THE INSPIRATION OF BOREDOM:

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN BOREDOM AND CREATIVITY

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Abstract

The present thesis investigated the novel question of whether boredom could inspire creativity through two studies, the first focusing on trait creativity and the second on creative performance. The results reflect boredom and creativity's complex, potentially null relationship. Study 1 found that trait boredom, controlling for overall personality structure, was not associated with creative personality. Study 2 found that neither state boredom nor the interaction between state and trait boredom was predictive of creative performance. Trait boredom, controlling for overall personality structure, was a positive predictor of curiosity (Study 1), and curiosity in turn was found to be a positive predictor of creative performance (Study 2), suggesting a potential mediated relationship. Future work exploring this possibility is encouraged. Researchers exploring the relationship between boredom and creativity are also urged to assess arousal and regulatory focus. Finally, work exploring multiple, potentially interacting components of creativity–particularly rater characteristics–is proposed.

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Table of Contents

List of Tables

List of Figures

The Inspiration of Boredom:

An Investigation of the Relationship Between Boredom and Creativity

Nineteenth century artist Gustave Flaubert credited boredom as the inspiration for his creations (Kuhn, 1976). Indeed, one of his most famous works, *Madame Bovary* (1857/1965), is in itself a testament to the creative lengths that individuals may go to in order to escape the frightening prospect of boredom.

Was Flaubert on to something? Could boredom spark creativity? The aim of the present thesis was to empirically investigate this question.

Why Might It Be Important To Reduce Boredom, and Spark Creativity?

Previous literature on both boredom and creativity suggests that answering this question could have important implications. Boredom, "the aversive experience of wanting, but being unable to engage in satisfying activity" (Eastwood, Frischen, Fenske, & Smilek, 2012, p. 483), has been linked to a number of negative outcomes. For example, research participants induced into a state of boredom display increased eating after a full meal (Abramson & Stinson, 1977) and increased hostility/aggression (van Tilburg & Igou, 2011), relative to controls. Experimental research has also found that state boredom may give rise to risky decision-making (Matthies, Philipsen, & Svaldi, 2012). Finally, a study of clinically depressed psychiatric inpatients found the state of boredom to be a key predictor of suicidal ideation (Ben-Zeev, Young, & Depp, 2012).

Research on trait boredom (i.e., characteristic tendency for an individual to be bored) has also found boredom proneness to be linked to a number of unpleasant outcomes. Specifically, existing research has demonstrated that boredom proneness is associated with a variety of behavioural problems such as problem gambling (Mercer & Eastwood, 2010), alcohol abuse

(Carlson, Johnson, & Jacobs, 2010; Flory, Pytte, Hurd, Ferrell, & Manuck, 2011), smoking (Carton, Jouvent, & Widloecher, 1994), risky and/or poor driving behaviour (Furnham & Saipe, 1992; Witte & Donahue, 2000), procrastination (Vodanovich & Rupp, 1999), and poor job performance (Watt & Hargis, 2009). Boredom proneness is further associated with a wide range of emotional challenges such as alexithymia (Eastwood, Cavaliere, Fahlman, & Eastwood, 2007), an absence of life meaning (Fahlman, Mercer, Gaskovski, Eastwood, & Eastwood, 2009), paranoia (von Gemmingen, Sullivan, & Pomerantz, 2003), trait anger (Dahlen, Martin, Ragan, & Kuhlman, 2004; Mercer-Lynn, Hunter, & Eastwood, 2013; Rupp & Vodanovich, 1997), depression (Goldberg, Eastwood, Laguardia, & Danckert, 2011; Mercer-Lynn et al., 2013; Sommers & Vodanovich, 2000), anxiety (Mercer-Lynn, Flora, Fahlman, & Eastwood, 2011; Sommers & Vodanovich, 2000), and job dissatisfaction (Kass, Vodanovich, & Callender, 2001).

On the other side of the research question, enhancing creativity could have a number of benefits. Before this is explored, however, it is worthwhile to pause to consider the definition of creativity in the field of psychology. This is a complex issue, as there is no clear, agreed-upon definition. Indeed, Prentky notes that the lack of a common definition "hangs as the mythical albatross around the neck of scientific research on creativity" (2001, p. 97). Definitions of creativity have ranged from the functional to the abstract. For instance, at the functional end Amabile (1982) defined creativity as "the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced" (p. 1001), and at the abstract end Rogers (1961) defined creativity as a dynamic co-creation between the "uniqueness of the individual on the one hand, and the materials, events, people or circumstances of his life on the other" (p. 350). As Batey and Furnham (2006) note, and the previous two definitions illustrate, definitions have also have

ranged in focus, for instance from on the person who creates, to on the process of creation. Introducing their own definition in an attempt to bring some clarity to the field, Batey and Furnham (2006) define creativity (more specifically, of creativity in a product) as a multi-component process involving attributes of: the product, the person who created the product, the person(s) judging the product, and the environment within which the product is created and judged. Underscoring this slippery, subjective notion of creativity, research has even found that definitions for creativity systematically vary across professions and workplace environments (Glück, Ernst, & Unger, 2002). Therefore, in the present thesis, given the lack of scientific definitional consensus, when discussing research on creativity it is specified which definition of or 'type' of creativity is being discussed (e.g., creative product vs. creative personality). In addition, in the two studies described herein, two different types of creativity operationalizations are employed to honour the current breadth of definitions.

To return to the question of the benefits of creativity, on the individual level, generating novel solutions or products may enhance job performance or general daily tasks of living (Sternberg & Lubart, 1996). Creativity may also improve well-being; indeed, art therapies are predicated upon this assumption and have been shown to be effective in reducing symptomatology (Reynolds, Nabors, & Quinlan, 2000). As well, emerging research suggests that creativity may ameliorate negative mood (Hunter & Eastwood, 2015). On the societal level, Sternberg and Lubart have advocated that creativity can result in new empirical findings, artistic movements, and solutions to social problems (1996). Recent statistics suggest that creativity–more specifically its decline–may be a particularly salient issue today. In her article "The Creativity Crisis," Kim (2011) analyzed normative data from the 1970s to 2008 from one of the most widely used creativity measures, the Torrance Tests of Creative Thinking (TTCT). Her

results showed that since 1990, even as IQ scores have increased, scores on the TTCT have significantly declined. Complementing this work, a 2014 report by the Conference Board of Canada awarded Canada a "D" grade for innovation as compared to its international peers, ranking Canada 13th among the 16 peer countries.

The Overall Aim of the Present Thesis

Given the implications of boredom and creativity for individuals and society as a whole, the present thesis sought to explore whether boredom could spark creativity. This was accomplished using a multi-study design, in order to capture the current breadth of operationalizations of both boredom and creativity. In Study 1, the relationship between boredom and creativity was examined from a trait perspective: that is, the relationship between boredom proneness and the creative personality was assessed. In Study 2, the contribution of boredom proneness *and* state boredom to performance on creativity tasks was investigated.

Study 1

Boredom and Creativity: A Trait Perspective

As noted above, one important focus in the field of creativity research has been what constitutes the creative person. One of the most popular areas of investigation in this realm is the relationship of overall personality taxonomies, particularly the Big Five Model, to creativity. The results have been impressive: in some studies, the Big Five Model has explained almost 50% of the variance in creative performance (Silvia et al., 2008; Silvia, Martin, & Nusbaum, 2009). At the factor level, Openness to Experience is the strongest Big Five predictor of creativity (Feist, 1998; Silvia et al., 2008; Silvia et al., 2009). Openness to Experience has been positively correlated with creativity across a range of operationalizations such as performance on verbal and figural divergent thinking tasks (Carson, Peterson, & Higgins, 2005; Furnham, Crump,

Batey, & Chamorro-Premuzic, 2009; Lin, Hsu, Chen, & Wang, 2012; Schretlen, van der Hulst, Pearlson, & Gordon, 2010; Silvia et al., 2008; Silvia et al., 2009; Walker & Jackson, 2014), writing a short story (Wolfradt & Pretz, 2001), self-reported creative achievements/activities (Silvia, Kaufman, Reiter-Palmon, & Wigert, 2011), and creative personality (Carson et al., 2005; McCrae, 1987; Wolfradt & Pretz, 2001).

The other Big Five factors have also evidenced usefulness in predicting creativity. Extraversion is typically a positive predictor of creative performance (Batey, Chamorro-Premuzic, & Furnham, 2009; Batey & Furnham, 2006; Wolfradt & Pretz, 2001) and has been found to positively predict creative personality (Wolfradt & Pretz, 2001). Conscientiousness is typically a negative predictor of creative performance (Silvia et al., 2008; Silvia et al., 2009; Wolfradt & Pretz, 2001), and has not been found to predict creative personality (McCrae, 1987; Wolfradt & Pretz, 2001). The predictive ability of Neuroticism and Agreeableness in explaining creative performance and personality has been mixed (Batey & Furnham, 2006; McCrae, 1987; Silvia et al., 2011; Wolfradt & Pretz, 2001). Recent work by Silvia et al. (2011) using the elaborated HEXACO model, which divides Big Five Agreeableness into arrogance (HEXACO Honesty-Humility) and hostility (HEXACO Agreeableness), suggests that it is arrogance (low Honesty-Humility) and not hostility (low Agreeableness) that is associated with creativity–self-reported creative achievements/activities in their study.

An intriguing personality variable that has yet to be examined in relation to creativity is boredom proneness–one's propensity towards experiencing boredom. As reviewed earlier, research on boredom proneness has overwhelmingly focused on its negative effects. However, there exists alongside this canon a history of theoretical work arguing for boredom's potential benefits (Healy, 1984; Kuhn, 1976; Stern, 1988). For instance, Elpidorou (2014) posited

boredom as a regulatory state that alerts the individual when his or her goals are no longer fulfilling, and motivates the search for new, meaningful projects. Schubert advanced that individuals could, if held in a boring situation, begin to generate creative responses (1978). As a result, researchers have called for empirical investigation of boredom's potential positive properties (Piotrowski, 2013; Vodanovich, 2003a). The existing theory on boredom's potential link with creativity has tended to discuss boredom broadly, without specifying whether it is trait, state, or both types of boredom that are surmised to be associated with creativity. The present study, focusing on trait boredom, sought to answer the question: Could boredom proneness be associated with creativity?

Closely related to creativity is curiosity, an interest in the discovery of new knowledge about self, others, or the world (Kashdan, Rose, & Fincham, 2004). Although not synonymous with creativity, the two constructs are closely linked: indeed, researchers have proposed that curiosity may be a necessary, but not sufficient, condition for creativity (Kashdan & Fincham, 2002). Research on curiosity's personality correlates has also found significant linkages to the Big Five Model. Just as with creativity, Openness to Experience and Extraversion are positive correlates of curiosity (Kashdan et al., 2004; Kashdan & Steger, 2007). In contrast to creativity research, Conscientiousness has emerged as another positive correlate of curiosity (Kashdan et al., 2004; Kashdan & Steger, 2007).

However, research in this area is relatively scarce and has focused on one measure of curiosity, the Curiosity and Exploration Inventory. This scale measures general tendencies towards exploration (the pursuit of novel knowledge and experiences), and absorption (the ability to be engrossed by these experiences). Supporting the need for research on multiple measures of trait curiosity, the literature has identified several, empirically distinct types of trait

curiosity (Litman, 2008; Litman & Jimerson, 2004; Litman & Spielberger, 2003) such as 'epistemic curiosity'–interest in and engagement with information/facts–which can be further broken down into 'interest' (pursuing knowledge due to pleasurable feelings of interest) and 'deprivation' (pursuing knowledge due to aversive feelings of incomprehension) components. The discovery of several distinct types of trait curiosity such as epistemic curiosity and its interest and deprivation components raises the possibility that these different types of curiosity might evidence different relationships with personality structure than have been demonstrated for the Curiosity and Exploration Inventory.

Some work has examined the potential relationship between boredom proneness and curiosity. To date, research using the Curiosity and Exploration Inventory has found that boredom proneness is negatively associated with curiosity, particularly with the measure's exploration subscale (Kashdan et al., 2002). Although research has not yet been conducted on other types of curiosity (e.g., epistemic), related research showing boredom proneness to be negatively associated with need for cognition suggests that epistemic curiosity would likely be negatively associated with boredom proneness as well (Seib & Vodanovich, 1998; Watt & Blanchard, 1994).

On the other side of the coin, theoretical work points to boredom as an area of pre-readiness for curiosity. For instance, Andy White speaks of the experience of boredom as a space that offers the individual the chance to wrestle with his or her life's conflicts, and subsequently to emerge prepared to authentically explore the world (1998). He describes his experience struggling with protracted boredom in his early adulthood, an experience he deems a period of safety that allowed him to come to terms with and subsequently address the disconnect between his current superficial existence and his desire to live meaningfully. Possible evidence for a

positive link between boredom and curiosity also lies in an intriguing experiment by van Aart, Bartneck, Hu, Rauterberg and Salem (2010, Study 2). In this study, participants played the acting role of Alice in the opening of *Alice in Wonderland*: they were subsequently induced into a state of boredom but then were allowed to follow a white rabbit through a 'park' space. Participants' agitation and curiosity increased pre- to post-experiment, which the authors held was consistent with their theory that state boredom aroused curiosity.

In summary, research on the related constructs of creativity and curiosity has found personality taxonomies, particularly the Big Five Model, to be important correlates. Openness to Experience and Extraversion appear to be especially important, while the role of other factors such as Agreeableness remains uncertain. In addition, boredom proneness's potential association with creativity has yet to be assessed, and its role in curiosity is unclear. Thus, our first study attempted to contribute to the existing literature in two ways. First, we explored the relationships between personality structure, and trait creativity and curiosity. We employed the HEXACO personality taxonomy as this measure has the advantage of retaining important Big Five factors such as Openness to Experience and Extraversion while distinguishing between the traditional Agreeableness components of arrogance and hostility. As Silvia et al. (2011) found, this distinction is important for the prediction of creativity. As well as including a popular measure of curiosity (the Curiosity and Exploration Inventory), we included two additional less commonly used trait measures of curiosity; namely, interest and deprivation epistemic curiosity. The second goal of Study 1 was to explore trait boredom's potential association with trait creativity and curiosity. To avoid potential overlap between boredom proneness and overall personality structure, we assessed boredom proneness's relationship with trait creativity and curiosity over and above a comprehensive model of personality (i.e., HEXACO).

Method

Participants and procedure. All participants were York University students, and received either course credit or financial compensation ($20) for participation. The total sample (N = 288) contained 92 men (32%); 192 women (67%); one individual who identified as male and female, one individual who identified as Other, and two individuals who did not identify a gender (1%). Participants identified with the following ethnicities: 31% South Asian, 22% White/Caucasian, 17% Black, 14% Arab/West Asian, 8% Chinese, 7% Other, 4% Latin American, 3% South East Asian, 3% Filipino, 1% Aboriginal, 0.6% Korean and 0.3% Japanese. (Participants were permitted to select more than one option. In being able to identify with multiple ethnicities, participants were enabled to provide us with a more complete and nuanced picture of their ethnic membership.) Participants had an average age of 21.70 years (SD = 4.71, range 17-56). Participants completed the measures in person as part of a larger study on personality, mood, and creativity.

Measures.

HEXACO-60. The HEXACO-60 (Ashton & Lee, 2009) is a 60-item measure of six major dimensions of personality: Honesty-Humility (H), Emotionality (E), Extraversion (X), Agreeableness (A), Conscientiousness (C) and Openness to Experience (O). 10 items assess each dimension, and six subscale scores are generated for each participant. A high H score denotes a concern for genuineness, justice, and modesty. A high E score indicates a participant who is highly prone to negative emotions, and tends to experience strong interpersonal emotional connections. A high X score reflects an energetic individual who enjoys interacting with others and who is comfortable in a range of social situations. A high A score denotes a non-judgmental and forgiving interpersonal stance, the ability to collaborate and compromise, and a calm

disposition. A high C score denotes an individual who is orderly, devotes significant effort to the tasks he or she pursues, and plans carefully to avoid errors. Lastly, a high O score speaks to an individual who appreciates aesthetic experiences, is curious and creative, and who welcomes uncommon ideas.

Participants respond to all items using a 5-point Likert-type scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). In the present study, H scores ranged from 18 to 50, with a mean of 33.97 and a standard deviation of 6.56; E scores ranged from 15 to 50, with a mean of 33.87 and a standard deviation of 6.62; X scores ranged from 14 to 49, with a mean of 33.22 and a standard deviation of 6.62; A scores ranged from 15 to 48, with a mean of 32.26 and a standard deviation of 5.84; C scores ranged from 20 to 49, with a mean of 35.33 and a standard deviation of 5.93; and O scores ranged from 15 to 49, with a mean of 35.05 and a standard deviation of 6.52.

In the article debuting the HEXACO-60, coefficient alphas for the six subscales ranged from .77 to .80 in a college sample, and from .73 to .80 in a community sample (Ashton & Lee, 2009). In the present study, coefficient alphas for the six subscales ranged from .72 to .81.

Boredom Proneness Scale (BPS). The BPS (Farmer & Sundberg, 1986) is a 28-item scale that measures an individual's proneness to experiencing boredom, with high scores reflecting a marked tendency to becoming bored. The present study used a 7-point Likert-type version of the scale (Vodanovich & Kass, 1990) ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*) that has been reported to have a coefficient alpha ranging from .79 to .84 (Vodanovich, 2003b). In the present study, scores ranged from 34 to 145, with a mean of 97.37 and a standard deviation of 17.61. The scale's coefficient alpha in the present study was .82.

Creative Personality Scale (CPS). The CPS (Gough, 1979) measures the extent to which an individual's personality can be considered creative. Out of a set of thirty adjectives (e.g., insightful, conventional), subjects endorse the adjectives they feel describe their personality. Eighteen of these adjectives are considered indicative of a creative personality (e.g., insightful), and the remaining twelve are considered indicative of a non-creative personality (e.g., conventional). A score of 1 is assigned for each creative adjective endorsed, and a score of -1 assigned for each non-creative adjective endorsed. Thus, total scores can range from -12 to 18, with high scores indicating individuals with a creative personality. In the present study, scores ranged from -6 to 13, with a mean of 3.89 and a standard deviation of 3.59. Coefficient alphas for the scale were originally reported to range from .73 (graduate students) to .77 (community sample) in men, and from .73 (graduate students) to .81 (community sample) in women. A more recent study (Wolfradt & Pretz, 2001) reported a coefficient alpha of .72 in a mixed-gender sample of students, and in the present study the coefficient alpha was .57 for the negatively keyed items and .77 for the positively keyed items.

Interest-Type Epistemic Curiosity Scale (ECI). The 5-item ECI (Litman, 2008) assesses the extent to which individuals tend to pursue information due to pleasurable feelings of interest, with high scores indicating this tendency. Participants respond on a 4-point Likert-type scale ranging from 1 (*Almost never*) to 4 (*Almost always*). A coefficient alpha of .82 has been reported (Litman, 2008). In the present study the coefficient alpha was .85, and scores ranged from 9 to 20, with a mean of 15.76 and a standard deviation of 3.11.

Deprivation-Type Epistemic Curiosity Scale (ECD). The 5-item ECD (Litman, 2008) assesses the extent to which individuals tend to pursue information out of a desire to eliminate an aversive feeling of incomprehension, with high scores indicating this tendency. Participants

respond on a 4-point Likert-type scale ranging from 1 (*Almost never*) to 4 (*Almost always*). A coefficient alpha of .76 has been reported (Litman, 2008). In the present study the coefficient alpha was .89, and scores ranged from 5 to 20, with a mean of 12.36 and a standard deviation of 3.82.

Curiosity and Exploration Inventory (CEI). The CEI (Kashdan et al., 2004) is a 7-item scale that measures an individual's tendency to seek out novel experiences and become absorbed in activities of interest. The CEI is comprised of two subscales, Exploration (4 items) and Absorption (3 items). Participants respond to all items using a 7-point Likert-type scale with three anchors: 1 (*Strongly disagree*), 4 (*Neither agree nor disagree*) and 7 (*Strongly agree*). High scores on the Exploration subscale signal participants who pursue new events, information and experiences, and high scores on the Absorption subscale signal participants who can become focused on experiences of interest. In the article debuting the CEI, coefficient alphas derived from student and community samples were reported to range from .63 to .74 for the Exploration subscale, and from .66 to .73 for the Absorption subscale (Kashdan et al., 2004). In the present study, coefficient alphas of .72 and .64 were observed for the Exploration and Absorption subscales. Scores for the Exploration subscale ranged from 9 to 28, with a mean of 21.07 and a standard deviation of 3.73; and scores for the Absorption subscale ranged from 5 to 21, with a mean of 14.99 and a standard deviation of 3.13.

Results

Correlations. Consistent with previous work (Culp, 2006), boredom proneness was negatively associated with Honesty-Humility (r = -.29), Extraversion (r = -.57), Agreeableness (r = -.23), Conscientiousness (r = -.44) and Openness to Experience (r = -.29). Unlike Culp (2006), who found no association, we found boredom proneness to be positively associated with

Emotionality (r = .18; all p values for BPS and HEXACO correlations < .01, N ranged from 257-262). This novel finding of an association between boredom proneness and Emotionality aligns with prior research that has linked boredom proneness to the experience of frequent negative affect and neuroticism (Mercer-Lynn et al., 2011).

Table 1 displays the relationships between the independent and dependent variables.

Table 1

Correlations Between HEXACO, BPS, and Creativity/Curiosity Variables

	CPS	ECI	ECD	CEI-E	CEI-A
H	-.05	.21**	.07	.15*	.08
E	-.33**	-.24**	-.03	-.22**	-.02
X	.46**	.32**	-.01	.36**	.09
A	.10	.14*	.07	.11	.02
C	.19**	.31**	.21**	.40**	.17**
O	.41**	.56**	.25**	.51**	.23**
BPS	-.33**	-.26**	.06	-.27**	-.06

Note. N ranged from 251-275. H = Honesty-Humility; E = Emotionality; X = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to Experience; BPS = Boredom Proneness Scale; CPS = Creative Personality Scale, ECI = Interest-Type Epistemic Curiosity Scale, ECD = Deprivation-Type Epistemic Curiosity Scale, CEI-E = CEI Exploration Subscale, CEI-A = CEI Absorption Subscale.

* $p < 0.05$. ** $p < 0.01$

Consistent with the literature, the personality taxonomy factors Openness to Experience and Extraversion were positively associated with creativity. Unlike previous work,

Conscientiousness was positively related to creativity, although this association was relatively weak (r = .19). Also in accordance with past work, Openness to Experience was correlated with exploration curiosity (CEI-E) and absorption (CEI-A). Conscientiousness and Extraversion also emerged as positive correlates of exploration curiosity, with Conscientiousness also positively related to absorption. Similar patterns were observed for interest- and deprivation-type epistemic curiosity. Openness to Experience and Conscientiousness were positively correlated with both measures of epistemic curiosity, while Extraversion was positively associated with interest-type epistemic curiosity. Boredom proneness was negatively related to almost all measures of creativity and curiosity.

Multiple regressions: Assessing personality structure and boredom proneness's relationships with trait creativity and curiosity. Next, a series of hierarchical regressions were conducted (results displayed in Tables 2 through 6). Each dependent variable was regressed on the HEXACO traits (Model 1), and then on the HEXACO traits and boredom proneness (Model 2). For each multiple regression, multicollinearity was assessed by examining variance inflation factors (VIF). Generally speaking, a VIF score greater than 10 for a predictor indicates that the assumption of multicollinearity has been violated, and within a multiple regression model an average VIF score substantially greater than 1 may indicate a biased regression (Field, Miles, & Field, 2012). In the present study, all VIF indices were within acceptable ranges.

Table 2

Hierarchical Regression: HEXACO and BPS as Predictors of CPS

Model	St. *ß* #1	St. *ß* #2	*t*	*p*
#1				
Honesty-Humility	-.15		-2.67	.008**

Emotionality	-.17	-3.11	.002**
Extraversion	.35	5.85	< .001**
Agreeableness	.08	1.48	.141
Conscientiousness	.00	.05	.963
Openness	.36	6.43	< .001**

$F(6, 215) = 23.50$, $p < .001$, Adj. $R^2 = .38$.

#2

Honesty-Humility	-.17	-2.83	.005**
Emotionality	-.17	-3.04	.003**
Extraversion	.31	4.59	< .001**
Agreeableness	.07	1.31	.192
Conscientiousness	-.01	-.20	.845
Openness	.35	6.19	< .001**
Boredom proneness	-.07	-.97	.331

$F(7, 214) = 20.20$, $p < .001$, Adj. $R^2 = .38$.

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

Table 3

Hierarchical Regression: HEXACO and BPS as Predictors of ECI

Model	St. *β* #1	St. *β* #2	*t*	*p*
#1				
Honesty-Humility	.06		1.06	.291
Emotionality	-.11		-2.03	.044*

Extraversion	.15	2.48	.014*
Agreeableness	.03	.62	.534
Conscientiousness	.14	2.37	.019*
Openness	.49	9.00	< .001**

$F(6, 209) = 25.80$, $p < .001$, Adj. $R^2 = .41$.

#2			
Honesty-Humility	.09	1.46	.146
Emotionality	-.12	-2.13	.035*
Extraversion	.20	2.97	.003**
Agreeableness	.05	.90	.372
Conscientiousness	.16	2.70	.008**
Openness	.51	9.18	< .001**
Boredom proneness	.12	1.63	.106

$F(7, 208) = 22.70$, $p < .001$, Adj. $R^2 = .41$.

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

Table 4

Hierarchical Regression: HEXACO and BPS as Predictors of ECD

Model	St. *β* #1	St. *β* #2	*t*	*p*
#1				
Honesty-Humility	-.05		-.66	.101
Emotionality	.01		.08	.512
Extraversion	-.14		-1.85	.938

Agreeableness	.06	.88	.065
Conscientiousness	.20	2.67	.008**
Openness	.25	3.56	< .001**

$F(6, 207) = 4.00$, $p < .001$, Adj. $R^2 = .08$.

#2			
Honesty-Humility	.01	.17	.864
Emotionality	-.01	-.14	.886
Extraversion	-.01	-.09	.930
Agreeableness	.09	1.30	.193
Conscientiousness	.25	3.37	< .001**
Openness	.28	4.03	< .001**
Boredom proneness	.28	3.02	.003**

$F(7, 206) = 4.86$, $p < .001$, Adj. $R^2 = .11$.

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

Table 5

Hierarchical Regression: HEXACO and BPS as Predictors of CEI-E

Model	St. *ß* #1	St. *ß* #2	*t*	*p*
#1				
Honesty-Humility	-.02		-.33	.742
Emotionality	-.08		-1.50	.135
Extraversion	.18		3.10	.002**
Agreeableness	.00		.01	.991

Conscientiousness	.26	4.38	< .001**
Openness	.40	7.28	< .001**

$F(6, 215) = 23.70$, $p < .001$, Adj. $R^2 = .38$.

#2			
Honesty-Humility	.02	.31	.754
Emotionality	-.09	-1.67	.096
Extraversion	.26	3.89	< .001**
Agreeableness	.02	.38	.703
Conscientiousness	.29	4.87	< .001**
Openness	.43	7.64	< .001**
Boredom proneness	.18	2.36	.019*

$F(7, 214) = 21.60$, $p < .001$, Adj. $R^2 = .39$.

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

Table 6

Hierarchical Regression: HEXACO and BPS as Predictors of CEI-A

Model	St. *ß* #1	St. *ß* #2	*t*	*p*
#1				
Honesty-Humility	-.01		-.07	.943
Emotionality	.03		.44	.660
Extraversion	.02		.28	.780
Agreeableness	-.04		-.54	.592
Conscientiousness	.12		1.56	.120

Openness	.19	2.70	.007**

$F(6, 215) = 2.28$, $p = .038$, Adj. $R^2 = .03$.

#2

Honesty-Humility	.03	.37	.712
Emotionality	.02	.33	.741
Extraversion	.09	1.06	.291
Agreeableness	-.02	-.28	.784
Conscientiousness	.15	1.92	.056
Openness	.21	2.94	.004**
Boredom proneness	.15	1.64	.103

$F(7, 214) = 2.35$, $p = .025$, Adj. $R^2 = .04$.

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

When creative personality was regressed on the HEXACO traits, the HEXACO personality taxonomy explained 38% of creative personality's variance. Openness to Experience and Extraversion were positive predictors, whereas Emotionality and Honesty-Humility were negative predictors. Boredom proneness did not explain a significant amount of variance in creative personality over and above overall personality structure.

On average, the HEXACO personality taxonomy explained 22.5% of the variance in the different measures of curiosity (median = 23%, range 3-41%). Openness to Experience explained a significant amount of variance in every curiosity measure, and neither Honesty-Humility nor Agreeableness explained variance in any curiosity measure. However, some differences between the curiosity measures were observed. Conscientiousness was a positive predictor of every

curiosity measure except absorption–i.e., was a positive predictor of interest- and deprivation-type epistemic curiosity, and of exploration curiosity–although this may have been a function of the absorption subscale's poor psychometric properties (see Limitations and Future Directions). Extraversion was a positive predictor of interest-type epistemic curiosity, and exploration curiosity, but not of deprivation-type epistemic curiosity or absorption. Finally, Emotionality was a negative predictor only of interest-type epistemic curiosity.

Boredom proneness was able to explain further variance in two curiosity measures: deprivation-type epistemic curiosity, and exploration curiosity. For each of these curiosity measures, boredom proneness, controlling for overall personality structure, emerged as a *positive* predictor.

Discussion

Personality taxonomies, creativity, and curiosity. Our regression of creativity on personality structure (HEXACO) aligned with previous work: Openness to Experience and Extraversion were positive predictors of creative personality, and the overall model explained a large portion of variance (38%) in creativity. As well, our results extended a recent finding by Silvia et al. (2011) demonstrating the importance of arrogance (low Honesty-Humility) and not hostility (low Agreeableness) in the prediction of creativity. In Silvia et al.'s (2011) study, arrogance, but not hostility, was associated with creative achievement; in the present study, we found this same pattern of relationships with creative personality.

Our results also underlined the importance of personality taxonomies in the prediction of curiosity, more specifically of interest-type epistemic curiosity and exploration curiosity. For these types of curiosity, the HEXACO model explained 41% and 38% of variance, respectively.

At the factor level, our results aligned with and extended previous research. Previous work found that Openness to Experience, Extraversion, and Conscientiousness were all positively associated with curiosity as measured by the Curiosity and Exploration Inventory. In Study 1, Openness to Experience and Conscientiousness emerged as positive predictors across curiosity measures. Although Extraversion was positively related to the Curiosity and Exploration Inventory's exploration subscale, this relationship did not hold for all measures: Extraversion was a positive predictor only of exploration curiosity and interest-type epistemic curiosity. Also highlighting potential differences between types of curiosity, Emotionality emerged as a significant (negative) predictor only in the prediction of interest-type epistemic curiosity.

These results suggest that certain types of curiosity may be more closely related to certain personality variables. For instance, exploration and interest-type epistemic curiosity seem to be closely linked to an outgoing, bold nature (Extraversion), whereas this quality is not important in the experience of absorption or deprivation-type epistemic curiosity. More broadly, these results suggest that future research on curiosity should take into account that different types of curiosity may be differentially related to key variables (e.g., in Study 1, Extraversion).

Boredom proneness and curiosity. Our results yielded the novel finding that boredom proneness, after its shared variance with overall personality structure was partialled out, was a positive predictor of deprivation-type epistemic curiosity and exploration curiosity. Although the amount of variance explained by boredom was relatively modest (1-3% variance added to the model), the results are nonetheless intriguing. A first question is what the BPS measures once HEXACO is partialled out. Previous research has shown that the BPS is strongly related to the behavioural inhibition system (Mercer-Lynn, Bar, & Eastwood, 2014). Consistent with that finding, the correlations between the BPS and HEXACO revealed that individuals who were

boredom prone also tended to be interpersonally inhibited or withdrawn (low Extraversion); prone to emotions, especially negative affect (high Emotionality); and to report a lack of verve or interest in the world (low Openness to Experience). However, research has also highlighted the fervent wish of the chronically bored individual to be meaningfully engaged (Bargdill, 2000). Perhaps it is this inhibited, withdrawn quality of boredom proneness that is removed when HEXACO is partialled out, leaving the portion of the boredom prone profile that desires exploration, and a coherent understanding of the world around them.

Of further interest is why boredom proneness, after controlling for HEXACO, was related to some types of curiosity (deprivation-type epistemic curiosity and exploration curiosity) and not others (interest-type epistemic curiosity and absorption). Boredom prone individuals are excruciatingly aware of the discrepancy between their current and desired state (Bargdill, 2000; Eastwood et al., 2007): thus, a desire to reduce an aversive feeling of not-knowing (deprivation-type epistemic curiosity) may resonate more closely with their experience than a pleasurable interest in finding out new information (interest-type epistemic curiosity). Similarly, boredom proneness represents a thwarted, but still present, desire to engage with or explore the world; absorption may be less central to the boredom prone individual because no target for engagement has yet been articulated. Alternatively, our absorption findings may have been an artifact of the subscale's poor psychometric properties (see Limitations and Future Directions).

Boredom proneness and creativity. The finding that boredom proneness, after controlling for HEXACO, was associated with curiosity but not creativity may speak to the dilemma that boredom represents. Tolstoy referred to boredom as a "desire for desires" (1877/2004, p. 465): as was just noted, the problem may not be interest itself–in addition to our present curiosity findings, related work has found boredom to be psychometrically distinct from

apathy (Goldberg et al., 2011)–but finding an avenue for this interest. The bored individual is curious, but is not yet able to bring this curiosity to fruition (i.e., to be creative). In the words of Stern, the bored individual is "a text in waiting" (1988, p. 1).

That boredom proneness, after controlling for HEXACO, was unrelated to creativity is also interesting in light of preliminary work suggesting that being in a state of boredom might spark creativity (Gasper & Middlewood, 2014; Mann & Cadman, 2014). Mann and Cadman (2014) found that participants induced into a state of boredom evidenced superior creative performance compared to participants in mood-neutral control groups, who solely completed the creativity task. Gasper and Middlewood (2014) found that participants induced into a state of boredom or elation performed better on measures of associative thought than participants induced into a state of distress or relaxation. Crucially, these experiments reviewed studied boredom as a state, whereas the present study studied boredom at the trait level. It may be that, at any given particular instance, the experience of boredom is a potent force in the moment for creative engagement. However, for those individuals who are frequently bored, the opportunity largely passes them by; indeed, if these individuals were able to productively channel their boredom into creativity, they would likely not report chronic boredom.

It is also possible that neither chronic boredom nor the experience of boredom in the moment induce creative engagement. The Mann and Cadman (2014) study reviewed above, while innovative, built into its methodology questionable assumptions that raise the possibility that it was not actually measuring boredom. In Mann and Cadman's (2014) two experiments, participants in the 'boredom' condition were only allowed to complete the creative task–i.e., were included in the study's sample–if they had rated their boredom during the boredom inducing task as at least 4 or 5 on a 5-point scale *and* had reported daydreaming during the

boredom induction. Thus, Mann and Cadman may have been assessing the impact of *mind wandering*, which has been identified as a facilitator of creative performance (Baird et al., 2012). In Baird et al.'s experiment, participants completed a creativity task, and then were assigned to one of four conditions: completing a cognitively undemanding task for 12 minutes, completing a cognitively demanding task for 12 minutes, resting for 12 minutes, or no rest. Finally, participants completed the creativity task again, with the same problems as well as some new ones. Participants who completed a cognitively undemanding task reported significantly more mind wandering than participants who completed a cognitively demanding task; and, participants who completed the undemanding task had superior creative performance on repeated-exposure creativity problems as compared to all other experimental conditions. Although given Baird et al.'s (2012) work it seems plausible that boredom and mind wandering might be related, and that some mixture of these experiences might spark creativity, Mann and Cadman's (2014) study was not a clear test of the impact of boredom itself on creative performance. Gasper and Middlewood's (2014) study was a clearer test. However, while their study measured general negative affect directly after the experimental mood induction, it only assessed the effectiveness of the boredom induction (i.e., reported boredom while watching the movie clip) *after* the creativity task. Ideally, boredom would be measured *in the moment*, as opposed to in a retrospective report. Thus, taking Study 1's findings and these two published studies as a whole, it is somewhat tenuous to conclude that boredom–either trait or state–facilitates creativity.

Limitations and future directions.

Use of the CEI Absorption subscale. Our measure of absorption (a subscale of the Curiosity and Exploration Inventory) was not strongly associated with any of our predictors. Although the Curiosity and Exploration Inventory has been the most closely investigated in

terms of personality taxonomy correlates, hence its use in the present study, its absorption subscale has shown poor internal consistency and has typically underperformed (Kashdan et al., 2009). Future researchers may want to use the Curiosity and Exploration Inventory-II (Kashdan et al., 2009): among other changes, the CEI-II has replaced the CEI absorption subscale with an "embracing" subscale measuring tolerance of uncertainty.

Use of the CPS. The CPS's low reliability–more specifically, the low reliability of its negatively keyed items–may have constrained the power of the present analyses. Future researchers may wish to revise the scale to improve its psychometric properties. For instance, researchers may wish to alter the response format. In particular, the use of a Likert-type scale rather than the scale's original dichotomous response format (endorse personality adjective by checking its box or do not endorse personality adjective by leaving its box blank) is recommended. This would allow participants to indicate with increased sophistication their degree of agreement with each personality adjective. As well, it would allow for researchers to distinguish between participants who do not feel that a given personality adjective describes them, and participants who simply have not responded to the item. Wolfradt and Pretz (2001), using this Likert-type scale response format modification, reported a coefficient alpha of .72. An additional option for improving the CPS's psychometric properties is to revise the current items. Given the low reliability of the negatively keyed items, it is recommended that special attention be paid to these. The CPS was created in 1979, and as such some of its adjectives (e.g., the negatively keyed items "mannerly" and "snobbish") may strike contemporary research participants as outdated or puzzling. Future work eliminating or modifying potentially problematic items, and possibly adding new items, is encouraged.

One operationalization of creativity. The present study employed one particular operationalization of creativity–the person who creates. As was reviewed, creativity has been defined and operationalized in a multitude of ways–in particular, most studies tend to operationalize creativity as a performance/behavioural measure. It would be beneficial to explore multiple operationalizations to examine whether the present study's findings are generalizable or operationalization-specific. In particular, given previous work that has raised the possibility that state boredom might result in superior creative performance (Mann & Cadman, 2014; Gasper & Middlewood, 2014), further exploring trait boredom's relationship with performance on a creativity task would be fruitful.

One operationalization of boredom. Similarly, Study 1 assessed trait boredom's relationship with creativity; the potential contribution of *state* boredom was not examined. This could be an important area of investigation, given the two studies reviewed prior (Mann & Cadman, 2014; Gasper and Middlewood, 2014) that have found some support for this link. Given these studies' shortcomings, investigation of the relationship between state boredom and creative performance is even more pressing–indeed, state boredom's relationship with creativity has yet to be thoroughly examined.

Conclusion

Study 1 investigated the relationship of personality structure and boredom proneness, with creative personality and trait curiosity. Consistent with the literature, Study 1 demonstrated the importance of personality variables in the prediction of creativity and curiosity; overall personality structure explained 38% of the variance in trait creativity and on average 22.5% of the variance in the different measures of curiosity (median = 23%, range 3-41%), with Openness

to Experience emerging as the most important personality factor in the prediction of trait creativity and curiosity.

Boredom proneness's relationship with creativity and curiosity was more complicated. Although a history of theory, and a few empirical studies, suggested that boredom could have some benefits–in particular that boredom could inspire creativity and curiosity–the current findings in Study 1 offer minimal support for the idea that trait boredom is positively associated with trait creativity. When boredom proneness's relationship with personality structure was partialled out, boredom proneness was unrelated to creative personality, but emerged as a *positive* predictor of deprivation-type epistemic and exploration curiosity. This suggests that the experience of chronic boredom–the longing for meaningful engagement with oneself and the world–may be linked to some fruitful consequences such as curiosity, especially perhaps when the more inhibited qualities of boredom proneness are not in the picture.

However, Study 1 also leaves important questions unanswered. Firstly, Study 1 employed a trait measure of creativity. The existing range of creativity definitions calls for a broader range of creativity operationalizations; in particular, many studies use *performance measures* of creativity. As well, Study 1 conceptualized boredom only at the trait level, finding that trait boredom, once its relationship with overall personality structure was partialled out, was unrelated to creativity. Thus, Study 1 could not investigate whether the state of boredom was linked to creativity, a question made more pressing by the unclear literature on this subject. To explore these new, exciting questions raised by Study 1, a second, focused investigation was conducted.

Study 2

A Performance Measure of Creativity

To expand the range of definitions of creativity employed, creativity was defined for Study 2 as an attribute of a product and was operationalized as assessed creative performance on one of three creativity tasks. The previous two empirical studies directly investigating state boredom and creative performance employed verbal, highly structured measures of creativity: Mann and Cadman (2014) operationalized creativity as performance on an Unusual Uses task (generating as many uses as possible for, in their study, 2 polystyrene cups), a Consequences task (generating consequences of, in their study, global narcolepsy), and an associative task based off of the Remote Associations Task; and Gasper and Middlewood (2014) operationalized creativity as performance on associative tasks (the Remote Associations Task in Study 1 and a categorization task in Study 2). In our study, in addition to including verbal, highly structured tasks such as the Unusual Uses task, we also included creativity tasks that called for figural responses (the Abbreviated Torrance Test for Adults; Goff & Torrance, 2002) and more open-ended creative responses (writing a short story).

The State of Boredom

As was noted above, Study 1 did not investigate whether the *state* of boredom was related to creativity. Two studies (Mann & Cadman, 2014; Gasper & Middlewood, 2014) have investigated this link, concluding that state boredom facilitated creative performance. However, given some of the methodological problems associated with these two studies, it is possible that the relationship between state boredom and creativity has yet to be truly explored. Study 2 sought to redress these methodological gaps. To provide a clear test of the relationship between state boredom and creative performance, unlike Mann and Cadman (2014) all participants were

to be kept in their experimental group regardless of whether or not they reported daydreaming during the boredom induction. Similarly, state boredom was to be assessed directly following the mood induction rather than retrospectively reported after the creativity task (as was done by Gasper & Middlewood, 2014).

Personality Variables as Moderators

Another compelling question not explored in Study 1 was the potential interaction between mood and personality in the prediction of creativity. Researchers have only just begun to explore this topic, and to date the results are mixed. For instance, Akinola and Mendes (2008) assessed the effects of general affective vulnerability (trait) and negative mood on creative performance. These authors found an interaction effect, such that individuals in the negative mood group who were affectively vulnerable generated the most creative products. In contrast, Chamorro-Premuzic and Reichenbacher (2008) found that negative affect did not moderate the effects of Neuroticism or Extraversion on creative performance. Zenasni and Lubart (2008) found mood and emotion-related trait interactions for some but not all creative performance measures in their study.

Theoretically, these potentially interactive effects are important to explore. Given the importance of personality variables in the prediction of creativity demonstrated in Study 1– overall personality structure explained 38% of the variance in creativity, with Openness to Experience emerging as the most important personality factor–the potential that trait variables may moderate the impact of mood state on creativity cannot be ignored. As well, many of the personality variables typically used in creativity research assess chronic affective responses (e.g., Neuroticism), suggesting that such individuals might be particularly susceptible to the effects of mood. Indeed, the three studies described above that explored interaction effects focused mainly

on trait variables of this type. However, work has yet to assess the potential moderator of boredom proneness, which also assesses chronic affective response. An additional avenue of exploration is state boredom's interactions with personality variables in predicting creativity: perhaps 'negative' and 'positive' moods, typically used in the literature to assess mood, do not reliably interact with personality variables in the same way that boredom might. Finally, it remains to be seen whether boredom proneness interacts with state boredom to predict creativity: for instance, given that boredom proneness was negatively correlated with creativity in Study 1, perhaps the state of boredom only sparks creativity in those individuals not chronically prone to boredom.

In selecting personality variables in addition to boredom proneness to measure and analyze, given the previous literature we focused on selecting variables that were well established empirically or theoretically, and/or touched on the experience of chronic affect. This resulted in the inclusion of the HEXACO factors Openness to Experience (as reviewed prior, one of the strongest contributors to creativity) and Emotionality (assesses chronic affective experience). Curiosity measures were included given Kashdan and Fincham's (2002) contention that curiosity may be a necessary, but not sufficient, condition for creativity. To limit the number of analyses, only the curiosity variables that were significantly related to trait boredom in Study 1 (i.e., exploration and deprivation-type epistemic curiosity) were used in the present study. Finally, creative personality as measured by the Creative Personality Scale was included; although creative personality has often been used as an outcome measure of creativity (as in Study 1), logically a measure assessing 'creative personality' should be able to explain variance in individuals' creative performance. Indeed, some work has found the CPS to be positively

associated with creative performance (Carson et al., 2005; Wolfradt & Pretz, 2001; Zhou & Oldham, 2001).

Summary of Study Aims

In sum, the purpose of Study 2 was to investigate the ability of state boredom to impact creative performance. A second aim was to explore the potential moderation of this relationship by trait boredom as well as by other empirically and/or theoretically important personality variables.

Method

Participants and procedure. The same data set used for Study 1 was drawn upon to answer Study 2's research questions. Participants completed the measures and tasks in person (see Figure 1) as part of a larger study on personality, mood, and creativity.

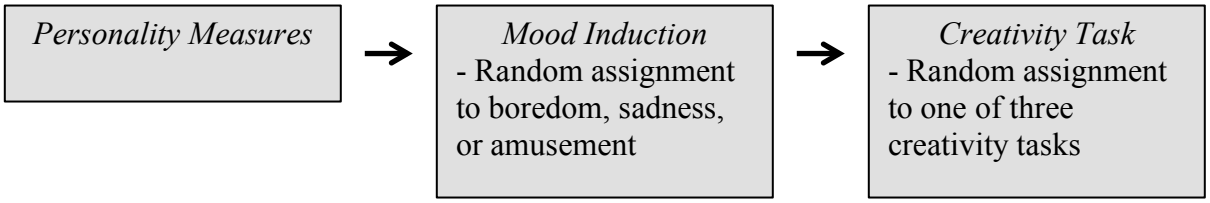

Figure 1. Study 2's experimental procedure.

The procedure for the present line of investigation was as follows. First, research participants completed a set of questionnaires assessing personality traits, and mood state. Second, participants were randomly assigned to one of the three following mood induction conditions: boredom, amusement (control), or sadness (another control). The mood induction was accomplished through a brief (5-minute) video clip. Post-manipulation, participants' mood (including boredom levels) was measured again. Finally, participants completed one of three creativity tasks: 1) the Abbreviated Torrance Test for Adults (Goff & Torrance, 2002), 2)

generating unusual uses for a brick and a knife (as in Silvia, 2011), or 3) writing a short story for 15 minutes (as in Wolfradt & Pretz, 2001). For all tasks, participants were told that they were completing a creativity task and that they should try to be as creative as possible, as this instruction to participants has been shown to result in more valid creativity scores (Harrington, 1975). A 5-minute comedy clip was shown to all participants at the very end of the experiment to ensure that any lingering negative affect elicited by the mood induction was abolished.

Measures.

Personality variables. All personality measures used for the present study (the Boredom Proneness Scale, the Creative Personality Scale, the HEXACO-60, the Curiosity and Exploration Inventory-Exploration subscale, and the Deprivation-Type Epistemic Curiosity Scale) were described in Study 1.

Mood state.

Multidimensional State Boredom Scale (MSBS). The MSBS (Fahlman et al., 2011) measures the experience of boredom in the moment; participants respond by agreeing or disagreeing with items such as "I feel bored" and "Time is dragging on" using a 7-point Likert-type scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*; p. 15). Five facets of the boredom experience are assessed: Disengagement, High Arousal Negative Affect, Low Arousal Negative Affect, Inattention, and Time Perception. High total scores indicate that the individual was experiencing boredom at the time the scale was completed. In the present study, after the mood induction MSBS scores ranged from 29 to 194, with a mean of 99.43 and a standard deviation of 35.07; and after the creativity task MSBS scores ranged from 29 to 189, with a mean of 91.67 and a standard deviation of 38.04. The full scale's coefficient alpha is .94, with subscale coefficient alphas ranging from .80 to .88. In the present study, the MSBS's coefficient alpha

was .96 after the mood induction, and .98 after the creativity task. Classification rates (into bored/not-bored conditions) of 89.9% have been reported (Hunter, Dyer, Cribbie, & Eastwood, 2015).

A short 5-item version of the scale was also used to assess boredom prior to the mood induction; this short version has been shown to possess almost equivalent classification rates as the full scale (84.1%; Hunter et al., 2015). In the present study, scores on this short version ranged from 5 to 33, with a mean of 18.94 and a standard deviation of 6.13. In the present study, the short 5-item version of the scale had a coefficient alpha of .81.

Items assessing non-boredom states. Eight researcher-created items were administered to assess non-boredom states before the mood induction, after the mood induction and after the creativity task. For each item, participants responded to the phrase "I feel [state]" using a 7-point Likert-type scale ranging from 1 (*Strongly disagree*) to 7 (*Strongly agree*). The following state descriptors were used: 'sad,' 'anxious,' 'amused,' 'happy,' 'energized,' 'sleepy,' 'good,' and 'bad.'

The descriptive statistics for these items are as follows: before the mood induction sadness scores ranged from 1 to 7, with a mean of 2.84 and a standard deviation of 1.74; after the mood induction sadness scores ranged from 1 to 7, with a mean of 3.00 and a standard deviation of 1.74; and after the creativity task sadness scores ranged from 1 to 7, with a mean of 2.58 and a standard deviation of 1.54. Before the mood induction, anxiety scores ranged from 1 to 7, with a mean of 3.46 and a standard deviation of 1.92; after the mood induction anxiety scores ranged from 1 to 7 with a mean of 3.27 and a standard deviation of 1.83; and after the creativity task anxiety scores ranged from 1 to 7, with a mean of 3.14 and a standard deviation of 1.81. Before the mood induction, amusement scores ranged from 1 to 7, with a mean of 3.81 and a standard

deviation of 1.60; after the mood induction amusement scores ranged from 1 to 7 with a mean of 3.56 and a standard deviation of 1.68; and after the creativity task amusement scores ranged from 1 to 7, with a mean of 3.84 and a standard deviation of 1.73. Before the mood induction, happiness scores ranged from 1 to 7, with a mean of 4.61 and a standard deviation of 1.55; after the mood induction, happiness scores ranged from 1 to 7, with a mean of 4.34 and a standard deviation of 1.58; and after the creativity task happiness scores ranged from 1 to 7, with a mean of 4.56 and a standard deviation of 1.61. Before the mood induction, energetic scores ranged from 1 to 7, with a mean of 3.89 and a standard deviation of 1.81; after the mood induction, energetic scores ranged from 1 to 7, with a mean of 3.70 and a standard deviation of 1.74; and after the creativity task, energetic scores ranged from 1 to 7, with a mean of 4.01 and a standard deviation of 1.71. Before the mood induction, sleepiness scores ranged from 1 to 7, with a mean of 4.74 and a standard deviation of 1.81; after the mood induction sleepiness scores ranged from 1 to 7, with a mean of 4.43 and a standard deviation of 1.84; and after the creativity task sleepiness scores ranged from 1 to 7, with a mean of 4.15 and a standard deviation of 1.88. Before the mood induction, feeling good scores ranged from 1 to 7, with a mean of 5.04 and a standard deviation of 1.41; after the mood induction, feeling good scores ranged from 1 to 7, with a mean of 4.60 and a standard deviation of 1.48; and after the creativity task scores ranged from 1 to 7, with a mean of 4.76 and a standard deviation of 1.44. Finally, before the mood induction, feeling bad scores ranged from 1 to 7, with a mean of 2.55 and a standard deviation of 1.54; after the mood induction, feeling bad scores ranged from 1 to 7, with a mean of 2.92 and a standard deviation of 1.59; and after the creativity task feeling bad scores ranged from 1 to 7, with a mean of 2.67 and a standard deviation of 1.43.

Materials.

Mood induction videos. The use of video clips to induce mood states is a common experimental procedure (e.g., Gross & Levenson, 1995; Hewig et al., 2005), and has been employed in creativity research (e.g., Isen, Daubman, & Nowicki, 1987). Based on previous empirical work, a clip from the 1979 movie *The Champ* (Lovell & Zeffirelli) where a young boy mourns his father's death was selected to induce the state of sadness. This clip has been shown to be extremely effective in terms of intensity (reported sadness ratings) and discreteness (significantly greater ratings of sadness than of other emotions such as rage, disgust and fear; Gross & Levenson, 1995; Hewig et al., 2005). A video clip to induce the emotion of boredom was generously made available by Markey, Chin, VanEpps, and Loewenstein (2014). In this clip, a man describes the mundane details of his highly routine workday in a monotone voice. This clip possesses high intensity and discreteness (Markey et al., 2014). Finally, a clip from the comedy sitcom *Brooklyn Nine-Nine* was selected to induce amusement (Goor, Schur, Lord, & Miller, 2013).

Creativity tasks.

Abbreviated Torrance Test for Adults (ATTA). The ATTA (Goff & Torrance, 2002) involves three activities, each three minutes in length: generating a list of problems that could result if one could walk on air or fly without being in an airplane or similar vehicle, and two drawing tasks in which participants draw pictures using a set of incomplete figures. Raters (one senior undergraduate student; and the author, a Masters student in Psychology with a Master of Social Work) rated each activity following the scoring guidelines outlined in the ATTA manual (Goff & Torrance, 2002).

The ATTA yields four ability scores: Fluency, Originality, Elaboration, and Flexibility, each of which assesses a different facet of creative ability (Goff & Torrance, 2002). Fluency is the capacity to generate multiple, relevant ideas, and in the ATTA is operationalized as the number of ideas generated for the verbal task and the number of figures generated for the drawing tasks. Originality is the ability to generate novel ideas, and in the ATTA is operationalized as the number of verbal and figural responses provided that are not listed in the manual as commonly generated responses. For instance, the response 'I would have so much fun I would never file my taxes' as a possible problem that might result if one could walk on air or fly is not a common response and thus would be considered original. Elaboration is the ability to add details to a basic idea, and in the ATTA is operationalized as the number of extraneous details that are added to the figures in the drawing task. As an example, if a participant drew a bird for a drawing task, and had the bird holding a worm, the addition of the worm would count towards his or her Elaboration score. Finally, Flexibility is the capacity to perceive a stimulus from a variety of perspectives. In the ATTA, this is operationalized as the number of different ways in which the participant can use the incomplete figures in the final drawing task. For instance, using an incomplete figure on its own to make a picture would be one way; and then combining two incomplete figures to make a picture would be a second way.

These four ability scores can be summed to create a Total Abilities score. Reliability scores (Kuder and Richardson's 21st formula, KR21) of .84 for the Total Abilities raw score were reported in the manual (Goff & Torrance, 2002). KR21 statistics ranging from .38 to .84 were also reported for the separate abilities (.38: Originality, Flexibility; .45: Fluency; .84: Elaboration; Goff & Torrance, 2002). Recent work has lauded the ATTA's validity as a measure

of creative ability, reporting an unadjusted validity coefficient of .59 for the scaled Total Abilities score (Althiuzen, Wierenga, & Rossiter, 2010).

Following the ATTA manual scoring guidelines, all ability raw total scores were transformed to scaled scores, and these scaled scores were summed to create the scaled Total Abilities score (Goff & Torrance, 2002). Intraclass correlation coefficients for the scaled scores across the two raters were .92 (Fluency), .75 (Originality), .79 (Elaboration), .84 (Flexibility), and .81 (Total Abilities). Given the high rate of agreement between raters, scores were averaged across the two raters. In the present study, the Fluency scaled score ranged from 11 to 19, with a mean of 13.98 and a standard deviation of 2.32; the Originality scaled score ranged from 11 to 19, with a mean of 15.84 and a standard deviation of 2.24; the Elaboration scaled score ranged from 11 to 19, with a mean of 15.70 and a standard deviation of 2.07; the Flexibility scaled score ranged from 12 to 19, with a mean of 15.17 and a standard deviation of 2.06; and the resulting Total Abilities score ranged from 52 to 74, with a mean of 61.96 and a standard deviation of 5.13.

Unusual Uses. Participants were allotted 3 minutes each to generate unusual uses for 1) a brick, and 2) a knife. Participants were also asked to identify their two most creative responses for each activity (Silvia et al., 2008). Raters (two senior psychology undergraduate students with previous undergraduate degrees) rated each unusual use on a scale from 1 (*not at all creative*) to 5 (*highly creative*; as in Silvia et al., 2008). Raters followed Amabile's (1982) Consensual Assessment Method, in which raters judge the creativity of a product (e.g., a generated unusual use) based on their own subjective definition of creativity. This procedure resulted in two creative performance measures per participant per unusual uses task: 1) an average rating of all unusual uses generated by that participant, and 2) an average rating of the two unusual uses

identified by that participant as their most creative. Creativity scores were then averaged across tasks. Intraclass correlation coefficients between the two raters were .17 (brick) and .47 (knife). Given the low rate of agreement between raters, the scores of only one rater were used. In the present study, that one rater's ratings of all unusual uses for a brick and a knife generated by a participant, averaged across that participant's responses, ranged from 1.32 to 3.52, with a mean of 2.11 and a standard deviation of 0.45. That rater's ratings of the two unusual uses for a brick and a knife identified by participants as their most creative, averaged across those responses, ranged from 1.25 to 4.25, with a mean of 2.35 and a standard deviation of 0.58.

Short story. Participants were allotted 15 minutes to write a short story in response to a captioned picture drawn from the book *The Mysteries of Harris Burdick* (Van Allsburg, 1984). Raters (one senior undergraduate student and the author) rated each story on a scale from 1 (*not at all creative*) to 5 (*highly creative*; similar to Wolfradt & Pretz, 2001). As with the Unusual Uses procedure, scoring followed Amabile's (1982) Consensual Assessment Method. The intraclass correlation coefficient between the raters was .45. Given the low rate of agreement between raters, the scores of only one rater were used. In the present study, that one rater's ratings of the short story responses ranged from 1 to 5, with a mean of 2.71 and a standard deviation of 0.92.

Results

Mood induction manipulation check. Differences in post-induction mood between the three mood induction groups (boredom, and the two control groups of amusement and sadness) were investigated. First, descriptive statistics were examined (see Table 7). Next, three ANOVAs were conducted to establish whether the three induction groups could be distinguished on the basis of the intended induced moods.

Table 7

Descriptive Statistics for Mood Induction Groups

Mood Induction Group	Post-Induction State Boredom *M* (*SD*), *n*	Post-Induction Amusement *M* (*SD*), *n*	Post-Induction Sadness *M* (*SD*), *n*
Boredom	106.22 (35.84), 81	3.13 (1.57), 93	2.62 (1.61), 93
Amusement	88.12 (34.66), 76	4.26 (1.73), 97	2.35 (1.35), 96
Sadness	103.44 (32.23), 77	3.26 (1.52), 91	4.05 (1.74), 91

A one-way ANOVA was conducted to examine whether the three mood induction groups significantly differed on reported mean levels of state boredom after the mood induction. All one-way ANOVA assumptions were met. The test revealed that the three induction groups reported significantly different boredom levels after the induction, $F(2, 231) = 6.25$, $p = .002$. Post-hoc Bonferroni comparisons showed, however, that although the boredom induction group experienced significantly more boredom than the amusement induction group ($p = .003$), the boredom and the sadness induction groups did not experience significantly different boredom levels after the induction, $p = 1.00$. As well, the sadness group experienced significantly more boredom than the amusement group, $p = .019$.

A second one-way ANOVA was planned to examine whether the three mood induction groups significantly differed on reported mean levels of amusement after the mood induction. However, the distribution of amusement responses within each group was non-normal, and no strategy of transformation was able to address this issue. Consequently, the non-parametric Kruskal-Wallis test, which transforms raw scores into rank scores, was employed. The test

revealed a significant difference between groups on post-induction amusement, $H(2) = 24.46$, $p < .001$. Post-hoc comparisons (with a correction to the alpha level for the number of comparisons) found that the amusement mood induction group (rank $M = 174.3$) reported significantly higher amusement compared to the boredom (rank $M = 125.3$) and sadness (rank $M = 133$) induction groups, ps $< .05$. The boredom and sadness groups did not report significantly different levels of amusement, $p > .05$.

A third one-way ANOVA was planned to examine whether the three mood induction groups significantly differed on reported mean levels of sadness after the mood induction. However, the distribution of sadness responses within each group was non-normal, and no strategy of transformation was able to address this issue. Consequently, the non-parametric Kruskal-Wallis test was employed. The test revealed a significant difference between groups on post-induction sadness, $H(2) = 46.73$, $p < .001$. Post-hoc comparisons (with a correction to the alpha level for the number of comparisons) found that the sadness mood induction group (rank $M = 189.5$) reported significantly higher sadness compared to the boredom (rank $M = 129.2$) and amusement (rank $M = 116.3$) induction groups, ps $< .05$. The boredom and amusement groups did not report significantly different levels of sadness, $p > .05$.

In conclusion, the three induction groups could be reliably distinguished from each other on the basis of amusement and sadness. However, although the boredom induction group reported significantly more boredom than the control group of amusement, individuals in the boredom induction group and individuals in the control group of sadness did not experience significantly different levels of boredom. Consequently, to investigate the planned research questions, the three induction groups were not solely used. In addition, participants' reported mood (e.g., boredom) after the induction was examined collapsed across experimental

conditions. As Zenasni and Lubart (2008) note, this approach has the advantage of abolishing any partial induction effects as it is based on participants' actual mood, not the mood they are assumed to have experienced.

Creation of the overall creative performance variable. To examine the relationships between state boredom, personality (including boredom proneness), and creative performance, a variable representing overall creative performance was created by transforming creative performance scores within each creativity task into z-scores, and then pooling these z-scores. Only one creativity index per task was transformed for inclusion in the overall creative performance variable (see Table 8).

Table 8

Indexes Used for Inclusion in Overall Creative Performance Variable

Creativity Task	Index
ATTA	Total Abilities
Unusual Uses	Average creativity score, all responses
Short Story	Creativity score

State boredom and creative performance.

Using the experimental groups to represent mood. To investigate whether experimental group had an effect on creative performance, a one-way ANOVA was planned, with the new overall creative performance variable as the dependent variable. However, the distribution of overall creative performance scores within each experimental group was non-normal. Consequently, the non-parametric Kruskal-Wallis test was employed. The test revealed that there was no significant difference among the experimental groups on creative performance, $H(2) =$

.37, $p = .830$. Post-hoc comparisons (with a correction to the alpha level for the number of comparisons) found no significant differences between any two groups (amusement group rank $M = 118.9$, boredom group rank $M = 112.4$, sadness group rank $M = 116.4$), all ps $> .05$.

To examine the possibility that experimental condition and creative performance might be differentially related across creativity tasks, one-way ANOVAs were planned with performance on each creativity task as the outcome variables. For this and future analyses, if a task had more than one potential creativity index, the index included in the overall creative performance variable was used. First, a one-way ANOVA investigated the effect of experimental condition on ATTA performance. All one-way ANOVA assumptions were met. The test revealed a significant difference among the groups on creative performance, $F(2, 66) = 3.33$, $p = .042$. Post-hoc Bonferroni comparisons revealed that there was a significant difference between the creativity scores of individuals in the amusement group ($M = 63.70$, $SD = 4.20$) and individuals in the boredom group ($M = 59.80$, $SD = 5.67$), $p = .05$. There were no differences between the creative performance of individuals in the sadness group ($M = 61.35$, $SD = 5.28$) and any other experimental group ($p = .26$ for the comparison between creative performance of individuals in the sadness and amusement groups, $p = 1.00$ for the comparison between the creative performance of individuals in the sadness and boredom groups).

A second one-way ANOVA examined the effect of experimental condition on Unusual Uses performance. All one-way ANOVA assumptions were met. The test revealed that there was no significant difference among the groups on Unusual Uses performance, $F(2, 78) = 1.09$, $p = .34$. Post-hoc Bonferroni comparisons revealed no significant differences between any two experimental groups: $p = 1.00$ for the comparison between the boredom group ($M = 2.08$, $SD = .39$) and the amusement group ($M = 2.02$, $SD = .42$); $p = .46$ for the comparison between the

sadness group ($M = 2.21$, $SD = .56$) and the amusement group; and $p = .89$ for the comparison between the sadness group and the boredom group.

A third, final one-way ANOVA examined the effect of experimental condition on short story performance. However, the distribution of short story scores within each group was non-normal, and no strategy of transformation was able to address this issue. Consequently, the non-parametric Kruskal-Wallis test was employed. The test revealed no significant difference between groups on short story performance, $H(2) = 1.68$, $p = .432$. Post-hoc comparisons (with a correction to the alpha level for the number of comparisons) found no significant differences between any two experimental groups (amusement group rank $M = 118.5$, boredom group rank $M = 110.4$, and sadness group rank $M = 118.9$), all ps $> .05$.

Using self-reported mood to represent mood. The impact of participants' self-reported mood scores on creative performance was explored next. To examine the potential impact of state boredom on creative performance, participants' state boredom scores after the mood induction were correlated with the new overall creative performance variable. An examination of the scatterplot revealed no evidence of non-linearity. The correlation was non-significant, $r = .04$, $n = 187$, $p = .589$. [1] To investigate whether state boredom and creative performance might be differentially related across creativity tasks, this association was also examined within each creativity task. These correlations were all non-significant; $r = .01$, $n = 61$, $p = .919$ for participants who completed the ATTA; $r = .07$, $n = 62$, $p = .587$ for participants who completed the Unusual Uses task; and $r = .02$, $n = 66$, $p = .896$ for participants who wrote a short story.

[1] For this correlation, participants were collapsed across mood induction conditions. Correlations between state boredom and creative performance performed within all three mood induction conditions were also non-significant. For participants in the boredom group, $r = .03$, $n = 62$, $p = .802$; for participants in the amusement group, $r = -.09$, $n = 62$, $p = .468$; and for participants in the sadness group, $r = .17$, $n = 63$, $p = .194$.

Since the overwhelming majority of the empirical work examining the effect of mood on creative performance has focused on broad 'positive' and 'negative' moods, we also explored whether broad 'positive' and 'negative' moods reported after the mood induction were associated with creative performance. First, two scales were created, one to assess positive mood and the other to assess negative mood. Eight researcher-created items assessing in the moment feelings of amusement, happiness, generally feeling good, energy, sadness, anxiety, generally feeling bad, and sleepiness were available to create these scales. Correlations among the positively valenced items were explored to determine which items would best be used to form a coherent scale assessing positive mood (see Table 9).

Table 9

Correlations Among Positively Valenced Items

	Amusement	Happiness	Good	Energetic
Happiness	.37 (*n* = 229)	–	–	–
Good	.32 (229)	.79 (228)	–	–
Energetic	.35 (229)	.68 (228)	.62 (228)	–

Given the high inter-correlations between happiness, feeling good, and feeling energetic, these items were retained to form a scale assessing positive affect. As all eight researcher-created items were assessed using the same Likert-type scale, these three items were simply summed together to form the new positive affect scale. The coefficient alpha of this new scale was .87.

The same procedure was applied to create a scale assessing negative affect. Examination of the correlations among the items assessing various facets of negative affect (see Table 10) suggested an overall negative affect scale comprised of the feeling sad, anxious, and bad items.

Although the inter-correlations among this scale were not as large as those observed for the positive affect items, broader coverage of the negative affect construct was privileged over a maximally high coefficient alpha. The coefficient alpha of the new negative affect scale was .80, lower than the positive affect scale but still well within acceptable limits.

Table 10

Correlations Among Negatively Valenced Items

	Sad	Anxious	Bad	Sleepy
Anxious	.54 (n = 229)	–	–	–
Bad	.75 (229)	.45 (228)	–	–
Sleepy	.20 (229)	.23 (228)	.18 (228)	–

Finally, the relationships of these new broad affect scales with creative performance were investigated. Examination of the scatterplots revealed no evidence of non-linearity. Positive affect was not significantly associated with creative performance, r = -.08, n = 227, p = .237. Neither was negative affect, r = .01, n = 228, p = .914.[2]

As before, this association was also examined within each creativity task. These correlations were all non-significant for the relationship between positive affect and creative performance; r = .03, n = 69, p = .777 for participants who completed the ATTA; r = -.14, n =

[2] Again, for these correlations participants were collapsed across mood induction conditions. Correlations between positive affect and creative performance performed within all mood induction conditions were also non-significant. For participants in the boredom group, r = -.04, n = 73, p = .755; for participants in the amusement group, r = -.01, n = 80, p = .402; and for participants in the sadness group, r = -.11, n = 74, p = .360. Additionally, correlations between negative affect and creative performance within all mood induction conditions were non-significant. For participants in the boredom group, r = -.11, n = 74, p = .355; for participants in the amusement group, r = -.09, n = 80, p = .415; and for participants in the sadness group, r = .19, n = 74, p = .110.

78, $p = .209$ for participants who completed the Unusual Uses task; and $r = -.13$, $n = 82$, $p = .250$ for participants who wrote a short story. The correlations were also all non-significant for the relationship between negative affect and creative performance; $r = -.22$, $n = 67$, $p = .073$ for participants who completed the ATTA; $r = -.19$, $n = 80$, $p = .093$ for participants who completed the Unusual Uses task; and $r = .01$, $n = 83$, $p = .904$ for participants who wrote a short story.

State boredom, personality variables, and creative performance. As was reviewed in the Introduction, little work has examined whether personality variables might interact with mood to predict creative performance. In addition, no work has examined the potential interaction of state boredom with personality variables in the prediction of creativity. To investigate the potentially moderating effect of these personality variables, each was entered into a multiple regression model containing the three self-reported mood variables (boredom, positive affect, and negative affect), and the interactions between each of these mood variables and the personality variable of interest. All independent variables were centered before being entered into the model to allow for a more ecologically valid control of mood; that is, so that the mood states were held constant at their respective means. The dependent variable for each regression was the overall creative performance variable. Any non-significant interactions observed were dropped and the model was re-run. Finally, assumptions were examined for all models below. Given the number of independent variables included in the models, close attention was paid to multicollinearity using the guidelines provided by Field et al. (2012). All VIF scores and mean VIF scores were within acceptable ranges.

Openness to Experience and Emotionality as moderators. The first model investigated the relationship of mood, the personality variable Openness to Experience, and their interactions with creative performance (see Table 11).

Table 11

Openness to Experience, Mood and Their Interaction as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.02	.31	.753
Openness	.04	3.81	< .001**
State Boredom	.00	.43	.669
Positive Affect	-.03	-1.27	.206
Negative Affect	-.01	-.23	.818
Openness*Boredom	-.00	-1.04	.301
Openness*Positive Affect	-.00	-.94	.349
Openness*Negative Affect	.00	.01	.992

$F(7, 163) = 2.38$, $p = .024$, Adj. $R^2 = .054$.

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

Since none of the interactions were significant, they were dropped and the model was re-run with main effects only (see Table 12).

Table 12

Openness to Experience and Mood as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.03	.45	.656
Openness	.04	3.75	< .001**
State Boredom	.00	.51	.613
Positive Affect	-.03	-1.32	.187
Negative Affect	-.01	-.30	.765

$F(4, 166) = 3.80$, $p = .006$, Adj. $R^2 = .062$.

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

The overall model was significant ($p = .006$), indicating that as a set Openness to Experience, state boredom, positive affect, and negative affect significantly predicted creative performance. More specifically, the model explained 6.2% of the variance in creative performance. The personality variable Openness to Experience was the only significant unique predictor. Holding each mood variable constant at its mean, an increase of one unit in Openness to Experience was associated with a .04 increase in creative performance, $t(166) = 3.75$, $p < .001$.

The second model investigated the relationship of mood, the personality variable Emotionality, and their interactions with creative performance (see Table 13). Since none of the interactions were significant, they were dropped and the model was re-run with main effects only (see Table 14). The overall model without interactions was not significant, $p = .841$.

Table 13

Emotionality, Mood and Their Interaction as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.03	.40	.690
Emotionality	-.01	-.58	.563
State Boredom	-.00	-.33	.742
Positive Affect	-.02	-.82	.413
Negative Affect	.00	.24	.811
Emotionality*Boredom	-.00	-.43	.668
Emotionality*Positive Affect	.00	.78	.437
Emotionality*Negative Affect	.00	.64	.523

$F(7, 163) = .56$, $p = .931$, Adj. $R^2 = -.028$.

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

Table 14

Emotionality and Mood as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.03	.33	.742
Emotionality	-.01	-.58	.563
State Boredom	-.00	-.23	.818
Positive Affect	-.02	-.93	.354
Negative Affect	.01	.17	.865

$F(4, 166) = .36$, $p = .841$, Adj. $R^2 = -.015$.

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

Boredom proneness as a moderator. The first model investigated the relationship of mood, the personality variable boredom proneness, and their interactions with creative performance (see Table 15). Since none of the interactions were significant, they were dropped and the model was re-run with main effects only (see Table 16). The overall model without interactions was not significant, $p = .392$.

Table 15

Boredom Proneness, Mood and Their Interaction as Predictors of Creative Performance

	B	*t*	*p*
Intercept	-.04	-.52	.603
BPS	-.01	-1.38	.171
State Boredom	.00	.42	.674

Positive Affect	-.03	-1.35	.178
Negative Affect	.01	.40	.691
BPS*Boredom	.00	1.18	.241
BPS*Positive Affect	-.00	-1.69	.093
BPS*Negative Affect	-.00	-1.52	.131

$F(7, 165) = 1.45$, $p = .188$, Adj. $R^2 = .018$.

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

Table 16

Boredom Proneness and Mood as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.01	.11	.913
BPS	-.01	-1.40	.163
State Boredom	.00	.17	.865
Positive Affect	-.03	-1.53	.128
Negative Affect	.01	.23	.818

$F(4, 168) = 1.03$, $p = .392$, Adj. $R^2 = .001$.

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

Creative personality as a moderator. The first model investigated the relationship of mood, creativity personality, and their interactions with creative performance (see Table 17). Since none of the interactions were significant, they were dropped and the model was re-run with main effects only (see Table 18). The overall model without interactions approached significance, $p = .076$. In this model, creative personality was a significant positive predictor of

creative performance ($t(177) = 2.49$, $p = .014$), such that a one-unit increase in individuals' creative personality score was associated with a .06 unit increase in creative performance.

Table 17

Creative Personality, Mood and Their Interaction as Predictors of Creative Performance

	B	*t*	*p*
Intercept	-.01	-.08	.940
CPS	.06	2.64	.009**
State Boredom	.00	.18	.859
Positive Affect	-.04	-1.91	.058
Negative Affect	-.00	-.04	.967
CPS*Boredom	.00	.21	.835
CPS*Positive Affect	.01	1.24	.218
CPS*Negative Affect	.00	.25	.805

$F(7, 174) = 1.44$, $p = .191$, Adj. $R^2 = .017$.

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

Table 18

Creative Personality and Mood as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.01	.15	.882
CPS	.06	2.49	.014*
State Boredom	-.00	.00	.998
Positive Affect	-.04	-1.84	.067
Negative Affect	.00	.12	.908

$F(4, 177) = 2.16$, $p = .076$, Adj. $R^2 = .025$.

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

Curiosity as a moderator. The first model investigated the relationship of mood, exploration curiosity, and their interactions with creative performance (see Table 19). Since none of the interactions were significant, they were dropped and the model was re-run with main effects only (see Table 20). The overall model without interactions approached significance, $p = .060$. Within this model, exploration curiosity was a significant positive predictor of creative performance ($t(177) = 2.60$, $p = .010$), such that a one-unit increase in individuals' exploration curiosity score was associated with a .05 unit increase in creative performance.

Table 19

Exploration Curiosity, Mood and Their Interaction as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.03	.46	.649
Exploration Curiosity	.05	2.43	.016*
State Boredom	-.00	-.11	.914
Positive Affect	-.03	-1.55	.123
Negative Affect	-.00	-.05	.961
Exploration Curiosity*Boredom	.00	.57	.568
Exploration Curiosity*Positive Affect	-.00	-.61	.544
Exploration Curiosity*Negative Affect	-.00	-.05	.961

$F(7, 174) = 1.55$, $p = .152$, Adj. $R^2 = .021$.

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

Table 20

Exploration Curiosity and Mood as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.01	.18	.854
Exploration Curiosity	.05	2.60	.010*
State Boredom	.00	.05	.960
Positive Affect	-.04	-1.94	.054
Negative Affect	-.01	-.27	.784

$F(4, 177) = 2.30$, $p = .060$, Adj. $R^2 = .028$.

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

The second model investigated the relationship of mood, deprivation-type epistemic curiosity, and their interactions with creative performance (see Table 21). Since none of the interactions were significant, they were dropped and the model was re-run with main effects only (see Table 22). The overall model without interactions was not significant, $p = .677$.

Table 21

Deprivation-Type Epistemic Curiosity, Mood and Their Interaction as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.03	.40	.690
Deprivation-Type Epistemic Curiosity	.01	.27	.787
State Boredom	-.00	-.39	.697
Positive Affect	-.02	-.99	.324
Negative Affect	.01	.20	.842

Deprivation-Type*Boredom	.00	.10	.920
Deprivation-Type*Positive Affect	-.00	-1.63	.105
Deprivation-Type*Negative Affect	.00	.07	.944

$F(7, 172) = .89$, $p = .514$, Adj. $R^2 = -.004$.

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

Table 22

Deprivation-Type Epistemic Curiosity and Mood as Predictors of Creative Performance

	B	*t*	*p*
Intercept	.02	.28	.780
Deprivation-Type Epistemic Curiosity	.01	.44	.660
State Boredom	-.00	-.19	.850
Positive Affect	-.03	-1.43	.154
Negative Affect	-.00	-.16	.873

$F(4, 175) = .58$, $p = .677$, Adj. $R^2 = -.009$.

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

Discussion

In summary, using the experimental mood induction groups, no differences were found among the experimental groups on overall creative performance, on Unusual Uses performance, or on short story performance. Differences among the groups were found on ATTA performance, with post-hoc tests revealing that the amusement group had a significantly higher Total Abilities creativity score than the boredom group.

When mood state was assessed by using participants' self-reported mood after the induction, boredom, positive affect, and negative affect were not significantly associated with

creative performance. Multiple regressions conducted to explore the potentially interacting effects of personality variables and mood state on creative performance revealed no interaction effects. Consistent with prior work (Batey & Furnham, 2006; Feist, 1988), Openness to Experience was a significant predictor of creative performance. As well, although its overall regression model did not quite meet significance ($p = .076$), there was a trend towards creative personality as a significant positive predictor of creative performance. Finally, there was also a trend towards exploration curiosity as a positive predictor of creative performance, with its overall regression model also falling just short of significance ($p = .060$). These trends suggest promising possibilities for future study.

General Discussion

The Relationship Between Boredom and Creativity

The present two investigations failed to find a link between boredom and creativity. In Study 1, boredom proneness did not predict creative personality over and above the HEXACO personality taxonomy. In Study 2, the experimental induction groups displayed significantly different creative performance on only one creativity task, the ATTA, in which the amusement group slightly out-performed the boredom group. Self-reported boredom scores after the induction collapsed across experimental groups were not associated with overall creative performance alone or in interaction with personality variables. Finally, boredom proneness was not a significant predictor of overall creative performance, by itself or in interaction with state boredom. This necessitates a return to the original question: could boredom spark creativity?

No relationship? The present findings raise the possibility that boredom simply does not spark creativity, and that Mann and Cadman's (2014) and Gasper and Middlewood's (2014) previous findings were either products of chance, or speaking to something other than boredom

itself. As was discussed in Study 1, these previous experiments had methodological flaws; Mann and Cadman (2014) confounded boredom and daydreaming, whereas Gasper and Middlewood (2014) measured the experience of boredom during the mood induction only after the creativity task was completed.

The results of these two studies finding a link between boredom and creativity are even more puzzling in light of work by Baas, De Dreu and Nijstad (2008). Baas et al. (2008) conducted a meta-analysis of 102 effect sizes from studies investigating the relationship between mood and creativity. Consistent with our findings, the authors found no difference in creative performance between positive moods and negative moods, $r = .04$. They also found no difference in creative performance between negative moods and mood-neutral controls, which conflicts with Mann and Cadman's (2014) findings.

However, researchers–including Baas et al. (2008) and Gasper and Middlewood (2014)–have argued that valence (i.e., positive/negative mood) cannot solely explain the effect of mood on creativity; it has been argued that activation (arousal) and regulatory focus (approach/avoidance) are also key, potentially interacting, factors. This was reflected in the results of Baas et al.'s meta-analysis (2008); the authors concluded that "the mood-creativity link is better understood as a function of various aspects of specific moods than simply in terms of hedonic tone [valence] or level of activation…a mood state's associated regulatory focus appears to be critically involved as well" (p. 795). Examining different combinations of these mood variables, the authors found that positive, activating moods associated with an approach regulatory focus (e.g., happiness) enhanced creativity, compared to mood-neutral controls. This was borne out in Gasper and Middlewood's (2014) study, in which individuals induced into a state of elation did indeed evidence superior creative performance. Baas et al. (2008) also found

that negative, activating moods associated with an avoidance regulatory focus (e.g., fear, anxiety) inhibited creativity, especially on creativity tasks involving cognitive flexibility, compared to mood-neutral controls. This was also consistent with Gasper and Middlewood's (2014) findings, where individuals induced into a state of distress showed inferior creative performance on association tasks.

Gasper and Middlewood's (2014) work diverges from Baas et al.'s (2014) in terms of negative, deactivating, approach moods. Baas et al. (2008) found that this combination–which manifested as 'sadness' in their meta-analysis–was *not* associated with creative performance, compared to mood-neutral controls. In contrast, Gasper and Middlewood (2014) found that this combination–which they conceptualized as 'boredom' in their study–was associated with creative performance. This may have been a product of conceptual error. Gasper and Middlewood (2014) performed affect manipulation checks to confirm that participants in the boredom condition were indeed less aroused than participants in the activated conditions (elation and distress), experienced less positive affect than individuals in the positive affect conditions (elation and relaxation), and experienced more boredom than participants in all other conditions (elation, distress, and relaxation), but failed to assess for regulatory focus. That is, they assumed–based on prior work–that boredom represented an "approach" state. This assumption is undermined by more recent empirical work showing that there are different 'types' of boredom, some associated more strongly with an avoidance regulatory focus and some associated more strongly with an approach regulatory focus (Mercer & Eastwood, 2010; Mercer-Lynn et al., 2014; Mercer-Lynn et al., 2011). Thus, Gasper and Middlewood may have found boredom (which was a negative, deactivated state in their study) to be linked to associative performance, but based on their conceptual issues and Baas et al.'s (2008) work it seems to be a stretch to

conclude that they found a negative, deactivated, *approach* state to be linked to associative performance.

It is also possible that these two studies diverge due to a difference in comparison group: Baas et al. (2008) compared the creative performance of negative, deactivating, approach moods to mood-neutral controls, whereas Gasper and Middlewood (2008) compared the creative performance of a negative, deactivating approach mood to a positive, deactivating, avoidance mood (relaxation) and a negative, activated, avoidance mood (distress). Perhaps boredom's effects only emerge in comparison to non-neutral affect. Nevertheless, the weight of the evidence as a whole presents less than a clear picture. In addition to our present Study 1 and Study 2 findings, Larson's (1990) study of students' experiences in daily life found that the experience of boredom while writing a paper *negatively* affected the quality of the paper.

Although it remains an open (and, as we have seen, somewhat dubious) question as to whether boredom enhances creativity, the mood of boredom may offer a unique test case for further exploration of the impact of arousal and regulatory focus on creativity. This seems particularly important in light of Baas et al.'s (2008) "cautious suggest[ion] that the regulatory focus and level of activation of a particular mood are the most important drivers of creativity" (p. 798), and the authors' note that some combinations of these variables (e.g., negative, activating, approach oriented moods) have not yet been explored. Unlike other moods, boredom has been shown to sometimes be associated with approach and sometimes with avoidance regulatory focus (Mercer & Eastwood, 2010; Mercer-Lynn et al., 2014; Mercer-Lynn et al., 2011). Additionally, boredom has been shown to include both elements of high and low arousal (Fahlman et al., 2011; Merrifield & Danckert, 2014), and individuals may even move between high and low arousal negative affect during the experience of boredom (Eastwood et al., 2012). Conducting a study in

which boredom's constituent regulatory focus (approach/avoidance) and arousal (high/low) were systematically manipulated and compared with mood-neutral and other control mood states would not only allow for some clarity on the issue of whether, and perhaps which 'types' of boredom might be linked to creative performance, but would also allow for a finer-grained test of the activation and regulatory focus hypotheses. At present, these hypotheses are tested, as in Baas et al.'s (2008) and Gasper and Middlewood's (2014) work, by selecting moods that represent combinations of these different categories and then seeing whether these moods are related to creative performance. This often entails at least some degree of assuming that the moods in these studies indeed represent that combination of valence, arousal, and regulatory focus. Manipulating and measuring arousal and regulatory focus *within* the mood state of boredom offers a rare opportunity to more directly test arousal and regulatory focus's effects.

Other variables at play? An additional alternative is that other variables, not included in the present study, are at play in the relationship between boredom and creativity. As was discussed above, more work needs to be done to disentangle not just the overall impact of arousal and regulatory focus on creativity, but also to determine how and if these variables combine in the experience of boredom to potentially influence creativity.

Another possibility is that curiosity mediates the relationship between boredom and creativity. As was discussed, Kashdan and Fincham (2002) proposed curiosity as a necessary condition for creativity–perhaps curiosity mediates the relationship between boredom and creativity. Suggestively, Study 1 found that trait boredom was associated with exploration curiosity once its shared variance with an overall personality taxonomy was partialled out, and exploration curiosity was in turn a positive predictor of creative performance in Study 2. Indeed, as was noted earlier, our finding in Study 1 that trait boredom, controlling for personality

structure, is associated with curiosity but not creativity may reflect the quandary of boredom, in which one is curious, but not able to satisfactorily transform this curiosity into meaningful engagement. Perhaps, then, it is the experience of curiosity, triggered by boredom, which allows the individual to engage and be creative. Although Study 1 was correlational, limiting our ability to make causal claims, this is an intriguing possibility that could be tested by future experimental studies.

The curiosity (and, in turn, creativity) spurred by boredom may also be relatively confined to certain stringent conditions, perhaps including the constraint of the experimental situation. For instance, Schubert (1978) suggested that for boredom to lead to creative responses, the individual had to be held in the boring situation. In an experiment, the creativity task is the only outlet available to reduce boredom. In the real world, the bored individual can easily escape their boredom through tasks that involve far less mental effort, an objective made significantly easier through the widespread use of technology such as smartphones. However, these quick fixes for boredom may only compound the problem. In *A Philosophy of Boredom*, Svendsen (1999/2005) writes that "man, the technical object and the outside world form a continuum. We spontaneously relate to ourselves and the world by means of the technical object. The problem is that a shift has occurred in this continuum between man, the technical object, and the outside world, placing too much emphasis on the middle state, hence reducing the polarity between man and world. Such a lack of polarity is also characteristic of boredom" (p. 87). Paradoxically, it is the constraint of the experimental setting that may allow creativity to flourish. Supporting this notion, as noted earlier in a study of students' experiences in their real life environments, Larson (1990) found that experiencing boredom while writing a creative work was a negative predictor of the piece's quality. Theoretically, this underlines Batey and Furnham's (2006) definition of

creativity as multi-dimensional: perhaps in addition to considering personality, and state variables such as arousal and regulatory focus, researchers should also be considering the effect of the experimental context.

The CPS: Valid, and Provides Support for Complex Models of Creativity

One finding that emerged from Study 2 was the CPS's ability to predict creative performance. Although the overall model predicting creative performance (comprised of the CPS and post-induction mood) was not significant, the CPS was found to be a unique, positive predictor. This supports the validity of the CPS; logically, a 'creative personality' should be associated with superior creative performance. Study 2 thus aligns with the previous small body of work that has shown the CPS to be associated with creative performance (Carson et al., 2005; Wolfradt & Pretz, 2001; Zhou & Oldham, 2001).

On a broader note, this finding in combination with the potential effect of the environment in which creativity is practiced discussed above, supports building complex models of creativity that explore the multiple, potentially interactive factors that comprise creativity. As outlined previously Batey and Furnham's (2006) definition of a creative product involves attributes of: the product, the person who created the product, the person(s) judging the product, and the environment within which the product is created and judged. Indeed, research investigating components of and relationships between components in this model has already begun. As was reviewed, the person who creates is already a major focus of creativity research. Batey and Furnham's review (2006) pays careful attention to the interplay between the creator and the creative product, noting that relationships between personality variables and creative performance are stronger for certain products (e.g., Extraversion seems to be most strongly related to creative performance when divergent thinking tasks such as Unusual Uses or the

ATTA are the criterion variable). Perhaps less explored within this definition is the person judging the product; although studies report and in some cases model rater error (as recommended by Silvia et al., 2008), rater characteristics (e.g., personality variables) have yet to be explored as influencing creativity performance/ratings. As well, the research has tended to examine these components of the model separately: it would be exciting to bring them together to explore the relative impact of each of these pieces.

Coding for Creativity: The Tradeoff Between Reliability and Validity

Preparing and analyzing the data for the present study also highlighted a current issue in the field of creativity research: coding for creative performance. The lack of a common definition of creativity, noted earlier, is mirrored on a methodological level in the lack of a common coding method for creative performance. This is not meant to imply that a lack of a common definition or coding method are inherently negative; indeed, that multiple definitions and coding systems exist speaks to the bravery of creativity researchers who have resisted premature consensus on these issues. Consequently, researchers investigating creativity have a number of coding options at their disposal, each of which has struck a different bargain between reliability and validity. As the brief review below of three common coding methods will highlight, the key thematic struggle in coding creative performance is that the more ecologically valid and inclusive a creativity coding method becomes, the less reliable it also tends to be.

Tightly controlled creativity operationalizations that would not vary between raters. Researchers interested in maximally reliable creativity scoring systems may choose the first option, tightly controlled creativity operationalizations that would not vary between raters. Examples of this type of creativity scoring include counting the number of responses generated (e.g., Batey et al., 2009). Another example of this type of scoring is the Wallach and Kogan

(1965) method for assessing the uniqueness/originality of responses, in which responses that occur once in the sample (i.e., only one participant generates that response) receive a score of '1', and all other responses receive a score of '0.' These options are so highly quantified that they are objective and do not require raters. However, since this type of scoring also requires quite a narrow operationalization of creativity, these options arguably suffer in validity, as the full concept of 'creativity' is not captured. In terms of Wallach and Kogan's (1965) system, this system has also come under methodological scrutiny. Silvia et al. (2008) note several problems with this system, such as its confounding of uniqueness with fluency (the number of responses generated); its inadvertent rewarding of bizarre, inappropriate responses; and its punishment of large sample sizes, such that as sample sizes increase the criterion for a creative response becomes increasingly more stringent.

Amabile's (1982) Consensual Assessment Method. On the other end of the continuum is the second option, Amabile's (1982) Consensual Assessment Method. In this coding system, raters judge the creativity of a product (e.g., a generated unusual use) based on their own subjective definition of creativity. This has the advantage of not constraining creativity definitions, an especially important advantage given the field's lack of a common definition. Thus, this method allows the full range of the concept to (hopefully) be sampled (high validity). In addition, it may be more empowering for raters to draw on their own definition of creativity as opposed to following guidelines or a manual. However, the Consensual Assessment Method can result in moderate to low intraclass correlations (reliability), as raters' subjective definitions may not overlap to a significant degree. For instance, in our Study 2, the intraclass correlation between two raters for the short story task was .45, and between two other raters for the Unusual Uses task was .17 (brick) and .47 (knife). Demonstrating that this was not purely a rater issue,

the same two raters that scored the short story also scored the ATTA using a manual, and achieved ability intraclass correlations ranging from .75 to .92, and an overall Total Abilities intraclass correlation of .81. Low reliability constrains the power of statistical analyses, and consequently in the present study we were forced to circumvent this issue by using only one rater's ratings for the short story and Unusual Uses tasks. Although this preserved statistical power, it arguably was not as valid as the original two-rater system would have been; one subjective definition was relied upon instead of two, triangulating definitions. Other studies using this method have also found low to moderate intraclass correlations; for instance, Wolfradt and Pretz's (2001) two short story raters had an intraclass correlation of .65.

A middle ground: Providing guidelines to raters. Researchers have attempted to find a middle ground between these two ends of the continuum. For instance, researchers have modifed Amabile's (1982) Consensual Assessment Method by providing guidelines to raters. Some creativity tasks such as the ATTA even come with built-in guidelines in the form of scoring manuals. Advocates of this approach argue that reliability is vastly improved. Silvia et al. (2008) note that "agreement between raters can be enhanced by giving them clear instructions, by providing accepted definitions of creativity, and by training them in the scoring system. Finding low agreement is not surprising when the raters are not trained or instructed" (p. 71). In our Study 2, intraclass correlations for the same two raters were larger for the ATTA creativity task, in which scoring is done by following manual guidelines, than for the short story task, which was scored using the Consensual Assessment Method.

However, arguably, explicitly modifying Amabile's (1982) Consensual Assessment Method violates the spirit of the Method, in which raters are supposed to draw upon their own definitions; indeed, Amabile (1982) states that raters "should not be trained by the experimenter

to agree with one another, and they should not be given specific criteria for judging creativity" (p. 1002). This does not mean it should not be done, just that modifying the Consensual Assesment Method by providing guidelines and/or training somewhat sacrifices its validity to reliability. Similarly, using a manual may also entail a validity for reliability sacrifice: in essence, a variety of creativity definitions (the raters') are substituted for one, overarching definition (the manual authors'), which may not be as inclusive/valid.

In summary, the three coding methods available offer researchers three separate reliability/validity tradeoffs to consider. Given the widespread use of all three methods, more work evaluating these methods is encouraged. Some researchers have already begun to explore this issue: of note, Silvia et al. (2008) found that Wallach and Kogan's (1965) method generated scores that were less dependable than the scores generated using their modified Consensual Assessment Method. They also found that the Wallach and Kogan (1965) method generated scores that were confounded with the number of responses generated, unlike their modified Consensual Assessment Method scores (Silvia et al., 2008). As these findings suggest, more work comparing additional scoring methods would be beneficial.

Limitations and Future Directions

One limitation of Study 2 was the mood induction: that is, the boredom and sadness groups could not be reliably distinguished on the basis of boredom, limiting our ability to make causal claims. That the two groups were difficult to disentangle is not entirely surprising; although boredom and depression have been found to be psychometrically and empirically distinct, they are still highly correlated (Goldberg et al., 2011). As well, the video used to induce sadness (*The Champ*; Lovell & Zeffirelli, 1979) was quite affecting, portraying a young child's frantic attempts to re-awaken his dead father. Related research has found that a lack of emotional

awareness/engagement with inner experience mediates the relationship between trauma and boredom (Cavaliere, Killian, & Eastwood, 2012). Although the experience of watching the video clip does not qualify as traumatic, it raises the possibility that watching an upsetting clip caused participants to withdraw from the experience, resulting in the experience of boredom in addition to sadness.

Previous work validating *The Champ* as inducing sadness and not other emotions (Gross & Levenson, 1994; Hewig et al., 2005) did not include measurement of boredom; as just stated it may be that this clip induces both sadness and boredom. This poses a complex, although not insurmountable problem to boredom researchers wishing to measure boredom's impact as compared to other mood states: comparison to closely related mood states may allow for a closer investigation of boredom's effects, but may also run the risk of muddying the conceptual waters. Markey et al.'s (2014) work introducing and validating a number of boredom inductions is a boon to researchers wishing to induce boredom; more work in future developing control conditions that produce related, but distinct mood states such as sadness would also be invaluable.

Another limitation of the present study was the lower rater reliabilities that resulted for the Unusual Uses and short story creativity tasks using Amabile's (1982) Consensual Assessment Method. Although the potential low statistical power this might have resulted in was avoided by using only one rater's ratings, this solution somewhat curtailed the validity of the ratings. As was noted earlier, these reliability/validity tradeoffs are a common theme in creativity coding, and research teams have used each coding method (and tradeoff) in turn. Future work, as discussed previously, could provide more information to researchers making these decisions by directly comparing the reliability and validity of coding methods.

A final limitation was Study 2's use of the CPS, which as discussed in Study 1 had low reliability in the present set of investigations. As was noted in Study 1, future work improving the CPS's psychometric properties is recommended.

The existing investigation's findings also suggest some exciting new avenues for exploration. As discussed, future work could measure–and disentangle the potential effects of–boredom, valence, arousal, and regulatory focus. As was also discussed, the relationship between boredom, curiosity, and creativity could be profitably examined as well. The results of this study, and previous theoretical work (Kashdan & Fincham, 2002) suggest that curiosity may act as a precondition for creativity, and perhaps even a mediator of the potential relationship between boredom and creativity. To our knowledge, these premises have yet to be empirically tested. Finally, future work exploring complex models of creativity that involves investigation of multiple, potentially interacting components (e.g., characteristics of the creator and characteristics of the situation; Batey & Furnham, 2006) is encouraged. In particular, the potential impact of rater characteristics has been under-researched.

Conclusion

The present thesis sought to investigate whether boredom could inspire creativity. Two studies, the first focusing on trait creativity and the second on performance measures of creativity, were conducted. The results reflect the complex and possibly nonexistent nature of boredom's potential relationship with creativity: trait boredom was not associated with trait creativity once its shared variance with an overall personality taxonomy was partialled out (Study 1), and neither state boredom nor the interaction between state and trait boredom was predictive of creative performance (Study 2). However, boredom was found to be a positive predictor of curiosity once its shared variance with an overall personality taxonomy was

partialled out (Study 1), and curiosity in turn was found to be a positive predictor of creative performance (Study 2), suggesting a potential mediated relationship. Future work exploring the potential relationships between boredom, curiosity, and creativity–in particular, the possibility that curiosity might mediate the relationship between boredom and creativity–is encouraged. Researchers exploring the relationship between boredom and creativity are also urged to incorporate measures of arousal and regulatory focus. Finally, future work exploring multiple, potentially interacting components of creativity–particularly rater characteristics–is proposed.

References

Abramson, E. E., & Stinson, S. G. (1977). Boredom and eating in obese and non-obese individuals. *Addictive Behaviors, 2*, 181-185.

Althuizen, N., Wierenga, B., & Rossiter, J. (2010). The validity of two brief measures of creative ability. *Creativity Research Journal, 22*, 53-61.

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology, 43*, 997-1013.

Ashton, M. C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91*, 340-345.

Akinola, M., & Mendes, W. B. (2008). The dark side of creativity: Biological vulnerability and negative emotions lead to greater artistic creativity. *Personality and Social Psychology Bulletin, 24*, 1677-1686.

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.

Baird, B., Smallwood, J., Mrazek, M. D., Kam, J. W., Franklin, M. S., & Schooler, J. W. (2012). Inspired by distraction mind wandering facilitates creative incubation. *Psychological Science, 23*, 1117-1122.

Bargdill, R. W. (2000). The study of life boredom. *Journal of Phenomenological Psychology, 31*, 188–219.

Batey, M., Chamorro-Premuzic, T., & Furnham, A. (2009). Intelligence and personality as predictors of divergent thinking: The role of general, fluid and crystallised intelligence. *Thinking Skills and Creativity, 4,* 60-69.

Batey, M., & Furnham, A. (2006). Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs, 132*, 355-429.

Ben-Zeev, D., Young, M. A., & Depp, C. A. (2012). Real-time predictors of suicidal ideation: Mobile assessment of hospitalized depressed patients. *Psychiatry Research, 197*, 55-59.

Carlson, S. R., Johnson, S. C., & Jacobs, P. C. (2010). Disinhibited characteristics and binge drinking among university student drinkers. *Addictive Behaviors, 35*, 242-251.

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.

Carton, S., Jouvent, R., & Widloecher, D. (1994). Sensation seeking, nicotine dependence, and smoking motivation in female and male smokers. *Addictive Behaviors, 19*, 219-227.

Cavaliere, C., Killian, K. D., & Eastwood, J. D. (2012). *Hiding from the pain: Trauma-induced boredom*. Unpublished manuscript, Department of Psychology, York University, Toronto, Canada.

Chamorro-Premuzic, T., & Reichenbacher, L. (2008). Effects of personality and threat of evaluation on divergent and convergent thinking. *Journal of Research in Personality, 42*, 1095-1101.

Conference Board of Canada. (2014). *Innovation*. Retrieved from http://www.conferenceboard.ca/hcp/details/innovation.aspx

Culp, N. A. (2006). The relations of two facets of boredom proneness with the major dimensions of personality. *Personality and Individual Differences, 41*, 999-1007.

Dahlen, E. R., Martin, R. C., Ragan, K., & Kuhlman, M. M. (2004). Boredom proneness in anger and aggression: Effects of impulsiveness and sensation seeking. *Personality and*

Individual Differences, 37, 1615-1627.

Eastwood, J. D., Cavaliere, C., Fahlman, S. A., & Eastwood, A. E. (2007). A desire for desires: Boredom and its relation to alexithymia. *Personality and Individual Differences, 42*, 1035–1045.

Eastwood, J. D., Frischen, A., Fenske, M. J., & Smilek, D. (2012). The unengaged mind: Defining boredom in terms of attention. *Perspectives on Psychological Science, 7*, 482-495.

Elpidorou, A. (2014). The bright side of boredom. *Frontiers in Psychology.* Published online October 13, doi: 10.3389/fpsyg.2014.01245

Fahlman, S. A., Mercer, K. B., Gaskovski, P., Eastwood, A. E., & Eastwood, J. D. (2009). Does a lack of life meaning cause boredom? Results from psychometric, longitudinal, and experimental analyses. *Journal of Social and Clinical Psychology, 28*, 307-340.

Fahlman, S. A., Mercer-Lynn, K. B., Flora, D. B., & Eastwood, J. D. (2011). Development and validation of the Multidimensional State Boredom Scale (MSBS). *Assessment.* Published online September 8, doi: 10.1177/1073191111421303

Farmer, R., & Sundberg, N. D. (1986). Boredom proneness: the development and correlates of a new scale. *Journal of Personality Assessment, 50*, 4-17.

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review, 2*, 290-309.

Field, A., Miles, J., & Field, Z. (2012). *Discovering statistics using R.* London, UK: SAGE Publications Ltd.

Flaubert, G. (1965). *Madame Bovary* (P. De Man, Trans.). New York, NY: W.W. Norton & Company, Inc. (Original work published 1857)

Flory, J. D., Pytte, C. L., Hurd, Y., Ferrell, R. E., & Manuck, S. B. (2011). Alcohol dependence, disinhibited behavior and variation in the prodynorphin gene. *Biological Psychology, 88*, 51-56.

Furnham, A., Crump, J., Batey, M., & Chamorro-Premuzic, T. (2009). Personality and ability predictors of the "consequences" test of divergent thinking in a large non-student sample. *Personality and Individual Differences, 46*, 536-540.

Furnham, A. & Saipe, J. (1992). Personality correlates of convicted drivers. *Personality and Individual Differences, 14*, 329-336.

Gasper, K., & Middlewood, B. L. (2014). Approaching novel thoughts: Understanding why elation and boredom promote associative thought more than distress and relaxation. *Journal of Experimental Social Psychology, 52*, 50-57.

Glück, J., Ernst, R., & Unger, F. (2002). How creatives define creativity: Definitions reflect different types of creativity. *Creativity Research Journal, 14*, 55-67.

Goff, K., & Torrance, E. P. (2002). *Abbreviated Torrance Test for Adults*. Bensenville, IL: Scholastic Testing Service.

Goldberg, Y. K., Eastwood, J. D., Laguardia, J., & Danckert, J. (2011). Boredom: An emotional experience distinct from apathy, anhedonia, or depression. Journal of Social and Clinical Psychology, 30, 647–666.

Goor, D. J., Schur, M. (Writers), Lord, P., & Miller, C. (Directors) (2013). Pilot [Television series episode]. In D. J. Goor, C. Miller, D. Miner, P. Lord, & M. Schur (Executive producers), *Brooklyn Nine-Nine*. New York, NY: Fox Broadcasting.

Gough, H. G. (1979). A Creative Personality Scale for the Adjective Check List. *Journal of Personality and Social Psychology, 37*, 1398-1405.

Gross, J. J., & Levenson, R. W. (1995). Emotion elicitation using films. *Cognition and Emotion, 9*, 87-108.

Harrington, D. M. (1975). Effects of explicit instructions to "be creative" on the psychological meaning of divergent thinking test scores. *Journal of Personality, 43*, 434–454.

Healy, S. D. (1984). *Boredom, self, and culture*. Canbury, NJ: Farleigh Dickinson University Press.

Hewig, J., Hagemann, D., Seifert, J., Gollwitzer, M., Naumann, E., & Bartussek, D. (2005). Brief report: A revised film set for the induction of basic emotions. *Cognition and Emotion, 19*, 1095-1109.

Hunter, A. G., & Eastwood, J. D. (2015). *The joy of creation: Examining the effect of creative engagement on mood*. Unpublished manuscript, Department of Psychology, York University, Toronto, Canada.

Hunter, J. A., Dyer, K. J., Cribbie, R. A., & Eastwood, J. D. (2015). Exploring the utility of the Multidimensional State Boredom Scale. *European Journal of Psychological Assessment*. Published online January 1, doi: 10.1027/1015-5759/a000251

Isen, A. M., Daubman, K. A., & Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology, 52*, 1122-1131.

Kashdan, T. B., & Fincham, F. D. (2002). Facilitating creativity by regulating curiosity. *American Psychologist, 57*, 373-374.

Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., & Steger, M. F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. *Journal of Research in Personality, 43*, 987-998.

Kashdan, T. B., Rose, P., & Fincham, F. D. (2004). Curiosity and exploration: Facilitating positive subjective experiences and personal growth opportunities. *Journal of Personality Assessment, 82*, 291-305.

Kashdan, T. B., & Steger, M. F. (2007). Curiosity and pathways to well-being and meaning in life: Traits, states, and everyday behaviors. *Motivation and Emotion, 31*, 159-173.

Kass, S. J., Vodanovich, S. J., & Callender, A. (2001). State-trait boredom: Relationship to absenteeism, tenure, and job satisfaction. *Journal of Business and Psychology, 16*, 317-327.

Khun, R. (1976). *The demon of noontide: Ennui in Western literature*. Princeton, NJ: Princeton University Press.

Kim, K. H. (2011). The creativity crisis: The decrease in creative thinking scores on the Torrance Tests of Creative Thinking. *Creativity Research Journal, 23*, 285-295.

Lin, W. L., Hsu, K. Y., Chen, H. C., & Wang, J. W. (2012). The relations of gender and personality traits on different creativities: A dual-process theory account. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 112.

Litman, J. A. (2008). Interest and deprivation dimensions of epistemic curiosity. *Personality and Individual Differences, 44*, 1585–1595.

Litman, J. A., & Jimerson, T. L. (2004). The measurement of curiosity as a feeling of deprivation. *Journal of Personality Assessment, 82*, 147-157.

Litman, J. A., & Spielberger, C. D. (2003). Measuring epistemic curiosity and its diversive and specific components. *Journal of Personality Assessment, 80*, 75-86.

Lovell, D. (Producer), & Zeffirelli, F. (Director) (1979). *The Champ* [Motion picture]. United States: Metro-Goldwyn-Mayer.

Mann, S., & Cadman, R. (2014). Does being bored make us more creative? *Creativity Research Journal, 26*, 165-173.

Markey, A., Chin, A., VanEpps, E. M., & Loewenstein, G. (2014). Identifying a reliable boredom induction. *Perceptual and Motor Skills, 119*, 237–253.

Matthies, S., Philipsen, A., & Svaldi, J. (2012). Risky decision making in adults with ADHD. *Journal of Behavior Therapy and Experimental Psychiatry, 43*, 938-946.

McCrae, R. R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology, 52*, 1258-1265.

Mercer, K. B., & Eastwood, J. D. (2010). Is boredom associated with problem gambling behaviour? It depends on what you mean by "boredom." *International Gambling Studies, 10*, 91-104.

Mercer-Lynn, Bar, R. J., & Eastwood, J. D. Causes of boredom: The person, the situation, or both? *Personality and Individual Differences, 56*, 122-126.

Mercer-Lynn, K. B., Flora, D. B., Fahlman, S. A., & Eastwood, J. D. (2011). The measurement of boredom: Differences between existing self-report scales. *Assessment*. Published online May 12, doi: 10.1177/1073191111408229

Mercer-Lynn, K. B., Hunter, J. A., & Eastwood, J. D. (2013). Is trait boredom redundant? *Journal of Social and Clinical Psychology, 32*, 897-916.

Merrifield, C., & Danckert, J. (2014). Characterizing the psychophysiological signature of boredom. *Experimental Brain Research, 232*, 481-491.

Piotrowski, C. (2013). Boredom research: An analysis of topical domain and historical trends. *Journal of Instructional Psychology, 40*, 1-3.

Prentky, R. A. (2001). Mental illness and roots of genius. *Creativity Research Journal, 13*, 95-104.

Reynolds, M. W., Nabors, L., & Quinlan, A. (2000). The effectiveness of art therapy: Does it work? *Art Therapy, 17*, 207-213.

Rogers, C. R. (1961). *On becoming a person.* Boston, MA: Houghton Mifflin Company.

Rupp, D. E., & Vodanovich, S. J. (1997). The role of boredom proneness in self-reported anger and aggression. *Journal of Social Behavior & Personality, 12*, 925-936.

Schretlen, D. J., van der Hulst, E. J., Pearlson, G. D., & Gordon, B. (2010). A neuropsychological study of personality: Trait openness in relation to intelligence, fluency, and executive functioning. *Journal of Clinical and Experimental Neuropsychology, 32*, 1068-1073.

Schubert, D. S. (1978). Creativity and coping with boredom. *Psychiatric Annals, 8*(3), 46-54.

Seib, H. M., & Vodanovich, S. J. (1998). Cognitive correlates of boredom proneness: The role of private self-consciousness and absorption. *The Journal of Psychology, 132*, 642-652.

Silvia, P. J. (2011). Subjective scoring of divergent thinking: Examining the reliability of unusual uses, instances, and consequences tasks. *Thinking Skills and Creativity, 6*, 24-30.

Silvia, P. J., Kaufman, J. C., Reiter-Palmon, R., & Wigert, B. (2011). Cantankerous creativity: Honesty-Humility, Agreeableness, and the HEXACO structure of creative achievement. *Personality and Individual Differences, 51*, 687-689.

Silvia, P. J., Martin, C., & Nusbaum, E. C. (2009). A snapshot of creativity: Evaluating a quick and simple method for assessing divergent thinking. *Thinking Skills and Creativity, 4*, 79-85.

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*(2), 68-85.

Sommers, J., & Vodanovich, S. J. (2000). Boredom proneness: Its relationship to psychological- and physical-health symptoms. *Journal of Clinical Psychology, 56*, 149-155.

Stern, E. M. (1988). Boredom as a text in waiting: A preface. In E. M. Stern (Ed.), *Psychotherapy and the bored patient* (pp. 1-3). New York, NY: The Haworth Press.

Sternberg, R. J., & Lubart, T. I. (1996). Investing in creativity. *American Psychologist*, 51(7), 677–688.

Svendsen, L. (2005). *A philosophy of boredom* (J. Irons, Trans.). London, UK: Reaktion Books. (Original work published 1999)

Tolstoy, L. (2004). *Anna Karenina*. (R. Pevear & L. Volokhonsky, Trans.). New York: Penguin Books. (Original work published 1877)

van Aart, J., Bartneck, C., Hu, J., Rauterberg, M., & Salem, B. (2010). How to behave as Alice in Wonderland–about boredom and curiosity. *Entertainment Computing, 1,* 125-137.

Van Allsburg, C. (1984). *The mysteries of Harris Burdick.* Boston, MA: HMH Books for Young Readers.

van Tilburg, W. A. P., & Igou, E. R. (2011). On boredom and social identity: A pragmatic meaning-regulation approach. *Personality and Social Psychology Bulletin*. Published online August 15, doi: 10.1177/0146167211418530

Vodanovich, S. J. (2003a). On the potential benefits of boredom: A neglected area in personality research. *Psychology and Education, 40*, 28-33.

Vodanovich, S. J. (2003b). Psychometric measures of boredom: A review of the literature. *The Journal of Psychology: Interdisciplinary and Applied, 137*, 569-595.

Vodanovich, S. J., & Kass, S. J. (1990). A factor analytic study of the boredom proneness scale. *Journal of Personality Assessment, 55*, 115–123.

Vodanovich, S. J., & Rupp, D. E. (1999). Are procrastinators prone to boredom? *Social Behaviour and Personality, 27*, 11-16.

von Gemmingen, M. J., Sullivan, B. F., & Pomerantz, A. M. (2003). Investigating the relationship between boredom proneness, paranoia, and self-consciousness. *Personality and Individual Differences, 34*, 907-919.

Walker, B. R., & Jackson, C. J. (2014). How the Five Factor Model and revised Reinforcement Sensitivity Theory predict divergent thinking. *Personality and Individual Differences, 57*, 54-58.

Watt, J. D., & Blanchard, M. J. (1994). Boredom proneness and the need for cognition. *Journal of Research in Personality, 28*, 44-51.

Watt, J. D., & Hargis, M. B. (2009). Boredom proneness: Its relationship with subjective underemployment, perceived organizational support, and job performance. *Journal of Business and Psychology.* Published online October 1, doi: 10.1007/s10869-009-9138-9

White, A. (1998). Ho hum: A phenomenology of boredom. *Journal of the Society for Existential Analysis, 9*, 69-81.

Witte, K., & Donahue, W. A. (2000). Preventing vehicle crashes with trains at grade crossings: the risk seeker challenge. *Accident Analysis and Prevention, 32*, 127-139.

Wolfradt, U., & Pretz, J. E. (2001). Individual differences in creativity: Personality, story writing, and hobbies. *European Journal of Personality, 15*, 297-310.

Zenasni, F., & Lubart, T. I. (2008). Emotion-related traits moderate the impact of emotional state on creative performances. *Journal of Individual Differences, 29*(3), 157–167.

Zhou, J., & Oldham, G. R. (2001). Enhancing creative performance: Effects of expected development assessment strategies and creative personality. *Journal of Creative Behaviour, 35*(3), 151-167.