

Creating Through Deviancy or Adjustment?

The Link between Personality Profile Normativeness and Creativity

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Introduction

“Here's to the crazy ones (...). They push the human race forward. (...) while some may see them as the crazy ones, we see genius. Because the people who are crazy enough to think they can change the world, are the ones who do” (Apple Inc., 1998).

Creativity, the ability to generate ideas or products that are novel, useful, and surprising (Runco, 2004; Simonton, 2000) is pivotal for personal growth and societal progress. Regarding novelty, a creative idea (or product) is considered novel or original to the extent that it can be distinguished from existing ideas and products (Kaufman & Sternberg, 2010). With regard to usefulness, a creative idea is considered useful if it satisfies a certain need or brings an adaptive solution to an existing problem (Kaufman & Sternberg, 2010; Simonton, 2011). Regarding surprise, a creative idea is considered surprising if it brings unexpected, non-obvious perspectives or solutions (Simonton, 2011). The importance of creativity stems from two different sources: creativity is simultaneously a source of meaning in our lives (Csikszentmihalyi, 1996) and an ability through which we can bring substantive change to the world, such as addressing global warming, societal issues, or understanding the universe. As Csikszentmihalyi (1996, p. 4) stated, “for better or for worse, our future is now closely tied to human creativity.” Thus, to enhance creative output in our lives and societies, understanding the psychology of creative individuals becomes an essential starting point.

Two prevalent conceptions of creative individuals are noteworthy: the deviant creator and the adjusted creator. Striking a chord in the media, the image of the creative individual as “crazy,” “weird,” “misfit,” and deviant from the norm is portrayed in the scientific literature as the “mad genius” hypothesis (Simonton, 1999). Counter to the mad genius hypothesis, the positive psychology framework paints a different image of the creative genius, instead

suggesting that creative individuals have reached their peak potential and that their creative endeavors are the quintessence of self-actualization, normalcy, and adjustment (Maslow, 1971a). Given these two opposing views, the present study aims to establish whether a creative individual is closer to being deviant or to being adjusted with regards to their personality trait profile.

Deviancy or Adjustment and Creativity through an Affective Lens

The image of a “mad” creative genius, disturbed, suffering from mental illness, and clashing with societal norms has not only been entertained by anecdotal life stories, but it has also received empirical attention. For example, Ludwig (1992) studied the biographies of 1,005 eminent individuals and found that depression and anxiety were overrepresented among highly creative people, with poets having the highest rates of psychosis and depression. Moreover, Andreasen (1987) compared the rates of mental illness in 30 creative writers with matched controls and concluded that creative writers were significantly more likely than controls to have experienced an episode of affective disorder (80% compared to 30%). In a recent meta-analysis across 38 studies, Taylor (2017) found that general mood disorder did not significantly predict creativity; however, when accounting for different types of mood disorder, individuals exhibiting bipolar disorders had higher levels of creativity compared to controls. Despite the findings supporting the idea that deviancy in the form of psychopathology may be related to creativity, other studies seem to suggest that this link is either weak or inexistent. For example, Silvia & Kimbrel (2010) measured the relation between dimensions of anxiety, depression, and general negative affect, on one side, and various forms of creativity, on the other. The results consistently showed that anxiety and depression symptoms had small to no associations with creativity, across diverse measures of creativity, including divergent thinking, creative self-

concept, and everyday creativity. In sum, given the inconsistent previous findings, the link between creativity and psychopathology or deviancy appears to be weak at best.

Contrary to the mad genius hypothesis, humanistic and positive psychology theorists posited that creativity is the pinnacle of self-actualization, stating that the two constructs “may turn out to be the same thing” (Maslow, 1971b). In fact, Rogers (1961) suggested that a person’s need to “actualize himself [or herself], to become his [her] potentialities” is the main force that motivates creative processes, thus equating adjustment with creativity. According to Simonton (2000), creativity is the display of “optimal functioning,” again hinting that this ability relates to self-actualization. In effect, Runco, Ebersole, and Mraz (1991) have previously found high creativity scores to be associated with high levels of self-actualization. Should creativity indeed be the display of “optimal functioning” (Simonton, 2000), then creativity should also be related to positive affective states. Indeed, diary studies have found positive affect in the morning to predict higher creativity at work during the same day (Binnewies & Wörnlein, 2011), or over an incubation period of up to two days (Amabile, Barsade, Mueller, & Staw, 2005). Furthermore, in their meta-analysis across 102 effect sizes, Baas, De Dreu, and Nijstad (2008) revealed that (a) positive moods led to more creativity than neutral moods, (b) activating positive moods associated with approach motivation (e.g., happiness) promoted the highest levels of creativity, and (c) activating negative moods associated with avoidance motivation (e.g., fear, anxiety), impeded creativity. A similar meta-analysis performed on 62 experimental and 10 non-experimental studies has brought further support to the link between positive affect and creative output (Davis, 2009). Thus, some evidence suggests that positive affect or adjustment might be related to creativity, a conclusion that is at odds with the aforementioned “mad genius” and psychopathology argument.

As shown above, when asking whether deviancy or adjustment is related to more creativity, the vast majority of previous studies focused on affective measures of deviancy or adjustment, such as psychopathology or positive mood, respectively. However, an alternative approach to this issue is through the lens of personality traits.

Deviancy or Adjustment and Creativity through a Personality Trait Lens

Personality traits are relatively consistent (across time and situations) patterns of thoughts, feelings, and behaviors (Roberts, 2009). The most commonly used personality trait framework is the Big Five (John, Naumann, & Soto, 2008) or Five-Factor Model (McCrae & Costa, 2008), which includes five broad traits: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. Like previous research on affect and creativity, research on personality traits and creativity has also found mixed evidence with regards to what kinds of trait levels (reflecting adjustment vs. deviancy) are related to more creativity. According to the cybernetic theory of the Big Five (DeYoung, 2015), moderately high levels of openness and extraversion may be adaptive because they reflect plasticity (exploration of new goals and strategies), whereas moderately high levels of emotional stability, conscientiousness, and agreeableness may be adaptive because they reflect stability (protection of goals and strategies). When it comes to creativity, however, previous research suggests that higher levels of openness to experience (Batey & Furnham, 2006; Feist & Barron, 2003; Kaufman, 2013; Kaufman et al., 2015; Silvia et al., 2008; 2009) and higher levels of extraversion (Kaufman et al., 2015) are related to more creativity, whereas lower levels of conscientiousness (or high impulsivity) (Gelade, 2002; Feist, 1998), lower levels of agreeableness (i.e., high hostility) (Feist, 1998), and lower levels of emotional stability (Mieg, Bendek, Braun, & Neyer, 2012) are related to more creativity.

In sum, research on personality traits and creative achievement, like the research on affect and creativity, is conflicted when it comes to indicating whether traits that are more indicative of adjustment or deviancy predict more creativity across the lifespan. However, previous research on personality and creativity has exclusively used the “variable-centered” approach (Block, 1971), where the link between each individual personality trait with the relevant outcome was tested. The variable-centered approach has one major drawback, as it cannot account for the fact that personality is a “peculiar patterning of attributes within the single person” (Allport, 1937, p. 9), as opposed to a set of disconnected traits. Moreover, if the variable-centered approach (where each personality trait is correlated with the outcomes) failed to render conclusive results regarding the position of creativity on the deviancy–normalcy spectrum, perhaps a different approach can help shed light on this issue. Therefore, we propose the person-centered approach (Allport, 1937) to conceptualize the link between deviancy/adjustment and creativity, by focusing on the *pattern* of personality traits within a person and its link to creativity across the lifespan.

We argue that the person-centered approach can shed light on previously inconsistent findings by considering personality profiles (i.e., sets of ranked traits) and how deviant (or not) people’s idiosyncratic profiles stand compared to the normative profile. To use the person-centered approach, we employed a measure of personality profile normativeness. According to Furr (2008), personality profile normativeness is defined as the “degree of similarity between an individual profile of personality scores and the group’s normative profile of scores.” Personality profile normativeness has long been considered a measure of psychological adjustment that presents strong associations with well-being, life satisfaction, and health (Bleidorn et al., 2012, Klimstra et al., 2010). Using personality profile normativeness as a measure of

deviancy/adjustment has two key advantages over previously used measures of deviancy/adjustment: (a) it avoids a piece-meal approach where different traits are used across different studies, rendering various findings difficult to compare and (b) it taps into a unique and comprehensive measure of being “weird” or “different” that takes into account each person’s whole personality profile, as opposed to specific traits or symptoms of psychopathology, which is more in line with the idea that creativity might stem from deviancy/adjustment considered more broadly and not just from a psychopathology perspective (see Damian & Simonton, 2014). We are not aware of any studies to date that have taken a person-centered approach to investigate the link between deviancy/adjustment and creativity. Thus, we believe that a systematic test of the link between personality profile normativeness and creativity can contribute greatly to the debate. Given the previous conflicting evidence (through the affective and personality trait lens), who is more creative: the misfits (e.g., people with more deviant personality profiles) or the well-adjusted (e.g., people with more normative personality profiles)?

Present Studies

The current studies employed a person-centered approach to determine whether personality profile normativeness was associated with creativity. Across four studies, we measured personality profile normativeness by correlating each person’s personality profile (rank-ordered set of traits) with the normative (average) personality profile of each respective sample (Furr, 2008). A higher correlation between the self-rated profile and the average profile would then be reflective of higher personality profile normativeness. For example, if an individual ascribed a higher score to him- or herself on agreeableness than on conscientiousness, and the mean of the sample to which he or she belonged to was also higher on agreeableness than

on conscientiousness, this individual would show a higher level of personality profile normativeness (Klimstra et al., 2010).

To assess the relationship between personality profile normativeness and creativity, we employed a variety of measures, methods, and designs, across our studies. Moreover, we controlled for potential confounding effects of important factors that relate to personality profile normativeness, creativity, and creative achievement such as demographics, parental socioeconomic status (SES), intelligence (Boudon, 1974; Damian et. al, 2015), and life satisfaction (Bleidorn et al., 2012, Klimstra et al., 2010). Study 1 used an MTurk sample and assessed the cross-sectional relationship between personality profile normativeness and a comprehensive range of creativity measures: self-reported (K-Docs; Kaufman, 2012), behavioral (Unusual Uses Task; Guilford, 1967), and occupational measures (O*NET occupational creativity), while controlling for life satisfaction and demographic factors. Study 2 sought to replicate the findings in a college student cross-sectional sample and with a different measure of creative achievement (CAQ; Carson, Peterson, & Higgins, 2005). Study 3 used a longitudinal sample to assess whether personality profile normativeness in adolescence predicted occupational creativity in young adulthood (after 11 years) and in old adulthood (after 50 years), above and beyond demographic variables, parental SES, life satisfaction, and intelligence. In Study 3, we also tested whether personality profile normativeness was associated cross-sectionally with occupational creativity in old adulthood (note that it was not possible to test cross-sectional links at baseline because the participants were too young to have jobs and thus had no measure of occupational creativity, or at the 11th year follow-up because personality traits were not assessed at that time point). Study 4 assessed both self-reported and informant-reported personality and creativity and sought to replicate and extend the previous findings within and across modalities. Although we did not

pre-register these studies, we followed the same data analysis plan across all the samples in order to replicate our findings and test their robustness. Furthermore, Study 4 was independently conducted by a different research laboratory following the same analysis plan from the first three studies. The present paper includes results from *all* samples on which analyses pertaining to our research question were conducted.

This set of studies has several advantages: (a) these are the first studies to take a person-centered approach in testing the link between deviancy/adjustment and creativity; (b) we used multiple large samples, some representative of the US population; (c) we employed a multi-method approach, using multiple measures of creativity from different data sources, behavioral (i.e., Unusual Uses Task, Guilford 1967), self-reported (K-Docs; Kaufman, 2012; CAQ; Carson, Peterson, & Higgins, 2005), informant-reported, and objective life outcomes (occupational creativity derived from job titles); (d) in testing the link between personality profile normativeness both cross-sectionally and longitudinally, with varying time spans in between, we were able to test the robustness of our findings and predictive validity of personality profile normativeness on creativity across the lifespan.

Study 1

In this study, we tested the cross-sectional association between personality profile normativeness and several measures of creativity, including self-reported creativity, behavioral creativity, and occupational creativity. We also included important control variables, such as demographics and life satisfaction.

All the data analysis scripts, materials, and data necessary to reproduce these results are available for masked peer review at the following address:

https://osf.io/gm95y/?view_only=52b36c7cc7ea4b3f949243fe7c58a5d6. Once the review

process has ended, we will make all these materials publicly available. Furthermore, all the output files are available at the same address and include exact p -values, in addition to the effect sizes and 95% confidence intervals reported in the present paper.

Methods

Participants.¹ Cross-sectional data ($N = 417$) were collected from Amazon MTurk. Because we are not aware of any previous research that investigated the link between personality profile normativeness and creativity, we did not have a clear effect size estimate based on which to conduct a power analysis. However, we planned to collect at least 343 participants, so that we would have 80% power to detect effects equivalent to a correlation of .15, which is smaller than the average effect of .20 found in psychological research (e.g., Paterson, Harms, Steel, & Credé, 2016); a sample size of 350 is also estimated to be the sample size where effects “stabilize” (Schönbrodt, 2013; Schönbrodt & Perugini 2013). Prior to all analyses, we excluded data based on the following criteria: insufficient study completion rate (if 40% or more of the survey was incomplete, $N = 49$), failed check questions (if 60% or more check questions were answered incorrectly, $N = 55$), and outlier study duration (spending less than 15 minutes or more than 90 minutes on the 45-minute survey, $N = 52$). The reported exclusionary criteria were determined prior to data analysis.

Our final sample consisted of 350 participants, out of which 56% identified as female and 76% identified as White, Non-Latino. The mean age was 37.5 ($SD=11.55$), and participants stemmed from a wide variety of US states and income levels (household income was normally distributed, with a mean of “\$40,000 – \$59,999” annually). Participants completed a series of questionnaires for about 45 minutes. Listwise deletion was used to deal with missing data.

Measures.

Demographics. Participants reported age, gender, race/ethnicity, and parental socioeconomic status (SES). Age was self-reported in years. Gender was coded Male = 0, and Female = 1, and race/ethnicity was coded 0 = White /Caucasian, and 1 = Other. To compute parental SES, participants reported parental educational attainment, for each parent. Participants were also asked whether certain resources were available in their household growing up (e.g., newspapers, magazines, a dictionary, computer, room to study, a high number of books, dishwasher). We computed an overall measure of resources by summing the amount of resources reported. Lastly, we obtained a composite parental SES measure by averaging standardized scores of these three components (i.e., mother education, father education, and resources).

Personality Profile Normativeness. We measured personality traits with the BFI-44 (John, Donahue, & Kentle, 1991), which assessed each of the Big Five dimensions (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism; e.g. “I see myself as someone who is reserved”, “I see myself as someone who generates of lot of enthusiasm”). The BFI-44 has shown suitable validity and psychometric properties (Soto & John, 2009), as well as high convergent validity (.73) with the NEO-FFI (John & Srivastava, 1999). Items of the BFI-44 can be divided into groups of 8-10 items, which are then averaged to form the 5 personality trait scales ($\alpha = .84$ to $.92$). Participants rated their answers on 5-point Likert scales ranging from “1 (*disagree strongly*)” to “5 (*agree strongly*).” Using these measures, we computed, for each participant, a personality normativeness score, by correlating each person’s rank-ordered set of Big Five traits with the sample mean’s rank-ordered set on Big Five traits at the same time point, following the same procedure as Furr (2008).

Life Satisfaction. We used Diener's Satisfaction with Life Scale (SWLS; Diener, Emmons, Larson, & Griffin, 1985), a well-validated and widely used scale (Gross & John, 2003; DeNeve & Cooper, 1998). The scale included five items (e.g., "In most ways my life is close to ideal," "The conditions of my life are excellent"). Participants rated their answers on 7-point Likert scales ranging from "1 (strongly agree)" to "7 (strongly disagree)". An overall index of life satisfaction was computed by averaging all five scores ($\alpha = .92$).

Self-Reported Creativity. We used the 50 item Kaufman Domains of Creativity Scale (K-Docs; Kaufman, 2012), which assessed creativity across the following five broad domains ($\alpha = .84$ to $.91$): Self/Everyday, Scholarly, Performance (encompassing writing and music), Mechanical/Scientific, and Artistic. Participant's self-reported creativity ("Compared to people of approximately your age and life experience, how creative would you rate yourself for each of the following acts?") was scored on a 5-point Likert scale from "1 (*much less creative*)" to "5 (*much more creative*)". Some sample items include: "Finding something fun to do when I have no money" (Self/Everyday domain) and "Coming up with a new way to think about an old debate" (Scholarly). An overall creativity score was obtained by averaging the scores across the entire scale ($\alpha = .94$).

Behavioral Creativity Task (Brick Task). Participants completed a version of the Unusual Uses Task (Guilford, 1967), a well-validated measure of creativity. Participants were given two minutes to generate and list alternative uses for a brick with the following prompt: "Please list as many creative uses as you can think of for a brick. Please refrain from listing typical uses or uses that are virtually impossible." Using Guilford's (1967) original coding scheme, two independent raters blinded to other participant characteristics measured fluency by counting the number of valid uses, and flexibility by counting the number of different categories

the participants' ideas belonged to. Inter-rater reliability was high ($\alpha = .98$, for both fluency and flexibility), so we averaged scores across raters for each measure. Because the two measures were highly correlated, fluency and flexibility scores were standardized and averaged to form an overall behavioral creativity score for each participant.²

Occupational Creativity. We used the Occupational Information Network (O*NET), which is a publicly available online database (<http://www.onetonline.org/>) developed by the U.S. Department of Labor. O*NET holds extensive information for more than 925 jobs, including: occupation-specific worker characteristics, requirements, and experience (Peterson, Mumford, Borman, Jeanneret, & Fleishman 1999; Peterson et al., 2001). To obtain measures of occupational creativity, participants were asked to report their job titles and specific tasks they engage in with high frequency on the job. This reported job information was then matched with O*NET codes in the database by trained independent raters.

The coding procedure entailed two phases. First, in the coding phase, two trained raters independently assigned O*NET codes to each reported job title by using information from the online database. The coders reached 50% agreement in this phase. Afterwards, the raters met to resolve their disagreements by comparing dissimilar O*NET codes and reaching consensus over up to 98% of the assigned job codes.

Second, we used the resulting job codes to obtain from the O*NET database key occupation-specific measures pertaining to occupational creativity: originality, fluency of ideas, and thinking creatively. These occupation-specific measures had been previously coded by O*NET experts who considered the level of particular ability needed to perform the occupation as a whole on a scale from 1 to 7. These ratings were then standardized to a scale ranging from 0 to 100, for ease of interpretation (for more information about the O*NET system coding of

abilities see: http://www.onetcenter.org/dl_files/AnalystProc.pdf). We computed an overall occupational creativity index by averaging the standardized scores on the three occupation-specific measures: originality, fluency of ideas, and thinking creatively ($\alpha = .96$)

Results

Inter-correlations. Table 1.1 presents means, standard deviations, and inter-correlations among study variables. Notably, out of the three different measures of creativity, personality profile normativeness had a statistically significant association only with self-reported creativity (K-Docs; $r = .20, p < .001$), and this association was positive, where people with more normative profiles reported being more creative.

Cross-sectional link between personality normativeness and creativity. Next, hierarchical multiple regressions were conducted to test the incremental validity of personality profile normativeness over demographic factors and life satisfaction in predicting creativity. Table 1.2. presents results from the two models examined. Model Set A, including normativeness and demographic factors, demonstrated that being more normative ($\beta = .22, 95\% \text{ CI } [.12, .32]$) was associated with more self-reported creativity, over and above demographic factors. Model Set B demonstrated that being more normative ($\beta = .19, 95\% \text{ CI } [.08, .31]$) was associated with more self-reported creativity, over and above both life satisfaction and demographic factors.

Study 2

The second study sought to extend the findings from Study 1 to a larger cross-sectional sample, this time of college students, instead of MTurk workers. Moreover, in this study, we used a self-report measure of creative achievement (as opposed to creative inclinations or behaviors).

All the data analysis scripts, materials, and data necessary to reproduce these results are available for masked peer review at the following address:

https://osf.io/gm95y/?view_only=52b36c7cc7ea4b3f949243fe7c58a5d6. Once the review process has ended, we will make all these materials publicly available. Furthermore, all the output files are available at the same address and include exact p -values, in addition to the effect sizes and 95% confidence intervals reported in the present paper.

Methods

Participants.³ Study 2 included 1,344 undergraduate students from a large West Coast public university (68% female) from different majors who participated in exchange for course credit towards an introductory psychology course. Because the average correlation found between personality profile normativeness and the three creativity measures included in Study 1 was $r = .10$, we considered this sample size appropriate for a conceptual replication, because $N = 781$ would have been needed to have 80% power to detect $r = .10$. The average participant age was 19 years ($SD = 2.04$), and the group was ethnically diverse. Participants completed a randomized set of tests that included measures of creativity, life satisfaction, and personality. No data exclusionary criteria were used, except for screening for illogical answer patterns on the creative achievement measure (CAQ), a step which has been recommended in previous research using this measure (Silvia & Kimbrel, 2010).⁴ For instance, if one participant reported that they did not compose a piece a music, but went on to report that their composition was acclaimed at national level, we interpreted such patterns in a conservative fashion, assuming that the latter response was not true, and excluded the cases for which this occurred. Following these procedures, we identified nine participants who had illogical response patterns on the CAQ measure. We reported the results of the negative binomial regression on the sample with and

without these cases. We present in Table 2.2 the results on the full sample, and in Table 1S (in the supplemental materials) the results with the reduced sample excluding the nine participants with illogical answers. Notably, the results did not differ across the two analyses. We used listwise deletion to deal with missing data.

Measures.

Demographics. Participants reported age, gender, and race/ethnicity. Age was self-reported in years. Gender was coded Male = 0, and Female = 1, and race/ethnicity was coded 0 = White/Caucasian, and 1 = Other. Participants also reported the level of education attained by their mothers and fathers on a scale from 1 (less than high school) to 5 (graduate or professional degree). To obtain a measure of parental SES, we averaged the two scores.

Creative Achievement. The Creative Achievement Questionnaire (CAQ; Carson, Peterson, & Higgins, 2005) was used to biographically measure objective creative accomplishments. The CAQ is comprised of the following ten domains: visual arts, music, dance, architectural design, creative writing, humor, inventions, scientific discovery, theater and film, and culinary arts. Each domain included a 7-item checklist and participants could select as many items off that checklist as applied to them. Checklist items are meant to capture incremental levels of achievement, ranging from 0, no achievement (“I do not have training or recognized talent in this area”) to 7, extremely high achievement (“My work has been reviewed in national publications”). Across a subset of items, participants were prompted to indicate the number of times the respective achievements had been experienced. For these items, the item score was multiplied by the total number of occurrences reported, and this multiplicative result was added into the scale score. To minimize the probability of aberrant response patterns, the participants were only presented with detailed questions regarding a domain if they had reported

previous training in that particular domain (else, they would be directed to the next domain). We computed an overall measure of creativity by summing the points across items. Having a minimum value of 0 and an unknown maximum value, this unique scoring method yields a skewed distribution that is reflective of the natural distribution of creative accomplishments (Carson, Peterson, & Higgins, 2005).

Life Satisfaction. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larson, & Griffin, 1985) was used to measure subjective levels of global life satisfaction. This was the same scale we used in Study 1. Overall life satisfaction was computed by averaging the five items ($\alpha = .88$).

Personality Profile Normativeness. Personality traits were measured with the 44-item Big Five Inventory (BFI-44; John et al., 1991), the same scale we used in Study 1 ($\alpha = .79 - .85$), and personality profile normativeness was computed in the same way as in Study 1, using Furr's (2008) procedure.

Intelligence. Participants self-reported their scores on standardized scholastic achievement mathematical and verbal tests (Math SAT and Verbal SAT). Consistent with previous research, which showed that SAT scores are highly related to intelligence (Frey & Detterman, 2004), we used these scores as proxies for intelligence. We averaged the two scores and for one overall intelligence proxy score.

Results

Inter-correlations. Table 2.1 presents means, standard deviations, and inter-correlations among study variables. Consistent with Study 1 and with previous findings (Klimstra et al., 2010), personality profile normativeness had a statistically significant positive association with

life satisfaction ($r = .34, p < .001$). However, the link with creative achievement was not statistically significant.

Cross-sectional link between personality normativeness and creative achievement.

The CAQ presents non-normally distributed count data, with a positive skewness and with excessive zeros (therefore, an over-dispersed Poisson distribution). That is, most participants had none or very few creative achievements, while only a few people had extreme achievements, which is an accurate representation of the distribution of Big-C creativity in real life (Carson et al., 2005). One way to model this kind of data is through negative binomial regression models (Hilbe, 2007; Silvia & Kimbrel, 2010). Similar to Study 1, we conducted a series of regression models to test the incremental validity of personality profile normativeness over demographic factors, life satisfaction, and intelligence in predicting creativity. Table 2.2 displays results from the negative binomial regression models of creative achievements. Model set A included demographics as covariates, while Model set B included life satisfaction in addition to the variables in Model set A, and Model set C included intelligence in addition to the variables in Model set B. Across all three models, personality profile normativeness was not statistically significantly related to creative achievement.

Study 3

In this study, we wanted to test whether the positive link between personality profile normativeness and creativity found in Study 1 would hold across time, in a nationally representative sample, tested longitudinally, and where occupational creativity was concerned.

For Study 3, we analyzed archival data that are not under our direct control; requests to access the data should be directed to AIR (<http://www.air.org/>). Our complete analysis scripts, output, and codebook are available for masked peer review at the following address:

https://osf.io/gm95y/?view_only=52b36c7cc7ea4b3f949243fe7c58a5d6. Once the review process has ended, we will make all these materials publicly available. Furthermore, all the output files are available at the same address and include exact *p*-values, in addition to the effect sizes and 95% confidence intervals reported in the present paper.

Methods

Participants.⁵ We used data from Project Talent (Wise, McLaughlin, & Steel, 1979), a longitudinal study that began data collection in 1960 and contains one of the largest nationally representative samples currently available. After the original testing, the participants were re-contacted four times (1st, 5th, 11th, and 50th year follow-up). Given the present study's interest in variables that could only be measured later in life (i.e., job-related variables) we used data from baseline and from the 11th and the 50th year follow-up. The participant demographics across the three used waves were as follows: (i) the average age was 16 years old at baseline, 27 years old at the 11th-year follow-up, and 67 years old at the 50th-year follow-up; (ii) the gender distribution was stable across the three time points, with 52% women; and (iii) the race/ethnicity distribution was fairly similar across waves with 95.5% Whites/Caucasians at baseline, 96.8% Whites/Caucasians at the 11th-year follow-up, and 95.3% at the 50th-year follow-up. For our analyses, we only included cases that were coded as “credible” on the response credibility index (see Wise et al., 1979). The response credibility index was computed based on questions that assess attention and willingness to cooperate. At baseline, there were 346,660 (out of 377,016) participants coded as ‘credible’. The response rate for the 11th -year follow-up was about 22% ($N = 81,912$). For the 50th -year follow-up, a subsample of 4,879 participants was randomly selected, out of which 3,462 people were mailed survey materials. Of these 3,462 participants, about 56% responded to the survey and were included in the final 50th year follow-up dataset (N

= 1,952, out of which 1,858 were coded as ‘credible’). Throughout the analyses we used listwise deletion to deal with missing data, which is why participant numbers reported in the analyses differ from the total number of credible data points reported here. At the 11th year follow-up, the sample used was large enough to provide 80% power to detect effects as small as $r = .03$; at the 50th year follow-up, the sample used was large enough to provide 80% power to detect effects as small as $r = .07$; these effects are comparable to the .06 correlation observed between personality profile normativeness and occupational creativity in Study 1.

Measures.

Overview. The baseline survey recorded the students’ demographics (age cohort, race,⁶ gender, and parental SES) and personality traits. The 11th-year follow-up (Year 11) recorded educational attainment, job titles, and life satisfaction (notably, personality traits were not recorded at Year 11). The 50th-year follow-up (Year 50) recorded job titles, personality traits, and life satisfaction. Next, we describe each of the measures used in the present study, the original coding procedures, and the transformations we performed.

Demographics. Age cohort represents the grade (9th, 10th, 11th, or 12th) at baseline. Race/ethnicity was dummy coded (0 = ‘White/Caucasian’ and 1 = ‘Other’). Gender was coded as 0 = Male, 1 = Female. For parental SES, we calculated a composite (Wise et al., 1979), based on participants’ answers to nine questions regarding home value, family income, number of books in the house, number of appliances, access to media, availability of a private room for the child, father’s job status, father’s education, and mother’s education.

Personality Profile Normativeness (baseline). To measure personality traits, we used the 10 scales recorded and scored by the Project Talent staff with The Project Talent Personality Inventory (PTPI; 108 items; note, however, that item-level data are not currently available to

researchers, so we had to rely on scale scores computed by the Project Talent staff). The scales are as follows: The Vigor scale measures the physical activity level; The Calmness scale measures the ability to control one's emotional reactions. The Mature Personality scale measures the tendency to work efficiently and responsibly. The Impulsiveness scale measures the propensity towards quick decisions, without full consideration for the consequences; The Self-Confidence scale measures social acceptability and independent thinking; The Culture scale measures aesthetic appreciation; The Sociability scale measures the tendency to enjoy being in social company. The Leadership scale measures the tendency to seek out responsibility and taking charge. The Social Sensitivity scale measures the ability to understand and be thoughtful about someone else's perspective. The Tidiness scale measures the desire for order in one's environment. Each item was rated on a 5-point scale from 1 ("*describes me extremely well*") to 5 ("*does not describe me very well*"). The baseline PTPI scales scores available for this study were coded by the Project Talent staff in a dichotomized manner, such that answers A (*extremely well*) and B (*quite well*) were coded as 1 and answers C (*fairly well*), D (*slightly*), and E (*not very well*) were coded as 0. As for reverse scored items, answers D and E were coded as 1 and answers A, B, and C were coded as 0. Scale scores were originally computed by summing the responses across scales. We divided the available summed scale scores by the known number of items in each scale to obtain scale average scores. This was necessary to make the scores comparable across scales and allow them to be rank-ordered for the sake of computing personality profile normativeness accurately.

Previous work has already established the validity and reliability of the PTPI measures, as well as their relationship with modern Big Five inventories. According to Pozzebon and colleagues (2013): Culture ($\alpha = .81$) is best reflective of Openness to Experience; Mature

Personality ($\alpha = .93$) and Impulsiveness ($\alpha = .72$) are best reflective of Conscientiousness; Self-Confidence ($\alpha = .78$) and Calmness ($\alpha = .87$) reflect Emotional Stability; Social Sensitivity reflects Agreeableness, and Sociability ($\alpha = .83$); Vigour ($\alpha = .86$), and Leadership ($\alpha = .79$) are most reflective of Extraversion.

Based on the PTPI scale scores at the 11th year follow-up, we computed personality profile normativeness following the same procedure described in Studies 1 and 2.

Personality Profile Normativeness (50th year follow-up). At the 50th year follow-up, participants completed a short-form version of the PTPI, whereby each one of the 10 PTPI scales was measured with a subset of 5 of the original items. Like baseline, participants rated how well each item described them on a 5-point scale (“extremely well” to “not very well”). For the sake of consistency, we computed PTPI scale scores following the same procedure used at baseline. More specifically, we dichotomized and averaged the items. Based on the PTPI scale scores at the 50th year follow-up, we computed personality profile normativeness following the same procedure described in Studies 1 and 2 (Furr, 2008). Additionally, because we had item-level data available at this time point, measured on continuous scales, we re-did all the analyses using the continuously measured items. These analyses presented no differences compared to the results reported in the paper, given that people’s personality profile normativeness scores stayed exactly the same regardless of whether we used dichotomous or continuous personality trait scores.

Occupational creativity (11th year follow-up). Similar to Study 1, we used the O*NET database to measure occupational creativity based on participants’ self-reported job titles at Year 11. Trained independent raters matched the reported job information with Occupational Information Network (O*NET) codes using the online database (see Study 1). The coding

procedure was similar to the procedure reported in Study 1, involving a coding phase (with coders reaching 64% agreement at Step 1, and 94% agreement at the follow-up), and a phase in which the jobs were matched with three occupation-specific measures pertaining to creativity: originality, fluency of ideas, and thinking creatively. These three measures were averaged to compute an overall occupational creativity index ($\alpha = .96$).

Occupational creativity (50th year follow-up). At the 50th year follow-up, participants' self-reported job titles were used. This procedure was similar to the aforementioned procedure, involving a coding phase (with coders reaching 60% agreement at Step 1, and 97% agreement at the follow-up), and a phase in which the jobs were matched with the following occupation-specific measures pertaining to creativity: originality, fluency of ideas, and thinking creatively. These measures were averaged to compute an overall occupational creativity index ($\alpha = .95$).

Life Satisfaction (11th year follow-up).⁷ Participants answered 13 questions about their life satisfaction levels on a scale from 1 (“*Not at all satisfied*”) to 5 (“*Extremely satisfied*”). The items covered life satisfaction across multiple domains (e.g., “*How satisfied are you with your personal relationship with your significant other, job, health, personal relationships, etc.?*”). We computed an overall life satisfaction score by averaging responses on all 13 items ($\alpha = .83$).

Life Satisfaction (50th year follow-up). Like Study 1, Project Talent recorded life satisfaction, at this follow-up, using Diener's Satisfaction with Life Scale (SWLS; Diener, Emmons, Larson, & Griffin, 1985 ($\alpha = .90$)).

Intelligence (Baseline). Project Talent's baseline survey contains several measures that reflect intelligence: verbal, mathematical, and spatial abilities, which are comprised in the radex model of cognitive ability (Guttman & Levy, 1991; Wise et al., 1979). Based on previous research (Su et al., 2012; Damian et al., 2015), we computed an overall measure of intelligence

by averaging the standardized values across the three composites. Participants' answers on measures of Vocabulary, English Composite, and Reading Comprehension were weighted to create the Verbal Composite ($\alpha = .88$). Answers on measures of Mathematics Information, Arithmetic Reasoning, Introductory Mathematics, and Advanced Mathematics were weighted to create the Mathematical Composite ($\alpha = .93$). Lastly, answers on measures of Three- and Two-Dimensional Spatial Visualization, Mechanical Reasoning, and Abstract Reasoning were weighted to create the Spatial Composite ($\alpha = .80$).

Results

Inter-Correlations. Table 3.1 depicts means, standard deviations, and zero-order correlations among study variables. Personality profile normativeness at baseline appeared to be inversely related to occupational creativity after 11 years ($r = -.02, p < .001$) and at the 50th year follow-up ($r = -.06, p = .022$). At the 50th year follow-up, there was no statistically significant cross-sectional correlation between personality profile normativeness and occupational creativity.

Longitudinal links between personality profile normativeness and occupational creativity.

Personality profile normativeness in adolescence and occupational creativity in young adulthood.⁸ To assess the longitudinal effects of personality normativeness on occupational creativity across eleven years, we conducted a set of three hierarchical multiple regression analyses with occupational creativity as the outcome (see Table 3.2). Model A tested the relationship between normativeness and occupational creativity while controlling for race, gender, and parental SES. Baseline personality normativeness significantly predicted occupational creativity ($\beta = .03, 95\% \text{ CI } [.01, .04]$) above and beyond gender and parental SES.

Models B and C showed that the positive effect of personality profile normativeness on occupational creativity remained statistically significant after including life satisfaction ($\beta = .02$, 95% CI [.00, .04]) and intelligence ($\beta = .03$, 95% CI [.01, .05]) in the equation, respectively.

Personality profile normativeness in adolescence and occupational creativity in old adulthood. To assess whether personality profile normativeness in adolescence predicted occupational creativity at the 50th year follow-up, we ran a set of three hierarchical multiple regression models with occupational creativity at the 50th year follow-up as the outcome (Table 3.3), in which we controlled for confounds similar to previous analyses. Baseline personality profile normativeness did not significantly predict occupational creativity in old adulthood in any of the models: Model A ($\beta = -.03$, 95% CI [-.08, .01]), Model B ($\beta = -.04$, 95% CI [-.09, .01]) and Model C ($\beta = -.03$, 95% CI [-.07, .02]).

Cross-sectional link between personality profile normativeness and occupational creativity. In the third set of regression analyses (Table 3.4) we assessed the cross-sectional relationship between personality normativeness and occupational creativity at the 50th year follow-up. Model Set A showed that being more normative at the 50th year follow-up was associated with more occupational creativity measured at the same time point ($\beta = .06$, 95% CI [.01, .11]), above and beyond demographic factors. In Model B, we introduced life satisfaction, and found that the positive link between normativeness and occupational creativity was no longer statistically significant ($\beta = .03$, 95% CI [-.02, .08]), although the effect was similar in size to our previous findings. Next, in Model C we controlled for intelligence and found that personality profile normativeness remained unrelated to occupational creativity at the 50th year follow-up ($\beta = .03$, 95% CI [-.02, .08]).

Study 4

In this study, we tested whether the positive link between personality profile normativeness and creativity would hold not just across self-reports, but also across informant-reports. It has been established that self- and informant-reports of personality are psychometrically equivalent (Olino & Klein, 2015), and have convergent validity (Connolly, Kavanagh, & Viswesvaran, 2007; Vazire, 2010; Vazire & Mehl, 2008). Furthermore, informant-reports of personality are better predictors than self-reports when it comes to highly evaluative, external traits such as job performance, intelligence, GPA, or mortality (Vazire, 2006; 2010; Oh, Wang, & Mount, 2011; Jackson, Connolly, Garrison, Leveille, & Connolly, 2015). This discrepancy may stem from the fact that self-reports may be subject to biases (i.e., social desirability, implicit beliefs). Thus, it is essential to test whether the positive link we found between personality profile normativeness and creativity holds not just across self-reports, but also across informant-reports.

The de-identified dataset, complete analysis scripts, output, and codebook are available for masked peer review at the following address: https://osf.io/gm95y/?view_only=52b36c7cc7ea4b3f949243fe7c58a5d6. Once the review process has ended, we will make all these materials publicly available. Furthermore, all the output files are available at the same address and include exact *p*-values, in addition to the effect sizes and 95% confidence intervals reported in the present paper.

Methods

Participants.⁹ Participants from a mid-sized, private Midwestern university completed in-lab assessments (N = 414; 276 female) as part of the Personality and Interpersonal Roles study (PAIRS; Vazire et al., 2016). Given the effect size observed in Study 1 for the cross-sectional

link between personality profile normativeness and self-reported creativity ($r = .20$), we considered this sample size appropriate, because a sample size of 191 affords 80% power to observe an effect of $r = .20$. Participants were an average of 19.43 years old ($SD = 2.32$, range = 18 to 39). Most of the sample identified their race as White (55%), while the remainder identified as Asian or Asian-American (24%), Black or African-American (11%), some combination of the above (7%), American Indian/Alaska native, Native Hawaiian/Pacific Islander, or Other (3%).

Measures.

Personality: Self-report. Similar to Studies 1 and 2, personality was assessed using the 44-item Big Five Inventory (John & Srivastava, 1999). Big Five composites were created: extraversion ($\alpha = .90$); agreeableness ($\alpha = .82$); conscientiousness ($\alpha = .86$); neuroticism ($\alpha = .85$); openness ($\alpha = .79$).

Personality: Informant-report. A total of 1,341 informants rated participants on the same 44-item BFI scales used for the self-reports. Each of the 414 participants nominated up to 10 informants, and for 390 of these participants, at least one informant from the following categories completed BFI ratings of the target participant: a current romantic partner, a best friend in current city of residence, a friend or roommate in current city of residence, a hometown friend, a friend of the opposite sex, a friend, parents, an ex-romantic partner, and/or a sibling. An average of available informant-reports was created for each participant. Cronbach's alpha reliability across all ratings and informants: extraversion ($\alpha = .95$); agreeableness ($\alpha = .96$); conscientiousness ($\alpha = .96$); neuroticism ($\alpha = .96$); openness ($\alpha = .95$). Correlations between self- and informant-reports of personality were fairly high compared to prior research (e.g., Vazire, 2010): extraversion, $r = .68$ [.61, .73]; agreeableness, $r = .48$ [.40, .56]; conscientiousness, $r = .49$ [.40, .56]; neuroticism, $r = .53$ [.46, .60]; openness, $r = .42$ [.33, .50].

Personality Profile Normativeness. Using the *Profile.norm* function from the *multicon* package in R (Sherman, 2015), profile correlations between each target participant's profile of Big Five personality traits and the average of the sample's profile were calculated (with each target participants' score excluded for their own correlation). Each correlation thus reflected the normativeness of the profile relative to the rest of the sample (Furr, 2008). The average of normative correlations for self-reported profiles was $r = .42$ (range = $-.94, .99$), while the average of normative correlations for informant-reported profiles was $r = .64$ (range = $-.75, 1$).

Creativity. Target participants rated the degree to which they saw themselves as "someone who is creative" using a Likert scale from 1 ("*Disagree strongly*") to 15 ("*Agree strongly*") ($M = 10.63$, $SD = 3.07$), while informants used the same scale to rate their perceptions of the target participant ($M = 12.00$, $SD = 2.05$).

Life Satisfaction. Participants rated their satisfaction within 10 different life domains, on a Likert scale from 1 ("*Completely dissatisfied*") to 15 ("*Completely satisfied*"). Items included, "How satisfied are you with your: family? ... friendships? ...physical health?". Cronbach's alpha of the 10-item scale was .82.

Intelligence. Target participants rated the degree to which they saw themselves as "someone who is intelligent" using a Likert scale from 1 ("*Disagree strongly*") to 15 ("*Agree strongly*") ($M = 12.13$, $SD = 2.31$), while informants used the same scale to rate their perceptions of the target participant ($M = 13.61$, $SD = 1.39$).

Parental Socioeconomic Status. Target participants completed the item, "Growing up, how would you describe your family's socioeconomic status?", choosing between "Lower class" (1%), "Lower-middle class" (9%), "Middle class" (29%); "Upper-middle class" (51%), and

Upper class (9%). Socioeconomic status (SES) responses were treated as a scale variable from 1 (Lower) to 5 (Upper).

Results

Inter-Correlations. Table 4.1. displays means, standard deviations, and zero-order correlations among study variables. The correlation between self- and informant-reported personality profile normativeness was statistically significant and positive ($r = .37, p < .001$). Furthermore, there was a statistically significant positive correlation between self-reported personality normativeness and self-reported creativity ($r = .28, p < .001$) as well as between informant-reported personality normativeness and informant-reported creativity ($r = .21, p < .001$). Across modalities, we found no statistically significant correlations between self- (/informant-) reported personality profile normativeness and informant- (/self-) reported creativity, respectively.

Relationship between personality profile normativeness and self-reported creativity.

To assess the relationship between personality profile normativeness and self-reported creativity, we ran two kinds of multiple regression models. Models A included personality profile normativeness (either self- or informant-reported) as a predictor along with demographic variables (gender and race) and socioeconomic status as controls. Models B added life satisfaction and intelligence controls in addition to the controls present in Models A. Results can be found in Table 4.2.

Regarding personality profile normativeness based on self-reports of personality, in Model A, we found that a higher level of personality profile normativeness was associated with more creativity ($\beta = .27, 95\% \text{ CI } [.17, .38]$). Next, in Model B where we introduced life

satisfaction and intelligence as control variables, we found that the effect held ($\beta = .25$, 95% CI [.14, .36]).

Regarding personality profile normativeness based on informant-reports of personality, in Model A, which included demographics and socioeconomic status as covariates, personality profile normativeness was not related to creativity ($\beta = .03$, 95% CI [-.08, .14]). In Model B, which added life satisfaction and intelligence as covariates, personality profile normativeness was still not associated with creativity ($\beta = .01$, 95% CI [-.11, .13]).

Relationship between personality profile normativeness and informant-reported creativity. To assess the relationship between personality profile normativeness and informant-reported creativity, we ran two kinds of multiple regression models. Models A included personality profile normativeness (either self- or informant-reported) as a predictor along with demographic variables (gender and race) and socioeconomic status controls. Models B added life satisfaction and intelligence controls in addition to the controls present in Models A. Results can be found in Table 4.3.

Regarding personality profile normativeness based on self-reports of personality, in Model A, we found personality profile normativeness was not a statistically significant predictor of informant-reported creativity ($\beta = .10$, 95% CI [-.01, .21]). However, in the second regression model (Model B), in which we introduced life satisfaction and intelligence as control variables, personality profile normativeness was statistically significantly associated with informant-reported creativity ($\beta = .11$, 95% CI [.00, .21]).

Regarding personality profile normativeness based on informant-reports of personality, in Model A, which included demographics and socioeconomic status as covariates, personality profile normativeness was a statistically significant predictor of informant-reported creativity (β

= .19, 95% CI [.08, .30]). In Model B, which added life satisfaction and intelligence as covariates, personality profile normativeness was not statistically significantly associated with creativity ($\beta = .11$, 95% CI [.00, .22]).

Discussion

In the present set of studies, we tested whether deviancy or adjustment was associated with more creativity by assessing the link between personality profile normativeness and creativity in four different samples, measured either cross-sectionally or longitudinally. For this, we employed a person-centered approach, using personality profile normativeness (Furr, 2008) across the four studies.

In Study 1, we used a sample of US adults to test the cross-sectional link between personality profile normativeness and a wide range of creativity measures. We found that personality profile normativeness was associated with self-reported creativity above and beyond demographics, SES, and life satisfaction, bringing support to the hypothesis that adjustment, as opposed to deviancy, is related to more creativity. The association between psychological adjustment and creativity is consistent with the humanistic and positive psychology view (Runco, Ebersole, & Mraz, 1991) that creativity is the culmination of optimal functioning.

Using a different measure of creativity (CAQ: Carson et al., 2005), Study 2 sought to conceptually replicate the findings in Study 1. We found no statistically significant association between personality profile normativeness and self-reported creative achievements in a student sample. However, previous studies have questioned the validity of the creative achievement measure when employed in a young sample, because participants may have not had enough time to accomplish real-world creative achievements of the magnitude measured in the CAQ (Silvia et al., 2012). Thus, in Study 3, we tested our hypotheses in a large sample across the lifespan.

Study 3, employing a nationally representative longitudinal sample, lent further support to the association between personality normativeness and creativity by showing that personality profile normativeness assessed in high school was associated with occupational creativity eleven years later, above and beyond demographics, SES, life satisfaction, and intelligence. In other words, individuals who were better adjusted during early adolescence selected into more creative jobs in their early adulthood. Hence, adjustment was not only associated with self-reported measures of creativity (Study 1), but also with an objective life-outcome measure (Study 3), attesting to the robustness of the effect. Notably, however, the effect size was much larger when the outcome was self-reported, as opposed to when it was a life outcome measured 11 years later.

One interesting finding suggested by Study 3 is that personality profile normativeness predicted occupational creativity after 11 years, but that the effect did not seem to hold 50 years later, in old adulthood. Personality theory suggests that the influence of traits on outcomes across the lifespan can follow one of two trajectories: (a) a cumulative trajectory, whereby the effect strengthens through selection into trait-specific situations or (b) a dissipation trajectory, whereby the effects decline due to random events, life experiences, and/or personality change (see Bleidorn et al., 2018; Damian et al., in press). Our data seem to support the latter, but more research is needed to examine the independent contribution of life experiences on creativity. Furthermore, it may be that normative adolescents, while adjusted to the social norms and rules of their specific developmental phase, do not necessarily develop into normative adults. Indeed, the correlation between personality profile normativeness at baseline and personality profile normativeness after 50 years ($r = .19, p < .001$) indicates that personality profile normativeness is only moderately stable across 50 years. It is well established in the literature that personality change occurs across the life-span (Roberts et al., 2006; Roberts et al., 2008), and that this

change usually occurs in the direction of maturation. Our study design, however, did not account for maturational changes in personality profiles, rendering it difficult to establish whether the normative adolescents did not select into more creative occupations after 50 years because they ceased to be normative in the meantime (Bleidorn et al., 2009; Bleidorn, Hopwood & Lucas, 2018). Using a cross-sectional analysis of the 50th year follow-up sample, we found that personality normativeness in old adulthood was related to occupational creativity, which was in line with our findings from Study 1, and in line with the longitudinal effects found across 11 years. However, this association was no longer statistically significant when controlling for life satisfaction and intelligence.

In Study 4, we found that when personality profile normativeness was based on self-reported personality measures, it was significantly associated with self-reported creativity but not with informant-reports of creativity. Conversely, when personality profile normativeness was based on informant-reports of personality, it was associated with informant-reports of creativity, but not with self-reports of creativity. These results suggest that people may have implicit theories about creativity, which could have influenced their self- or other-perceptions on both personality and creativity measures. Further research is needed to determine whether these results hold when the outcome is an objective (rather than a perceived) measure of creativity.

Notably, and in light of the “mad genius” theoretical debate, across our four studies none of the statistically significant links between personality profile normativeness and creativity were negative, implying that being more deviant was not reliably associated with being more creative. One possible criticism is that we only fitted linear models, when in fact, it is possible that personality profile normativeness and creativity show a curvilinear association. For example, it could be that moderate levels of deviancy are not conducive to creativity but perhaps high levels

are, and that relationship might be obscured by fitting linear models. To address this issue, we provide scatter plots for the data across all four studies (see Supplemental Materials Figures 1S to 6S). As can be seen in the scatterplots, there is no evidence for a curvilinear link between personality profile normativeness and creativity across any of the studies. This suggests that the present results are inconsistent with the “mad genius” hypothesis, and that adjustment, not deviancy, might be related to more creativity.

Going back to the beginning of the paper, and thinking of people like Steve Jobs, who were reportedly both brilliant and deviant (Isaacson, 2011), and of extensive empirical evidence from the genius literature suggesting that being deviant or having had extensive diversifying experiences (which are often characterized by deviancy) is associated with more genius-level creativity (e.g., Damian & Simonton, 2015; for a review see, Damian, 2017), how can we reconcile this with the present results? The answer might lie in the so-called “mad-genius paradox.” Specifically, through a mathematical simulation, Simonton (2014) showed that the two apparently conflicting propositions (the “mad” vs. well-adjusted creator) may be simultaneously true. Namely, it is possible that (a) among *creative* people, the most creative show more deviancy than the less creative and (b) among *all* people, more creative people show more adjustment. The simulation showed that this phenomenon follows logically from the distribution of creative productivity, which is approximated by an inverse power function, where an extremely small number of people are responsible for the highest number of creative products. Thus, according to this simulation, both camps can be right at the same time: deviancy and adjustment can *both* predict creativity, but in different kinds of samples. Moreover, the fact that we failed to find curvilinear effects in our general population samples, does not go against the possibility that deviancy may still predict more creativity among creative geniuses. This is

because, given the rare occurrence of creative geniuses, it is unlikely that we had enough such distinguished cases present in our samples, even when these samples were representative of the general population.

In conclusion, our present findings support a robust link between personality profile normativeness and creativity, when creativity is self- or informant-reported, and when personality traits and creativity are measured within modality. The results seem less robust with respect to more objective measures of creativity, although we did find some evidence for a more modest link between personality profile normativeness and an objective measure of occupational creativity in Study 3 (but see Footnote 8). Our findings may be interpreted in several ways: one possibility is that normativeness really is conducive to creativity in the general population. However, because the effect did not reliably replicate across creativity measures, we provide two alternative interpretations. One possibility is that the perception of creative ability is positively biased by personality profile normativeness both in self-perception (i.e., the more normative one is, the more likely he/she is to consider him/herself as more creative) and in other-perception (i.e., the more adjusted someone appears, the more people are willing to consider him/her as more creative). This explanation is in line with the halo effect (Nisbett & Wilson, 1977), which postulates that global, positive, person-centered evaluations of an individual (in our case, someone's level of adjustment) render positive evaluations of that person's other attributes (e.g., creativity). Another possibility is that people's specific lay theories about normativeness and creativity may influence their judgements about their own and others' level of creativity (i.e., people might hold lay beliefs that adjustment is related to creativity). Thus, future research should consider assessing halo effects and lay theories of creativity and the influence these processes may play in people's perceptions of their own and others' levels of creativity.

Despite the above limitations, we consider that these studies present several advantages that advance our understanding of processes that might underlie creativity: (a) to our knowledge, this is the first work to employ a person-centered approach in the study of creativity and adjustment/deviancy; (b) our data comes from different kinds of samples, with different age groups; (c) we tested our hypotheses both cross-sectionally and longitudinally across a wide time-span (11 and 50 years); (d) we used a wide range of measures of creativity, self-reports, informant-reports, behavioral, and occupational measures. All in all, these studies further our knowledge of the underlying mechanisms of creativity, contribute to the decades-old “mad genius” debate, and suggest that adjustment and not deviancy might be related to more creativity in the general population.

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Footnotes

¹The dataset used in Study 1 comes from an online sample, and it has not been used in any previous papers. Note, that unlike in the other three studies, we did not have a measure of intelligence available in this study, so we could not include it as a control variable.

²We also conducted the analyses for fluency and flexibility separately, and we found no meaningful differences in the results.

³The dataset used in Study 2 comes from a college student sample and it has been previously used in one paper on creativity and motivation (Damian & Robins, 2013). However, this study did not include a measure of personality profile normativeness.

⁴Excluded participants and their answers: Participant number 715 answered for the visual arts section, that they never won any prize, neither had any showings, nor sold a piece work, and that their work had never been critiqued in local publications, but went on to state that their work had been critiqued in national publications; participant 582 answered for the musical section that they never composed a piece of music, but that their composition has been acclaimed in national publications; participants 29, 724, and 1008 answered for the dance section that they had never choreographed dance professionally, but that their choreography had received national attention; participants 141, 453, 715, 761, and 1231 reported that their writing has been reviewed in local publications, but had previously claimed that they had never written an original work. Results without these participants are presented in Table 1S of the supplemental materials.

⁵The data used in Study 3 comes from the Project Talent dataset. The latter is a large longitudinal study conducted on a US representative sample. Previous literature has been published using the personality data available at baseline, at the 11th and/or at the 50th year follow-up, which are the waves that we have also employed in our analyses (Damian et al., in

press; Spengler et al., in press; Damian & Roberts, 2015; Damian, Spengler, & Roberts, 2017; Damian et al., 2015; Major, Johnson, & Deary, 2014). However, none of these papers investigated the link between personality profile normativeness and occupational creativity, and none of these papers used a measure of occupational creativity.

A comprehensive list of papers published using *other* variables from the Project Talent dataset can be found at the following link: <http://www.projecttalent.org/about/biblio>.

⁶Due to a clerical mistake, Project Talent race/ethnicity data were not recorded at baseline, but was recovered for 50% of the sample at the 5th year follow-up.

⁷Owing to a clerical mistake, the Project Talent recorded Life Satisfaction for one subset of the sample (only 9th graders, N=10,059) at the 11th Year follow-up.

⁸To make the results comparable across Models A through C, we report the regression analysis results for the subset of the sample that reported Life Satisfaction (N= 10,059, the life satisfaction measure was missing for the rest of the sample). However, we also conducted separate regression analyses on the entire sample, in which we tested Model A', with gender, grade, race, and parental SES as covariates, as well as Model B' where we added intelligence to the covariate list present in Model A'. The results from these models are reported as well in Table 2S, found in the Supplemental Materials. Notably, effect of personality profile normativeness was in the same direction at it was statistically significant in Model B', but was smaller and no longer statistically significant in Model A'. Thus, it is possible that the effects reported in Table 3.2 do not generalize beyond the sample of 10,059 9th graders. In the discussion section, we consider the possibility that personality profile normativeness might only show a robust association in the context of self-reported or informant-reported creativity (as opposed to behavioral or occupational creativity) and discuss theoretical implications.

⁹The dataset used in Study 4 has been previously used in papers regarding personality (Colman, Vineyard, & Letzring, 2018; Finnigan & Vazire, 2018; Solomon & Vazire, 2016; Wilson, Harris & Vazire, 2015; Wilson, Thompson, & Vazire, 2017). However, previous studies employing this dataset have never used the creativity measure employed in the present study.

Table 1.1.

Descriptive statistics and inter-correlations among Study 1 variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Personality Profile Normativeness	.57	.47								
2. Gender	.55	.50	-.01							
3. Age	37.50	11.55	.14	.11						
4. Race	.24	.43	.07	-.04	-.21					
5. Parental SES	.03	.73	-.05	-.07	-.19	-.10				
6. Life Satisfaction	4.54	1.72	.38	-.07	-.02	-.02	.01			
7. Behavioral Creativity	.00	.96	.05	.00	.00	-.18	.13	-.05		
8. Self-Reported Creativity	3.21	.60	.20	-.03	-.12	.07	.09	.14	.09	
9. Occupational Creativity	47.01	11.71	.06	-.14	-.00	.02	.18	.11	.09	.09

Note. $N = 305-350$. Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other). **Bold** indicates statistical significance at $p < .05$.

Table 1.2.

Summary of Regression Analyses for Cross-Sectional Predictors of Self-Reported Creativity

	Model A		Model B	
	β	95% CI for β	β	95% CI for β
Predictor				
Personality Profile Normativeness	.22	[.12, .32]	.19	[.08, .31]
Covariates				
Gender	-.01	[-.12, .09]	-.01	[-.11, .10]
Age	-.14	[-.25, -.03]	-.13	[-.24, -.02]
Race	.03	[-.08, .13]	.03	[-.08, .14]
Parental SES	.08	[-.03, .19]	.08	[-.03, .19]
Life Satisfaction			.06	[-.05, .17]
R^2 (adjusted)	.06		.06	

Note. $N=342$. Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other). β s represent standardized regression coefficients. **Bold** indicates statistical significance at $p < .05$.

Table 2.1.

Descriptive statistics and inter-correlations among Study 2 variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Personality Profile Normativeness	.40	.48							
2. Gender	.32	.47	.05						
3. Age	19.52	2.04	.03	-.01					
4. Race	.68	.47	.03	.01	-.02				
5. Parental SES	3.11	1.27	-.02	.06	-.03	-.36			
6. Intelligence	623.42	99.49	-.03	.16	.03	-.13	.36		
7. Life Satisfaction	4.70	1.26	.34	-.11	-.01	-.31	.12	.02	
8. Creative Achievement	7.22	10.30	-.01	.01	-.02	-.03	.10	.06	.04

Note. N= 1,109. Gender was dummy coded (0 = Male, 1 = Female). **Bold** indicates statistical significance at $p < .05$.

Table 2.2.

Negative binomial model of creative achievement as predicted by personality profile normativeness.

Count of Creative Achievements	Model A		Model B		Model C	
	B	95% Wald CI	B	95% Wald CI	B	95% Wald CI
Predictor						
Personality Profile Normativeness at Baseline	-.04	[-.17, .08]	-.07	[-.20, .07]	-.08	[-.24, .07]
Covariates						
Gender	.02	[-.11, .15]	.01	[-.12, .14]	.04	[-.10, .19]
Age	-.01	[-.04, .02]	-.01	[-.04, .02]	-.04	[-.10, .01]
Race	-.02	[-.15, .12]	-.02	[-.16, .11]	.02	[-.14, .17]
Parental SES	.12	[.07, .17]	.12	[.07, .17]	.10	[.04, .16]
Life Satisfaction			.04	[-.02, .09]	.04	[-.02, .10]
Intelligence					.00	[.00, .00]
N	1,258		1,254		948	

Note. **Bold** indicates statistical significance at $p < .05$. Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other). B indicates unstandardized Poisson coefficients, which are interpreted as the log counts unit change in the outcome for every unit change in the predictor while holding the rest of the predictors constant.

Table 2.1.

Descriptive Statistics and inter-correlations among Study 3 variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. Personality Profile Normativeness Baseline	.51	.29										
2. Personality Profile Normativeness Y50	.62	.25	.19									
3. Gender	.52	.50	.14	.18								
4. Age Grade	10.43	1.10	.02	.01	.00							
5. Race	.05	.21	-.03	.04	.04	-.02						
6. Parental SES	98.07	10.09	-.00	.03	-.02	.08	-.18					
7. Intelligence	-.003	.88	-.04	-.02	-.16	.26	-.22	.44				
8. Life Satisfaction Y11	3.81	.51	.08	.12	.04	NA	-.03	-.01	-.11			
9. Life Satisfaction Y50	3.97	.81	.05	.17	-.01	.07	-.01	.09	.10	.30		
10. Occupational Creativity Y11	46.43	11.97	-.02	.03	-.16	.01	-.06	.29	.37	.02	.07	
11. Occupational Creativity Y50	46.28	11.76	-.06	.04	-.12	.01	.01	.21	.30	-.12	.17	.43

Note. **Bold** indicates statistical significance at $p < .05$. Grade reflects the grade to which the participants belonged at baseline (9th to 12th grade). Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other). Sample sizes across waves as follows: *Baseline* ($N = 147,873 - 346,660$); *Year 11* ($N = 19,738 - 47,143$); *Year 50* ($N = 1,564 - 1,837$). NA = correlation not available because life satisfaction was only collected for 9th graders

Table 3.2.

Summary of Regression Analysis for Longitudinal Predictors of Occupational Creativity after 11 years

	Model A		Model B		Model C	
	β	95% CI for β	β	95% CI for β	β	95% CI for β
Predictor						
Personality Profile Normativeness at Baseline	.03	[.01, .04]	.02	[.00, .04]	.03	[.01, .05]
Covariates						
Gender	-.16	[-.17, -.14]	-.16	[-.17, -.14]	-.14	[-.15, -.12]
Race	-.01	[-.03, .01]	-.01	[-.03, .01]	.05	[.03, .06]
Parental SES	.27	[.26, .29]	.28	[.26, .29]	.16	[.14, .18]
Life Satisfaction Y11			.03	[.01, .04]	.06	[.04, .08]
Intelligence					.29	[.27, .31]
N		10,059		10,059		9,915
R^2 (adjusted)		.10		.10		.17

Note. **Bold** indicates statistical significance at $p < .05$. β s represent standardized regression coefficients. Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other).

Table 3.3.

Summary of Regression Analysis for Longitudinal Predictors of Occupational Creativity after 50 Years

Predictor	Model A		Model B		Model C	
	β	95% CI for β	β	95% CI for β	β	95% CI for β
Personality Profile Normativeness at Baseline	-.03	[-.08, .01]	-.04	[-.09, .01]	-.03	[-.07, .02]
Covariates						
Gender	-.12	[-.17, -.07]	-.12	[-.17, -.07]	-.08	[-.12, .03]
Age Grade	-.05	[-.10, -.00]	-.05	[-.10, -.00]	-.09	[-.14, -.05]
Race	.07	[.02, .12]	.07	[.03, .12]	.10	[.06, .15]
Parental SES	.23	[.18, .28]	.21	[.16, .26]	.12	[.07, .18]
Life Satisfaction Y50			.15	[.10, .20]	.13	[.09, .18]
Intelligence					.26	[.21, .31]
N		1,544		1,531		1,506
R^2 (adjusted)		.06		.09		.14

Note. **Bold** indicates statistical significance at $p < .05$. β s represent standardized regression coefficients. Grade reflects the grade to which the participants belonged at baseline (9th to 12th grade). Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other).

Table 3.4.

Summary of Regression Analysis for Cross-Sectional Predictors of Occupational Creativity at Year 50

Predictor	Model A		Model B		Model C	
	β	95% CI for β	β	95% CI for β	β	95% CI for β
Personality Profile Normativeness at Year 50	.06	[.01, .11]	.03	[-.02, .08]	.03	[-.02, .08]
Covariates						
Gender	-.14	[-.19, -.09]	-.13	[-.18, -.08]	-.09	[-.14, .04]
Age Grade	-.05	[-.10, .00]	-.05	[-.10, -.01]	-.10	[-.14, -.05]
Race	.07	[.02, .12]	.08	[.03, .13]	.11	[.06, .15]
Parental SES	.23	[.18, .28]	.21	[.16, .26]	.12	[.07, .18]
Life Satisfaction Y50			.15	[.10, .20]	.13	[.08, .18]
Intelligence					.26	[.20, .31]
N		1,529		1,520		1,495
R^2 (adjusted)		.07		.09		.14

Note. **Bold** indicates statistical significance at $p < .05$. β s represent standardized regression coefficients. Grade reflects the grade to which the participants belonged at baseline (9th to 12th). Gender was dummy coded (0 = Male, 1 = Female). Race was dummy coded (0 = White, 1 = Other)

Table 4.1.

Descriptive statistics and inter-correlations among Study 4 variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Personality Profile Normativeness (Self-Reports of Personality)	.42	.44									
2. Personality Profile Normativeness (Informant-Reports of Personality)	.64	.39	.37								
3. Gender	1.67	.47	-.16	.01							
4. Race	1.45	.50	-.05	.09	.03						
5. Parental SES	3.59	.83	-.01	.05	.05	-.21					
6. Life Satisfaction	10.36	2.08	.38	.31	.01	-.16	.17				
7. Creativity (Self-Report)	10.63	3.07	.28	.04	.08	-.01	-.02	.12			
8. Creativity (Informant-Report)	12.00	2.05	.06	.21	.16	-.05	.08	-.00	.25		
9. Intelligence (Self-Report)	12.13	2.31	.18	.03	.04	-.15	.11	.24	.27	-.11	
10. Intelligence (Informant-Report)	13.61	1.39	.07	.28	.03	-.15	.10	.04	-.02	.46	.01

Note. **Bold** indicates $p < .05$. Gender was dummy coded (0 = Male, 1 = Female).

Table 4.2.

Self-reported creativity predicted by personality profile normativeness (based on both self- and informant- reports of personality)

	Creativity (Self-Report)			
	Model A		Model B	
	β 95% CI for β			
<i>Predictors</i>				
Normativeness of Personality Profile (Self-report)	.27 [.17, .38]	.25 [.14, .36]		
Normativeness of Personality Profile (Informant-report)			.03 [-.08, .14]	.01 [-.11, .13]
<i>Covariates</i>				
Gender	.12 [.02, .23]	.12 [.02, .22]	.05 [-.07, .16]	.05 [-.06, .17]
Parental SES	-.03 [-.14, .07]	-.05 [-.16, .06]	.00 [-.11, .12]	-.03 [-.14, .09]
Race	.01 [-.10, .12]	.06 [-.04, .17]	.01 [-.11, .12]	.08 [-.04, .20]
Life Satisfaction		-.02 [-.13, .09]		.10 [-.03, .22]
Intelligence (Self-report)		.21 [.10, .31]		.18 [.06, .30]
R^2 (adjusted)	.07	.11	-.01	.03

Note. **Bold** indicates significance at $p < .05$. Gender coded as 0 = Male; 1 = Female. β s represent standardized regression coefficients.

Table 4.3

Informant-reported creativity predicted by personality profile normativeness (based on both self- and informant- reports of personality)

		Creativity (Informant-Report)			
		Model C		Model D	
		β	β	β	β
		95% CI for β	95% CI for β	95% CI for β	95% CI for β
<i>Predictors</i>					
	Normativeness of Personality Profile (Self-Report)	.10 [-.01, .21]	.11 [.00, .21]		
	Normativeness of Personality Profile (Informant-Report)			.19 [.08, .30]	.11 [-.00, .22]
<i>Covariates</i>					
	Gender	.20 [.09, .31]	.17 [.07, .27]	.18 [.07, .29]	.15 [.05, .25]
	Parental SES	.07 [-.04, .18]	.03 [-.07, .13]	.05 [-.07, .16]	.03 [-.07, .14]
	Race	-.04 [-.15, .07]	.03 [-.07, .13]	-.05 [-.16, .07]	.02 [-.09, .12]
	Life Satisfaction		-.06 [-.17, .05]		-.06 [-.17, .05]
	Intelligence (Self-Report)		.48 [.38, .57]		.43 [.32, .53]
	R^2 (adjusted)	.04	.25	.06	.23

Note. **Bold** indicates significance at $p < .05$. Gender coded as 0 = Male; 1 = Female. β s represent standardized regression coefficients.

Supplemental Materials

Table 1.S.

Negative binomial model of creative achievement as predicted by personality profile normativeness (without 9 participants with illogical response patterns)

Count of Creative Achievements	Model A		Model B		Model C	
	B	95% Wald CI	B	95% Wald CI	B	95% Wald CI
Predictor						
Personality Profile Normativeness at Baseline	-.07	[-.19, .06]	-.10	[-.23, .04]	-.08	[-.24, .07]
Covariates						
Gender	.01	[-.12, .13]	-.01	[-.13, .12]	.06	[-.09, .20]
Age	-.01	[-.04, .02]	-.01	[-.04, .02]	-.04	[-.09, .01]
Race	-.03	[-.17, .11]	-.05	[-.19, .09]	.02	[-.14, .17]
Parental SES	.15	[.10, .20]	.15	[.10, .20]	.10	[.03, .16]
Life Satisfaction			.04	[-.01, .10]	.05	[-.01, .11]
Intelligence					.00	[.00, .00]
N		1,250		1,246		944

Note. Bolded font indicates statistical significance at $p < .05$. Gender was dummy coded (0 = Males, 1 = Females). Race was dummy coded (0 = White, 1 = Other). B indicates unstandardized Poisson coefficients, which are interpreted as the log counts unit change in the outcome for every unit change in the predictor while holding the rest of the predictors constant.

Table 2.S.

Summary of Regression Analysis for Longitudinal Predictors of Occupational Creativity after 11 years

Predictor	Model A'		Model B'	
	β	95% CI for β	β	95% CI for β
Personality Profile Normativeness at Baseline	.01	[.00, .01]	.02	[.02, .03]
Covariates				
Gender	-.15	[-.16, -.14]	-.12	[-.12, -.11]
Age Grade	-.01	[-.02, .00]	-.09	[-.09, -.08]
Race	.01	[.00, .02]	.05	[.04, .06]
Parental SES	.29	[.28, .30]	.17	[.16, .17]
Intelligence			.31	[.30, .32]
N		43,372		43,372
R^2 (adjusted)	.11		.18	

Note. Model A' indicates results of analyses conducted on the entire sample. Bolded – statistical significance at $p < .05$.

Grade reflects the grade to which the participants belonged at baseline.

Gender was dummy coded (0 = Males, 1 = Females). Race was dummy coded (0 = White, 1 = Other).

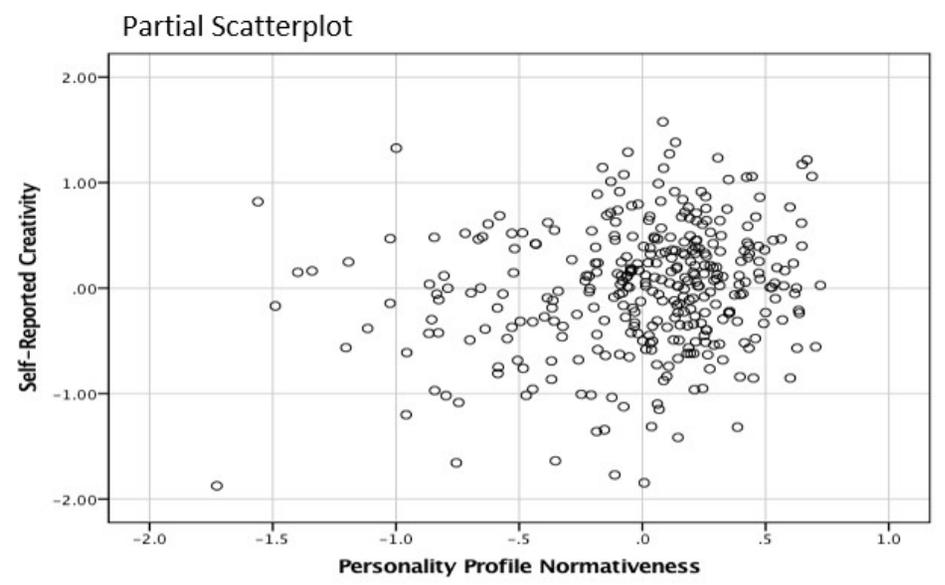
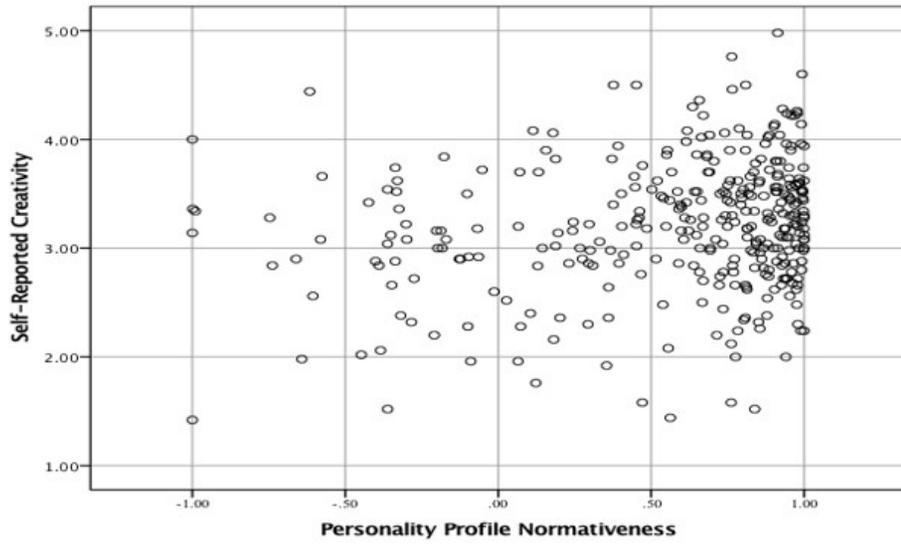
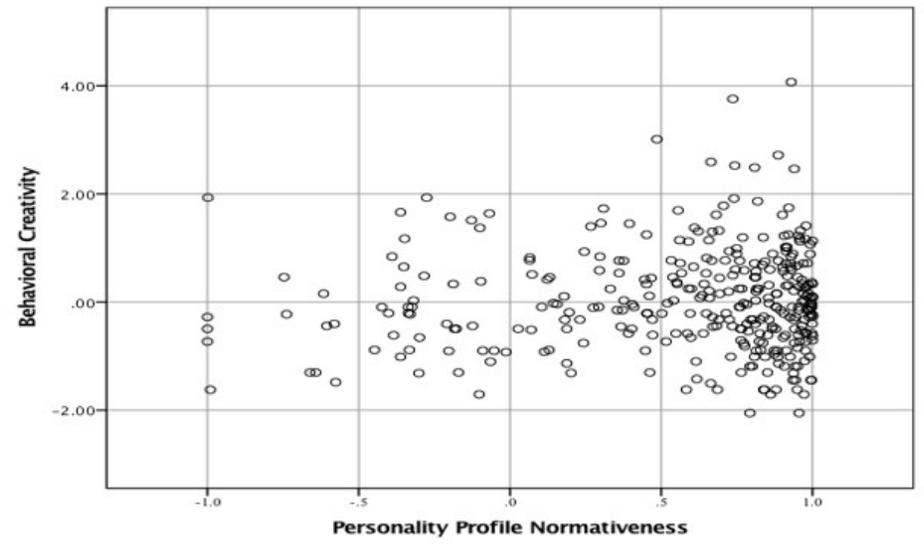
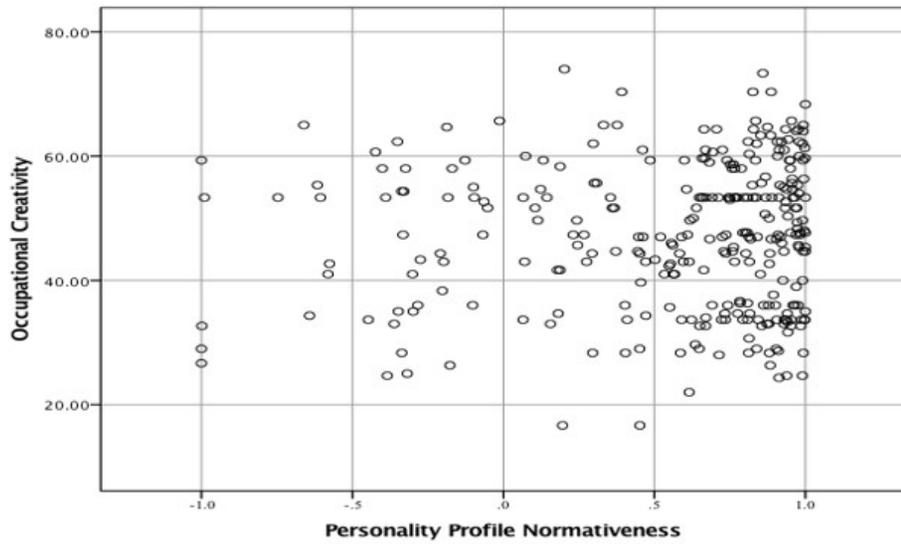


Figure 1S. Scatterplots depicting the relationship between personality profile normativeness and different types of creativity (Study 1)

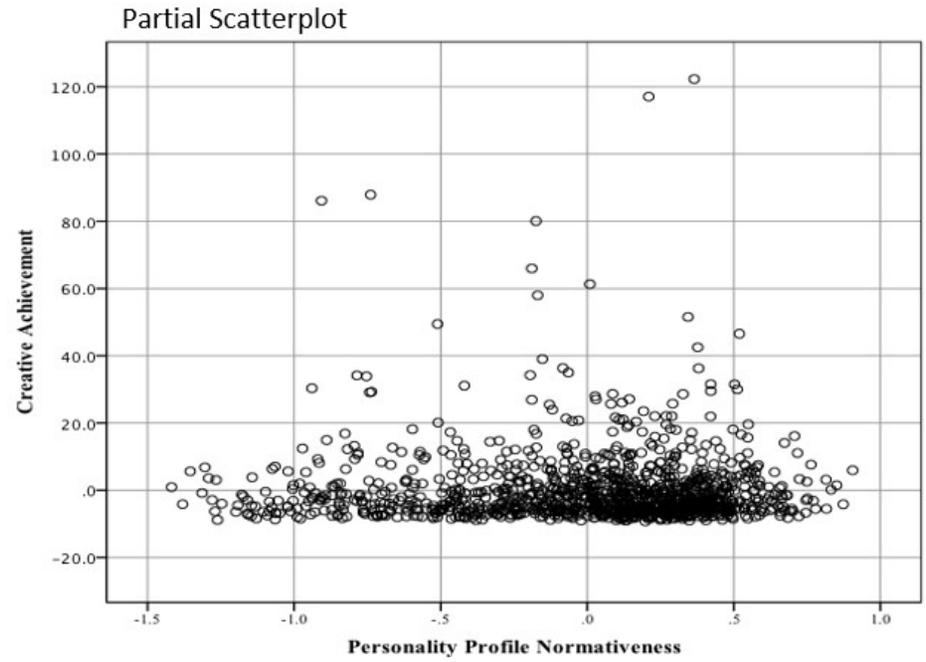
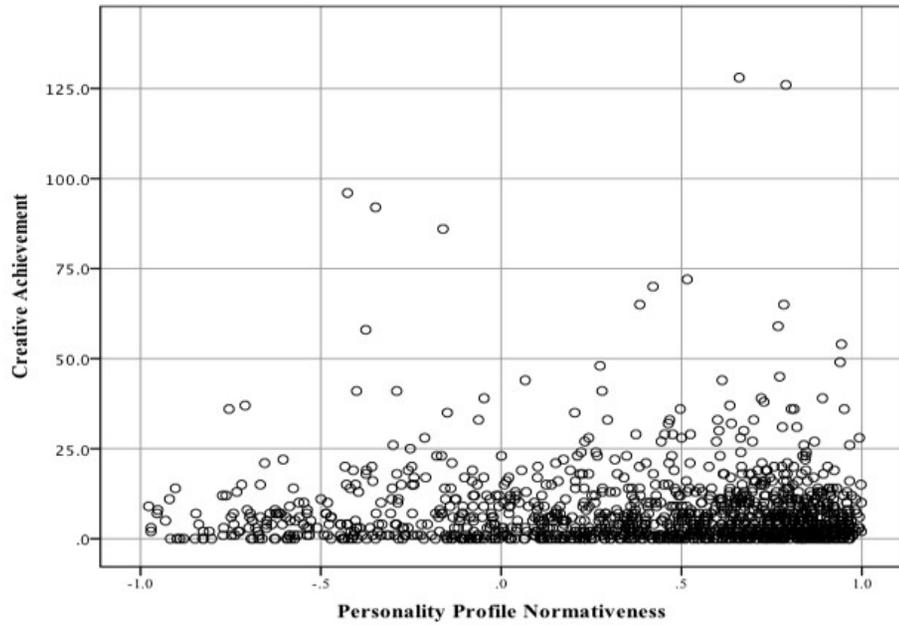


Figure 2S. Scatterplots depicting the relationship between personality profile normativeness and creative achievement (Study 2)

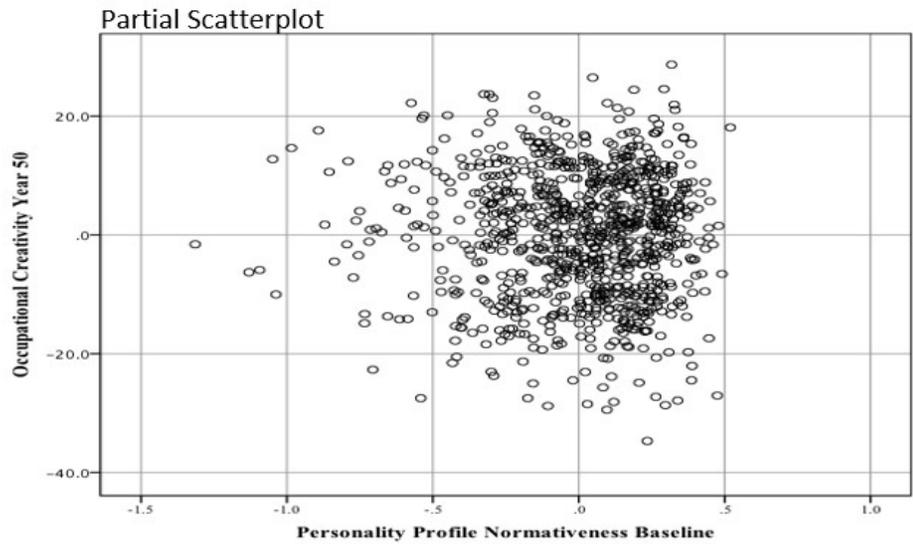
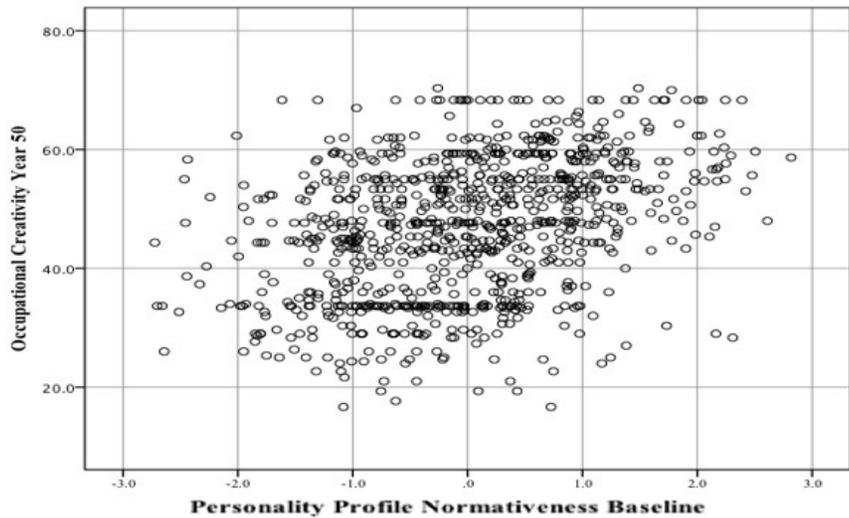
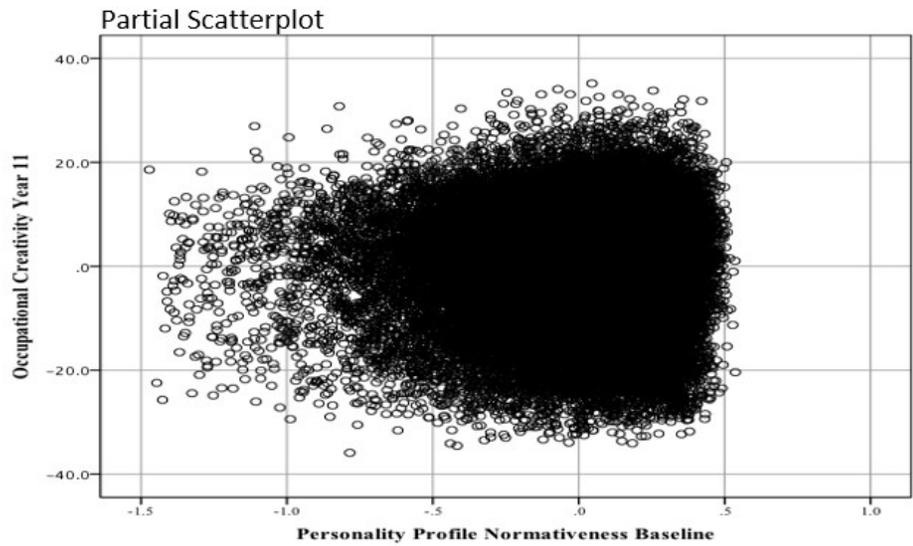
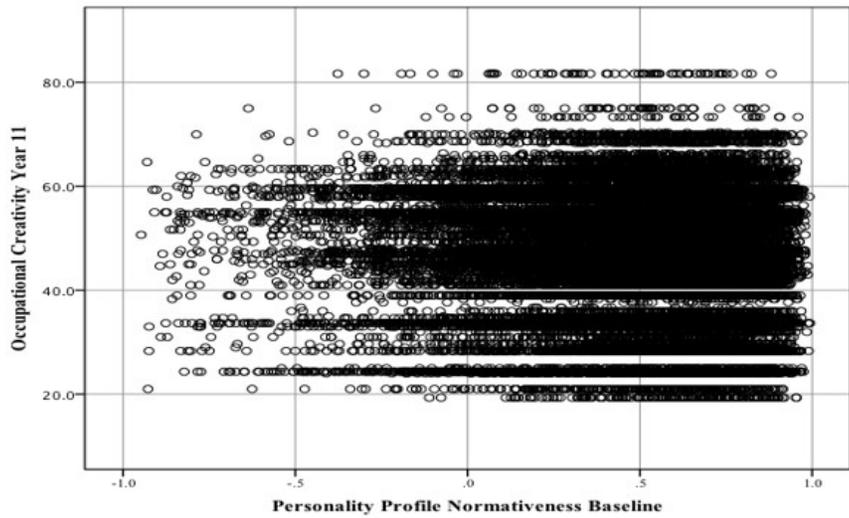


Figure 3S. Scatterplots depicting the relationship between personality profile normativeness and occupational creativity (Study 3)

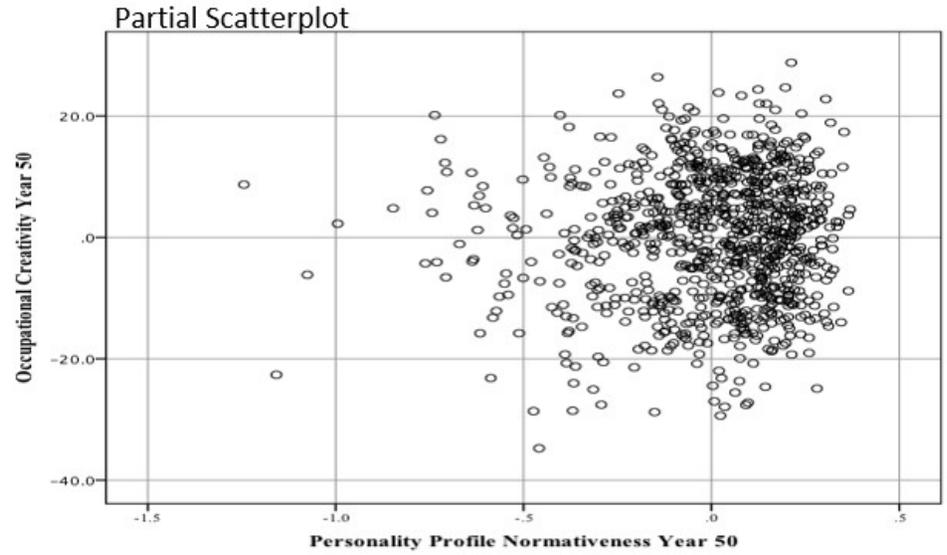
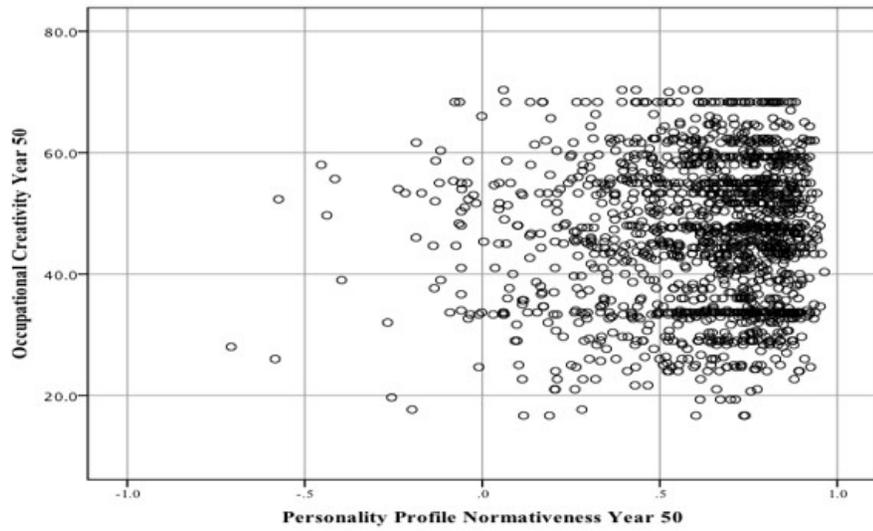


Figure 4S. Scatterplots depicting the relationship between personality profile normativeness and occupational creativity (Study 3 - Continued)

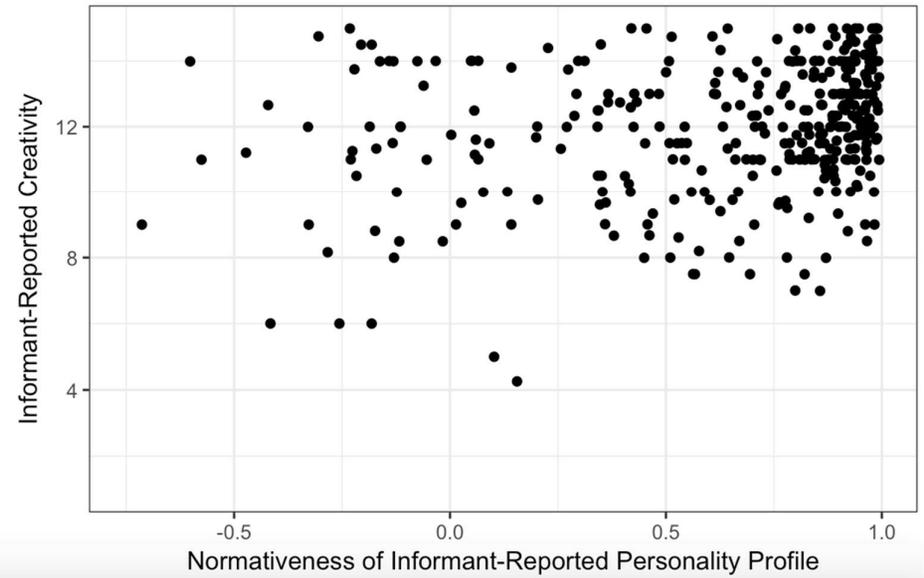
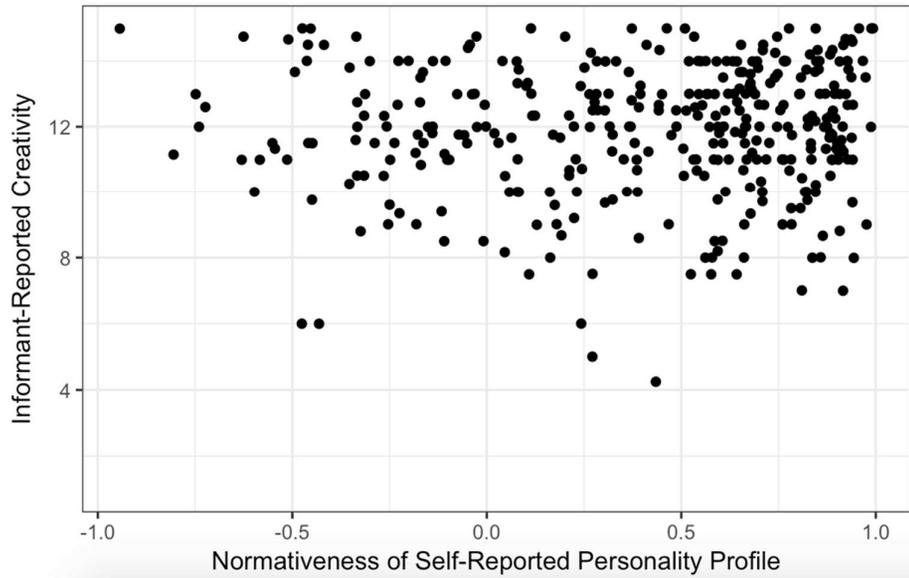
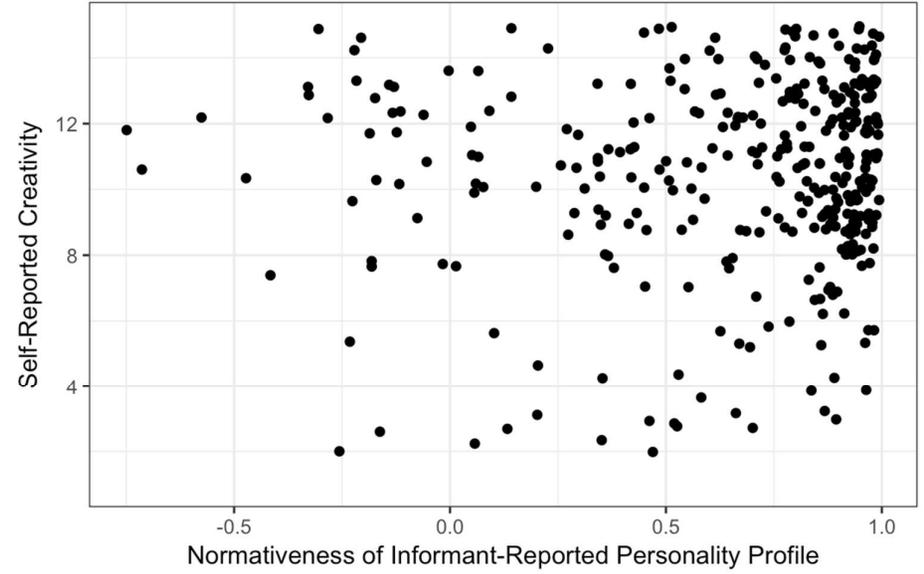
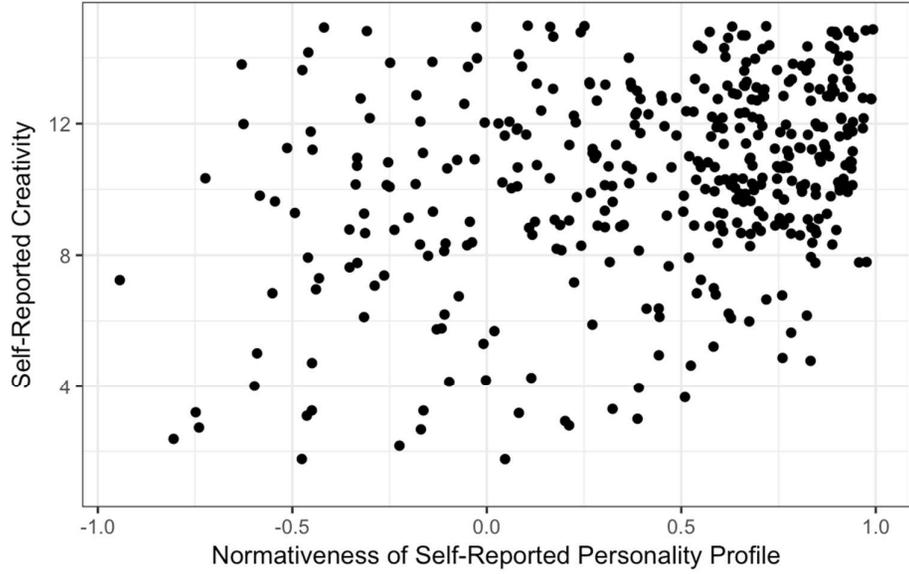


Figure 5S. Scatterplots depicting the relationship between personality profile normativeness and creativity (Study 4)

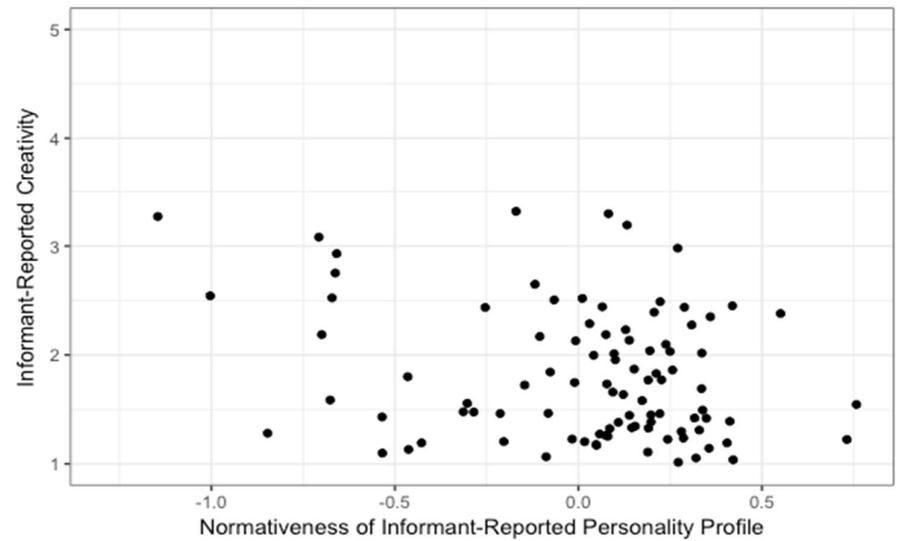
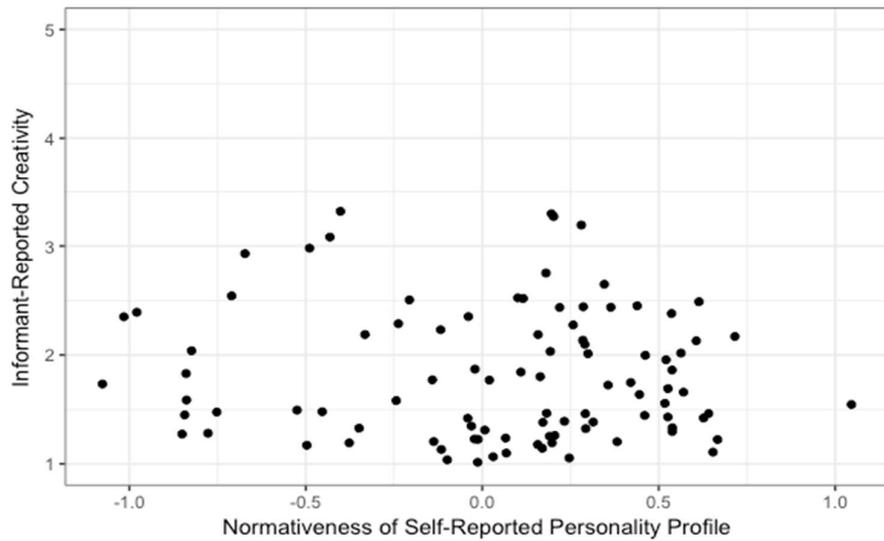
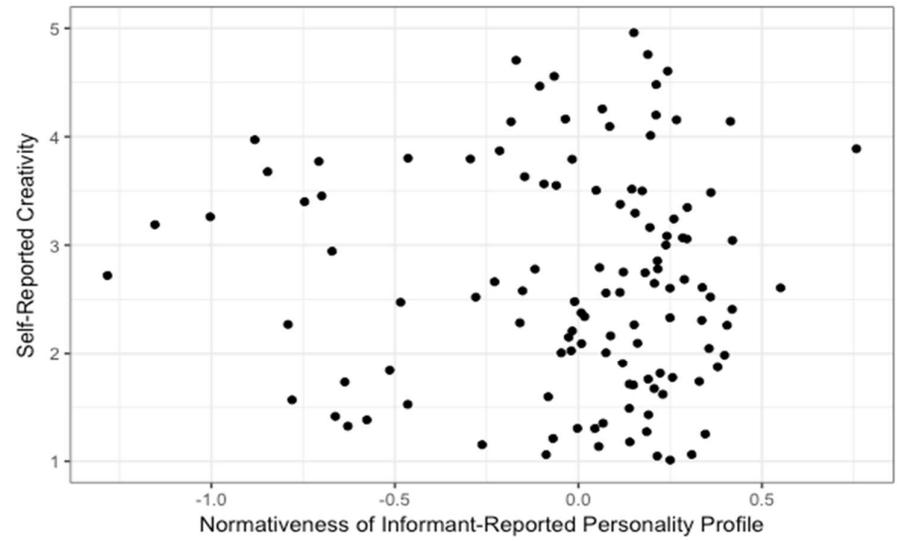


Figure 6S. Partial scatterplots depicting the relationship between personality profile normativeness and creativity (Study 4).