	WB	0.03	0.01	<.01	.07	0.03	0.01	<.01	.10	0.02	0.01	.02	.06	0.01	0.01	.26	.02	0.01	0.01	.08	.04
duration	→	cse	→	WB	0.02	0.01	.04	.03	0.01	0.01	.06	.04	0.01	0.01	.26	.02	0.01	0.01	.24	.03	0.03	0.01	<.01	.09
sum		intensity	→	WB	0.06	0.02	.01	.08	0.04	0.01	<.01	.07	0.10	0.02	<.01	.12	0.06	0.02	<.01	.07	0.07	0.02	<.01	.07
intensity	→	mastery	→	WB	0.05	0.02	.01	.06	0.03	0.01	.01	.06	0.08	0.02	<.01	.09	0.02	0.02	.21	.03	0.02	0.01	.12	.02
intensity	→	cse	→	WB	0.02	0.01	.12	.02	0.01	0.01	.12	.02	0.02	0.02	.26	.02	0.03	0.02	.10	.04	0.05	0.02	.02	.05
sum		breadth	→	WB	0.03	0.02	.16	.03	0.13	0.06	.04	.06	0.04	0.06	.50	.02	0.12	0.07	.06	.05	0.07	0.08	.38	.03
breadth	→	mastery	→	WB	0.02	0.02	.24	.02	0.07	0.05	.16	.03	0.02	0.05	.61	.01	0.03	0.03	.32	.01	0.03	0.03	.32	.02
breadth	→	cse	→	WB	0.01	0.01	.20	.01	0.06	0.04	.07	.03	0.01	0.02	.45	.01	0.09	0.06	.14	.04	0.03	0.05	.53	.02

CHAPTER 3:

Motivations and Creativity: Pathways to Achievement and Well-Being

Abstract

Past research examining the relationship between motivation and creativity has tended to focus on the extent to which individuals work for the sake of the creative process itself (intrinsic motivation), or for the sake of outcomes external to the process (extrinsic motivation). An additional dimension of motivation may however play an important role: the extent to which individuals seek to benefit themselves or others through their work. In keeping with this, recent studies have suggested that prosocial motivation enhances creativity. The present studies used a qualitative-to-quantitative approach to further investigate the nature and role of both self- and other-oriented motivations for creativity. Study 1, a qualitative study of 56 creative professionals in two artistic and two scientific fields, provided a comprehensive phenomenological examination of the specific self- and other-oriented motivations and processes underlying creative behavior. Study 2, a quantitative study of 972 graduate students in five artistic and five scientific fields, showed that the motivations and processes derived from Study 1 could be reduced to three kinds of motivations (prosocial, intellectual, and emotional motivations) and one process (sense of audience, or the degree to which creators think about others). Furthermore, results of a multigroup path analysis demonstrated that the relationships between motivations, processes, creative achievement, and well-being differed between domains considered (arts and sciences). These results highlight the importance of taking a domain-specific approach to the study and enhancement of creativity, as well as the promise of bridging personality, social, cognitive, and clinical psychology literatures in order to provide a comprehensive examination of the antecedents and outcomes of creative behavior.

Motivations and Creativity: Pathways to Achievement and Well-Being

Where does creativity come from? Past research has investigated this question in order to better understand and enhance individuals' ability to generate ideas or products that are both novel and useful (Sternberg & Lubart, 1999). The quantity and success of popular books aimed at improving one's creative abilities is a testament to the intuitive appeal and importance of this mission (e.g., De Bono, 1995; Kelley & Kelley, 2013; Michalko, 201; Sawyer, 2013). The attractiveness of creativity as a subject of scientific inquiry can be explained by its role in both personal and societal development. At the personal level, creativity is typically seen as an intrinsically desirable characteristic (Peterson & Seligman, 2004). In addition, creative thinking may enhance individual well-being through a variety of mechanisms such as providing opportunities for distraction and positive affect (Dalebroux, Goldstein, & Winner, 2008; Drake, Coleman, & Winner, 2011), meaning-making (Runco, 2009; Pennebaker & Seagal, 1999; Sexton & Pennebaker, 2009), competence (Fisher & Specht, 1999), and growth (Aldwin & Sutton, 1998; Bloom, 1998; Forgeard, 2013), among others (for reviews see Forgeard & Eichner, in press; Forgeard, Mecklenburg, Lacasse, & Jayawickreme, in press). At the societal level, creativity is touted as the main driver of human progress, allowing history to unfold in a positive direction, and humans to survive and flourish through improved means of living, reproduction, and cultural advancement (Csikszentmihalyi, 1996; Feist, 2001; Gabora & Kaufman, 2010; Miller, 2000, 2001; Mithen, 1996; Nettle & Clegg, 2006). At the organizational level, creativity is one of the main human resources that allow companies to invent and provide others with important products or services (Florida,

2002; Robinson & Stern, 1997). Within educational contexts, teaching creativity may develop students' adaptive problem-solving skills and prepare them for the challenges of their professional and private lives by allowing them to think flexibly and solve problems (Hunsaker, 2005). Creativity, however, is not always encouraged in practice within the organization or the classroom because of competing demands for conscientiousness and diligence (Mueller, Melwani, & Goncalo, 2011; Scott, 1999; Staw, 1995; Westby & Dawson, 1995).

Determinants of Creativity

Given that creativity is largely seen as a desirable process, what do scientists know about ways to enhance it? Creative thinking is of course multiply determined, and a wide array of factors affects the likelihood that creative ideas will be generated and selected (Kaufman, 2013; Mumford & Gustafson, 1988; Simonton, 1988, 1999). To date, cognition has constituted the main focus of attention of researchers, given that creative thinking is by nature a cognitive process. Much effort has therefore been devoted to understanding the specific thinking styles and operations that lead to creative output (e.g., Finke, Ward, & Smith, 1992; Weisberg, 2006). In keeping with this, most interventions dedicated to enhancing creativity have used cognitive approaches, focusing on teaching people how to think creatively (Scott, Leritz, & Mumford, 2004). Other important influences acting upstream onto cognition have also been investigated, including motivational and social factors, which constitute the main focus of the present studies: (e.g., Amabile, 1996; Sawyer, 2003, 2008), personality (e.g., Feist, 1998, 1999), culture (e.g., Csikszentmihalyi, 1999; Niu & Sternberg, 2002, 2006), emotion (e.g., Baas, De

Dreu, & Nijstad, 2008) as well physical environments and experiences (e.g., Leung et al., 2012; McCoy & Evans, 2002; Mehta & Zhu, 2009) (for comprehensive reviews of the field of creativity research see Kaufman, 2009; Runco, 2007; Sawyer, 2013).

Studying the Role of Motivation Further

The study of motivation investigates why individuals engage in particular behaviors (here, creativity), and how these reasons affect how they do so. Given the amount of research that this topic has already generated in the field of creativity research (see below), why is motivation a promising approach that continues to deserve further study? First, interventions that do not include a motivational component may assume that people want to be creative to begin with (which may or may not be the case).

Interventions that use motivation can help tackle the problem of getting people “in the door” in the first place, by helping them find out *if* and *why* they would want to engage in creative work. Indeed, cognitive interventions may not be as effective—or effective at all— if individuals participating do not feel compelled to be creative in the first place.

Second, motivation plays an important role in guiding cognition – in other words, why we generate novel ideas probably influences how we go about doing this (Amabile, 1983, 1987, 1996; Forgeard & Mecklenburg, 2013; Hennessey, 2010; Ruscio, Whitney, & Amabile, 1998). Third, studying the role of motivation is especially important because it probably influences not just how people think and what they achieve, but also how they relate to what they achieve. Motivation can influence individuals’ metacognitive appraisals of their work, and this function may determine the extent to which they derive meaning from their efforts. Thus, by allowing individuals to pursue and accomplish

personally meaningful goals (Little, 1998; Little & Chambers, 2004; McGregor & Little, 1998) fulfilling basic needs such as autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan & Deci, 2000; Sheldon & Elliot, 1999), creative work may contribute to well-being.

Past Research on Motivation and Creativity

Intrinsic and extrinsic motivation. Important insights about the role of motivation in creativity have emerged over recent decades. Pioneering work by Amabile and colleagues has established that one of the best determinants of creativity is the creator's intrinsic interest in his or her work (for a review see Amabile, 1996; Collins & Amabile, 1999). When intrinsically motivated, creators create for the sake of the process itself – they derive direct personal benefits from the act of creation, generally described as enjoyment or satisfaction. In contrast, when extrinsically motivated, creators create for the sake of outcomes external to the process (e.g., obtaining evaluation, rewards, or praise, fulfilling constraints, etc.). A vast body of empirical research based on prior social-psychological work (e.g., Lepper, Greene, & Nisbett, 1973) has shown that intrinsic motivation enhances creativity, whereas extrinsic motivation decreases creativity insofar as it also decreases intrinsic motivation by providing another salient justification for one's actions (Amabile, 1979, 1982, 1983a, 1983b, 1985, 1996; Amabile & Gitomer, 1984; Amabile, Goldfarb, & Brackfield, 1990; Amabile, Hennessey, & Grossman, 1986; Amabile, Hill, Hennessey, & Tighe, 1994; Bartis, Szymanski, & Harkins, 1988; Hennessey, 1989; Joussemet & Koestner, 1999; Koestner, Ryan, Bernieri, & Holt, 1984). Extrinsic motivation may indeed take the creator's attention away from the work and the

learning process and instead refocus attention on performance, impeding the creator's ability to work effectively (Kaufman, 2009; Nicholls, 1979).

Following these investigations, Amabile and colleagues sought to understand how some creators manage to remain intrinsically motivated and thrive in spite of the inevitable presence of extrinsic rewards or constraints in the environment. In keeping with this, a series of "immunization studies" demonstrated that children can be taught to remain focused on their intrinsic interest in the task at hand, even if potentially harmful extrinsic motivators are introduced in the environment (Gerrard, Poteat, & Ironsmith, 1996; Hennessey, Amabile, & Martinage, 1989; Hennessey & Zbikowski, 1993).

Additional work suggests that not all extrinsic motivators are harmful, as some may support intrinsic motivation rather than harm it. In her revised theory, Amabile specified that extrinsic motivators can benefit creativity if they reinforce the creator's interest in the process, provide useful information, and/or support the creator's autonomy and competence (Amabile 1993, 1996; Amabile, Conti, Coon, Lazenby, & Herron, 1996; Amabile & Gryskiewicz, 1987; Eisenberger & Selbst, 1994). For example, a creator may benefit from seeking to earn the respect of a mentor who encourages independence and risk-taking. In contrast, a mentor who constrains the creator's freedom, or who provides rewards based on performance rather than learning, will likely be detrimental (Amabile, Goldfarb, & Brackfield, 1990; Byron & Khazanchi, 2012).

Prosocial motivation. Recent research also suggests that prosocial motivation, defined as the "desire to expend effort based on a concern for helping or contributing to other people" (Batson, 1987; Grant & Berry, 2011, p. 10) may enhance creativity

(Bechtold, De Dreu, Nijstad, & Choi, 2010; Carmeli, McKay, & Kaufman, 2012; Grant & Berry, 2011; Polman & Emich, 2011). Caring for others may stimulate creative thinking by enhancing persistence and vigor (Carmeli et al., in press; Grant, 2008), by increasing psychological distance and abstract thinking (Förster, Epstude, & Özelsel, 2009; Polman & Emich, 2011) and by enhancing perspective-taking (Grant & Berry, 2011; Hoever, van Knippenberg, van Ginkel, & Barkema, 2012).

Given these findings, Forgeard and Mecklenburg (2013) proposed that the intrinsic/extrinsic dimension may not be sufficient to characterize the motivations driving creativity. To address this shortcoming, they proposed a two-dimensional model in which the intrinsic/extrinsic dimension is complemented by a self/other dimension. The intrinsic/extrinsic dimension describes the creator's locus of motivation: in other words, where creators direct their attention – on the process itself (intrinsic) or on outcomes external to the process (extrinsic). The self/other dimension describes the intended beneficiaries of the creator's work: creators may wish to contribute both to themselves and to others, and therefore be either personally or prosocially motivated. This two-dimensional framework highlights the importance of not conflating these two dimensions, as both intrinsic and extrinsic motivation can be self- or other-oriented. In keeping with this, Forgeard and Mecklenburg (2013) described the four quadrants of their framework as follows: Growth (intrinsic and self-oriented motivations emphasizing personal benefits afforded by the creative process), Gain (extrinsic and self-oriented motivations emphasizing personal rewards external to the process), Guidance (intrinsic and other-oriented motivations emphasizing ways which others may benefit from the

creative process, for example through mentorship), and Giving (extrinsic and other-oriented motivations emphasizing the ways in which outcomes of the creative process have important and meaningful benefits for others external to the process).

Remaining Questions

In spite of the large body of research speaking to the role of intrinsic motivation and recent work examining the influence of prosocial motivation, important gaps still exist in the literature. These gaps guided the main objectives of the present studies.

Toward a phenomenology of motivation. First, although scientists have studied and obtained important information about the role of broad motivational orientations in creativity, little is known about the specific conscious manifestations of these motivations in the minds of creators. If, however, researchers want to understand or enhance creativity using motivation as a tool, a phenomenology of motivation (i.e., a detailed description of conscious experience) is needed in order to truly understand what happens in the minds of creators when they decide they want to create, and when these motivations get translated into creative thinking processes and behaviors. Furthermore, by obtaining a more fine-grained account of the motivations that drive creative behavior, researchers may discover new and hitherto unexamined forms of motivation. While there is great value in reducing motivations to their broadest, most important characteristics, such as the dimensions outlined above (intrinsic/extrinsic, self/other), much theoretical and applied knowledge might be gained by further exploring the wide variety and complexity of the motivations driving creative behavior. Forgeard and Mecklenburg (2013) began this task by proposing a number of specific prosocial motivations based on

a multidisciplinary literature review, including: wanting to provide others with pleasurable or satisfying experiences, wanting to foster communication, wanting to uncover new knowledge and problem-solving, and wanting to challenge others and make them think in more nuanced way. While a review of theoretical perspectives in psychology and related disciplines (e.g., philosophy, literary criticism, etc.) provides important insights, an empirical investigation of this question is needed in order to provide a scientifically grounded account of the forms motivations take for creators.

Objective # 1: To go beyond broad motivational orientations in order to examine the specific motivations that drive creative behavior in the arts and sciences at a phenomenological level.

Domains of creativity. Second, research studies examining the role of motivation in creativity have for the most part investigated one population at a time (e.g., school students, creative professionals, etc.). Although researchers are typically careful about specifying that their results may not apply to other contexts, the literature on motivation and creativity still seems to suggest a “one-size-fits-all” model where some motivations are always beneficial, and others always detrimental across domains (Forgeard & Mecklenburg, 2013). The effect of motivations on creativity however likely highly depends on the populations considered, and the present series of studies examined this possibility by comparing the motivations of individuals involved in the arts and in the sciences (as detailed below).

Objective # 2: To examine whether the domain considered (here, the arts versus the sciences) moderates the effect of motivation on creativity.

Creative samples. Third, studies tend to focus on samples that vary widely in levels of creative achievement. Following the “four-c” model of creativity proposed by Kaufman and Beghetto (2009), the bulk of creativity research has tended to focus on either eminent, “Big-C” creativity (through historiometric investigations of deceased creators who changed the course of history in their field), or on everyday creativity or “little-c” (through studies of school children or unselected participants who engage in creative acts in their daily lives). The present study focused on intermediate levels of creativity by studying both established and aspiring professionals in creative fields engaging in “Pro-c” creativity.

Objective # 3: To study the nature and role of motivations in individuals regularly involved in creative work in their daily lives, either as established or as aspiring professionals.

Bridging disconnected areas of research. Fourth, past research has provided a somewhat incomplete account of the relationship between motivations and creativity. Most of the literature on this subject has focused on creative performance or achievement as the main outcome of interest (by for example using specific performance or production tasks as their primary dependent variables) (Amabile, 1982; Kaufman, Plucker, & Baer, 2008). The effect of motivation, as explained above, may however, also have profound effects not just on what creators achieve, but on how they relate to what they achieve. Thus, research in this area can shed important light on how creators’ well-being is affected by motivations. In general, the literature on the cognitive, social, and motivational determinants of creative performance has largely been disconnected from

research in the clinical and positive psychology area that focuses on the benefits of creative activities. The present series of studies attempts to bridge this gap by providing an integrated account of the relationship between motivation, creative achievement, and well-being.

Objective # 4: To bridge disconnected areas of research by examining both creative achievement and well-being as outcomes, as well as their relationships.

Fifth, and finally, researchers need to continue to investigate not just what kinds of motivations are associated with enhanced outcomes, but also the mechanisms through which they do so. Such knowledge will strengthen findings and help build coherent and convincing theories, as well as provide important information in order to ensure the effectiveness of future creativity interventions aimed at enhancing either or both creative achievement and well-being.

Objective # 5: To further investigate the mechanisms explaining the associations between motivations, creative achievement, and well-being.

The Present Studies

The present studies aimed to address the five objectives listed above. Following the model of Meston and Buss (2007), these studies used a bottom-up qualitative-to-quantitative approach in order to enrich the scientific understanding of the nature of the motivations driving creative work in the arts and sciences, and to examine how these motivations may be associated with differential levels of achievement and well-being through specific mechanisms. In Study 1, creative professionals in the arts and sciences completed semi-structured interviews designed to provide a phenomenological account of

the various self- and other-oriented motivations driving creative behavior. These motivations provided the basis for a self-report scale. In Study 2, this scale was validated using a sample of graduate students in the arts and sciences. In turn, this study examined relationships between motivations, creative performance, and well-being, as well as potential mechanisms driving the associations found.

Study 1

Method

Participants. Fifty-six individuals (21 female, 35 male) working in one of four creative fields completed individual interviews. The four fields selected included two artistic fields (creative writing and visual art) and two scientific fields (mathematics and social psychology). Qualitative research methodologists have recommended sampling until a point of saturation or redundancy has been reached – in other words, until no new information emerges from additional interviews (Lincoln & Guba, 1985; Merriam, 2009). In a methodological investigation, Guest, Bunce, and Johnson (2000) investigated the number of interviews needed to reach the point of saturation within a sample of 60 participants, and found that all ideas had emerged within the first 12 interviews. Based on these findings, the sample size for the present study included 14 participants per subsample (56 in total).

Participants were recruited via email invitations. They all worked in the Philadelphia or New York City metro areas and received \$100 in compensation for a one-hour interview. All participants also consented to conducting interviews in a non-confidential manner, so that the content of their work could be discussed during

interviews. Inclusion and exclusion criteria ensured that all participants in our sample had reached professional levels of creative achievements in their field (as described below, these minimum criteria were, on average, far exceeded), and to ensure that all members of a subsample shared enough in common (and thus, formed a somewhat homogeneous group of participants).

Creative writers. Creative writers were eligible to participate if they had published at least one novel, poetry collection, or short story collection. Nonfiction writers (who did not also publish a work of fiction or poetry) were not invited to participate. Potential participants were identified via two sources: the *New York Times* Notable Books of the year list (for the years 2008-2011) as well as the websites of Creative Writing and English departments of universities in the Philadelphia or New York City metro areas. Descriptive information about participants' achievements was extracted from their professional websites (if available) and/or from the online bookstore amazon.com. The final 14 creative writers (9 female, 5 male) who participated in this study had published an average of 5.85 books ($SD = 4.88$) at the time they were interviewed. Eight appeared at least once on the *New York Times* Notable Books of the year list, and 11 were faculty members at universities.

Visual artists. Visual artists were eligible to participate if they had at least one solo exhibition in a museum or gallery. Given that visual artists often work using multiple media (painting, sculpture, installation, video, photography, etc.), the type of media used did not constitute an inclusion or exclusion criteria. Potential participants were identified via two sources: the website artifacts.net, which provides information

about artists (e.g., number and titles of exhibitions, media, biographical facts, value of works sold, etc.), as well as the websites of Fine Arts and Visual Arts departments of nearby universities. Descriptive information about participants' achievements was extracted from their professional websites (if available) and/or the website artifacts.net. The final 14 visual artists (4 female, 10 male) who participated in this study had an average of 22.21 solo exhibitions ($SD = 25.19$) at the time they were interviewed. Seven were faculty members at universities.

Mathematicians. Mathematicians were eligible to participate if they obtained a doctoral degree, worked as a university faculty member, and had published at least three peer-reviewed journal articles. Potential participants were identified through the websites of Mathematics departments of nearby universities. Descriptive information about participants' achievements was extracted from the website ISI Web of Science. The final 14 mathematicians (1 female, 13 male) in our sample published an average of 14.21 journal articles ($SD = 11.02$) at the time they were interviewed.

Social psychologists. Social psychologists were eligible to participate if they obtained a doctoral degree, worked as a university faculty member, and had published at least three peer-reviewed journal articles. Because the field of psychology includes a wide range of subdisciplines, this subsample was restricted to social psychologists in order to increase its homogeneity. Potential participants were identified through the websites of Psychology departments of universities in the Philadelphia or New York City metro areas. Descriptive information about participants' achievements was extracted from the website ISI Web of Science. The final 14 psychologists (7 female, 7 male) who

participated in this study published an average of 39.57 journal articles ($SD = 32.39$) at the time they were interviewed.

Materials and procedures. All interviews were conducted by the first author and/or a trained research assistant. When both were present (as was the case for 31 out of 56 interviews), interviewers agreed on who would lead the interview. The interview leader was responsible for obtaining consent, asking all scripted questions, and debriefing the participant at the end of the study. The second interviewer ensured that all procedures were respected and asked follow-up questions when appropriate (see below).

The interviews took place at a location agreed upon by the participant and the interviewer(s). Most interviews were conducted at participants' offices, studios, or homes. All interviews were recorded on a handheld voice recorder, and ranged from 40 to 99 minutes in length ($M = 60$ minutes, $SD = 15$).

Interview questions. A series of semi-structured interview questions, designed to last approximately one hour, was developed for the purposes of this study (see Appendix A for the full list of questions). Questions asked participants to reflect and comment on their motivations for engaging in creative work (“*why?*”) as well as the specific processes they follow while engaging in such work (“*how?*”). Interviewers queried participants about self-oriented motivations and processes, as well as other-oriented motivations and processes. Interviews began with broad questions (e.g., “What motivates you to do your work?”) followed by more specific questions (e.g., “In what ways does your artistic/scientific work serve personal needs? What do you get out of it?”).

Results

Coding Procedures. Following their completion, all interviews were transcribed and proofread by a team of trained research assistants, a process which yielded a total of 868 pages of single-spaced verbatim transcripts. Following transcription, the first author and a trained research assistant used structural coding methods to extract qualitative data from interviews using the software NVivo (Version 9). Structural coding refers to the process of looking for specific information about a topic of inquiry in “a segment of data that relates to a specific research question used to frame the interview” (Saldaña, 2013, p. 84; see also MacQueen, McLellan-Lemal, Bartholow, & Milstein, 2008; Namey, Guest, Thairu, & Johnson, 2008). In the present study, segments of interviews were therefore labeled (“coded”) as units of information (“ideas”) pertaining to the research questions at hand following the process described below (as described by Saldaña, 2013; see also Auerbach & Silverstein, 2003).

Categories. Before coding began, and based on the research questions at hand, the two coders agreed to extract “ideas” (i.e., repeating units of information) related to four main categories: (a) self-oriented motivations, (b) other-oriented motivations, (c) self-oriented processes, and (d) other-oriented processes. Beyond these four categories, coders did not look for specific information in the text, but instead used a discovery-oriented approach to let the ideas expressed by participants emerge. As a result of this approach, two additional categories became apparent: (e) work-oriented motivations, and (f) work-oriented processes. Indeed, many participants reported motivations only related to the work itself (rather than personal or social benefits), and processes not involving the self or others, but only the work at hand.

Ideas. Given the large quantity of data considered, coders used an iterative process to develop and refine the set of ideas emerging from interviews. First, coders independently extracted repeating ideas from the 14 interviews of creative writers by identifying segments of texts corresponding to the coding categories defined above, and by labeling segments expressing the same ideas by a brief word or phrase reflecting the idea expressed. Next, the two coders compared and discussed the lists of ideas they independently came up with. Coders used a consensus-based approach to decide whether an idea appearing on their lists should be kept, renamed, merged with another idea overlapping in content, or split into multiple ideas. This process resulted in an initial list of ideas used to code the next set of 14 interviews (corresponding to all participants in each subsample). Coders repeated this process three additional times (after each set of 14 interviews). Results of this analysis included 81 ideas (as described in further detail in Study 2): 53 motivations and 28 processes. Both coders then went back and checked all 56 interviews using this final list of ideas (to make sure that all interviews were coded consistently, and to use the full range of ideas considered to code all interviews). This iterative coding process allowed coders to verify that they reached the point of saturation at which no, or little, new information emerges (Auerbach & Silverstein, 2003; Lincoln & Guba, 1985; Merriam, 2009).

Although coders discussed how they defined each idea after analyzing each sample in order to reach a consensus, they coded all interviews independently. To assess whether coders agreed on the extent to which ideas were expressed within the interviews considered, an index of interrater reliability was computed examining the number of

times ideas were expressed within each interview (according to both coders). Coders were reliable across ($\alpha = .74$) and within all subsamples (Creative Writers $\alpha = .74$, Visual Artists $\alpha = .69$, Mathematicians $\alpha = .77$, Social Psychologists $\alpha = .75$).

Discussion

Results of Study 1 provided a rich and detailed account of the motivations reported by creative professionals in two artistic and two scientific fields. An in-depth qualitative analysis allowed for 81 distinct motivations and processes to emerge. Limitations inherent to qualitative methodologies restricted the conclusions that can be drawn from this study. First, this sample only represented four specific fields and may therefore not capture motivations from other fields. Second, the motivations reported by participants may indeed be present before the act of creation, or alternatively may constitute post-hoc explanations influenced by social desirability. In addition, it remains unclear at this point the extent to which these conscious motivations and processes predict differential levels of creative achievement or well-being.

Study 2, a quantitative study of graduate students in the arts and sciences, addressed these questions by accomplishing two goals. First, Study 2 examined whether the 81 ideas described above could be reduced to a smaller number of dimensions using factor analyses. Given the nature of the questions included in interviews as well as Forgeard and Mecklenburg's (2013) two-dimensional model, it was expected that motivations would be characterized by the intrinsic/extrinsic and self/other-oriented dimensions, while processes would be characterized by the self/other-oriented dimensions (given that processes by definition cannot be extrinsic). Second, Study 2

investigated the relationships between motivations, processes, creative achievement, and outcomes, and tested whether these relationships differed between graduate students in the arts and in the sciences. Hypotheses for this objective were formulated based on the results of factor analyses (as described below).

Study 2

Method

Participants. Participants consisted of 972 graduate students in one of ten fields (five scientific and five artistic), including: mathematics ($n = 97$), psychology ($n = 96$), biology ($n = 98$), economics ($n = 97$), engineering ($n = 100$), visual arts ($n = 96$), performance arts ($n = 101$), music ($n = 98$), creative writing ($n = 100$), and architecture ($n = 89$). A wider range of fields was sampled in Study 2 in order to assess whether the motivations derived from Study 1 would apply to other fields as well. Participants were 27.34 years old on average ($SD = 5.82$), 56.6% female, and 71.1% Caucasian (see Table 1 for more descriptive information).

Participants who completed the study were given the opportunity to enroll in a raffle with a 1 in 30 chance of winning a \$30 Amazon gift card. Participants were recruited via email by contacting department chairs and administrative assistants at relevant programs. In total, programs at 939 universities were contacted. All programs contacted were at universities in the United States with the exception of the field of architecture. Due to the limited number of architecture programs in the United States, and in order to get the desired sample size, English-speakers in programs outside of the

United States (in Canada, the United Kingdom and Ireland) were contacted, resulting in 17 non-US participants, or 1.54% of the sample.

Materials and procedures. Participants completed a 30-minute survey administered online via the survey administration platform Qualtrics. This survey included a self-report scale developed for the purpose of this study, measures administered to assess convergent and discriminant validity, outcomes related to creative achievement and well-being, and additional information about creative work processes.

Self-reported motivations and processes. A self-report scale was developed to assess the degree to which participants endorsed the motivations and processes found in Study 1. An initial pool of 81 items was developed, in which each item corresponded to one idea found in Study 1 (see above). This approach was chosen in order to maximize content coverage of the ideas found in Study 1, and to empirically derive whether and how these ideas grouped into meaningful factors. Thus, the scale tested in this study included 53 items assessing why participants engage in creative work (motivations), and 28 items assessing what participants do while they are engaged in the creative process (processes). The order of presentation of items was randomized within each section (motivations followed by processes) and the randomized order of presentation was the same for all participants) (see Appendix B for the complete version of this scale including instructions.

Measures of convergent and discriminant validity. The following measures were administered in order to test the convergent and discriminant validity of the Creative Orientation Scales. Specific hypotheses were determined following factor analyses,

although the choice of measures included in the study was guided by the two-dimensional model of creativity proposed by Forgeard and Mecklenburg (2013) (intrinsic/extrinsic, and self/other dimensions).

Intrinsic motivation. Participants completed a 4-item measure developed by Grant (2008) in order to assess participants' level of intrinsic motivation for their work. The initial prompt was slightly modified to add the word "creative" ("Why are you motivated to do creative work?"). This scale was reliable in the present sample ($\alpha = .95$).

Prosocial motivation. Participants completed a 4-item measure developed by Grant (2011) in order to assess participants' level of prosocial motivation for their work. Again, the initial prompt was slightly modified to add the word "creative" ("Why are you motivated to do creative work?"). This scale was reliable in the present sample ($\alpha = .92$).

Values. Participants' completed the Short Schwartz's Values Survey (SSVS; Lindeman & Verkasalo, 2005), a 10-item measure of the values of power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. A measure of values was included based on the idea that values may serve as overarching guiding principles for selecting motivations. Values were combined into the following overarching domains based on Schwartz's model (1994): openness to change (stimulation, self-direction) ($\alpha = .68$), self-enhancement (achievement, power) ($\alpha = .67$), conservation (security, conformity, and tradition) ($\alpha = .78$), and self-transcendence (universalism, benevolence) ($\alpha = .64$). Hedonism was not included given that it belongs both to self-enhancement and openness to change, and reduced the reliability of each domain when included.

Creative achievement and performance. Participants completed measures of creative achievement in order to examine associations with motivations and processes.

Creative achievement. All participants completed the Creative Achievement Questionnaire (CAQ; Carson, Peterson, & Higgins, 2005), a 96-item questionnaire that assesses creative achievement across 10 domains. Statistical analyses used the CAQ subscale closest to each participant's creative field. For all scientists, this subscale was the "Scientific Discovery" subscale. Four out of the five artistic fields had a specific dedicated subscale ("Visual Arts," "Music," "Architectural Design," and "Creative Writing.") For performance artists, the Creative Achievement subscale chosen was the highest of two subscales: "Dance," ($n = 22$) or "Theater and Film" ($n = 79$).

Other markers of creative achievement. All participants were asked to indicate the number of awards, grants, and fellowships received for their work. A sum score was calculated for each participant. In addition, all participants also reported their graduate GPA. Finally, all scientists were asked to indicate the approximate total number of research projects completed and journal articles they published as authors in their lives at the time they completed the survey.

Divergent-thinking. Participants completed two divergent-thinking tasks. First, participants completed an Alternate Uses Task (Silvia et al., 2008) in which they were asked to come up with as many creative uses for a newspaper as possible. Second, participants also completed a problem-solving task in which they were asked to come up with as many creative ideas as possible for the owner of an Italian restaurant looking to attract new clients and increase his revenue. Each task respectively generated a total of

5939 and 6390 ideas respectively. Participants were asked to select their most creative idea for each task. For each task, the creativity of the answer picked as most creative was rated by four trained research assistants who achieved excellent levels of reliability for both tasks ($\alpha = .84$ and $.80$ respectively) (Silvia et al., 2008). A composite score was created for use in statistical analyses by standardizing and summing the creativity scores for both tasks.

Psychopathology and well-being. Participants completed measures of psychopathology and well-being in order to examine their relationships with motivations and processes.

Psychopathology. Participants completed the Depression Anxiety Stress Scales – 21 (Antony, Bieling, Cox, Enns, & Swinson, 1998), a 21-item self-report measure assessing symptoms of depression, anxiety, and arousal.

Life satisfaction. Participants completed the Satisfaction with Life Scale (Diener et al., 2005), a 5-item self-report measure assessing the extent to which individuals are satisfied with their lives.

Processes and mechanisms. It was hypothesized that processes explaining potential associations between motivations and achievement, as well as between motivations and well-being, would emerge from factor analyses. In addition, two other variables were included in our survey to assess additional processes.

Hours worked. Participants reported the average number of hours per week they have typically spent working in this field since they started (including coursework, homework, and independent work and activities). It was hypothesized that hours of

involvement would mediate the relationship between motivations and achievement, as perseverance predicts accomplishment in a number of domains (Duckworth, Peterson, Matthews, & Kelly, 2007).

Self-efficacy. Participants completed the Generalized Self-Efficacy Scale (Schwarzer & Jerusalem, 1995), a 10-item measure assessing the extent to which individuals believe they can handle challenges and deal with difficulties. It was hypothesized that generalized self-efficacy would mediate the relationship between motivations and well-being.

Cognitive ability. Participants reported their SAT or ACT scores to be used as a proxy for cognitive ability to be controlled for in further analyses. ACT scores were converted to equivalent SAT scores.

Results

Six sets of analyses were conducted. First, exploratory and confirmatory factor analyses examined the factor structure and reliability of the scale developed. These analyses were followed-up by convergent and discriminant validity analyses. Second, statistical analyses examined differences in motivations between graduate students in the arts and sciences. Third, a multigroup path analysis investigated the nature of the associations between motivations, achievement, and well-being, as well as possible processes accounting for the associations found. Third, exploratory item level correlations assessed whether constructs not captured by the main motivations found in factor analyses predicted creative achievement.

Exploratory Factor Analyses (EFA). Two random stratified samples of participants (keeping the proportions of students from each field equal) were created to examine the factor structure of the scale. A larger sample was selected for EFA ($n = 648$, two thirds of the entire sample) than CFA ($n = 324$, one third of the entire sample) in order to maximize the stability of the factor solution found. These sample sizes resulted in eight participants per item for EFA and four participants per item in the CFA at the very minimum (that is, in the unlikely event that all 81 items would be retained in the EFA).

Overall factor structure. The main EFA ($n = 648$) examined the overall factor structure emerging from the 81 items included in the scale. The number of factors to include in the model was estimated using Velicer's Minimum Average Partialing (MAP) Test (Velicer, 1976), which recommended an 8-factor solution. EFA was conducted using principal axis factoring and promax rotation, as factors extracted from the scale should theoretically be correlated. Upon determining the factor structure ensuring reliability of all factors (all Cronbach's α s $> .70$), EFA was repeated to test promax rotations at $k = 2$, 3, and 4 (Tataryn, Wood, & Gorsuch, 1999). The k value which maximized the hyperplane count was retained. The quality of all factor solutions examined was judged according to: (1) the amount of variance explained by each factor, (2) the number of items loading on each factor ($>.40$), aiming for a minimum of three to ensure reliability across samples (Velicer & Fava, 1998), (3) hyperplane counts (in percentages), (4) the reliability of extracted factors, and finally (5) the meaningfulness of extracted factors.

According to these criteria, a four-factor solution ($k = 2$) including 40 items was retained. Table 2a describes the final factor solution including factor loadings, amount of variance explained by each factor, and factor reliabilities. Table 2b describes correlations between factors. The constructs assessed by each factor included three kinds of motivation as well as one process.

The motivations and one process corresponded to: Prosocial Motivation (17 items, $\alpha = .91$, 19.11% of variance explained), Emotional Motivation (7 items, $\alpha = .81$, 5.94% of variance explained), Intellectual Motivation (8 items, $\alpha = .81$, 5.16% of variance explained), and Sense of Audience (7 items, $\alpha = .78$, 3.78% of variance explained). Prosocially motivated individuals engage in creative work in order to contribute to the lives of others in some meaningful way. Emotionally motivated individuals engage in creative work as a way to deal with adverse experiences, and as a way to manage their emotions. Intellectually motivated individuals engage in creative work because they derive personal satisfaction out of the intellectual stimulation inherent to the creative process, and because they enjoy challenging themselves and being completely engaged and absorbed in their work. Sense of Audience refers to the extent to which participants reported taking into account other people's viewpoints (e.g., audience members, peers, collaborators), either by obtaining input from them, or by thinking about how they may react to their work.

Forty-one items were excluded from the scale at this stage: 31 items did not load on any factor, two items loaded on two different factors, and 8 items did not meaningfully relate to the theoretical construct represented by their factor (e.g., an item

reflecting a self-oriented motivation loading on a factor reflecting an other-oriented motivation, etc.).

Subfactors. Following this first set of EFAs, a second set of factor analyses using the same exact methodology was conducted to determine whether meaningful subfactors emerged from each factor. A one-factor solution emerged for three out of the four factors (Emotional Motivation, Intellectual Motivation, and Sense of Audience). In contrast, a three-factor solution emerged for Prosocial Motivation ($k = 3$). The three factors corresponded to: wanting to establish a sense of connection among others (“Connection,” 5 items, $\alpha = .85$, 42.66 % of variance explained), wanting to help others see the world from different perspectives (“Perspectives,” 7 items, $\alpha = .82$, 7.48 % of variance explained), and wanting to promote tangible changes in the lives of others (“Change,” 3 items, $\alpha = .79$, 7.02 % of variance explained). Two items that did not load on any subfactors were excluded at this stage, resulting in a 38-item scale.

Confirmatory Factor Analysis. The resulting 38-item scale and four-factor solution (with three subfactors) found in EFA was tested again using Confirmatory Factor Analysis in the second sample of participants ($n = 324$, resulting again in approximately 8 participants per item). A unit loading identification constraint (ULI; Kline, 2005) was used for all latent variables. Thus, for each factor, the unstandardized coefficient of the reference variable was constrained to 1⁴.

Following Kline (2005), the model’s fit was assessed by examining four fit statistics: the model chi-square (comparing the fit of the identified and saturated models,

⁴ Because the residual variance of the latent variable Connection was negative, this parameter was fixed to 0 in the final analysis presented here.

the chi-square statistic should be nonsignificant), the Standardized Root Mean Squared Residual (summary of the average covariance residual; the SRMR should be inferior to .10), the Root Mean Square Error of Approximation (estimate of the “misfit” of the model based on a noncentral index; the RMSEA should also be inferior to .10), and the Comparative Fit Index (another noncentral index of fit; the CFI should be superior to .90). Analyses were conducted in MPlus 7 (Muthén & Muthén, 2012).

Two indices showed that this model was a good fit for the data (SRMR = .08, RMSEA = .07, 90% C.I. = .07-.08). The chi-square statistic was significant, $\chi^2(657) = 1800.96$, $p < .001$, which may be due to a large sample size and large correlations between variables (Kline, 2005). Although the CFI was lower than expected (CFI = .80), this indication of poor fit probably resulted from the large number of variables included in the model rather than actual misspecification. In a study of the impact of the number of variables on fit indexes, Kenny and McCoach (2003) noted that the CFI does not function well with correctly specified models that include a large number of variables. This property of the CFI could lead researchers to use “less than suboptimal strategies” (p. 335) to reduce the number of variables in their models (e.g., designing studies with few indicators per factor, item parceling, breaking down large models into several smaller models, etc.), thus sacrificing the opportunity to examine comprehensive and elaborate models in order to obtain model fit. To remedy this problem, Kenny and McCoach therefore recommended “that researchers simultaneously examine the RMSEA and the CFI or TLI [Tucker-Lewis index] in models with a large number of variables. If the TLI and CFI seem slightly lower than hoped, but the RMSEA seems a bit better, then there

may be no real cause for concern” (p. 349). Thus, the model was a satisfactory fit for the data.

Results of the CFA, including standardized path coefficients and R-square values are presented in Figure 1. In addition, all unstandardized estimates (with corresponding standard errors), standardized estimates, and p-values for each factor loading and covariance are presented in Appendix C.

Convergent and discriminant validity. Hypotheses for the convergent and discriminant validity analyses were refined using the final factor structure of the scale. To do so, the nature of the motivations reflected by factors was examined according to the two-dimensional framework of motivation outlined by Forgeard and Mecklenburg (2013). Motivations included in the Prosocial Motivation factor appeared to be both extrinsic and other-oriented. Motivations included in both the Intellectual and the Emotional motivation factors appeared to be both intrinsic and self-oriented. Sense of Audience (the only process that emerged from factor analyses) was other-oriented.

Convergent and discriminant validity analyses used Grant’s (2008, 2011) brief measures of intrinsic and prosocial motivations as well as the Short Schwartz’s Values Survey (SSVS; Lindeman & Verkasalo, 2005). It was hypothesized that Prosocial Motivation and Sense of the Audience factor would relate to Grant’s prosocial motivation (vs. intrinsic motivation) and Schwartz’s self-transcendence (vs. openness to change). In contrast, it was hypothesized that Intellectual and Emotional Motivation would relate to Grant’s intrinsic motivation (vs. prosocial motivation) and Schwartz’s openness to change (vs. self-transcendence).

Fisher's *r*-to-*z* transformations were used to compare correlation coefficients. All results supported the hypotheses above with one exception (see Tables 3a and 3b for correlation coefficients, *z*, and 1-tailed *p*-values). Although the correlation between Emotional Motivation and Schwartz's openness to change ($r = .27$) was higher than its correlation with Schwartz' self-transcendence ($r = .21$), this difference did not reach significance ($z = 1.21, p = .11$). Overall, the self-report scale tested in this study demonstrated adequate convergent and discriminant validity.

Differences in motivations and processes between artists and scientists. A one-way MANCOVA examined whether artists and scientists differed on the three motivations and one process emerging from the self-report scale. This analysis covaried age, gender, ethnicity (minority or Caucasian), and type of program (Master's or Ph. D.). This MANCOVA yielded a significant main effect, Wilks Lambda = .86, $F(4, 963) = 40.40, p < .001$, partial $\eta^2 = .144$. Follow-up one-way ANCOVAs indicated significant differences on all four factors: graduate students in the arts endorsed higher levels of Prosocial Motivation, Emotional Motivation, and Intellectual Motivation than graduate students in the sciences. The latter however endorsed higher levels of Sense of Audience than graduate students in the arts. Descriptive and inferential statistics, as well as a measure of effect size (Cohen's *d*), are listed in Table 4 and presented in Figure 2.

Relationships between achievement outcomes. Relationships between achievement outcomes within domains were assessed in order to verify that the main dependent variable used in later analyses (i.e., the Creative Achievement Questionnaire field score) meaningfully related to other outcomes. Later analyses only used this

variable so that the same model could be tested across domains, and to reduce the number of tests performed. As expected for measures of achievement, all variables presented evidence of nonnormality and were therefore log transformed.

As hypothesized, within graduate students in the sciences ($n = 488$), the Creative Achievement Questionnaire field score was significantly correlated with the number of awards and grants won ($r = .39$), graduate GPA ($r = .17$), the total number of scientific projects conducted ($r = .36$), and the total number of articles published as an author ($r = .50$) (all $ps < .001$). As expected, within graduate students in the arts ($n = 484$), the Creative Achievement Questionnaire field score was significantly correlated with the number of awards and grants won ($r = .33$) and graduate GPA ($r = .18$) (all $ps < .001$).

Multigroup path analysis. A multigroup path analysis using maximum likelihood estimation was conducted in MPlus 7 (Muthén & Muthén, 2012) in order to test (a) a model outlining relationships between motivations, processes, achievement, and well-being, and (b) whether these relationships were moderated by domain (arts vs. sciences).

As a result of previous analyses, two variables in the present dataset constituted possible processes: Hours Worked (the average number of hours worked per week), and Sense of Audience. The baseline model hypothesized that motivations (Prosocial, Emotional, Intellectual) predict processes (Hours Worked and Sense of Audience), which in turn predict creative performance (Divergent Thinking, Creative Achievement) as well as subjective feelings of accomplishment (Generalized Self-Efficacy). These in turn predict well-being (Satisfaction with Life and Depression/Anxiety/Stress). This model is

presented in Figure 3. Path analyses allowed variables at the same level to covary.

Analyses controlled for age, gender, ethnicity (Caucasian or other), and SAT scores (as a proxy for cognitive ability). The joint significance of indirect effects was assessed using bootstrapping (MacKinnon, 2008).

Model comparison. The unconstrained model (in which parameters were allowed to vary depending on the domain considered – arts vs. sciences), $\chi^2(38) = 188.80, p < .001$, was a significantly better fit for the data than the constrained model (in which all paths were constrained to be equal across both domains), $\chi^2(112) = 386.50, \Delta\chi^2(74) = 197.70, p < .001$. Thus, the unconstrained model was retained for further examination of parameter estimates. Three additional fit indices supported the unconstrained model as an adequate fit for the data: SRMR = .04, RMSEA = .09 [CI = .08-.10], CFI = .90. The chi-square fit statistic listed above was significant ($p < .001$), which may have been due to the large sample size (Kline, 2005).

Sciences. Parameter estimates of direct and indirect effects for graduate students in the sciences are listed in Tables 5 and 6, as well as in Figure 4a.

Direct effects. Intellectual and Prosocial motivations both predicted increased Sense of Audience, whereas Intellectual motivation alone predicted Hours Worked. Emotional motivations did not predict any of the processes. Both Hours Worked and Sense of Audience predicted Creative Achievement, although the effect of Sense of Audience only neared significance ($p < .10$). Creative achievement in turn predicted lower levels of Depression/Anxiety/Stress, although this effect also only neared significance ($p < .10$). Finally, Sense of audience also predicted Generalized Self-

Efficacy, which in turn predicted higher levels of Satisfaction with Life as well as lower levels of Depression/Anxiety/Stress. Although none of the processes predicted Divergent-Thinking performance, this variable was significantly related to Creative Achievement, and its relationship to Generalized Self-Efficacy neared significance. Creative Achievement and Generalized Self-Efficacy were also significantly related.

Indirect effects. Results of the tests of joint significance indicated that Hours Worked mediated the relationship between Intellectual Motivation and Creative Achievement. Sense of Audience mediated the relationship between Prosocial Motivation and Creative Achievement, though this relationship only approached significance ($p < .10$). In addition, Sense of Audience mediated the relationship between Prosocial Motivation and Generalized Self-Efficacy. Finally, Generalized Self-Efficacy mediated the relationship between Sense of the Audience and Satisfaction with Life as well as Depression/Anxiety/Stress, though the latter only approached significance ($p < .10$). None of the other indirect effects tested were significant or near-significant (all $ps > .10$).

Arts. Parameter estimates of direct and indirect effects for graduate students in the arts are listed in Tables 5 and 6, as well as in Figure 4b.

Direct effects. Both Intellectual and Prosocial Motivations positively predicted Hours Worked, although this effect only neared significance for Prosocial Motivation ($p < .10$). Both of them also positively predicted Sense of Audience. In contrast, Emotional Motivation negatively predicted both Hours Worked and Sense of Audience. In turn, Hours Worked positively predicted both Creative Achievement and Generalized Self-Efficacy. Sense of Audience also positively predicted Generalized Self-Efficacy, but

negatively predicted Creative Achievement. Finally, Generalized Self-Efficacy predicted higher levels of Satisfaction with Life and lower levels of Depression/Anxiety/Stress. None of the other variables predicted well-being outcomes. In addition, none of the processes predicted Divergent Thinking, but this variable was significantly related to Creative Achievement. Creative Achievement was also significantly related to Generalized Self-Efficacy.

Indirect effects. Results of the tests of joint significance indicated that Sense of the Audience mediated the relationship between all three motivations and Generalized Self-Efficacy (though this effect only approached significance for Emotional Motivation, $p < .10$). In addition, Sense of the Audience also mediated the relationship between Prosocial Motivation and Creative Achievement, though this effect again only approached significance ($p < .10$). Hours Worked mediated the effect of Emotional Motivation on both Creative Achievement and Generalized Self-Efficacy. Finally, Generalized Self-Efficacy mediated the relationships between both processes (Hours Worked and Sense of Audience) and both well-being outcomes (Satisfaction with Life and Depression/Anxiety/Stress). Among these, the indirect effect from Hours Worked to Depression/Anxiety/Stress only approached significance ($p < .10$).

Exploratory item level correlations. Item level correlations examined relationships between items excluded from the scale and Creative Achievement. These analyses aimed to examine whether constructs that could not be reliably measured by the scale may still be important to examine in future research.

Sciences. Within graduate students in the sciences ($n = 488$), 9 motivations and 9 processes significantly predicted Creative Achievement (see Table 7) (all $ps < .05$).

Six motivations positively predicted Creative Achievement: “Because I appreciate the freedom and flexibility afforded by this line of work,” “Because I play a part in the advancement of my discipline,” “Because I feel an irresistible urge to do it,” “Because I hope to leave a legacy that will have an impact on the way others in my field do their own work in the future,” “Because it allows me to capture (or try to capture) the complexity of reality,” and “Because it is a part of my identity.” Three motivations negatively predicted Creative Achievement: “Because I want to help others escape into an imaginary world,” “Because my work may in some way have spiritual or religious significance for others,” and “Because I may be able to help others come to terms with difficult experiences.”

Six processes positively predicted Creative Achievement: “I learn from mentors and role models,” “I try to provide others with accurate and honest work,” “I become completely absorbed and lose track of time,” “I resist the impulse to give up when I run into an obstacle or setback,” “I go over my work more than once before considering it finished,” and “I remain confident that I can overcome difficulties.” Three processes negatively predicted Creative Achievement: “I imagine myself as my main audience,” “I decide on a predefined structure for my work,” and “I think and act like a child in some way.”

Arts. Within graduate students in the arts ($n = 484$), 5 motivations and 5 processes significantly predicted Creative Achievement (all $ps < .05$) (see Table 7). All five

motivations positively predicted Creative Achievement: “Because I feel an irresistible urge to do it,” “Because it allows me to articulate thoughts about the world,” “Because it allows me to capture (or try to capture) the complexity of reality,” “Because it is a part of my identity,” and “Because I may be able to help others come to terms with difficult experiences.” Three processes positively predicted Creative Achievement: “I feel a sense of autonomy or freedom,” “I think about different facets of my own experience” and “I draw on my personal experiences, thoughts, and/or feelings.” Two processes negatively predicted Creative Achievement: “I have parameters or constraints on my work” and “I decide on a predefined structure for my work.”

Discussion

Results of Study 2 showed that the 81 ideas expressed by artists and scientists in Study 1 could be reduced to four broad factors - three types of motivations (Prosocial, Emotional, and Intellectual), and one process (Sense of Audience). These factors showed adequate convergent and divergent validity with relevant measures of intrinsic/extrinsic motivation as well self-oriented/other-oriented values. Prosocial motivation also further subdivided into three subfactors (Connection, Perspectives, and Change).

As reported above, recent theoretical work has suggested that motivations for creative work may best be characterized along two dimensions: intrinsic vs. extrinsic, and self vs. other-oriented (Forgeard & Mecklenburg, 2013). How do the factors found in Study 2 map on to this framework? Prosocial motivations included in the present scale were both extrinsic and other-oriented. Emotional and intellectual motivations were both intrinsic and self-oriented. Thus, the types of motivations endorsed most consistently in

Studies 1 and 2, which emerged as overarching factors, did not include intrinsic and other-oriented motivations, as well as extrinsic and self-oriented motivations.

This finding can be explained by the fact that approximately half of the original items included in the scale dropped out after factor analyses, resulting in the omission of themes represented by fewer ideas in Study 1. Exploratory item level correlations however showed that ideas that did not load onto any factor might still predict important outcomes. For example, within graduate students in the sciences, the item “Because I appreciate the freedom and flexibility afforded by this line of work,” which reflects an extrinsic and self-oriented motivation, significantly predicted creative achievement. Similarly, the item “Because I hope to leave a legacy that will have an impact on the way others in my field do their own work in the future,” which reflects an intrinsic and other-oriented motivation, also significantly predicted creative achievement.

This issue is especially important with regards to Processes, for which only one factor emerged (Sense of Audience). Self-oriented processes excluded from the scale may therefore still be important. For example, within graduate students in the arts, the item “I draw on my own personal experiences, thoughts, and/or feelings” significantly predicted creative achievement.

Study 2 also investigated the extent to which graduate students in the sciences and the arts endorsed the motivations and processes measured by the self-report scale. Aspiring artists endorsed significantly higher levels of all motivations than aspiring scientists. The effect size was small to medium for both Prosocial and Intellectual motivations, but large for Emotional Motivation. In contrast, aspiring scientists endorsed

significantly higher levels of Sense of Audience, though the corresponding effect size was small.

Finally, Study 2 examined specific pathways explaining how motivations may predict important outcomes related to creative achievement and well-being. A multigroup path analysis found that the relationships between motivations, processes, achievement and well-being outcomes differed according to the domain considered (arts vs. sciences).

Prosocially or intellectually motivated graduate students in the sciences reported thinking about their audience more, which was in turn associated with higher levels of creative achievement and well-being. Intellectually motivated students also reported working longer hours, which was in turn associated with higher levels of creative achievement. Thus, in the sciences, both prosocial and intellectual motivation independently and indirectly predicted positive outcomes.

Results pertaining to graduate students in the arts presented a more complex picture. Prosocially or intellectually motivated graduate students in the arts also reported working longer hours and thinking about their audience more. In contrast, emotionally motivated students reported working fewer hours and thinking about their audience less. Working longer hours predicted higher levels of creative achievement and well-being. Thinking about the audience more predicted higher levels of well-being, but lower levels of creative achievement. Thus, in the arts, each motivation predicted distinct pathways associated with positive and/or negative outcomes on achievement and well-being.

These results extend findings related to Amabile's intrinsic motivation hypothesis (1996), as well as Grant and Berry's (2011) demonstration of the benefits of prosocial

motivation for creative thinking. They also highlight the need to better understand the specific mechanisms accounting for motivational effects, and ways in which effects differ according to the domains considered. As proposed by Grant and Berry (2011), the extent to which individuals engage in perspective-taking and think about others during the creative process may play an important role. In Grant and Berry's study, perspective-taking referred to the act of seeing the world through the eyes of beneficiaries of the work only (i.e., audience members). In the present study, the process of Sense of Audience (which emerged out of factor analyses) was broader and reflected a more generally tendency to seek, imagine, and take into account other people's perspectives during the creative process, including beneficiaries, but also gatekeepers, peers, and colleagues.

Why did sense of audience predict enhanced achievement in the sciences, but lessened achievement in the arts? The answer may lie in the degree of constraint associated with creativity in different disciplines. It is possible that creativity in the arts places a higher premium on originality and risk-taking. Thus, thinking too much about others may lead to harmful self-censorship in this field. In contrast, scientists may place a premium on usefulness – in this sense, thinking about others may sharpen critical thinking skills and allow for the production of well-reasoned ideas and products. More research is needed to test this speculation, and replicate these findings.

The results of Study 2 also found that emotional motivations play a complex role in the artistic creative process. Indeed, emotional motivations indirectly predicted reduced levels of achievement insofar as they were associated with fewer hours spent working. However, emotional motivations also indirectly predicted higher levels of

achievement insofar as they were associated with thinking about one's audience less.

Thus, it is possible that emotional motivations may allow artists to focus solely on their own experiences, and prevent them from self-censoring because of what others may think, which in this domain may prove beneficial. The specific association of emotional motivations to the arts is consistent with past personality findings showing that artists tend to be more emotionally unstable and sensitive, whereas scientists tend to be more conscientious (Feist, 1998, 1999).

Results of this study are in line with recent work examining the relationship between cognitive abilities and personality with creativity in different fields. In a sample of English school students, Kaufman (2013) found that cognitive and personality predictors (as measured by a comprehensive battery of tests) could be broken down into four factors: explicit cognitive ability, intellectual engagement, affective engagement, and aesthetic engagement. Cognitive ability and intellectual engagement, both related to effortful, slow, and conscious (or "Type 1") thinking processes, predicted creative achievement in the sciences. In contrast, affective and aesthetic engagement, both related to automatic, fast, unconscious (or "Type 2") processes, predicted creative achievement in the arts (Allen & Thomas, 2011; Evans, 2003, 2008).

Although this study tested a model in which motivations predicted processes, achievement, and well-being, it is important to note here again that the cross-sectional nature of the data collected could not verify the causal nature (and direction) of associations found. The importance of emotional motivations in the arts, and the fact that these indirectly negatively predicted well-being outcomes through a lessened sense of

audience, could be explained in a number of ways: a focus on emotional motivations may indeed lead to enhanced achievement but reduced well-being by lessening social connection. Alternatively, individuals with low levels of well-being may self-select into the arts and as a result endorse emotional motivations. Indeed, past research has shown that teenagers involved in afterschool arts activities have higher levels of depressive symptoms than teenagers not involved in the arts (Young, Winner, & Cordes, 2012), and creative artists in general display higher than average rates of mood disorders (e.g., Andreasen, 1987; Jamison, 1996; Ludwig, 1995). Thus, psychopathological symptoms (here, depression, anxiety, and stress) may drive (rather than result from) emotional motivation. It is also possible that the challenging nature of the artistic creative process may decrease well-being, (paradoxically) leading artists to endorse emotional motivations. In addition, motivations and outcomes most likely influence each other in a bidirectional manner.

This important limitation applies to all findings described here, and further research using experimental and/or longitudinal designs are needed in order to establish causality. In addition, while graduate students provided an interesting and varied sample of individuals actively involved in creative work, it is possible that the results found here may not generalize to other levels of creativity (e.g., everyday creativity or eminent creativity) (Kaufman & Beghetto, 2009). In addition, the present sample drew on multiple fields within each domain in order to look at arts and sciences. The fields sampled however only represented five out of a multitude of possible fields. Though the sample size in the present study did not provide the power necessary to examine patterns

of results across fields using path analyses, important variations may exist within domains (e.g., within the sciences, psychologists may for example emphasize prosocial motivations more than mathematicians). Future studies examining larger samples of individuals within each field should examine such differences.

General Discussion

The present studies examined the nature of the motivations driving artists and scientists, as well as the extent to and ways in which motivations predict processes, achievement, and well-being. Results of Study 1 provided an in-depth qualitative exploration of motivations and processes, and confirmed the importance artists and scientists confer to other-oriented motivations for creative work, in addition to self-oriented processes. Up until recently, other-oriented motivations were for the most part construed as potentially harmful for creativity. Indeed, extrinsic motivators such as constraints, or rewards that detract from intrinsic motivation, impede creative thinking (Amabile, 1996). However, in line with Amabile's revised intrinsic motivation hypothesis, other extrinsic motivators that are other-oriented may benefit creativity by acting in concert with intrinsic motivation (Amabile, 1993; Amabile et al., 1996). Results of Study 2 further supported this claim by building on recent working examining the role of prosocial motivation for creativity (e.g., Grant & Berry, 2011), and confirmed the need to examine how the role of motivations differ according to the domain considered.

In addition, the present studies bridged the literature in personality, cognitive, social and clinical psychology by simultaneously examining motivations, processes, achievement and well-being outcomes. While scientific work has begun to document

possible beneficial effects of creative activities on well-being, few studies have examined the specific mechanisms accounting for these effects (Dalebroux, Goldstein, & Winner, 2008; Drake & Winner, 2012, 2013; Forgeard et al., in press). In addition, virtually no work in this area has examined the extent to which the quality of the work produced matters for well-being – in other words, whether creativity truly is one of the active ingredients at play, and if so, what would account for such an effect. In the present research, well-being was mostly linked to the extent to which individuals seek and think about others' perspectives during the creative process, rather than their level of creative achievement. These results are in line with recent research demonstrating the efficacy of prosocial interventions for well-being (Aknin et al., 2013; Dunn, Aknin, & Norton, 2008; Grant & Sonnentag, 2010; Lyubomirsky, Sheldon, & Schkade, 2005). In addition, well-being was related to individuals' sense of generalized self-efficacy, a finding in line with a large body of research attesting to the benefits of believing in one's ability to reach goals (e.g., Bandura, Pastorelli, Barbaranelli, Caprara, 1999; Benight & Bandura, 2004; Karademas, 2006; Maciejewski, Prigerson & Mazure, 2000; Muris, 2002). Thus, results of the present studies support the notion that the association between creativity and psychopathology may result at least partially from the therapeutic benefits of the creative process (Forgeard et al., in press). As this study only investigated the role of a limited number of mechanisms, further research should investigate the role of other potential mechanisms using mediational models.

In contrast, the present studies evidenced a negative relationship between actively pursuing emotional well-being and enhanced psychological adjustment. As suggested

above, this finding may result from a self-selection effect, as individuals low in well-being may be more likely to endorse such motivations. Thus, even if the process of pursuing emotional motivations results in benefits for well-being, the associations between both might remain negative. However, it is also possible that well-being may best be achieved not by actively and directly focusing on this endeavor, but rather by pursuing other meaningful intellectual or prosocial goals. This hypothesis is in line with research showing that the active pursuit of happiness may backfire (Kesebir & Diener, 2008; Schooler, Ariely, & Loewenstein, 2003; Mauss et al., 2012; Mauss, Tamir, Anderson, & Savino, 2011). By actively and directly seeking to increase their happiness, individuals may paradoxically set themselves up for disappointment (Gruber, Mauss, & Tamir, 2013). The idea that happiness is best achieved indirectly is not new, and was already expressed in John Stuart Mill's autobiography (1873/2009, p. 117):

Those only are happy (I thought) who have their minds fixed on some object other than their own happiness; on the happiness of others, on the improvement of mankind, even on some art or pursuit, followed not as a means, but as itself an ideal end. Aiming thus at something else, they find happiness by the way.

Conclusion

The present studies explored the richness and complexity of the motivations driving individuals to engage in creative work in the arts and sciences, and investigated the relationships between specific forms of motivations, creative achievement, and well-being. These studies add to the scientific understanding of the conscious experience associated with creative behavior, and will hopefully aid the creation of novel and

effective experimental interventions for individuals involved in artistic or scientific creative work at any level. The results described here also highlight the need to take a domain-specific approach to theory and applied work designed to enhance creativity, as pathways to outcomes (including creative achievement and well-being) likely differ according to the discipline considered.

References

- Aknin L., Barrington-Leigh, C. P., Dunn, E. W., Helliwell, J. F., Burns, J., Biswas-Diener, R., Kemeza, I., Nyende, P., Ashton-James, C. E., & Norton, M. I. (2013). Prosocial spending and well-being: Cross-cultural evidence for a psychological universal. *Journal of Personality and Social Psychology, 104*, 635-652.
- Aknin, L. B., Dunn, E. W., & Norton, M. I. (2012). Happiness runs in a circular motion: Evidence for a positive feedback loop between prosocial spending and happiness. *Journal of Happiness Studies, 13*, 347-355.
- Aldwin, C. M., & Sutton, K. J. (1998). A developmental perspective on posttraumatic growth. In R. G. Tedeschi, C. L. Park & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 43-64). Mahwah, NJ: Erlbaum.
- Allen, A. P., & Thomas, K. E. (2011). A dual process account of creative thinking. *Creativity Research Journal, 23*, 109-118.
- Amabile, T. (1982). Children's artistic creativity: Detrimental effects of competition in a field setting. *Personality and Social Psychology Bulletin, 8*, 573-578.
- Amabile, T. M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology, 37*, 221-233.
- Amabile, T. M. (1982). The social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43*, 997-1013.
- Amabile, T. M. (1983a). Social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology, 45*, 357-377.

- Amabile, T. M. (1983b). *The social psychology of creativity*. New York: Springer Verlag.
- Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of personality and social psychology*, 48, 393-399.
- Amabile, T. M. (1987). The motivation to be creative. In S. G. Isaksen (Ed.), *Frontiers of creativity research: Beyond the basics* (pp. 223-254). Buffalo, NY: Bearly Limited.
- Amabile, T. M. (1993). Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Human Resource Management Review*, 3, 185-201.
- Amabile, T. M. (1996). *Creativity in context*. Boulder, CO: Westview Press.
- Amabile, T. M., & Gitomer, J. (1984). Children's artistic creativity effects of choice in task materials. *Personality and Social Psychology Bulletin*, 10, 209-215.
- Amabile, T. M., & Gryskiewicz, S. (1987). *Creativity in the R&D laboratory*. Technical report no. 30. Greensboro, NC: Center for Creative Leadership.
- Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. *Academy of Management Journal*, 39, 1154-1184.
- Amabile, T. M., Goldfarb, P., & Brackfield, S. C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. *Creativity Research Journal*, 3, 6-21.
- Amabile, T. M., Hennessey, B. A., & Grossman, B. S. (1986). Social influences on creativity: The effects of contracted-for reward. *Journal of Personality and Social Psychology*, 50, 14-23.

- Amabile, T. M., Hill, K. G., Hennessey, B. A., & Tighe, E. M. (1994). The Work Preference Inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology, 66*, 950-967.
- Andreasen, N. (1987). Creativity and mental illness: Prevalence in writers and their first-degree relatives. *American Journal of Psychiatry, 144*, 1288-1292.
- Antony, M. M., Bieling, 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 in clinical groups and a community sample. *Psychological Assessment, 10*, 176-181.
- Auerbach, C. F., & Silverstein, L. B. (2003). *Qualitative data: An introduction to coding and analysis*. New York: New York University Press.
- Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin, 134*, 779-806.
- Bandura, A., Pastorelli, C., Barbaranelli, C., & Caprara, G. V. (1999). Self-efficacy pathways to childhood depression. *Journal of Personality and Social Psychology, 76*, 258-269.
- Bartis, S., Szymanski, K., & Harkins, S. G. (1988). Evaluation and performance: A two-edged knife. *Personality and Social Psychology Bulletin, 14*, 242-251.
- Batson, C. D. (1987). Prosocial motivation: Is it ever truly altruistic? In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 20, pp. 65-122). New York: Academic Press.

- Bazeley, P. (2007). *Qualitative data analysis with NVivo*. London: Sage.
- Bechtold, M. N., De Dreu, C. K. W., Nijstad, B. A., & Choi, H.-S. (2010). Motivated information processing, social tuning, and group creativity. *Journal of Personality and Social Psychology, 99*, 622-637.
- Benight, C. C., & Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy, 42*, 1129-1148.
- Bloom, S. L. (1998). By the crowd they have been broken, by the crowd they shall be healed: The social transformation of trauma. In R. G. Tedeschi, C. L. Park & L. G. Calhoun (Eds.), *Posttraumatic growth: Positive changes in the aftermath of crisis* (pp. 173-208). Mahwah, NJ: Erlbaum.
- Byron, K., & Khazanchi, S. (2012). Rewards and creative performance: A meta-analytic test of theoretically derived hypotheses. *Psychological Bulletin, 138*, 809-830.
- Carmeli, A., McKay, A. S., & Kaufman, J. C. (in press). Emotional intelligence and creativity: The mediating role of generosity and vigor. *The Journal of Creative Behavior*. Advance online publication.
- 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.
- Collins, M. A., & Amabile, T. M. (1999). Motivation and creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 297-312). Cambridge: Cambridge University Press.

- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: Harper Collins.
- Csikszentmihalyi, M. (1999). Implications of a systems perspective for the study of creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 313-335). Cambridge: Cambridge University Press.
- Dalebroux, A., Goldstein, T. R., & Winner, E. (2008). Short-term mood repair through art-making: Positive emotion is more effective than venting. *Motivation and Emotion, 32*, 288-295.
- De Bono, E. (1995). *Serious creativity*. Harper Business.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological inquiry, 11*, 227-268.
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71-75.
- Drake, J. E., & Winner, E. (2012). Confronting sadness through art-making: Distraction is more beneficial than venting. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 251-266.
- Drake, J. E., & Winner, E. (2013). How children use drawing to regulate their emotions. *Cognition and Emotion, 27*, 512-520.
- Drake, J. E., Coleman, K., & Winner, E. (2011). Short-term mood repair through art: Effects of medium and strategy. *Art Therapy: Journal of the American Art Therapy Association, 28*, 26-30.

- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087-1101.
- Eisenberger, R., & Selbst, M. (1994). Does reward increase or decrease creativity? *Journal of Personality and Social Psychology, 66*, 1116-1127.
- Evans, J. S. B. (2003). In two minds: Dual-process accounts of reasoning. *Trends in Cognitive Sciences, 7*, 454-459.
- Evans, J. S. B. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59*, 255-278.
- Feist, G. (2001). Natural and sexual selection in the evolutionary of creativity. *Bulletin of Psychology and the Arts, 2*, 11-16.
- 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. (1999). The influence of personality on artistic and scientific creativity. In R. J. Sternberg (Ed.), *Handbook of creativity*. New York, NY: Cambridge University Press.
- Fisher, B. J., & Specht, D. K. (1999). Successful aging and creativity in later life. *Journal of Aging Studies, 13*, 457-472.
- Florida, R. (2002, May). *The rise of the creative class*. Washington Monthly. Retrieved from <http://www.washingtonmonthly.com>.

- Forgeard, M. J. C. (2011). Mood and creativity: Unpacking the puzzle. In L. DellaPietra (Ed.), *Perspectives on creativity* (Vol. 2, pp.188-211). Newcastle upon Tyne, UK: Cambridge Scholars Publishing.
- Forgeard, M. J. C. (2013). Perceiving benefits after adversity: The relationship between self-reported posttraumatic growth and creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 7, 245-264.
- Forgeard, M. J. C., & Elstein, J. G. (2014). Advancing the clinical science of creativity. *Frontiers in Psychology*.
- Forgeard, M. J. C., & Mecklenburg, A. C. (2013). The two dimensions of motivation and a reciprocal model of the creative process. *Review of General Psychology*, 17, 255-266.
- Forgeard, M. J. C., Mecklenburg, A. C., Lacasse, J. J., & Jayawickreme, E. (in press). Bringing the whole universe to order: Creativity, healing, and posttraumatic growth. In J. C. Kaufman (Ed.), *New ideas about an old topic: Creativity and mental illness*. New York: Cambridge University Press.
- Förster, J., Epstude, K., & Özsel, A. (2009). Why love has wings and sex has not: How reminders of love and sex influence creative and analytic thinking. *Personality and Social Psychology Bulletin*, 35, 1479-1491.
- Gabora, L. & Kaufman, S. (2010). Evolutionary perspectives on creativity. In J. Kaufman & R. Sternberg (Eds.) *The Cambridge handbook of creativity* (pp. 279-300). Cambridge UK: Cambridge University Press.

- Gerrard, L. E., Poteat, G. M., & Ironsmith, M. (1996). Promoting children's creativity: Effects of competition, self-esteem, and immunization. *Creativity Research Journal, 9*, 339-346.
- Gone, J. P. (2009). A community-based treatment for Native American historical trauma: prospects for evidence-based practice. *Journal of Consulting and Clinical Psychology, 77*, 751-762.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods, 18*, 59-82.
- Grant, A. M. (2008). Does intrinsic motivation fuel the prosocial fire? Motivational synergy in predicting persistence, performance, and productivity. *Journal of Applied Psychology, 93*, 48-58.
- Grant, A. M., & Berry, J. (2011). The necessity of others is the mother of invention: Intrinsic and prosocial motivations, perspective-taking, and creativity. *Academy of Management Journal, 54*, 73-96.
- Grant, A. M., & Sonnentag, S. (2010). Doing good buffers against feeling bad: Prosocial impact compensates for negative task and self-evaluations. *Organizational Behavior and Human Decision Processes, 111*, 13-22.
- Gruber, J., Mauss, I. B., & Tamir, M. (2011). A dark side of happiness? How, when, and why happiness is not always good. *Perspectives on Psychological Science, 6*, 222-233.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field methods, 18*, 59-82.

- Hardin, J. W., & Hilbe, J. M. (2003). *Generalized estimating equations*. John Wiley & Sons, Inc.
- Hennessey, B. A. (1989). The effect of extrinsic constraints on children's creativity while using a computer. *Creativity Research Journal*, 2(3), 151-168.
- Hennessey, B. A., & Zbikowski, S. M. (1993). Immunizing children against the negative effects of reward: A further examination of intrinsic motivation training techniques. *Creativity Research Journal*, 6, 297-307.
- Hennessey, B. A., Amabile, T. M., & Martinage, M. (1989). Immunizing children against the negative effects of reward. *Contemporary Educational Psychology*, 14, 212-227.
- Hoever, I. J., van Knippenberg, D., van Ginkel, W. P., & Barkema, H. G. (2012). Fostering team creativity: Perspective taking as key to unlocking diversity's potential. *Journal of Applied Psychology*, 97, 982-996.
- Jamison, K. R. (1993). *Touched with fire: manic-depressive illness and the artistic temperament*. New York, NY: Free Press.
- Jamison, K. R. (1996). *Touched with fire*. Simon and Schuster.
- Joussemet, M., & Koestner, R. (1999). Effect of expected rewards on children's creativity. *Creativity Research Journal*, 12, 231-239.
- Karademas, E. C. (2006). Self-efficacy, social support and well-being: The mediating role of optimism. *Personality and Individual Differences*, 40, 1281-1290.
- Kaufman, J. C. (2009). *Creativity 101*. New York: Springer.

- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology, 13*, 1-12.
- Kaufman, J. C., Plucker, J. A., & Baer, J. (2008). *Essentials of creativity assessment*. Hoboken, NJ: Wiley & Sons.
- Kaufman, S. B. (2013). Opening up openness to experience: A four-factor model and relations to creative achievement in the arts and sciences. *The Journal of Creative Behavior, 47*, 233-255.
- Kaufman, S. B. (2013). *Ungifted: Intelligence redefined*. New York: Basic Books.
- Kelley, T., & Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all*. New York: Random House.
- Kenny, D. A., & McCoach, D. B. (2003). Effect of the number of variables on measures of fit in structural equation modeling. *Structural Equation Modeling, 10*, 333-351.
- Kesebir, P., & Diener, E. (2008). In pursuit of happiness: Empirical answers to philosophical questions. *Perspectives on Psychological Science, 3*, 117-125.
- Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling*. New York, NY: Guilford.
- Koestner, R., Ryan, R. M., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of Personality, 52*, 233-248.
- Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis. *Journal of Personality and Social Psychology, 28*, 129-137.

- Leung, A. K. Y., Kim, S., Polman, E., Ong, L. S., Qiu, L., Goncalo, J. A., & Sanchez-Burks, J. (2012). Embodied metaphors and creative “acts”. *Psychological Science*, *23*, 502-509.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Lindeman, M., & Verkasalo, M. (2005). Measuring values with the short Schwartz's value survey. *Journal of Personality Assessment*, *85*, 170-178.
- Little, B. R. (1998). Personal project pursuit: Dimensions and dynamics of personal meaning. In P. T. P. Wong & S. P. Fry (Eds.), *The human quest for meaning: A handbook of psychological research and clinical applications* (pp. 193-212). Mahwah, NJ, US: Lawrence Erlbaum.
- Little, B. R., & Chambers, N. C. (2004). Personal project pursuit: On human doings and well-beings. In W. M. Cox & E. Klinger (Eds.), *Handbook of motivational counseling* (pp. 65-82). Hoboken, NJ: Wiley & Sons.
- Ludwig, A. (1995). *The price of greatness: Resolving the creativity and madness controversy*. New York: Guilford Press.
- Lyubomirsky, S., Sheldon, K. M., & Schkade, D. (2005). Pursuing happiness: The architecture of sustainable change. *Review of General Psychology*, *9*, 111-131.
- Maciejewski, P. K., Prigerson, H. G., & Mazure, C. M. (2000). Self-efficacy as a mediator between stressful life events and depressive symptoms: Differences based on history of prior depression. *The British Journal of Psychiatry*, *176*, 373-378.

- MacKinnon, D. (2008). *Introduction to statistical mediation analysis*. New York: Erlbaum.
- MacQueen, K. M., McLellan-Lemal, E., Bartholow, K., & Milstein, B. (2008). Team-based codebook development: Structure, process, and agreement. In G. Guest & K. M. MacQueen (Eds.), *Handbook for team-based qualitative research* (pp. 119-135). Lanham, MD: AltaMira Press.
- Mauss, I. B., Savino, N. S., Anderson, C. L., Weisbuch, M., Tamir, M., & Luderslager, M. L. (2012). The pursuit of happiness can be lonely. *Emotion, 12*, 908-912.
- Mauss, I. B., Tamir, M., Anderson, C. L., & Savino, N. S. (2011). Can seeking happiness make people unhappy? Paradoxical effects of valuing happiness. *Emotion, 11*, 807-815.
- McCoy, J. M., & Evans, G. W. (2002). The potential role of the physical environment in fostering creativity. *Creativity Research Journal, 14*, 409-426.
- McGregor, I., & Little, B. R. (1998). Personal projects, happiness, and meaning: On doing well and being yourself. *Journal of Personality and Social Psychology, 74*, 494-512.
- Mehta, R., & Zhu, R. J. (2009). Blue or red? Exploring the effect of color on cognitive task performances. *Science, 323*, 1226-1229.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Wiley & Sons.
- Meston, C. M., & Buss, D. M. (2007). Why humans have sex. *Archives of Sexual Behavior, 36*, 477-507.

- Michalko, M. (2001). *Cracking creativity: The secrets of creative genius*. Random House.
- Miller, G.F. (2000). *The mating mind: How sexual choice shaped the evolution of human nature*. London: Vintage.
- Miller, G.F. (2001). Aesthetic fitness: How sexual selection shaped artistic virtuosity as a fitness indicator and aesthetic preferences as mate choice criteria. *Bulletin of Psychology and the Arts*, 2, 20-25.
- Mithen, S. (2006). *The singing Neanderthals: The origins of music, language, mind, and body*. London: Weidenfeld and Nicolson.
- Mueller, J. S., Melwani, S., & Goncalo, J. A. (2012). The bias against creativity: Why people desire but reject creative ideas. *Psychological science*, 23, 13-17.
- Mumford, M. D., & Gustafson, S. B. (1988). Creativity syndrome: Integration, application, and innovation. *Psychological bulletin*, 103, 27-43.
- Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. *Personality and Individual Differences*, 32, 337-348.
- Muthén, L. K., & Muthén, B. O. (2012). *Mplus 7: Statistical analysis with latent variables – User's guide* (7th edition). Los Angeles, CA: Muthén & Muthén.
- Namey, E., Guest, G., Thairu, L., & Johnson, L. (2008). Data reduction techniques for large qualitative datasets. In G. Guest & K. M. MacQueen (Eds.), *Handbook for team-based qualitative research* (pp. 137-161). Lanham, MD: AltaMira Press.

- Nettle, D., & Clegg, H. (2006). Schizotypy, creativity and mating success in humans. *Proceedings of the Royal Society of London*, 273, 611-615.
- Nicholls, J. G. (1979). Quality and equality in intellectual development : The role of motivation in education. *American Psychologist*, 34, 1071-1084.
- Niu, W., & Sternberg, R. J. (2002). Contemporary studies on the concept of creativity: The East and the West. *Journal of Creative Behavior*, 36, 269-288.
- Niu, W., & Sternberg, X. (2006). The philosophical roots of western and eastern conceptions of creativity. *Journal of Theoretical and Philosophical Psychology*, 26, 1001-1021.
- Peterson, C., & Seligman, M. E. (2004). *Character strengths and virtues: A handbook and classification*. Oxford University Press.
- Polman, E., & Emich, K. J. (2011). Decisions for others are more creative than decisions for the self. *Personality and Social Psychology Bulletin*, 37, 492-501.
- Robinson, A. G., & Stern, S. (1997). *Corporate creativity: How innovation and improvement actually happen*. San Francisco, CA: Berrett-Koehler.
- Runco, M. (2007). *Creativity – Theories and themes: Research, development, and practice*. Burlington, MA: Elsevier.
- Runco, M. A. (2009). Writing as an interaction with ideas. In S. B. Kaufman & J. C. Kaufman (Eds.), *The psychology of creative writing* (pp. 180-195). New York: Cambridge University Press.

- 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*, 243-263.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68-78.
- Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd edition). Thousand Oaks, CA: Sage.
- Sawyer, K. (2013). *Zig Zag: The surprising path to greater creativity*. San Francisco, CA: Jossey-Bass.
- Sawyer, R. K. (2003). *Group creativity: Music, theater, collaboration*. Mahwah, NJ: Lawrence Erlbaum.
- Sawyer, R. K. (2008). *Group genius: The creative power of collaboration*. New York: Basic Books.
- Sawyer, R. K. (2012). *Explaining creativity: The science of human innovation* (2nd edition). New York: Oxford University Press.
- Schooler, J. W., Ariely, D., & Loewenstein, G. (2003). The pursuit and assessment of happiness can be self-defeating. In I. Brocas & J. D. Carrillo (Eds.), *The psychology of economic decisions, volume 1: Rationality and well-being* (pp. 41-70). New York: Oxford University Press.

- Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). Windsor, UK: NFER-NELSON.
- Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal*, 16, 361-388.
- Sexton, J. D., & Pennebaker, J. W. (2009). The healing powers of expressive writing. In S. B. Kaufman & J. C. Kaufman (Eds.), *The psychology of creative writing* (pp. 264-273). New York: Cambridge University Press.
- Sheldon, K. M., & Elliot, A. J. (1999). Goal striving, need satisfaction, and longitudinal well-being: The self-concordance model. *Journal of Personality and Social Psychology*, 76, 482-497.
- Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., ... & 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.
- Simonton, D. K. (1988c). *Scientific genius: A psychology of science*. New York: Cambridge University Press.
- Simonton, D. K. (1999). Talent and its development: An emergenic and epigenetic model. *Psychological Review*, 106, 435-457.
- Staw, B. M. (1995). Why no one really wants creativity. In C. Ford & D. A. Gioia (Eds.), *Creative action in organizations: Ivory tower visions and real world voices*. Thousand Oaks, CA: Sage Publications.

- Stuart Mill, J. (1873/1989). *Autobiography*. London: Penguin Books.
- Tataryn, D. J., Wood, J. M., & Gorsuch, R. L. (1999). Setting the value of k in promax: A Monte Carlo study. *Educational and Psychological Measurement, 59*, 384-391.
- Velicer, W. F. (1976). Determining the number of components from the matrix of partial correlations. *Psychometrika, 41*, 321-327.
- Velicer, W. F., & Fava, J. L. (1998). Effects of variable and subject sampling on factor pattern recovery. *Psychological Methods, 3*, 231
- Young, L. N., Winner, E., & Cordes, S. (2013). Heightened incidence of depressive symptoms in adolescents involved in the arts. *Psychology of Aesthetics, Creativity, and the Arts, 7*, 197-202.

Table 1

Demographic Characteristics of Sample and Subsamples, Including Age, Gender, Ethnicity, and Type of Graduate Program.

Field	<i>n</i>	Age (in years)		Gender (%)		Ethnicity (%)		Program Type (%)	
		<i>M</i>	<i>SD</i>	Male	Female	White	Other	Master's	Doctorate
<i>All Fields</i>	972	27.34	5.82	43.4	56.6	71.1	28.9	52.6	47.4
Scientists	488	26.16	4.64	49.0	51.0	61.1	38.9	21.7	78.3
Artists	484	28.52	6.60	37.8	62.2	81.2	18.8	83.7	16.3

Table 2a

Results of the Exploratory Factor Analysis (40 items) of the Self-Report Scale of Motivations and Processes.

	Prosocial	Emotional	Intellectual	Sense of Audience
	(motivation)	(motivation)	(motivation)	(process)
# of items	17	7	8	8
Internal Consistency	$\alpha = .91$	$\alpha = .81$	$\alpha = .81$	$\alpha = .78$
Variance Explained	19.11%	5.94%	5.16%	3.78%
Motivations				
Because I want people to better understand each others' viewpoints and perspectives	.72			
Because I hope my work can contribute to fairness and justice in the world	.70			
Because I hope that my work can reach new people that would otherwise not have been exposed to particular ideas	.68			
Because I can promote and help put into action important political or social ideals	.64			

Because I want to make people think in a more nuanced way about the world	.64
Because I think my work may have positive and concrete repercussions on the lives of others	.60
Because I hope that my work may foster a sense of kinship and connection between people	.60
Because I want to give other people a sense of hope	.58
Because I want other people to have a more accurate and rich understanding of reality	.58
Because through my work, I can make sure that certain important experiences or facts are not forgotten	.56
Because I think that other people may benefit from being challenged and made to feel uncomfortable in some way	.53
Because I want other people to feel validated in some way	.50
Because I want to impart important knowledge to others	.49
Because I believe my work can help people share some kind of meaningful experience	.48
Because I want others to respect and appreciate experiences that are unlike their own	.46
Because I am hoping to surprise or provoke thought in whoever comes into contact with my work	.46

Because I want to get others to interact or participate in an exchange or conversation	.40	
Because it allows me to express and manage my emotions		.73
Because it somehow helps me deal with difficult personal experiences		.70
Because it allows me to escape into an imaginary world		.59
Because it almost functions like a spiritual or religious practice for me		.54
Because it makes me feel good physically		.48
Because it allows me to experience beauty		.45
Because it makes me feel better mentally		.41
Because it feeds my intellectual curiosity		.60
Because I like to be surprised and learn new things		.60
Because it brings me pleasure, excitement, and satisfaction		.60
Because it allows me to explore and understand something I'm interested in		.58

Because I get completely engaged and absorbed in what I am doing	.57
Because it's a way to challenge and test myself	.53
Because it provides me with a sense of accomplishment	.47
Because I like the feeling of coming up with something that's truly my own	.43

Processes

I get feedback from other people about my work	.62
I think about what other members of my field are doing	.59
I receive affirmation and support from others	.54
I consider other people's viewpoints	.54
I actively think about how other people will react to my work	.48
I think about how I can convince others that my work is worthwhile	.42

I take into account how I can make my work as accessible
and clear as possible to others

.41

I collaborate with other people

.40

Table 2b

Factor Correlations for the Exploratory Factor Analysis of the Creative Orientation Scales.

Factor Correlations	Prosocial	Emotional	Intellectual	Sense of Audience
<i>Prosocial</i>	1.00			
<i>Emotional</i>	.28	1.00		
<i>Intellectual</i>	.18	.16	1.00	
<i>Sense of Audience</i>	.28	.08	.09	1.00

Tables 3a and 3b

Convergent and Discriminant Validity Analyses using Grant's (2008, 2011) Intrinsic and Prosocial Motivation Scales, as well as the Short Schwartz' Values Survey (Lindeman & Verkasalo, 2005).

Factor	Grant's Intrinsic Motivation	Grant's Prosocial Motivation	z	1-tailed p
Prosocial Motivation	.161	.607	-11.92	<.001
Intellectual Motivation	.489	.114	9.25	<.001
Emotional Motivation	.375	.07	7.13	<.001
Sense of the Audience	.149	.438	-7.04	<.001

Factor	Schwartz's Openness to Change	Schwartz's Self-Transcendence	z	1-tailed p
Prosocial Motivation	.194	.371	-4.25	<.001
Intellectual Motivation	.268	.161	2.47	.007
Emotional Motivation	.266	.214	1.21	.113
Sense of the Audience	.113	.204	-2.06	.02

Table 4

Results of the one-way MANCOVA and follow-up one-way ANCOVAs (controlling for age, gender, ethnicity, and type of program), including estimated marginal means, standard errors, F-test, p-values, and effect size (Cohen's d).

	Scientists		Artists		<i>F</i>	<i>p</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>			
Prosocial	3.29	0.04	3.56	0.04	$F(1, 966) = 14.27$	<.001	0.31
Emotional	2.76	0.05	3.64	0.05	$F(1, 966) = 135.62$	<.001	0.80
Intellectual	4.24	0.03	4.39	0.03	$F(1, 966) = 7.73$.01	0.23
Audience	3.88	0.04	3.75	0.04	$F(1, 966) = 4.98$.03	0.15

Table 5

Direct Effects for the Multigroup Path Analysis, Including Unstandardized Estimates, Standard Errors, p-values, and Standardized Estimates for Graduate Students in Science and in the Arts.

			Science (n = 488)				Art (n = 484)			
			<i>Unstd</i>	<i>SE</i>	<i>p</i>	<i>Std</i>	<i>Unstd</i>	<i>SE</i>	<i>p</i>	<i>Std</i>
Regression Paths										
Age	→	Prosocial	-0.01	0.01	.343	-.04	-0.02	0.01	.017	-.14
Gender	→	Prosocial	0.27	0.07	<.01	.17	0.02	0.07	.738	.01
Ethnicity	→	Prosocial	0.16	0.08	.043	.09	-0.04	0.10	.651	-.02
SAT Scores	→	Prosocial	-0.95	0.35	.006	-.16	-0.43	0.22	.054	-.09
Age	→	Emotional	-0.01	0.01	.126	-.07	0.00	0.01	.754	.01
Gender	→	Emotional	-0.18	0.08	.018	-.11	0.22	0.08	.005	.12
Ethnicity	→	Emotional	0.42	0.08	<.01	.24	0.05	0.10	.648	.02
SAT Scores	→	Emotional	-0.62	0.36	.090	-.10	-0.55	0.22	.012	-.11
Age	→	Intellectual	0.00	0.01	.547	-.03	0.00	0.00	.587	.02
Gender	→	Intellectual	0.07	0.06	.201	.06	0.06	0.05	.281	.05
Ethnicity	→	Intellectual	-0.10	0.06	.093	-.08	-0.15	0.07	.044	-.10
SAT Scores	→	Intellectual	0.58	0.36	.102	.13	-0.18	0.15	.224	-.06
Prosocial	→	Hours Worked	0.00	0.01	.899	.01	0.02	0.01	.089	.08
Emotional	→	Hours Worked	-0.01	0.01	.428	-.04	-0.04	0.01	<.01	-.20
Intellectual	→	Hours Worked	0.04	0.01	.005	.15	0.04	0.02	.049	.11

Age	→	Hours Worked	0.00	0.00	.051	.10	0.00	0.00	.263	-.06
Gender	→	Hours Worked	0.02	0.02	.275	.05	0.03	0.02	.104	.07
Ethnicity	→	Hours Worked	-0.01	0.02	.690	-.02	0.02	0.02	.314	.05
SAT Scores	→	Hours Worked	-0.05	0.07	.520	-.04	-0.02	0.06	.758	-.02
Prosocial	→	Sense of Audience	0.31	0.04	<.01	.39	0.40	0.05	<.01	.44
Emotional	→	Sense of Audience	-0.05	0.04	.172	-.07	-0.09	0.04	.032	-.11
Intellectual	→	Sense of Audience	0.23	0.07	<.01	.22	0.24	0.06	<.01	.19
Age	→	Sense of Audience	0.01	0.01	.497	.04	-0.01	0.01	<.01	-.13
Gender	→	Sense of Audience	0.08	0.05	.110	.06	0.04	0.06	.549	.02
Ethnicity	→	Sense of Audience	-0.05	0.06	.417	-.04	0.01	0.07	.875	.01
SAT Scores	→	Sense of Audience	0.02	0.27	.948	.00	-0.30	0.17	.073	-.07
Hours Worked	→	Creative Achievement	0.53	0.14	<.01	.18	0.27	0.11	.014	.13
Sense of Audience	→	Creative Achievement	0.06	0.03	.073	.08	-0.05	0.03	.086	-.08
Age	→	Creative Achievement	0.02	0.01	<.01	.18	0.01	0.00	.016	.12
Gender	→	Creative Achievement	0.03	0.04	.452	.03	-0.03	0.04	.511	-.03
Ethnicity	→	Creative Achievement	-0.23	0.04	<.01	-.22	0.00	0.04	.966	.00
SAT Scores	→	Creative Achievement	0.56	0.17	<.01	.16	-0.03	0.13	.806	-.01
Hours Worked	→	Divergent Thinking	0.53	0.40	.183	.06	-0.26	0.36	.462	-.03
Sense of Audience	→	Divergent Thinking	-0.06	0.12	.609	-.03	0.15	0.10	.131	.07
Age	→	Divergent Thinking	0.03	0.01	.033	.09	0.01	0.01	.197	.06
Gender	→	Divergent Thinking	-0.07	0.14	.603	-.02	0.05	0.16	.735	.02
Ethnicity	→	Divergent Thinking	-0.59	0.14	<.01	-.18	-0.14	0.21	.489	-.04
SAT Scores	→	Divergent Thinking	2.88	0.51	<.01	.26	1.38	0.50	.006	.15
Hours Worked	→	GSE	0.09	1.18	.938	.00	2.64	0.99	.007	.12

Sense of Audience	→	GSE	0.80	0.38	.034	.12	1.03	0.27	<.01	.18
Age	→	GSE	-0.01	0.05	.900	-.01	0.03	0.03	.355	.04
Gender	→	GSE	-0.37	0.38	.324	-.04	-1.04	0.39	.007	-.12
Ethnicity	→	GSE	-0.28	0.40	.485	-.03	-0.42	0.48	.384	-.04
SAT Scores	→	GSE	-3.38	1.73	.051	-.11	2.05	1.18	.083	.08
Creative Achievement	→	DAS	-0.40	0.23	.083	-.07	0.21	0.31	.503	.03
Divergent Thinking	→	DAS	-0.13	0.09	.136	-.07	-0.08	0.08	.322	-.05
General Self-Efficacy	→	DAS	-0.12	0.03	<.01	-.18	-0.10	0.03	<.01	-.17
Age	→	DAS	-0.03	0.02	.130	-.06	-0.02	0.02	.180	-.06
Gender	→	DAS	0.19	0.24	.424	.04	0.04	0.25	.886	.01
Ethnicity	→	DAS	0.52	0.27	.057	.09	0.23	0.36	.530	.03
SAT Scores	→	DAS	-2.82	1.53	.065	-.15	-0.42	0.82	.611	-.03
Creative Achievement	→	SWLS	0.58	0.65	.370	.05	-0.45	0.66	.500	-.03
Divergent Thinking	→	SWLS	-0.09	0.20	.633	-.02	-0.07	0.17	.656	-.02
General Self-Efficacy	→	SWLS	0.53	0.07	<.01	.36	0.55	0.06	<.01	.37
Age	→	SWLS	-0.18	0.06	<.01	-.14	-0.13	0.04	<.01	-.14
Gender	→	SWLS	1.01	0.53	.055	.08	1.33	0.53	.013	.10
Ethnicity	→	SWLS	-0.50	0.62	.414	-.04	-0.07	0.63	.908	-.01
SAT Scores	→	SWLS	4.99	2.91	.086	.11	-1.18	1.84	.521	-.03
Covariance Paths										
Gender	↔	Age	-0.16	0.11	.130	-.07	-0.19	0.16	.237	-.06
Ethnicity	↔	Age	-0.11	0.10	.278	-.05	-0.05	0.12	.696	-.02
SAT Scores	↔	Age	-0.07	0.05	.109	-.11	-0.09	0.06	.172	-.08
Ethnicity	↔	Gender	0.00	0.01	.858	-.01	0.00	0.01	.726	.02

SAT Scores	↔ Gender	0.00	0.00	.355	-.05	0.00	0.00	.454	.04
SAT Scores	↔ Ethnicity	-0.01	0.01	.083	-.12	0.00	0.00	.920	-.01
Emotional	↔ Prosocial	0.23	0.03	<.01	.36	0.25	0.04	<.01	.38
Intellectual	↔ Prosocial	0.19	0.03	<.01	.38	0.16	0.03	<.01	.36
Intellectual	↔ Emotional	0.24	0.03	<.01	.48	0.26	0.03	<.01	.55
Sense of Audience	↔ Hours Worked	0.01	0.00	.008	.13	0.01	0.01	.041	.10
Divergent Thinking	↔ Creative Achievement	0.06	0.03	.032	.10	0.11	0.03	<.01	.18
General Self-Efficacy	↔ Creative Achievement	0.34	0.09	<.01	.18	0.14	0.07	.041	.09
General Self-Efficacy	↔ Divergent Thinking	0.50	0.29	.086	.08	0.21	0.29	.472	.03
Depression Anxiety Stress	↔ Satisfaction with Life	-2.73	0.78	<.01	-.19	-3.61	0.89	<.01	-.25

Table 6

Indirect Effects for the Multigroup Path Analysis, Including Unstandardized Estimates, Standard Errors, p-values, and Standardized Estimates for Graduate Students in Science and in the Arts.

				Science (n = 488)				Arts (n = 484)				
				<i>Unstd</i>	<i>SE</i>	<i>p</i>	<i>Std</i>	<i>Unstd</i>	<i>SE</i>	<i>p</i>	<i>Std</i>	
Sum	Prosocial	→	Divergent Thinking	-0.02	0.04	.63	-.01	0.06	0.04	.18	.03	
Prosocial	→	Hours Worked	→	Divergent Thinking	0.00	0.01	.92	.00	-0.01	0.01	.54	.00
Prosocial	→	Sense of Audience	→	Divergent Thinking	-0.02	0.04	.61	-.01	0.06	0.04	.14	.03
Sum	Emotional	→	Divergent Thinking	0.00	0.01	.91	.00	0.00	0.02	.93	.00	
Emotional	→	Hours Worked	→	Divergent Thinking	0.00	0.01	.57	.00	0.01	0.02	.48	.01
Emotional	→	Sense of Audience	→	Divergent Thinking	0.00	0.01	.68	.00	-0.01	0.01	.26	-.01
Sum	Intellectual	→	Divergent Thinking	0.01	0.03	.82	.00	0.03	0.03	.37	.01	
Intellectual	→	Hours Worked	→	Divergent Thinking	0.02	0.02	.27	.01	-0.01	0.02	.51	.00
Intellectual	→	Sense of Audience	→	Divergent Thinking	-0.01	0.03	.62	-.01	0.04	0.03	.17	.01
Sum	Prosocial	→	Creative Achievement	0.02	0.01	.11	.03	-0.01	0.01	.22	-.03	
Prosocial	→	Hours Worked	→	Creative Achievement	0.00	0.01	.90	.00	0.01	0.00	.17	.01
Prosocial	→	Sense of Audience	→	Creative Achievement	0.02	0.01	.08	.03	-0.02	0.01	.09	-.04
Sum	Emotional	→	Creative Achievement	-0.01	0.01	.29	-.01	-0.01	0.01	.20	-.02	
Emotional	→	Hours Worked	→	Creative Achievement	0.00	0.01	.46	-.01	-0.01	0.01	.02	-.03
Emotional	→	Sense of Audience	→	Creative Achievement	0.00	0.00	.32	-.01	0.00	0.00	.23	.01
Sum	Intellectual	→	Creative Achievement	0.03	0.01	.01	.04	0.00	0.01	.89	.00	
Intellectual	→	Hours Worked	→	Creative Achievement	0.02	0.01	.05	.03	0.01	0.01	.13	.01

Intellectual	→	Sense of Audience	→	Creative Achievement	0.01	0.01	.13	.02	-0.01	0.01	.13	-.02
Sum		Prosocial	→	GSE	0.25	0.12	.03	.05	0.46	0.12	.00	.09
Prosocial	→	Hours Worked	→	GSE	0.00	0.01	.99	.00	0.05	0.04	.18	.01
Prosocial	→	Sense of Audience	→	GSE	0.25	0.12	.03	.05	0.41	0.11	.00	.08
Sum		Emotional	→	GSE	-0.04	0.04	.30	-.01	-0.21	0.08	.01	-.04
Emotional	→	Hours Worked	→	GSE	0.00	0.02	.96	.00	-0.12	0.06	.05	-.02
Emotional	→	Sense of Audience	→	GSE	-0.04	0.04	.28	-.01	-0.09	0.05	.08	-.02
Sum		Intellectual	→	GSE	0.18	0.12	.12	.03	0.35	0.13	.01	.05
Intellectual	→	Hours Worked	→	GSE	0.00	0.05	.94	.00	0.10	0.07	.17	.01
Intellectual	→	Sense of Audience	→	GSE	0.18	0.11	.11	.03	0.25	0.10	.02	.03
Sum		Hours Worked	→	SWLS	0.31	0.73	.67	.01	1.36	0.59	.02	.04
Hours Worked	→	Divergent Thinking	→	SWLS	-0.05	0.14	.72	.00	0.02	0.08	.81	.00
Hours Worked	→	Creative Achievement	→	SWLS	0.31	0.37	.41	.01	-0.12	0.19	.53	.00
Hours Worked	→	GSE	→	SWLS	0.05	0.62	.94	.00	1.46	0.57	.01	.05
Sum		Sense of Audience	→	SWLS	0.46	0.22	.04	.05	0.58	0.18	.00	.07
Sense of Audience	→	Divergent Thinking	→	SWLS	0.01	0.03	.83	.00	-0.01	0.03	.72	.00
Sense of Audience	→	Creative Achievement	→	SWLS	0.03	0.05	.45	.00	0.02	0.04	.59	.00
Sense of Audience	→	GSE	→	SWLS	0.42	0.21	.05	.04	0.57	0.17	.00	.07
Sum		Hours Worked	→	DAS	-0.29	0.22	.19	-.02	-0.20	0.17	.24	-.01
Hours Worked	→	Divergent Thinking	→	DAS	-0.07	0.08	.38	.00	0.02	0.05	.67	.00
Hours Worked	→	Creative Achievement	→	DAS	-0.21	0.14	.12	-.01	0.06	0.09	.54	.00
Hours Worked	→	GSE	→	DAS	-0.01	0.14	.94	.00	-0.28	0.14	.06	-.02
Sum		Sense of Audience	→	DAS	-0.11	0.06	.08	-.03	-0.13	0.05	.01	-.04
Sense of Audience	→	Divergent Thinking	→	DAS	0.01	0.02	.70	.00	-0.01	0.02	.47	.00
Sense of Audience	→	Creative Achievement	→	DAS	-0.02	0.02	.23	-.01	-0.01	0.02	.58	.00
Sense of Audience	→	GSE	→	DAS	-0.09	0.05	.07	-.02	-0.11	0.04	.01	-.03

Table 7

Item-Level Correlations between All Scale Items (Motivations and Processes), Creative Achievement and Well-Being Outcomes. Significant Correlations Are Highlighted in Grey, Within Graduate Students in the Sciences and in the Arts. Results are presented in descending order of significance.

Graduate Students in the Sciences (<i>n</i> = 488)	Creative Achievement	
	<i>r</i>	<i>p</i>
Motivations Excluded from Scale		
Because I appreciate the freedom and flexibility afforded by this line of work	.22	<.001
Because I can play a part in the advancement of my discipline	.17	<.001
Because I want to help others escape into an imaginary world	-.17	<.001
Because my work may in some way have spiritual or religious significance for others	-.16	<.001
Because I feel an irresistible urge to do it	.14	<.01
Because I may be able to help others come to terms with difficult experiences	-.14	<.01
Because I hope to leave a legacy that will have an impact on the way others in my field do their own work in the future	.11	.01
Because it allows me to capture (or try to capture) the complexity of reality	.11	.02
Because it is a part of my identity	.09	.04
Because it is just an intrinsically valuable thing to do	.08	.08
Because I hope that others will be interested and engaged by my work.	.07	.12
Because it is important to challenge assumptions	.07	.13
Because it helps me see the world from different perspectives	-.06	.18
Because I can hopefully inspire and act as a role model for less experienced members of my field	.06	.18
Because I enjoy pushing my limits and making myself feel uncomfortable or uncertain in some way	.06	.21
Because it helps me feel like I belong to a larger community	.02	.62
Because I hope that others will enjoy my work	.01	.75
Because I enjoy the lifestyle and perks that come with this work	-.01	.83
Because I have an obligation to do so	.01	.86
Because it makes me feel confident and in control	.01	.89
Because it allows me to articulate thoughts about the world	.00	.96
Processes Excluded from Scale		

I learn from mentors and role models	.21	<.001
I try to provide others with accurate and honest work	.16	<.001
I become completely absorbed and lose track of time	.15	<.01
I resist the impulse to give up when I run into an obstacle or setback	.14	<.01
I go over my work more than once before considering it finished	.14	<.01
I imagine myself as my main audience	-.14	<.01
I decide on a predefined structure for my work	-.13	<.01
I think and act like a child in some way	-.13	.00
I remain confident that I can overcome difficulties	.09	.04
I feel a sense of autonomy or freedom	.08	.07
I focus on the work itself rather than my or other people's feelings towards it	.08	.07
I spend time exploring the material at hand	.08	.09
I follow particular habits	.04	.32
I do not think too hard about what motivates me to create	.04	.34
I isolate myself from other people's physical presence and influence	-.04	.38
I engage in physical activities to stimulate my imagination	.03	.47
I have parameters or constraints on my work	-.03	.53
I draw on my own personal experiences, thoughts, and/or feelings	.03	.53
I try not to doubt my own abilities too much	.02	.62
I think about different facets of my own experience	.02	.67

Graduate Students in the Arts (<i>n</i> = 484)	Creative Achievement	
	<i>r</i>	<i>p</i>

Motivations Excluded from Scale

Because I feel an irresistible urge to do it	.24	<.001
Because it allows me to articulate thoughts about the world	.21	<.001
Because it is a part of my identity	.16	<.001
Because it allows me to capture (or try to capture) the complexity of reality	.16	<.01
Because I may be able to help others come to terms with difficult experiences	.14	<.01
Because it is important to challenge assumptions	.08	.06
Because I have an obligation to do so	.06	.16
Because I enjoy pushing my limits and making myself feel uncomfortable or uncertain in some way	.06	.17
Because I can play a part in the advancement of my discipline	-.06	.18
Because I enjoy the lifestyle and perks that come with this work	-.06	.22
Because my work may in some way have spiritual or religious significance for others	.05	.28
Because I can hopefully inspire and act as a role model for less experienced members of my field	.05	.30
Because it is just an intrinsically valuable thing to do	.05	.32

Because it helps me feel like I belong to a larger community	.04	.37
Because I hope that others will enjoy my work	.03	.45
Because I appreciate the freedom and flexibility afforded by this line of work	.03	.54
Because I hope to leave a legacy that will have an impact on the way others in my field do their own work in the future	-.03	.55
Because it helps me see the world from different perspectives	.02	.69
Because I hope that others will be interested and engaged by my work.	.01	.79
Because I want to help others escape into an imaginary world	.00	.93
Because it makes me feel confident and in control	.00	.97

Processes Excluded from Scale

I have parameters or constraints on my work	-.14	<.001
I feel a sense of autonomy or freedom	.13	<.01
I think about different facets of my own experience	.12	.01
I draw on my own personal experiences, thoughts, and/or feelings	.11	.01
I decide on a predefined structure for my work	-.10	.03
I become completely absorbed and lose track of time	.08	.06
I spend time exploring the material at hand	.08	.08
I remain confident that I can overcome difficulties	.08	.10
I learn from mentors and role models	-.07	.11
I think and act like a child in some way	.07	.12
I imagine myself as my main audience	.07	.14
I follow particular habits	-.06	.20
I go over my work more than once before considering it finished	.05	.25
I try not to doubt my own abilities too much	.05	.27
I do not think too hard about what motivates me to create	.03	.49
I engage in physical activities to stimulate my imagination	-.02	.64
I focus on the work itself rather than my or other people's feelings towards it	.02	.73
I resist the impulse to give up when I run into an obstacle or setback	.01	.77
I try to provide others with accurate and honest work	-.01	.84
I isolate myself from other people's physical presence and influence	.00	1.00

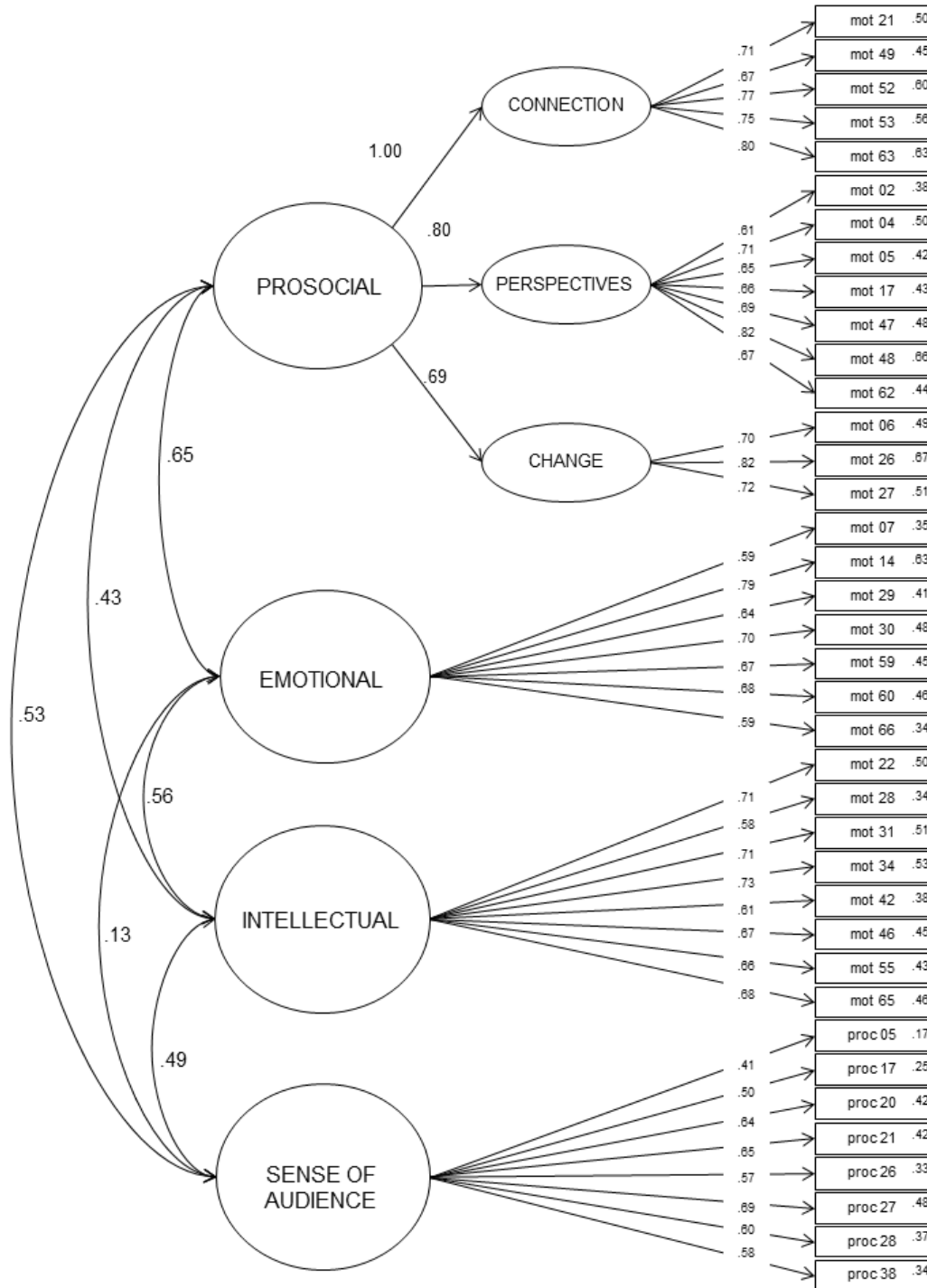


Figure 1. Results of the Confirmatory Factor Analysis (Study 2) including factor correlations, standardized factor loadings, and multiple squared correlations.

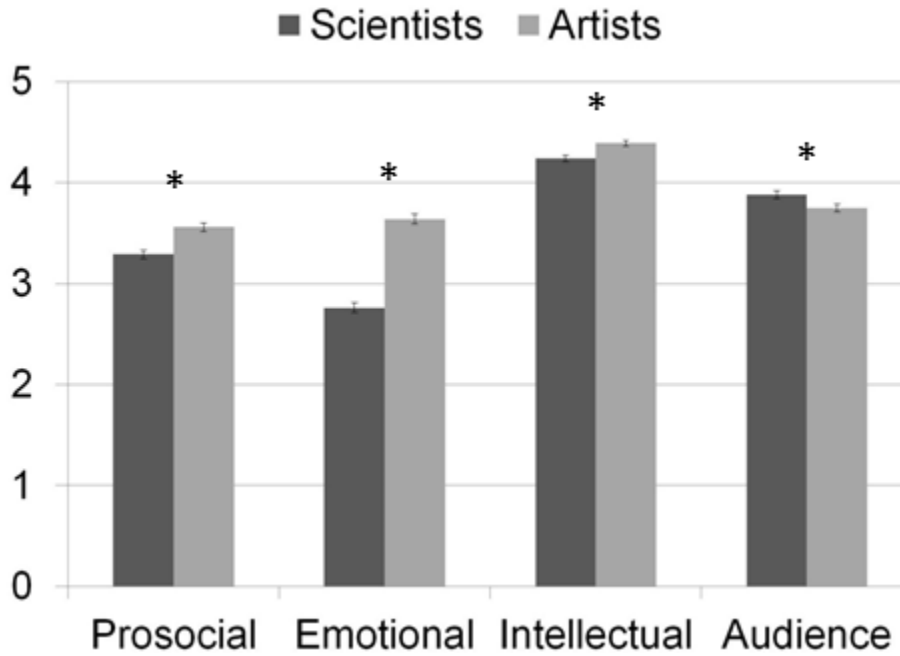


Figure 2. Results of the one-way MANCOVA and follow-up ANCOVAs assessing differences between artists and scientists on motivations and processes (controlling for age, gender, ethnicity, and type of program). Error bars represent standard errors of the mean. Asterisks denote significant differences.

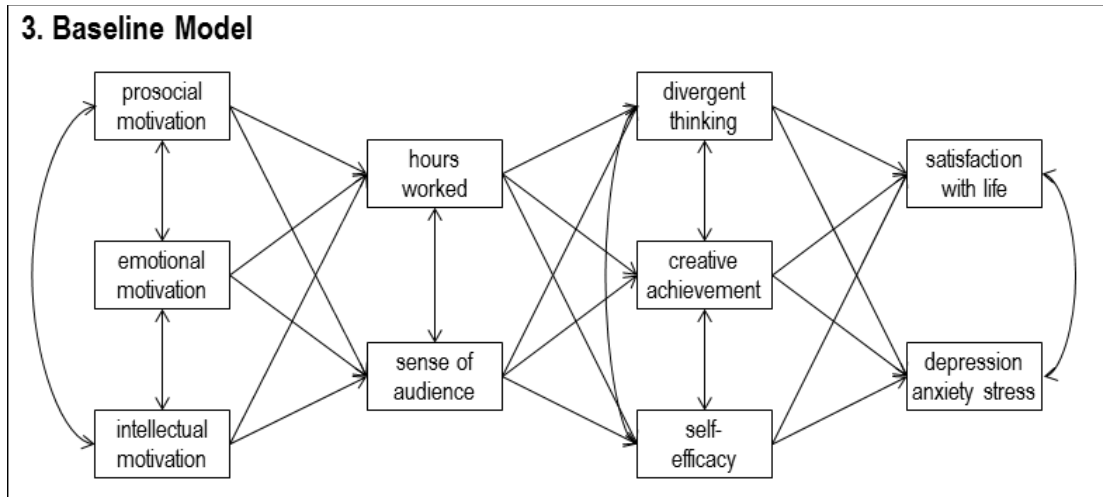


Figure 3. Baseline model tested in the multigroup path analysis.

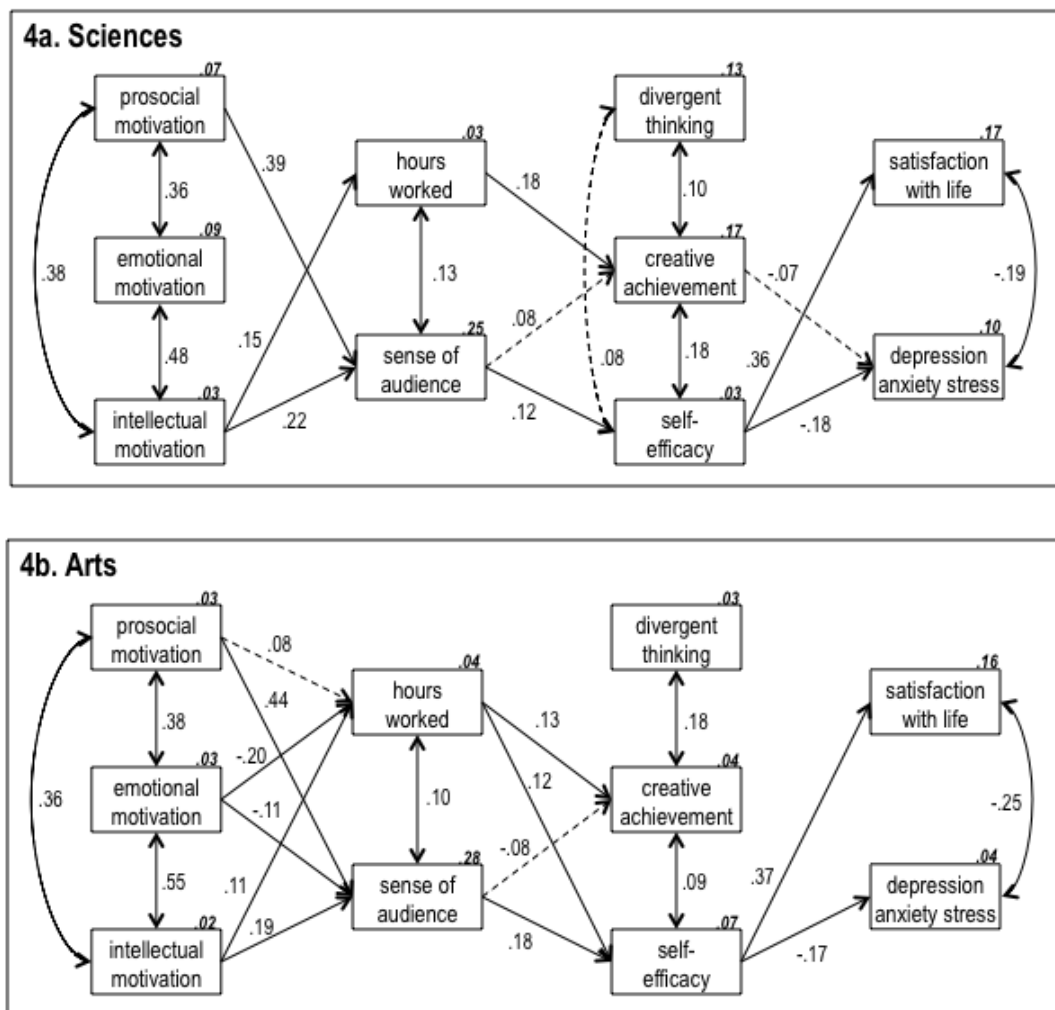


Figure 4. Results of the multigroup path analysis for graduate student in the sciences (Figure 4a) and in the arts (Figure 4b), including significant and near-significant regression and covariance path coefficients, as well as multiple squared correlations. Near-significant paths appear in dotted lines.

*Semi-Structured Interview Protocol (Study 1)***Part 1 – Questions Pertaining to Motivations**

Let's start with a broad question. What motivates you to do your work? What made you pick this career, as opposed to another one? Why were you attracted to a creative (artistic/scientific) career?

For example, what is the work you are most proud of, and what motivated it?

In what ways does your (artistic/scientific) work serve personal needs? Do you get anything out of it? If so, what do you get out of it?

In what ways does your (artistic/scientific) work serve other people? What might other people (from your audience, your field, or people in general) get out of it? What effect do you hope to have on other people?

Which qualities or strengths of yours help you in your creative work? Do you hold particular values or beliefs that motivate you to pursue your (prosocial/personal) goals?

We have been talking about two main kinds of motivations for doing creative (artistic/scientific) work. We talked about self-oriented motivations, and ways in which your work may serve personal needs. We also talked about other-oriented motivations, and ways in which your work may serve other people. Which kind of motivation do you think is most important for your work? Do you think that you do it mostly for yourself, or for other people? Or both?

Part 2 – Questions Pertaining to Processes

When do you do your best work? Do you use particular strategies to find good ideas? What might you tell a newcomer in your field to help them?

Do you think about your audience, or other people, while you are working? Do you ever target your work to a specific (real or imaginary) person or group? If so, how do you think that this may help you?

Do you enjoy working with others, or do you prefer to work alone? How important is the support of other people to your work?

Appendix B*Self-Report Scale of Motivations/Processes (Study 2)*

Part 1 - Motivations

You will find below statements describing particular **motivations** for engaging in artistic/scientific creative activities or doing artistic/scientific creative work. Some of these statements may apply or seem relevant to you, and others may not.

Using the scale provided, please indicate the degree to which these statements are true of YOUR experience, and the degree to which you pursue the motivations proposed *for their own sake* (i.e., not as means to other ends). Remember, there are no right or wrong answers!

Answer Options:

- 1 = Mostly untrue
- 2 = Somewhat untrue
- 3 = Neither true or untrue, or I never think about this
- 4 = Somewhat true
- 5 = Mostly true

I engage in (artistic/scientific) creative activities or do (artistic/scientific) creative work...

1. Because I want to get others to interact or participate in an exchange or conversation
2. Because I want others to respect and appreciate experiences that are unlike their own
3. Because I want other people to have a more accurate and rich understanding of reality
4. Because I can promote and help put into action important political or social ideals
5. Because it almost functions like a spiritual or religious practice for me
6. Because it allows me to capture (or try to capture) the complexity of reality
7. Because it is just an intrinsically valuable thing to do
8. Because it helps me feel like I belong to a larger community
9. Because I enjoy pushing my limits and making myself feel uncomfortable or uncertain in some way
10. Because it allows me to express and manage my emotions
11. Because I hope that others will enjoy my work
12. Because I want to make people think in a more nuanced way about the world
13. Because I enjoy the lifestyle and perks that come with this work
14. Because I believe my work can help people share some kind of meaningful experience
15. Because it allows me to explore and understand something I'm interested in

16. Because I have an obligation to do so
17. Because it is a part of my identity
18. Because I hope my work can contribute to fairness and justice in the world
19. Because I think my work may have positive and concrete repercussions on the lives of others
20. Because I like the feeling of coming up with something that's truly my own
21. Because it allows me to escape into an imaginary world
22. Because it somehow helps me deal with difficult personal experiences
23. Because it feeds my intellectual curiosity
24. Because I can hopefully inspire and act as a role model for less experienced members of my field
25. Because I hope to leave a legacy that will have an impact on the way others in my field do their own work in the future
26. Because it brings me pleasure, excitement, and satisfaction
27. Because I feel an irresistible urge to do it
28. Because it is important to challenge assumptions
29. Because I hope that my work can reach new people that would otherwise not have been exposed to particular ideas
30. Because I appreciate the freedom and flexibility afforded by this line of work
31. Because it allows me to articulate thoughts about the world
32. Because I get completely engaged and absorbed in what I am doing
33. Because my work may in some way have spiritual or religious significance for others
34. Because I hope that others will be interested and engaged by my work.
35. Because I can play a part in the advancement of my discipline
36. Because it's a way to challenge and test myself
37. Because I think that other people may benefit from being challenged and made to feel uncomfortable in some way
38. Because I want people to better understand each others' viewpoints and perspectives
39. Because through my work, I can make sure that certain important experiences or facts are not forgotten
40. Because it makes me feel confident and in control
41. Because I want to give other people a sense of hope
42. Because I want other people to feel validated in some way
43. Because it provides me with a sense of accomplishment
44. Because I want to help others escape into an imaginary world
45. Because I may be able to help others come to terms with difficult experiences
46. Because it allows me to experience beauty

47. Because it makes me feel better mentally
48. Because I am hoping to surprise or provoke thought in whoever comes into contact with my work
49. Because I hope that my work may foster a sense of kinship and connection between people
50. Because it helps me see the world from different perspectives
51. Because I like to be surprised and learn new things
52. Because it makes me feel good physically
53. Because I want to impart important knowledge to others

Part 2 - Processes

You will find below statements describing things people may find helpful to do or think **during the creative process** (that is, during the period of time that they are actively working on an artistic/scientific project). Some of these statements may apply or seem relevant to you, and others may not.

Using the scale provided, please indicate the degree to which these statements are true of YOUR experience. Remember, there are no right or wrong answers!

Answer Options:

- 1 = Mostly untrue
- 2 = Somewhat untrue
- 3 = Neither true or untrue, or I never think about this
- 4 = Somewhat true
- 5 = Mostly true

When I am engaging in (artistic/scientific) creative activities or work...

1. I think about different facets of my own experience
2. I resist the impulse to give up when I run into an obstacle or setback
3. I draw on my own personal experiences, thoughts, and/or feelings
4. I receive affirmation and support from others
5. I follow particular habits
6. I become completely absorbed and lose track of time
7. I do not think too hard about what motivates me to create
8. I feel a sense of autonomy or freedom
9. I go over my work more than once before considering it finished
10. I get feedback from other people about my work
11. I decide on a predefined structure for my work

12. I take into account how I can make my work as accessible and clear as possible to others
13. I actively think about how other people will react to my work
14. I have parameters or constraints on my work
15. I focus on the work itself rather than my or other people's feelings towards it
16. I try not to doubt my own abilities too much
17. I think about what other members of my field are doing
18. I consider other people's viewpoints
19. I think about how I can convince others that my work is worthwhile
20. I try to provide others with accurate and honest work
21. I learn from mentors and role models
22. I collaborate with other people
23. I remain confident that I can overcome difficulties
24. I think and act like a child in some way
25. I imagine myself as my main audience
26. I spend time exploring the material at hand
27. I engage in physical activities to stimulate my imagination
28. I isolate myself from other people's physical presence and influence

Appendix C

Unstandardized Estimates (Uns.), Standard Errors (SE), Standardized Estimates (Std.), and p-Values for Path Loadings and Covariances in the Confirmatory Factor Analysis

		<i>Uns.</i>	<i>SE</i>	<i>Std.</i>	<i>p</i>
Path Loadings					
PROSOCIAL	→ CONNECTION	1.00	0.00	1.00	n/a ⁵
	→ PERSPECTIVES	0.75	0.08	.80	<.001
	→ CHANGE	0.76	0.08	.69	<.001
CONNECTION	→ (mot21) Because I believe my work can help people share some kind of meaningful experience	1.00	0.00	.71	<.001
	→ (mot49) Because, through my work, I can make sure that certain important experiences or facts are not forgotten	1.01	0.09	.67	<.001
	→ (mot52) Because I want to give other people a sense of hope	1.17	0.09	.77	<.001

⁵ Due to a negative residual variance, the variance of Connection was constrained to 0.

	→	(mot53) Because I want other people to feel validated in some way	1.10	0.09	.75	<.001
	→	(mot63) Because I hope that my work may foster a sense of kinship and connection between people	1.26	1.00	.80	<.001
PERSPECTIVES	→	(mot2) Because I want to get others to interact or participate in an exchange or conversation	1.00	0.00	.61	<.001
	→	(mot4) Because I want others to respect and appreciate experiences that are unlike their own	1.11	0.11	.71	<.001
	→	(mot5) Because I want others to have a more accurate and rich understanding of reality	0.97	0.10	.65	<.001
	→	(mot17) Because I want to make people think in a more nuanced way about the world	0.99	0.10	.66	<.001
	→	(mot47) Because I think that other people may benefit from being challenged and made to feel uncomfortable in some way	1.14	0.11	.69	<.001
	→	(mot48) Because I want people to better understand each other's viewpoints and perspectives	1.25	0.11	.82	<.001
	→	(mot62) Because I am hoping to surprise or provoke thought in whoever comes into contact with my work	1.01	0.10	.67	<.001
CHANGE	→	(mot6) Because I can promote and help put into action important political or social ideals	1.00	0.00	.70	<.001
	→	(mot26) Because I hope my work can contribute to fairness and justice in the world	1.16	0.09	.82	<.001
	→	(mot27) Because I think my work may have positive and concrete repercussions on the lives of others	0.91	0.09	.72	<.001

EMOTIONAL	→	(mot7) Because it almost functions like a spiritual or religious significance for others	1.00	0.00	.59	<.001
	→	(mot14) Because it allows me to express and manage my e(motions	1.35	0.13	.79	<.001
	→	(mot29) Because it allows me to escape into an imaginary world	1.09	0.12	.64	<.001
	→	(mot30) Because it somehow helps me deal with difficult personal experiences	1.20	0.13	.70	<.001
	→	(mot59) Because it allows me to experience beauty	1.05	0.11	.67	<.001
	→	(mot60) Because it makes me feel better mentally	0.95	0.10	.68	<.001
	→	(mot66) Because it makes me feel good physically	0.94	0.11	.59	<.001
INTELLECTUAL	→	(mot22) Because it allows me to explore and understand something I am interested in	1.00	0.00	.71	<.001
	→	(mot28) Because I like the feeling of coming up with something that's truly my own	1.31	0.14	.58	0.51
	→	(mot31) Because it feeds my intellectual curiosity	1.07	0.09	.71	<.001
	→	(mot34) Because it brings me pleasure, excitement, and satisfaction	1.30	0.11	.73	<.001
	→	(mot42) Because I get completely engaged and absorbed in what I am doing	1.21	0.12	.61	<.001

	→	(mot46) Because it's a way to challenge and test myself	1.35	0.12	.67	<.001
	→	(mot55) Because it provides me with a sense of accomplishment	1.29	0.12	.66	<.001
	→	(mot65) Because I like to be surprised and learn new things	1.19	0.12	.68	<.001
AUDIENCE	→	(proc5) I receive affirmation and support from others	1.00	0.00	.41	<.001
	→	(proc17) I get feedback from other people about my work	1.02	0.17	.50	<.001
	→	(proc20) I take into account how I can make my work as accessible and clear as possible to others	1.57	0.25	.64	<.001
	→	(proc21) I actively think about how other people will react to my work	1.82	0.30	.65	<.001
	→	(proc26) I think about what other members of my field are doing	1.45	0.24	.57	<.001
	→	(proc27) I consider other people's viewpoints	1.57	0.24	.69	<.001
	→	(proc28) I think about how I can convince others that my work is worthwhile	1.81	0.29	.60	<.001
	→	(proc38) I collaborate with other people	1.68	0.27	.59	<.001

Covariances

EMOTIONAL	↔	PROSOCIAL	0.48	0.07	.65	<.001
INTELLECTUAL	↔	PROSOCIAL	0.19	0.03	.43	<.001
	↔	EMOTIONAL	0.24	0.04	.56	<.001
AUDIENCE	↔	PROSOCIAL	0.19	0.04	.53	<.001
	↔	EMOTIONAL	0.05	0.03	.13	0.06
	↔	INTELLECTUAL	0.10	0.02	.49	<.001

GENERAL DISCUSSION

Results of the present studies enriched the scientific understanding of the relationship between creativity and well-being by addressing a number of key questions. First, these studies investigated whether the relationship between creative behavior and well-being holds across multiple domains and life contexts. Second, these studies examined a number of mechanisms that may account for the relationships found. Third, these studies explored the role of important individual differences in personality and motivation. Finally, these studies took a comprehensive approach to the study of well-being by examining a broad range of outcomes. The implications and limitations of the present findings are discussed here, as well as future directions for research in this area.

Life Contexts

This research showed that creativity is associated with enhanced well-being across a number of domains and life contexts. Chapter 1 found that perceptions of increased creativity occurred following experiences of adversity. Chapter 2 found that emerging adults who gained a sense of creative self-efficacy while participating in extracurricular activities during high school experienced higher levels of well-being at the beginning of college. Chapter 3 showed that creative work was indirectly associated with enhanced well-being for aspiring and professional artists and scientists.

Domains

Past research has tended to mainly focus on the benefits of artistic creativity. This research demonstrated that creative behavior in various domains (including domains not generally or stereotypically thought of as creative) is associated with enhanced well-being. In Chapter 1, participants reported creative growth following adversity in domains as diverse as entrepreneurship, the arts, the sciences, interpersonal interactions, and everyday problem-solving. Chapter 2 examined the relationship between creative self-efficacy and well-being for a range of extracurricular activities, including athletic, academic, artistic, and prosocial activities. Chapter 3 examined the relationship between creative work and well-being in professional and aspiring artists and scientists.

Mechanisms

To date, little research has examined mechanisms which may explain potential benefits of creativity for well-being. Chapter 2 demonstrated that the relationship between extracurricular involvement in high school and well-being at the beginning of college was mediated by both feelings of mastery and creative self-efficacy. In Chapter 3, aspiring artists and scientists appeared to experience greater levels of well-being to the extent to which they spent more hours engaging in creative work, thought about others during the creative process, and experienced greater levels of self-efficacy.

Individual Differences

This research also examined a number of important individual differences which may affect the degree to which individuals engage in creative behavior to begin with, as well as the degree to which creative behavior is beneficial for well-being. In Chapter 1, the personality trait of openness to experience moderated the degree to which experiences

of adversity predicted perceptions of increased creativity. In Chapter 2, intrinsic motivation predicted participation in extracurricular activities. In Chapter 3, prosocial, emotional, and intellectual motivations predicted the extent to which participants spent more hours engaging in creative work and thought about others during their work, processes which in turn predicted achievement and well-being outcomes.

Facets of Well-Being

Existing evidence regarding the relationship between creativity and well-being has tended to focus on short-term mood outcomes or symptoms of psychopathology. This research attempted to examine a broader range of outcomes related to well-being. Past theoretical work has highlighted the importance of understanding well-being as a multifaceted construct that reflects not just how people feel, but also what people do (Forgeard et al., 2011; Ryan & Deci, 2001; Ryff, 1989; Seligman, 2011). In Chapter 1, perceptions of increased creativity were associated with reports of posttraumatic growth in multiple domains. Beyond their inherent value, reports of posttraumatic have been associated with enhanced well-being outcomes including greater psychological and physical health (Barskova & Oesterreich, 2009; Helgeson, Reynolds, & Tomich, 2006). In Chapter 2, involvement in extracurricular activities indirectly predicted lower levels of psychopathology (depression and anxiety), as well as higher levels of positive psychological health (life satisfaction, flourishing, positive emotion). In Chapter 3, creative work was also indirectly linked to both psychopathology (depression, anxiety, stress), and life satisfaction. In addition, Chapter 3 also examined the relationship between creative achievement and well-being outcomes, and found that subjective

feelings of competence (as reflected by self-efficacy), but not objective levels of achievement, predicted well-being outcomes. Although past research has tended to study either achievement or well-being as their primary outcome, this research attempted to bridge disconnected areas of research including the social, motivational, and clinical literatures.

Limitations and Future Directions

Future research should continue to build evidence to address the questions examined by the present studies. An important limitation of this research was its reliance on cross-sectional methods. Future work using longitudinal and experimental methods is needed in order to provide evidence of causality. In addition, it is likely that creative thinking and behavior *both* reflects and enhances psychological health (Richards, 2007), and future research should keep in mind the probable bidirectional nature of this relationship, in addition to ruling out confounding factors.

An additional crucial challenge for this area of research will be to further examine whether creativity exerts its benefits via general or creativity-specific mechanisms. Such research will help establish whether creative thinking and behavior has unique benefits. Study 2 for example demonstrated that specific feelings of creative self-efficacy predicted well-being over and above general feelings of mastery. Beyond these findings, more research is needed in order to investigate whether the generation of novel and useful ideas is indeed the specific active ingredient that explains potential benefits. It is possible, for example, that engaging in creative activities has benefits not because individuals generate novel and useful ideas, but because it enables other processes involved in

psychological health such as general feelings of mastery and self-efficacy (Bandura, 1997), behavioral activation (Jacobson, Martell, & Dimidjian, 2001), engagement and flow (Csikszentmihalyi, 1996), or distraction (Drake & Winner, 2012). Related to this, it is possible that the benefits of striving to generate novel and useful ideas is explained by usefulness only. Future research in this area may attempt to clarify the relative contributions and interaction of originality and usefulness for well-being. Isolating the effects of originality and usefulness may be difficult, as originality likely influences the extent to which an idea is useful. Still, not all useful ideas are original, and future work should examine whether ideas that are both original and useful provide unique benefits for well-being.

Creativity as a Transdiagnostic Process

To frame future research on when, how, and for whom creativity enhances well-being, researchers may want to conceptualize creative thinking as an important yet understudied transdiagnostic process at play in well-being and psychopathology that can be defined, operationalized, assessed, and (if found to be adaptive) enhanced. Doing so may also help clarify how creativity relates to other processes studied by psychological scientists. For example, creative thinking is likely closely related to psychological flexibility, defined as the ability to effectively adapt one's cognitions, emotions, and behaviors to the situation at hand (Kashdan & Rottenberg, 2010). Psychological flexibility probably does not necessarily require creative thinking – individuals may build a repertoire of options by learning from others or from the environment (as opposed to inventing them anew). Creative thinking however probably enhances and strengthens

psychological flexibility by allowing individuals to generate new and effective cognitive, emotional, and behavioral strategies on their own. In addition to other aforementioned mechanisms, creative thinking may therefore enhance well-being by helping to counteract a number of detrimental transdiagnostic processes at play in psychopathology including repetitive negative thinking, as well as interpretational and expectancy biases (Harvey et al., 2004), and by helping individuals adopt flexible interpretations and coping styles (Fresco, Williams, & Nugent, 2006). Thus, a better understanding of the relationship between creative thinking and other forms of thinking may help place this construct within the context of the broader literature on well-being and psychopathology.

In addition, future research should strive to understand when creative thinking is beneficial, and when it is not. In particular, it is likely that creative thinking may only be beneficial in moderate amounts. Related to this, researchers have called for investigating the boundary conditions under which any positive psychological trait or process may become detrimental, as seemingly linear relationships may in fact be monotonic when examining their full range of expression (Grant & Schwartz, 2011). The relationship of creative thinking to psychological health is probably not linear. Past a certain point, excessive creativity and flexibility may foster impulsivity or instability (Kashdan & Rottenberg, 2010). Thus, the benefits of creative thinking and behavior likely depend on the development of metacognitive knowledge and strategies allowing individuals to be cognizant of their own creative abilities, of the circumstances in which creative thinking is or is not beneficial, as well the optimal degree of creative thinking that will best serve the purpose of the activity at hand (Kaufman & Beghetto, 2013).

Conclusion

Researchers interested in better understanding the antecedents and outcomes of creative thinking have exciting tasks ahead of them: to continue building evidence to support the claim that creative behavior enhances well-being, to further examine the role of general and creativity-specific mechanisms that may account for its benefits, and to highlight important individual differences determining whether individuals engage in creative behavior and benefit from it. The present studies contributed to these efforts by providing evidence that creative behavior is associated with enhanced well-being across a number of life contexts and domains through mechanisms important for psychological health. In addition, the present studies suggested that individual differences in personality and motivation influence the extent to which individuals engage in creative work, and whether they experience concurrent benefits for well-being. These findings have important implications for designing and maximizing the effectiveness of interventions or activities designed to enhance well-being through creativity.

References

- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Barskova, T., & Oesterreich, R. (2009). Post-traumatic growth in people living with a serious medical condition and its relations to physical and mental health: A systematic review. *Disability & Rehabilitation, 31*, 1709-1733.
- Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins Publishers.
- Drake, J. E., & Winner, E. (2012). Confronting sadness through art-making: Distraction is more beneficial than venting. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 255-261.
- Forgeard, M. J. C., Jayawickreme, E., Kern, M. L., & Seligman, M. E. P. (2011). Doing the right thing: Measuring well-being for public policy. *International Journal of Wellbeing, 1*, 79-106.
- Fresco, D. M., Williams, N. L., & Nugent, N. R. (2006). Flexibility and negative affect: Examining the associations of explanatory flexibility and coping flexibility to each other and to depression and anxiety. *Cognitive Therapy and Research, 30*, 201-210.
- Grant, A. M., & Schwartz, B. (2011). Too much of a good thing: The challenge and opportunity of the inverted u. *Perspectives on Psychological Science, 6*, 61-76.
- Harvey, A. G., Watkins, E. R., Mansell, W., & Shafran, R. (2004). *Cognitive behavioural processes across psychological disorders: A transdiagnostic approach to research and treatment*. Oxford: Oxford University Press.

- Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology, 74*, 797-816.
- Jacobson, N. S., Martell, C. R., Dimidjian, S. (2001). Behavioral activation treatment for depression: Returning to contextual roots. *Clinical Psychology: Science and Practice, 8*, 255-270.
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review, 30*, 865-878.
- Kaufman, J. C., & Beghetto, R. A. (2013). In praise of Clark Kent: Creative metacognition and the importance of teaching kids when (not) to be creative. *Roeper Review, 35*, 155-165.
- Richards, R. R. (2007). *Everyday creativity and new views of human nature*. Washington, DC: American Psychological Association.
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141-166.
- Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*, 1069-1081.
- Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. New York: Free Press.