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Depressive Anhedonia and Creative Self-Concepts, Behaviors, and Achievements

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Abstract

In the large literature on creativity and mental illness, relatively few studies have explored anhedonia—impairments in anticipating, seeking, and experiencing rewards. This project explored self-reported creativity in a sample of adults who differed in depressive anhedonia, determined via face-to-face structured clinical interviews. Participants completed measures of everyday creativity (engaging in common creative behaviors and hobbies), creative self-concepts (creative self-efficacy, creative personal identity, and self-rated creativity in different domains), and creative achievements. Compared to the control group ($n = 52$), people in the anhedonia group ($n = 22$) had significantly higher engagement in little-c creative activities (medium effect size). Effect sizes for self-rated creativity and creative achievement were either small or near-zero. Taken together, the findings suggest that anhedonia deserves more attention in future research on motivational aspects of creativity.

Keywords: anhedonia; depression; creativity; creative identity; creative self-efficacy; creative achievement

Depressive Anhedonia and Creative Self-Concepts, Behaviors, and Achievements

The intersection of creativity and mental illness has proven to be both controversial and fertile. The past decade has seen enormous growth in both conceptual models and empirical studies on different disorders, populations, and forms of creativity (Kaufman, 2014; Kyaga, 2015; Simonton, 2019). At this point, the literature is large enough to have prompted several meta-analyses that focused on different disorders, populations, and forms of creativity (Acar & Sen, 2013; Baas et al., 2016; Paek et al., 2016; Taylor, 2017).

This literature sorts into three sampling strategies that yield different inferences (Silvia & Kaufman, 2010). Many studies recruit broad, unselected samples and evaluate the covariance of psychopathology symptoms and creativity (e.g., estimate correlations with scores on creativity scales and symptom scales; Zabelina et al., 2014); other studies recruit samples based on creativity and compare them on mental health outcomes (e.g., poets, artists, and non-artistic controls; Nettle, 2006); and some studies recruit samples based on mental health criteria and compare them on creative outcomes (e.g., adults with or without an ADHD diagnosis; White & Shah, 2016). These last two designs represent different conditional probabilities—the probability that someone has mental health issues given that they are creative ($P(A|B)$) versus the probability that someone is creative given that they have mental health issues ($P(B|A)$)—that afford different claims and conclusions (Taylor, 2017). It is possible, for example, to find that people with a given disorder have a high probability of being creative while also finding that people who are creative to have a low probability of having that disorder (Silvia & Kaufman, 2010).

By far, sampling based on mental health criteria is the least common design, largely because of the resource-intensive nature of recruiting clinical samples. In the present research, we add to this small cluster of studies by recruiting participants with clinically significant anhedonia—impairments in anticipating, seeking, and experiencing rewards (Shankman et al., 2014). Anhedonia appears in many forms of psychopathology, but it is central to depression.

Along with depressed mood, loss of interest or pleasure is a cardinal symptom of major depressive disorder. In the present work, we use the term *anhedonia* primarily in the context of depression.

To date, anhedonia has received relatively little attention in creativity research, but it has interesting connections. Because anhedonia reflects a disordered positive affect system (Watson, 2000), the core expression of anhedonia is diminished reward responsiveness: anticipated goals do not seem as alluring and appealing, and attained rewards do not seem as gratifying and satisfying (Treadway & Zald, 2011). At clinical levels of severity, anhedonia manifests as significant disinterest in normally appealing things and thus affects processes connected to making decisions, selecting goals, and persisting versus quitting (Eddington et al., 2015, 2017; Treadway et al., 2012).

The notion of impaired reward responsiveness has intriguing intersections with several theories and bodies of work in creativity. Many models of creativity are motivational, such as creativity as a form of approach motivation (Baas et al., 2016) and creativity as a process involving goal-seeking, confidence beliefs, and emotion regulation (Benedek et al., 2020; Karwowski & Lebuda, 2017; Karwowski & Beghetto, 2019). In these models, the creative process is largely appetitive and approach-oriented, in which people engage appetitive motivation and positive emotions to pursue creative goals and to serve as counterweights to negative emotions like anxiety and frustration (Ivcevic & Hoffmann, 2017). These models have many differences, but none would see reduced sensitivity to rewards and diminished approach motivation as a context for greater creative activity. A related body of work examines the reciprocal links between pursuing creative goals and positive affect. Experience sampling and daily diary studies consistently find that spending time on creative activities is associated with heightened positive affect (Conner et al., 2018; Conner & Silvia, 2015; Karwowski et al., 2017; Silvia et al., 2014), particularly the activated positive states—feelings of liveliness, excitement, and energy—that are the opposite of anhedonia (Watson, 2000).

Findings from recent meta-analyses offer limited guidance on how depressive anhedonia might predict creativity. Research syntheses of creativity and depression have not isolated specific effects of anhedonia, given the dearth of primary studies, and the effects for depression appear small and inconsistent. In their meta-analysis of mental health and “little-c” creativity, Paek et al. (2016) found a very small positive effect size for depression ($r = .04$) on creative outcomes. In their analysis of clinical and non-clinical samples for a wide range of creative outcomes, however, Baas et al. (2016) found a very small negative effect size for depression ($r = -.06$). In a well-conceived meta-analysis, Taylor (2017) structured the analyses according to sampling design, allowing distinct tests of the different questions they pose. In the sample of studies that selected for mood disorders and evaluated creativity—the third main design—there was a small but positive effect (Hedges’s $g = .08$). The sample size for studies on major depression, however, was small ($k = 5$), and the subsample didn’t afford isolating depressive anhedonia.

In the present research, we explored differences in creativity in a sample of adults who differed in depressive anhedonia, determined via face-to-face structured clinical interviews. As part of a broader study on anhedonia and motivation (Silvia et al., 2020, in press), we included self-report scales that assessed creative self-efficacy and identity (Karwowski et al., 2018), self-rated creativity in different domains (Kaufman, 2012), everyday “little-c” creative behaviors (Batey, 2007; Dollinger, 2003), and creative achievements (Carson et al., 2005). Time constraints precluded performance measures, such as divergent thinking or humor production, but self-report measures of creativity offer a well-rounded view of people’s creative self-concepts—how they construe their creative abilities, skills, and experiences (Karwowski & Lebeda, 2017)—and their past creative behaviors and achievements (Kaufman, 2019; Silvia et al., 2012). Our approach was essentially exploratory, so we had no specific predictions.

Method

Participants

Participants were recruited from the local area via print and online ads and flyers distributed around the neighboring cities and college campuses. A final sample of 78 people took part in the study. Detailed information about recruitment, screening, and demographics is provided in the Online Supplemental Material (OSM). The sample was young ($M = 23.26$ years, $SE = .61$, range = 18 to 43), largely female ($n = 59$, 76%), and diverse (47% African American, 36% European American, 12% Hispanic/Latinx, and 6% Asian American; people could select several or no categories).

Procedure

Clinical interview. Participants completed a structured clinical interview administered by trained clinical psychology graduate students using select modules of the Structured Clinical Interview for DSM disorders (SCID-5-RV: First et al., 2015; SCID-II: First et al., 1997). Because the DSM-5 SCID version was released mid-project, the first 21 participants were interviewed with the SCID-IV-TR; there were no substantive differences for our purposes.

Participants were ineligible if they reported any past manic or hypomanic symptoms, reported any clinically significant psychotic symptoms, reported current substance abuse or dependence, had active suicidal ideation, or met diagnostic criteria for antisocial or borderline personality disorder. Notably, participants were ineligible if they had taken antidepressants within the past 8 weeks. Finally, the participants were in good physical health and not currently taking medications that modified autonomic influences on the cardiovascular system, an exclusion that was necessary for physiological data collected as part of the larger study.

Based on the clinical interview, anhedonic symptoms were ruled “absent” in 56 (71.8%), “subclinical” in 4 (5.1%), and “present at clinical levels” in 18 (23.1%). The subclinical and clinical levels were combined, yielding 22 participants in the depressive anhedonia group (28.2%) and 56 participants in the control group (71.8%). Of the 78, major depressive disorder (MDD) was ruled “present” in 18 (22.4%) and “not present” in 60 (77.6%). As expected, the anhedonia and MDD groups largely overlapped. Of the 22 people in the anhedonia group, 17

(77.3%) had concurrent major depressive disorder (MDD). Stated differently, almost everyone with MDD (17 of 18) was in the anhedonia group; most of the people in the anhedonia group (17 of 22) were also in the MDD group.

Creativity Assessments

The creativity assessments were completed during an individual lab session that lasted 2 hours. Along with cognitive tasks examining effort (e.g., Silvia et al., 2020, in press), participants completed self-report scales assessing different aspects of creativity. These tasks were selected to capture two main facets of creativity that are amenable to self-report assessment: people's creative behaviors and people's beliefs about their creativity. For people's behaviors, the scales covered both common, everyday behaviors (the BICB and CBI) as well as significant achievements (the CAQ). For personal beliefs, the scales offered a broad look at people's appraisals of their creativity (the KDOCS) as well as focused confidence beliefs about creativity (the SSCS) that are rooted in social-cognitive models of motivation (Bandura, 1997; Karwowski & Beghetto, 2019). All the scales are available at OSF (<https://osf.io/4s9p6/>).

Everyday creative behaviors. Everyday creative behaviors were measured with two scales that focus on common, "little-c" creative activities (Kaufman & Beghetto, 2009). First, the Biographical Inventory of Creative Behaviors (BICB; Batey, 2007) presents 32 items representing a range of creative activities (e.g., "Produced your own food recipes" and "Choreographed a dance") and asks if the respondent has done them in the past year. People respond with a *No/Yes* (coded 0/1) scale. The items were averaged to create a proportion score ranging from 0 to 1. Second, the short form of Hocevar's (1979) Creative Behavior Inventory developed by Dollinger (2003) has 28 items that focus on the domains of arts, crafts, music, and writing (Silvia et al., 2012). People respond using a 4-point scale that expresses how often they have done an activity (e.g., "Made a sculpture" and "Designed and made a piece of clothing"), ranging from 0 (*Never did this*) to 3 (*More than 5 times*). The items were averaged to form an overall score. The BICB and CBI overlap, but the BICB offers greater breadth and the CBI offers

greater depth into artistic domains that are common creative hobbies.

Creative self-beliefs. *Creative self-efficacy* and *creative personal identity*, two key aspects of the creative self-concept (Karwowski & Lebuda, 2017), were measured with the Short Scale of Creative Self (SSCS; Karwowski et al., 2018). This scale has 6 items for creative self-efficacy (e.g., “I trust my creative abilities”) and 5 items for creative personal identity (e.g., “Being a creative person is important to me”). People respond with a 5-point scale (1 = *Definitely not*, 5 = *Definitely yes*). This scale has been widely used in studies of creative self-concepts (e.g., Karwowski & Lebuda, 2016; Karwowski et al., 2013; Snyder et al., in press), and it captures two key motivational concepts that influence people’s creative goals and decisions.

We assessed beliefs about one’s own creativity using the K-DOCS (Kaufman, 2012), which asks people to self-evaluate their creativity (relative to people of their age and life experience) for 50 different activities on a 5-point scale (1 = *much less creative*, 5 = *much more creative*). The activities sort into 5 domains: *Artistic* (e.g., “Sketching a person or object”), *Mechanical/Scientific* (e.g., “Taking apart machines and figuring out how they work”), *Performance* (e.g., “Playing music in public”), *Scholarly* (e.g., “Coming up with a new way to think about an old debate”), and *Self/Everyday* (e.g., “Choosing the best solution to a problem”). This scale has been widely used to study people’s beliefs about their own creativity (McKay et al., 2017).

Creative achievement. Creative achievement was measured with the Creative Achievement Questionnaire (CAQ; Carson et al., 2005), a popular scale for measuring high-level creative achievements in 10 domains. Because CAQ scores have substantial positive skew (Silvia et al., 2012), a handful of cases with high values will be highly influential in small samples like this one, particularly for the 10 basic domains. We thus focused our analysis on the CAQ total score (the sum of all 10 domains) and on the Arts (sum of visual arts, music, dance, creative writing, humor, and theatre) and Sciences (sum of inventions and scientific discovery) subscales proposed by S. B. Kaufman et al. (2016).

Results

The data were screened and coded using R 4.0 and analyzed in Mplus 8.1. Four participants (all in the control group) were dropped because of high scores on an infrequency scale that catches inattentive and careless responding (e.g., endorsed several items like “I sometimes eat cement”; McKibben & Silvia, 2017). We compared the anhedonia and control groups using regression models estimated with maximum likelihood with robust standard errors, which correct somewhat for biasing effects of non-normality. Each model had anhedonia as a predictor and one or more outcomes, as detailed below. Because the predictor is categorical (control = 0, anhedonia = 1) and the outcomes are continuous, we report *Y*-standardized regression coefficients. These represent the difference, in the outcome’s *SD* units, between the two groups (Long, 1997), so the regression coefficients are effect sizes in the Cohen’s *d* metric (small = .20, medium = .50, large = .80; Cumming, 2012).

Table 1 displays the descriptive statistics for all outcomes. Readers interested in effects based on MDD groupings can find tables, figures, and analysis results in the OSM. The data and R and Mplus scripts are posted at OSF (<https://osf.io/cqnyt/>).

Everyday Creative Behaviors

Did the anhedonia and control groups differ in their everyday creative behaviors? As Figure 1 illustrates, people in the anhedonia group had significantly higher scores on the BICB, $b = .49$ [.00, .98], $SE = .25$, $p = .049$, and on the CBI, $b = .62$ [.16, 1.08], $SE = .23$, $p = .008$, based on a regression model with the BICB and CBI as simultaneous outcomes. The effect sizes (.49 and .62) were in the “medium” range.

Creative Self-Beliefs

For the creative self-concept factors measured by the SSCS (see Figure 2), a regression model including efficacy and identity as simultaneous outcomes found that the anhedonia group was essentially the same as the control group in creative self-efficacy, $b = .05$ [-.43, .53], $SE = .24$, $p = .835$, and non-significantly higher, with a small-to-medium effect size, in creative

personal identity, $b = .39 [-.10, .89]$, $SE = .25$, $p = .116$.

For self-rated creativity in the 5 K-DOCS domains (see Figure 3), a regression model with all 5 domains as simultaneous outcomes found that the two conditions did not differ significantly in any domain: Artistic ($b = .12 [-.42, .66]$, $SE = .27$, $p = .663$), Mechanical/Scientific ($b = .11 [-.40, .63]$, $SE = .26$, $p = .665$), Performance ($b = .26 [-.24, .77]$, $SE = .26$, $p = .307$), Scholarly ($b = -.03 [-.43, .38]$, $SE = .21$, $p = .905$), and Self/Everyday ($b = -.28 [-.76, .21]$, $SE = .25$, $p = .264$).

Taken together, no effects were statistically significant for the SSCS and K-DOCS scales. Keeping in mind their non-significance, only 3 of the 7 effect sizes are worth noting: compared to the control group, people in the anhedonia group had a higher creative personal identity (.39) and rated themselves are relatively higher (.26) in Performance creativity (e.g., domains involving public performance) and relatively lower (-.28) in Self/Everyday creativity (e.g., finding solutions to common personal and interpersonal situations).

Creative Achievement

For CAQ scores, we analyzed the CAQ total score and Arts and Sciences subscales. The CAQ scores were log-transformed to reduce skew (Silvia et al., 2012). As Figure 4 illustrates, the anhedonia and control groups didn't differ significantly based on a regression model with the CAQ Total ($b = .12 [-.41, .66]$, $SE = .27$, $p = .651$) as the outcome. A follow-up model with the Arts ($b = .08 [-.46, .61]$, $SE = .27$, $p = .779$) and Sciences ($b = .07 [-.46, .60]$, $SE = .27$, $p = .785$) subscales as joint outcomes found small, non-significant effects.

Replicating Standard Findings

For creativity studies where small and null effects are anticipated, we have suggested that researchers replicate common effects to rule out the possibility that the assessments or sampling design simply failed (Silvia & Kimbrel, 2010). In the present sample, we evaluated correlations between self-reported creativity and Openness to Experience, a cornerstone construct in creativity research (Karwowski & Lebuda, 2016; Oleynick et al., 2017). Openness to

Experience, measured with the full NEO-PI-3 (McCrae et al., 2005), correlated significantly at the usual effect size levels with the BICB ($r = .29$), CBI ($r = .31$), KDOCS Artistic Creativity ($r = .48$), creative self-efficacy ($r = .40$) and identity ($r = .35$), and CAQ Total ($r = .44$), so the present sample and data appear credible for evaluating the effects of anhedonia on creativity.

Discussion

The present research builds upon past work in some useful ways. First, studies that select for mental health criteria are much less common than the other two sampling designs (Taylor, 2017). Second, positive affect, approach motivation, and self-regulation are prominent in the larger creativity literature (Baas et al., 2016; Ivcevic & Hoffmann, 2017; Karwowski & Beghetto, 2019), so it is worth exploring links between creativity and anhedonia.

The findings for clinically significant anhedonia do not necessarily resemble the findings for studies of positive affect and approach motivation in non-clinical samples, at least with regards to everyday creative behaviors and creative identities. Based on significance testing, people in the depressive anhedonia condition had significantly higher scores on the BICB and CBI, two measures of engagement in everyday creative activities. Based on effect sizes, anhedonia had medium effect sizes reflecting higher everyday creativity (BICB and CBI), a small-to-medium effect size reflecting higher creative personal identity (SSCS), and small effect sizes reflecting higher self-rated performance creativity and lower self-rated self/everyday creativity (K-DOCS). No notable effects appeared for the CAQ, which focuses on major public accomplishments. We should emphasize that most of these smaller effects had confidence intervals including zero, so they should be seen as food-for-thought for future research and meta-analysis.

It bears repeating that the major research designs in this literature—studying covariance in broad samples, recruiting creative samples, or recruiting clinical samples—afford different claims that logically needn't agree (Silvia & Kaufman, 2010; Taylor, 2017). The probability that someone identifies as male given that they wear bow ties almost surely differs from the

probability that someone wears bow ties given that they identify as male, but this disparity is not a “replication failure” or a problem for how we understand dapper masculinity. Logically, both “anhedonic people are more likely to have creative hobbies” and “creative people are less likely to experience anhedonia” can be true.

Samples with severe, clinically important symptoms identified via structured clinical interviews have rarely been studied in creativity research. Although psychopathological constructs can be represented as dimensions (Krueger et al., 2018), relationships with other factors vary across the dimensions, creating complex discontinuities. For the purposes of understanding social relationships, by analogy, middle-aged adults are not simply “higher on the age dimension” than middle-schoolers. Few studies have recruited clinical samples of adults with major depression (see Taylor, 2017), let alone the specific feature of anhedonia, so more studies would be necessary for the field to understand if creative processes shift and transform as symptoms become increasingly severe.

We don’t want to overinterpret causal aspects of these findings, but they seem consistent with the large body of work that emphasizes the value of creative activities as a means of coping and resilience (Drake et al., 2016; Richards, 2018; Shafir et al., 2020). Likewise, sociocultural schools of thought emphasize factors that shape people’s self-selection into creative hobbies and occupations. As Kaufman and Baer (2002) noted in the context of poetry, many creative activities have low barriers to entry—they don’t require recruiting large groups, buying expensive equipment, committing to years of formal schooling, or enduring standardized tests—and thus afford wider participation in the face of barriers and inequalities.

In any event, the complex issues surrounding creativity and mental health will be settled by the evolution of large literatures, not by any single study (Silvia & Kaufman, 2010), and we strongly encourage researchers to consider anhedonia in future work. As a transdiagnostic feature that appears in many disorders, anhedonia has the potential to bridge several mental health domains (e.g., depressive anhedonia and anhedonic qualities of schizotypy) and inform

models of creativity that emphasize motivational and goal processes (Baas et al., 2016; Karwowski & Beghetto, 2019).

As caveats, we should highlight that the present sample, like most studies using face-to-face interviews, is relatively small. In the absence of national databases, recruiting based on mental health is much more time and resource-intensive than recruiting based on creative interests, occupations, or achievements. Scores for highly skewed outcomes, such as creative achievement, are particularly affected by sampling variance, so we have more confidence in the findings for everyday creative behaviors and creative self-concepts than for the volatile CAQ scores. In addition, the sample was recruited with some unique constraints from the project's primary goals, such as being free from antidepressant medication and in good cardiovascular health (see OSM). It's hard to say what consequences these sampling criteria would have for findings about creativity, but having a relatively healthy sample likely reduced generalizability.

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Table 1

Descriptive Statistics

	Anhedonia			Control		
Outcome	<i>M (SD)</i>	<i>Median</i>	<i>Min, Max</i>	<i>M (SD)</i>	<i>Median</i>	<i>Min, Max</i>
BICB	.31 (.18)	.28	.09, .85	.24 (.12)	.24	.00, .56
CBI	.67 (.50)	.57	.07, 2.21	.43 (.31)	.41	.00, 1.14
SSCS Self-efficacy	3.95 (.53)	4.00	3.00, 4.83	3.93 (.58)	4.00	2.33, 5.00
SSCS Identity	4.07 (.92)	4.40	2.00, 5.00	3.72 (.90)	3.90	1.80, 5.00
K-DOCS Artistic	3.20 (.88)	3.17	1.78, 4.67	3.11 (.72)	3.17	1.78, 4.56
K-DOCS Mechanical/Scientific	2.44 (.82)	2.17	1.22, 4.33	2.36 (.74)	2.33	1.00, 4.33
K-DOCS Performance	2.94 (.90)	3.10	1.00, 4.60	2.72 (.84)	2.80	1.00, 5.00
K-DOCS Scholarly	3.24 (.38)	3.36	2.55, 3.73	3.25 (.67)	3.36	1.36, 4.64
K-DOCS Self/Everyday	3.64 (.51)	3.73	2.45, 4.64	3.79 (.56)	3.82	1.64, 4.82
CAQ Total	16.14 (19.03)	10.50	0, 87	12.73 (17.77)	7.50	0, 113
CAQ Art Subscale	13.41 (18.34)	9.50	0, 86	10.77 (16.86)	6.00	0, 106
CAQ Science Subscale	2.18 (7.15)	.00	0, 32	1.23 (4.25)	.00	0, 23

Note. Sample sizes are $n = 22$ (Anhedonia) and $n = 52$ (Control). The raw CAQ scores are presented. BICB = Biographical Inventory of Creative Behaviors; CAQ = Creative Achievement Questionnaire; CBI = Creative Behavior Inventory; K-DOCS = Kaufman Domains of Creativity Scale; SSCS = Short Scale of Creative Self.

Figure 1. Everyday creative behavior scores (BICB & CBI scales) for the Control and Anhedonia groups.

Note. The boxplot displays the median and interquartile range for each group.

Figure 2. Creative self-efficacy and creative personal identity scores for the Control and Anhedonia groups.

Note. The boxplot displays the median and interquartile range for each group.

Figure 3. Self-rated creativity in the K-DOCS domains for the Control and Anhedonia groups.

Note. The boxplot displays the median and interquartile range for each group.

Figure 4. CAQ total scores and Arts and Sciences subscale scores for the Control and Anhedonia groups.

Note. The boxplot displays the median and interquartile range for each group. Raw CAQ scores are presented.

Online Supplemental Material

As the main article notes, the creativity data were collected as part of a broader NIH-funded study on depression and motivation. The core aims involved applying impedance cardiography techniques to study cardiac autonomic activity during lab-based effort tasks and during daily life via ambulatory self-report and physiological methods. Because of the autonomic nervous system outcomes, participant recruitment involved eligibility criteria related to age, overall health, medication use, and cardiovascular history that are unrelated to the creativity outcomes.

The following information about recruitment, screening, and participation is taken directly, with minor editing, from the OSM for the project's first publication (Silvia et al., 2020).

1. Detailed Description of the Recruitment and Screening of Participants

Participants

We recruited participants via print ads in local media, online Craigslist ads, and flyers distributed around the neighboring cities and the local college and university campuses. Some recruitment materials focused on attracting people who were likely to be experiencing depression; other materials focused on attracting non-depressed controls. People who contacted the research team (via phone, text, or e-mail) took part in a brief phone interview to screen out obviously ineligible participants.

Clinical screening interview. We conducted 156 phone screenings and invited 88 people to a face-to-face interview and screening session on the university campus. Participants received \$15 in cash for completing this session, which consisted of a structured clinical interview, questions about cardiovascular health and medication use, measurement of height and weight, and assessment of heart rate and blood pressure. To be eligible, people had to be between 18 and 45 years of age and in good cardiovascular health. People were ineligible if they had ever had a heart attack, stroke, or any heart surgery; if they had ever been to a doctor for

any heart issues, such as irregular heartbeats or high blood pressure; if they took any medication to treat any heart or cardiovascular condition, including cholesterol medication; and if they had diabetes, were pregnant, or took daily preventative asthma medication. To rule out hypertensive participants, the interviewer assessed blood pressure and heart rate with an automated monitor and a standard cuff placed over the brachial artery of the non-dominant arm. The sample's mean values were within normal limits (SBP $M = 120.97$ mmHg, $SE = 1.56$; DBP $M = 67.96$ mmHg, $SE = 1.31$; HR $M = 74.31$ bpm, $SE = 1.34$). Height and weight were measured with a medical beam scale. The sample's median body mass index (BMI) was 24.72 ($M = 26.26$, $SE = .75$, range from 17.47 to 47.25), which is on the boundary of normal and overweight.

Participants completed a structured clinical interview administered by trained clinical psychology graduate students using select modules of the Structured Clinical Interview for DSM disorders (SCID-5-RV: First, Williams, & Spitzer, 2015; SCID-II: First, Gibbon, Spitzer, Williams, & Benjamin, 1997). The SCID version for the DSM-5 was released after we began data collection, so the first 21 participants were interviewed with the SCID-IV-TR. The diagnostic criteria for major depression and depressive anhedonia remained the same across the two versions.

Participants were ineligible if they had taken antidepressants within the past 8 weeks. We did not assess why people were not taking anti-depressants, but in our experience with recruiting adults with depression from the local population, we find that the most common reasons are a general reluctance to take prescription medication, intolerance of antidepressant side effects, and the many issues of health-care access and affordability that are unfortunately common in the United States.

In addition, participants were ineligible if they reported any past manic or hypomanic symptoms, reported any clinically significant psychotic symptoms, reported current substance abuse or dependence, had active suicidal ideation, or met diagnostic criteria for antisocial or borderline personality disorder. After their participation in the study was complete, the clinical

interviewer discussed treatment and referral options with participants for whom it was relevant.

Final sample. Based on the screening interview, 78 people who were determined to be eligible ultimately took part in the laboratory part of the study. Of the 78, anhedonic symptoms were ruled “absent” in 56 (71.8%), “subclinical” in 4 (5.1%), and “present at clinical levels” in 18 (23.1%). For analysis purposes, the subclinical and clinical levels were combined, yielding 22 participants in the depressive anhedonia condition (28.2%) and 56 participants in the control condition (71.8%). Of the 78, major depressive disorder (MDD) was ruled “present” in 18 (22.4%) and “not present” in 60 (77.6%). As expected, the anhedonia and MDD groups were largely overlapping. Of the 22 people in the anhedonia condition, 17 (77.3%) had concurrent major depressive disorder (MDD). Stated differently, almost everyone with MDD (17 of 18) was in the anhedonia group; most of the people in the anhedonia group (17 of 22) were also in the MDD group.

The final sample was predominantly young ($M = 23.26$ years, $SE = .61$, range = 18 to 43) and female ($n = 59$, 76%). Based on self-reported race and ethnicity, the sample was diverse: 47% African American, 36% European American, 12% Hispanic/Latinx, and 6% Asian American. (People could select more than one category or decline to select any.) For fine-grained demographics, see OSM Table 1, which displays a wide array of sample demographics by condition.

2. Additional Procedure Details

Eligible participants took part in the laboratory session soon after the screening interview, usually within a week. The clinical interviewer set up a time for the participant to take part and explained that for the day of the laboratory session, participants would have to abstain from exercise, physical exertion, caffeine, and nicotine from the time of waking up until the laboratory session. The interviewer went over these issues with the participants to ensure that they understood that caffeine is in many beverages (e.g., often in tea, soda, and energy drinks)

and some foods (e.g., caffeinated gum and chocolate) and that abstaining from nicotine refers not only to smoking cigarettes but also to nicotine gums, patches, chewing tobacco, and nicotine delivery systems like vaping and e-cigarettes. Participants were reminded of the scheduled session and the activities to avoid the day before the session.

The experimenter for the lab session was unaware of the participant's clinical status or group membership. Participants received \$20 plus their earnings from the effort tasks for taking part in the laboratory session. The surveys and tasks were administered with DirectRT and MediaLab research software. Responses were collected with an Empirisoft high-speed keyboard, which has a timing accuracy of 1 ms.

3. Results by Major Depressive Disorder Grouping

The main text emphasized the effects of anhedonia, but many readers and meta-analysts may be curious about the effects when the participants are divided according to depression status. As noted in the main text, 19 participants met criteria for major depressive disorder (MDD). The descriptive statistics and between-group comparisons are presented in OSM Table 2. The effects broadly parallel the effects for anhedonia, which is expected given the overlap between the categories. The patterns are displayed as OSM Figures 1-4.

OSM Table 1

Sample Demographic Characteristics

Variable	Control Condition	Anhedonia Condition
Gender (% Female)	78%	68%
Age (Years)	22.53 (.59)	21.79 (.86)
Currently Married (%)	9%	6%
Widowed, Divorced, or Separated (%)	2%	0%
Parents (% with children)	4%	0%
Any Past Psychiatric Hospitalizations (%)	0%	13%
Any Treatment in Past Month (%)	6%	7%
Body Mass Index (BMI)	26.05 (.89)	25.24 (.76)
Height (inches)	65.98 (.45)	65.41 (.79)
Weight (pounds)	162.63 (5.87)	160.45 (8.66)
Screening SBP	120.45 (1.78)	122.32 (3.20)
Screening DBP	67.71 (1.48)	68.59 (2.75)
Screening HR	72.48 (3.51)	71.09 (2.20)
Native English Speakers (%)	91%	88%
Hispanic/Latinx (%)	11%	14%
American Indian/First Americans (%)	4%	5%
Asian (%)	7%	5%
Pacific Islander (%)	0%	0%
African American (%)	48%	45%
European American (%)	38%	32%

Note. Total $n = 78$ (56 control, 22 anhedonic). Standard errors are in parentheses. Age is in decimal years (i.e., 22.5 equals 22 years, 6 months). Screening SBP, DBP, and HR refer to the values of systolic blood pressure, diastolic blood pressure, and heart rate assessed at the face-to-face clinical screening interview. Height and weight were recorded by the researchers using a medical beam scale, and BMI is based on these values. For the race and ethnicity categories, the values represent the percent of participants who endorsed it. Values may not sum to 100% because people could endorse several categories or decline to endorse any. Past psychiatric hospitalizations refers to the percent of participants who indicated any past hospitalizations for a psychiatric condition. Any treatment in the past month refers to any psychosocial treatment in the past month, ranging from inpatient or outpatient treatments to 12-step programs and support groups. All participants who indicated not being “Currently married” or “Widowed, Divorced, or Separated” were classified as “Never Married.” Gender, race, and ethnicity are taken from self-reports given during the lab session, which may differ slightly from data collected in the face-to-face interview due to differences in category options.

OSM Table 2

Descriptive Statistics for Self-Reported Creativity: Major Depressive Disorder (MDD) Grouping

	MDD			Control			Group Comparison		
Outcome	<i>M (SD)</i>	<i>Median</i>	<i>Min, Max</i>	<i>M (SD)</i>	<i>Median</i>	<i>Min, Max</i>	<i>b (SE)</i>	95% CI	<i>p</i>
BICB	.31 (.13)	.32	.09, .53	.24 (.15)	.24	.00, .85	.48 (.26)	-.03, .98	.065
CBI	.68 (.50)	.57	.07, 2.21	.44 (.32)	.39	.00, 1.18	.62 (.25)	.12, 1.12	.015
SSCS Self-efficacy	3.91 (.51)	4.00	3.00, 4.67	3.94 (.58)	4.00	2.33, 5.00	-.05 (.25)	-.54, .43	.826
SSCS Identity	3.99 (.92)	4.40	2.00, 5.00	3.76 (.91)	4.00	1.80, 5.00	.25 (.27)	-.27, .77	.347
K-DOCS Artistic	3.17 (.78)	3.22	1.78, 4.11	3.13 (.77)	3.11	1.78, 4.67	.06 (.27)	-.47, .58	.834
K-DOCS Mechanical/Scientific	2.46 (.56)	2.33	1.78, 3.56	2.36 (.82)	2.33	1.00, 4.33	.13 (.22)	-.31, .56	.564
K-DOCS Performance	2.82 (.77)	3.00	1.00, 3.90	2.77 (.89)	2.80	1.00, 5.00	.06 (.25)	-.43, .54	.812
K-DOCS Scholarly	3.27	3.36	2.55, 4.00	3.24 (.65)	3.36	1.36, 4.64	.06 (.21)	-.35, .48	.771

	(.41)								
K-DOCS Self/Everyday	3.69 (.49)	3.73	2.45, 4.64	3.77 (.57)	3.82	1.64, 4.82	-.15 (.25)	-.64, .34	.546
CAQ Total	16.53 (19.91)	11	0, 87	12.78 (17.51)	8	0, 113	.13 (.29)	-.52, .82	.663
CAQ Art Subscale	14.11 (19.60)	10	0, 86	10.67 (16.44)	6	0, 106	.10 (.29)	-.63, .90	.728
CAQ Science Subscale	1.89 (7.32)	0	0, 32	1.38 (4.38)	0	0, 23	-.06 (.27)	-.59, .47	.832

Note. Sample sizes are $n = 19$ (MDD) and $n = 55$ (Control). The raw CAQ scores are presented. The Group Comparison column reports Y -standardized regression coefficients, which are interpreted like Cohen's d effect sizes. BICB = Biographical Inventory of Creative Behaviors; CAQ = Creative Achievement Questionnaire; CBI = Creative Behavior Inventory; K-DOCS = Kaufman Domains of Creativity Scale; SSCS = Short Scale of Creative Self.

OSM Figure 1. Everyday creative behavior scores (BICB & CBI scales) for the Control and MDD groups.

Note. The boxplot displays the median and interquartile range for each group.

OSM Figure 2. Creative self-efficacy and creative personal identity scores for the Control and MDD groups.

Note. The boxplot displays the median and interquartile range for each group.

OSM Figure 3. Self-rated creativity in the K-DOCS domains for the Control and MDD groups.

Note. The boxplot displays the median and interquartile range for each group.

OSM Figure 4. CAQ total scores and Arts and Sciences subscale scores for the Control and MDD groups.

Note. The boxplot displays the median and interquartile range for each group. Raw CAQ scores are presented.