

Monk Prayogshala Working
Paper # 2024-1

Hansika Kapoor
Sarah Rezaei
Hreem Mahadeshwar
James Kaufman

February, 2024

**WHAT COULD GO
WRONG? ANXIETY
FUELS, BUT OPTIMISM
BUFFERS NEGATIVE
COUNTERFACTUAL
DIVERGENT THINKING**

What Could Go Wrong? Anxiety Fuels, but Optimism Buffers

Negative Counterfactual Divergent Thinking

Hansika Kapoor

Department of Psychology, Monk Prayogshala, Mumbai, Maharashtra, India
Neag School of Education, University of Connecticut, USA

Sarah Rezaei

Department of Psychology, Monk Prayogshala, Mumbai, Maharashtra, India

Hreem Mahadeshwar

Department of Psychology, Monk Prayogshala, Mumbai, Maharashtra, India

James C. Kaufman

Neag School of Education, University of Connecticut, USA

Address correspondence to Hansika Kapoor at hk@monkprayogshala.in

The Department of Psychology Working Papers are a series of ongoing research outputs from the Department of Psychology Monk[®] Prayogshala[®]. The purpose of making these papers publicly available is to initiate dialogue and receive feedback on the preliminary work presented. The views and opinions expressed therein are those of the authors and do not necessarily reflect those of Monk Prayogshala, any supporting agencies, or any of its associated entities.

Monk[®] Prayogshala[®] is a Section 8 company registered under the Indian Companies Act, 2013. The contents of this document are the Intellectual Property of Monk[®] Prayogshala[®] (Sec. 8), a company incorporated under the provisions of the Companies Act, 1956 and having its registered office at 4114, Oberoi Garden Estates, C Wing, Next to Chandivali Studios, Powai, Mumbai 400 072, India. (C) Monk[®] Prayogshala[®], 2011-2020. All rights reserved. The recipient of this document is not permitted to copy, make available, sell, disclose, publish, disseminate or otherwise transmit the information contained in this document without prior permission from Monk[®] Prayogshala[®].

The authors declare no conflict of interest. Author CRediT Note: Hansika Kapoor: Conceptualization, Methodology, Formal data analysis, Writing - Review and Editing, Supervision, Project administration Sarah Rezaei: Formal Data Analysis, Writing - Original draft preparation, Writing - Review and Editing Hreem Mahadeshwar: Writing - Original draft preparation, Writing - Review and Editing James C. Kaufman: Conceptualization, Methodology, Writing - Review and Editing. The study has been preregistered in the OSF repository at the following DOI: https://osf.io/xht45/?view_only=757459c58f4f421fbd9e2e83a9937a19. The data that support the findings of this study are openly available in the OSF repository: https://osf.io/9gqs5/?view_only=ba9b8c94ad144395ac90576d3c599cab. This study was approved by the Institutional Review Board at the University of Connecticut in May 2022 (#X22-0123) and the IRB at Monk Prayogshala in June 2022 (#090-022).

What Could Go Wrong? Anxiety Fuels, but Optimism Buffers Negative Counterfactual Divergent Thinking

Abstract

Anxiety-driven counterfactual thinking can be a slippery slope. Building on the premise that both positive and negative emotions can impact creativity, the present study examines how trait anxiety, optimism, and other mental health factors like therapy experience shape outputs in divergent thinking (DT) tasks. Using an online sample ($N = 647$), the study introduces counterfactual DT tasks, where participants are prompted to respond to how a situation can either go in their favor (positive) or against it (negative). Although no difference was found in the originality of the responses across the two tasks, the negative counterfactual generated more numerous ideas as compared to the positive one. Results also revealed that trait anxiety, especially when combined with past therapy experience, increases the number of negative counterfactual ideas. In contrast, optimism acts as a protective factor, enabling fewer ideas when combined with past therapy experience or a past mental health diagnosis. Our study challenges the binary view of emotional influences on creativity, highlighting the role of individual differences and experiences in shaping creativity. Diversifying the counterfactual DT tasks and using more refined measures of rumination and mental health history can provide further nuance to this line of research between creativity and anxiety.

Keywords: anxiety; creativity; counterfactual thinking; divergent thinking; therapy

What Could Go Wrong? Anxiety Fuels, but Optimism Buffers Negative Counterfactual Divergent Thinking

The act of creating something new hinges on our cognitive abilities, and the process of creativity helps generate original, high-quality, and elegant solutions to ill-defined, complex, and novel problems (Mumford & Gustafson, 1988). Prior work has attempted to discern the determinants of creativity and among those, various studies have looked into the role of emotions (eg. Ivcevic et al., 2023). The consensus based on past scholarship is that emotions and affective states influence the creative process (Baas et al., 2011; Bledow et al., 2013; Leung et al., 2014; Strasbaugh & Connelly, 2021). More recent work has shown that positive affect can facilitate and have a great influence on creative motivation (He, 2023).

Conversely, the role of negative affect in creativity is less clear. Earlier work emphasized the element of time and negative affect. Kaufmann and Vosburg (2002) found that negative affect was initially harmful, but people in a negative mood were more likely to persevere and not be satisfied with their work. As a result, if enough time is allowed for a task, people with negative affect may eventually outperform those with positive affect. Kaufmann and Kaufmann (2014) argued that people with negative affect may flourish on more complicated problems with more constraints. More recently, some studies report that anxiety and nervousness can also play a facilitating role (Du et al., 2021; Strasbaugh & Connelly, 2021; Zhan et al., 2020), but others have found no effect or even a negative impact on creativity (Acar et al., 2021; Baas et al., 2020; Mao et al., 2021). Given such disparate findings, particularly with negative affect, it is evident that the relationship between emotional states and creative output is far from definitive and warrants further empirical scrutiny.

Emotions, Affect, and Creativity

Emotions play a complex role in creativity, serving as both catalysts and inhibitors in the artistic and innovative process. Central to understanding this intricate interplay is the Dual Pathway to Creativity Model (Nijstad et al., 2010), which illuminates how different emotional states channel creative energies along two distinct pathways. The first is the flexibility pathway, predominantly fueled by positive emotions, which fosters cognitive flexibility and the generation of novel ideas. The other is the persistence pathway, more often triggered by negative emotions, which drives detailed, meticulous, and sustained effort in creative tasks. In examining creativity through a dual-pathway lens, insights are gained into how varying emotional experiences—from the peaks of joy and excitement to the valleys of sadness and frustration—distinctively shape and color the creative landscape, influencing both the process and the outcome of creative endeavors.

The relationship between positive affect and creative achievement is thought to stem from the role of optimism in fostering cognitive flexibility and resilience, allowing individuals to persist in creative endeavors despite potential setbacks. Specifically, optimism helps in creating a positive emotional and cognitive environment, which can enhance creative thinking and problem-solving (Rego et al., 2012). This relationship was partly mediated by the positivity ratio, a balance between positive and negative emotions, with a higher positivity ratio, often a result of optimism, being conducive to greater creative thinking skills. Optimism also mitigates the negative impacts of avoidance motivation—a focus on preventing negative outcomes—on creativity (Isckson et al., 2014). Specifically, by fostering positive expectations and reducing barriers like anxiety and threat appraisals, optimism tends to enhance creative thinking.

Further, a meta-analysis also supported the contextual perspective on the emotions–creativity link, suggesting that negative emotions could potentially facilitate the creative process in certain situations (Davis, 2009). Baas et al. (2011, 2012) showed the link between negative

emotions (such as fear and uncertainty) and creativity; such negative emotions signaled an unfulfilled prevention-focused state, which could lead to creative insights and the generation of many novel ideas. Other evidence regarding the influence of negative emotions on idea generation comes from Wang et al. (2021) who used varying intensities of avoidance motivation—high, low, and unbiased—to study the neural mechanisms underlying creative thinking. Participants were shown different pictures that induced particular motivational states that varied across the three groups. The low-avoidance group was exposed to images evoking sadness (like pollution or funerals), while the high-avoidance motivation group viewed fear-inducing images (such as snakes or sharks). Interestingly, the low-avoidance group demonstrated greater fluency in divergent thinking than the high-avoidance group; this is in contrast with findings by De Dreu et al. (2008), which found that fear boosted creative fluency.

Moreover, research on creativity within organizational settings has also found support for the enhancing influence of negative emotions on creativity within a supportive context, i.e., with the presence of facilitating conditions like supervisory support and rewards for creativity (George & Zhou, 2007). Similarly, a negative mood also enhanced employees' creative engagement when they felt empowered and had a high trait learning goal orientation (To et al., 2015).

Creativity, Anxiety, and Mental Health

Among negative emotions, the intricate relationship of anxiety's impact on creative thinking and performance has garnered attention in contemporary research. The concept of "creativity anxiety" – anxiety specific to creative thinking – was associated with fewer real-world creative achievements (Daker et al., 2023). Specifically, creativity anxiety not only affected creative cognitive performance but also correlated with state-level anxiety and effort during creative tasks. Additionally, creativity anxiety was also found to manifest across various domains,

from artistic to more technical ones like science or math (Daker et al., 2020); tasks with a creative thinking component tended to induce higher anxiety than similar tasks without a creative component. In terms of trait anxiety, higher trait anxiety was related to higher scores on the Creative Functioning Test (CFT; Carlsson et al., 2000), a computerized perceptual test designed to measure creativity through a series of tasks typically evaluating divergent thinking abilities, such as fluency, originality, and flexibility. Higher trait anxiety was also related to higher originality and fluency during idea generation (Baas et al., 2008). Complementing this, Leung et al. (2014) applied the framework of emotion regulation and found that worrisome emotions, particularly experienced by highly neurotic individuals, had a positive impact on creativity task performance, in contrast to happy emotions. This finding adds a nuanced layer to the emotions-creativity debate, suggesting that certain types of negative emotions, like worry, can facilitate creative processes, depending on the individual's personality traits.

Similarly, both anxiety and anger have the propensity to facilitate idea generation despite their adverse reputation. Strasbaugh and Connelly (2021) differentiated between two types of emotions: incidental and integral anger and anxiety. Incidental emotions refer to those unrelated to either the task or the performance context, such as interacting with a confederate who is trained to induce anger through social cues; integral emotions refer to those closely related to the task or performance of interest, such as watching a video to induce anger. Specifically, anxious participants were found to generate better ideas than those feeling angry; flexibility and fluency, on the other hand, were linked with integral anger along with appraisals of certainty, control, and determination, all of which aid in overcoming problems and doing well on tasks (Strasbaugh & Connelly, 2021). Moreover, other work highlights that not all negative emotions uniformly enhance creativity; the specific nature of the emotion plays a critical role (Baas et al., 2011). For instance, the effect of creativity anxiety might vary depending on the nature and demands of the

task at hand (Daker et al., 2023). This implies that although anxiety can be a barrier to optimal creative output, it also leads to increased effort and heightened emotional response, which can potentially be channeled or managed to improve creative performance.

Studies have also hinted towards a rather complex intersection of past psychiatric history, therapy experiences, and creative outcomes. For instance, a high association was found between being in creative professions and having bipolar disorder or schizophrenia (Kyaga et al., 2011). Additionally, a study with a broader perspective on mental health conditions found that while certain psychiatric conditions are more prevalent among creative professionals, the nature of this association varies significantly across different fields and artistic disciplines (Ludwig, 1995). However, these and other studies on creativity and mental illness are fraught with a wide variety of concerns regarding their validity, methodologies, and generalizability (Kaufman, 2014; Schlesinger, 2014).

In the context of psychotherapies, Schlesinger (2009) highlighted how approaches that utilize introspection and cognitive flexibility tend to have a positive influence on a client's creativity. Further, Open-Monitoring (OM; a technique of meditation allowing for flexible and unrestricted attention by not constraining the individual to focus on a specific concept or fixed item) training also enhanced creativity and improved divergent thinking (Colzato et al., 2012). Forest therapy, which involves spending time in a forest environment to enhance health, wellness, and happiness through immersive, mindful experiences in nature, also tends to boost creativity as measured by a word-association task (Yu & Hsieh, 2020). This exploration of internal thought processes and enhancing mental adaptability in therapy share a conceptual link with the role of positive affect, mainly optimism, in creative endeavors. Optimism, much like the cognitive flexibility fostered in therapeutic settings, equips individuals with a constructive mindset that can significantly amplify their creative capacities (Lei & Lei, 2022).

The Present Study

In addition to investigating the link between performance-based creativity and anxiety, this study also attempts to explore whether trait anxiety can sometimes enhance, rather than hinder, creative thinking. The study aligns with positive psychology's focus on leveraging positive traits, such as optimism, to buffer negative emotions' impact on creativity. We also introduce a counterfactual divergent thinking task, in which one can think of responses that would either be personally favorable or unfavorable, and compare these to responses from a real-world divergent thinking task. In general, we propose that individuals with higher trait anxiety will be more likely to think of more possible negative outcomes for a hypothetical situation as compared to those with lower levels of trait anxiety. We also predict that individuals with higher trait anxiety will be more likely to indulge in excessive counterfactual thinking, imagining numerous potential negative outcomes, which would then further contribute to worry and increase distress (Epstude & Roese, 2008). This assumption is rooted in the notion that anxiety can lead to a heightened state of problem awareness (Robinson et al., 2013), potentially sparking more (counterfactual) divergent thinking. Moreover, we aim to explore the influence of self-rated creativity, optimism, mental health history, and experience with therapy on creative performance.

The following hypotheses were pre-registered:¹

H1a: Fluency on the positive counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency, and originality on the real-world divergent thinking task.

H1b: Fluency on the negative counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative self-efficacy, scores on the K-

¹https://osf.io/xht45?view_only=757459c58f4f421fbd9e2e83a9937a19

DOCS, optimism, fluency, and originality on the real-world divergent thinking task.

H1c: Fluency on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative self-efficacy, scores on the K-DOCS, and optimism.

H2a: Originality on the positive counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency and originality on the real-world divergent thinking task..

H2b: Originality on the negative counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency and originality on the real-world divergent thinking task..

H2c: Originality on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative self-efficacy, scores on the K-DOCS, and optimism.

H3a: There is a positive association between trait anxiety and fluency on the negative counterfactual divergent thinking task.

H3b: There is a negative association between trait anxiety and fluency on the positive counterfactual divergent thinking task.

H4a: There is a positive association between trait anxiety and originality on the negative counterfactual divergent thinking task.

H4b: There is a negative association between trait anxiety and originality on the positive counterfactual divergent thinking task.

Additionally, we sought to explore the following research questions:

RQ1: Is there a difference in creative performance on a real-world divergent thinking task and a counterfactual divergent thinking task?

RQ2: Does past psychiatric history lead to differences in creative performance on divergent thinking tasks?

RQ3: Does trait anxiety moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks?

RQ4: Does optimism moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks?

Method

The study received ethical approval from the Institutional Review Board (IRB) at the University of Connecticut in May 2022 (#X22-0123) and the IRB at Monk Prayogshala in June 2022 (#090-022).

Participants

A power analysis using G*power was computed (latest ver. 3.1.9.7 Faul et al., 2007, 2009). In a study by Leung et al. (2014), the three-way interaction of emotions (happy, worrisome, and neutral), cognitive load, and neuroticism accounted for 3% of the variance in fluency in creativity task ratings ($\eta_p^2 = 0.03$). Considering an effect size (f^2) of 0.175, a power of 0.80, an alpha value of 0.05, and 16 predictors, the sample size was estimated to be 124 for each of the two counterfactual divergent thinking conditions ($124 * 2 = 248$).

For the present study, participants from India were recruited via a multi-site entry, i.e., the Qualtrics survey link was posted on various social media platforms such as Twitter, Instagram, and Facebook. Participants from the US were recruited through University of Connecticut participant pool and via a post on *Psychological Research on the Net*. A total of 1045 participants filled out the Qualtrics form; after cleaning for missing values and discarding invalid responses based on age (< 18), failure to pass at least one attention check, and self-reported English proficiency < 5 , data from 647 participants² were retained (Men = 265, Women = 374, other = 10, $M_{age} = 22.36$, $SD_{age} =$

²After cleaning for missing values, analysis was computed on data from 631 participants.

6.8; Student = 63.19%, Employed = 32.07%, Unemployed/Retired = 4.74%). Of these, 319 participants (Men = 135, Women = 178, Other = 6, $M_{age} = 22.24$, $SD_{age} = 6.79$; Student = 64.57%, Employed = 28.53%, Unemployed/Retired = 4.7%) responded to the positive counterfactual DT task and 328 participants (Men = 129, Women = 195, Other = 4, $M_{age} = 22.47$, $SD_{age} = 6.81$; Student = 59.15%, Employed = 33.53%, Unemployed/Retired = 4.57%) responded to the negative counterfactual DT task.

Measures

Real-World Divergent Thinking Task (RWDT)

Participants were presented with a realistic scenario (*You need a very large amount of money in a short amount of time*) and asked to come up with as many new and original ways to address the problem. The responses were coded on: fluency (the number of responses generated), flexibility (if the responses belonged to different categories, determined and labeled by two raters), originality (assessed via relative frequency-based statistical scoring; see also Forthmann et al., 2020),³ moral valence (the intended moral valence in the responses; 1 = *evil*, 2 = *sinful*, 3 = *self-interested*, 4 = *ambiguous*, 5 = *neutral*, 6 = *noble*; Kapoor & Kaufman, 2022), and goal-directedness (disregarding valence, whether the response would meet the goal, rated as 1 = *Very Unlikely* to 4 = *Very Likely*). Five postgraduate raters (4 women and 1 man; $M_{age} = 25$) coded moral valence and goal-directedness. We assessed the inter-rater reliability of ratings for valence and goal-directedness using the Intra-Class Correlation Coefficient (ICC 2). As all ICCs were above

³ We attempted to measure creativity according to how novel, useful, and appropriate (1 = *Not at all creative* to 6 = *Very creative*) the responses were using 5 raters; the ICC value for the real-world task was .75, but for the counterfactual divergent thinking tasks, the ICC values were very low. Therefore, we resorted to assessing statistical originality. Further, the correlation between creativity (other-rated) and originality (frequency-based) was .91 for the real-world task.

the .70 cutoff (Table 1), the ratings across raters were averaged to obtain means of moral valence and goal-directedness for each participant.

Counterfactual Divergent Thinking Task (CDT)

To understand how well participants can generate responses to a situation that is likely to provoke worry in a real-life setting, the following scenario was used: *“You are going out on a date for the first time.”* In the Positive Counterfactual Divergent Thinking Task (PCDT), it was paired with the instruction: *“In this task, you will be presented with a scenario. You will be asked to think of as many ways in which things can go RIGHT or in your favour in this situation. You can generate as many responses as possible in this manner. There are no right or wrong answers; respond at your own pace. Have fun!”*

In the Negative Counterfactual Divergent Thinking Task (NCDT), the following instruction was used: *“In this task, you will be presented with a scenario. You will be asked to think of as many ways in which things can go WRONG or not in your favour in this situation. You can generate as many responses as possible in this manner. There are no right or wrong answers; respond at your own pace. Have fun!”* Participants were randomly assigned to either the PCDT or the NCDT.

The responses to the CDTs were rated on valence (whether the response is negative or positive based on how reasonable people would judge it; 1 = *very negative* to 6 = *very positive*) by the five raters (Table 1). All responses were also coded on fluency, flexibility, and originality as in the RWDT.

State-Trait Anxiety Inventory (STAI) Form Y-2 (Spielberger, 1989)

This 20-item measure assesses trait anxiety ($\alpha = .81$) on a 4-point Likert scale, ranging from 1 = *Almost Never* to 4 = *Almost Always*. A sample item is “I get in a state of tension or turmoil as I think over my recent concerns and interests.”

Kaufman Domains of Creativity Scale (K-DOCS) (*Kaufman, 2012*)

The 50-item K-DOCS was used to measure creativity and its various domains, assessed on a 5-point Likert scale ranging from 1 = *Much Less Creative* to 5 = *Much More Creative*. Self-reported creativity was assessed across five domains, namely: Self/Everyday ($\alpha = .88$), Scholarly ($\alpha = .90$), Performance ($\alpha = .93$), Scientific ($\alpha = .91$), and Artistic ($\alpha = .89$). A sample item was “Making a sculpture or piece of pottery.”

Creative Self-Efficacy Scale (CSE; Beghetto, 2006)

The CSE scale measured an individual’s belief in their ability to generate novel and useful ideas and whether they viewed themselves as having a good imagination ($\alpha = .84$). It comprised 3 items, and assessed on a 5-point Likert scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*). A sample item was “I have a lot of good ideas.”

Optimism Scale (*English version by Coelho et al., 2018; Created by Pedrosa et al., 2015*)

This 9-item scale was used to measure optimism ($\alpha = .88$) through a 5-point Likert scale ranging from 1 = *Strongly Disagree* to 5 = *Strongly Agree*. A sample item was “I believe that I will accomplish the main goals of my life.”

Procedure

The survey link directed all the participants to a Qualtrics form where they were asked to

fill in demographic information, questions about their psychological history⁴ and past experience with a mental health professional,⁵ and all the measures presented to them in a randomized order. All participants responded to the RWDT, but were randomly assigned to respond to either the positive CDT or the negative CDT.

Results

Data analysis was computed using RStudio (RStudio Team, 2023). The analysis code is available on OSF.⁶ Sample descriptives and zero-order correlations are displayed in Table 2.

Trait Anxiety and Creative Performance

Hierarchical regressions⁷ were computed to assess predictors of fluency on the counterfactual and real-world divergent thinking tasks (Table 3). Those who generated more numerous responses on the RWDT task were also likely to give more responses on the positive CDT task (H1a). Similarly, higher fluency on the RWDT task and lower scientific creativity were associated with more responses on the negative CDT task (H1b). Higher fluency on the RWDT task was associated with having lower education,⁸ no history of a diagnosed mental health condition,⁹ and some experience with therapy, but lower scores on performance creativity (H1c).

⁴“Have you ever been diagnosed with depression, anxiety, or any other kind of emotional/psychological concern by a healthcare provider?” Responses were coded as No = 0, Yes = 1.

⁵“Have you ever seen a mental health professional (i.e. therapist, counsellor, or someone similar) for depression, anxiety, or any other kind of emotional/psychological concern?” Responses were coded as No = 0, Briefly = 1, Routinely = 2.

⁶https://osf.io/9gqs5/?view_only=ba9b8c94ad144395ac90576d3c599cab

⁷ To predict fluency on the positive and negative CDT and RWDT task, a hierarchical multiple regression was computed with the age, gender, education, employment, past diagnosed mental health condition, and experience with therapy added in Step 1, trait anxiety and optimism scores in Step 2, CSE and all KDOCS subscales in Step 3, and fluency and/or originality scores on RWDT task in Step 4.

⁸ ‘Lower education’ here should be understood as relatively lower, rather than inherently inferior (n = 631, Not completed High School = 9, Finished High School = 403, Associate’s Degree = 30, Bachelor’s Degree = 132, Master’s Degree = 52, Doctoral = 5)

⁹ This variable will henceforth be referred to as “(no) MH history.”

Similar hierarchical regressions¹⁰ were computed to assess predictors of originality on the CDT and RWDT tasks (Table 4). None of the predictors were associated with originality on the positive CDT task (H2a). Generating more original responses on negative CDT tasks was associated with experience with therapy and generating less original responses on the RWDT task (H2b). Originality on the RWDT task was associated with being younger, being a student, and having some experience with therapy, but lower self-rated scientific creativity (H2c).

For H3 and H4, zero-order correlations (Table 2) showed that higher trait anxiety correlated with giving more responses on the negative CDT task $r(631) = .16, p < .01$ (H3a). However, no significant correlation was found between trait anxiety and fluency on the positive CDT task (H3b). Similarly, no significant correlations were found between trait anxiety and originality on both CDT tasks (H4a, b).

Exploratory Findings

For RQ1, paired t-tests were computed to compare the difference between creative performance in fluency and originality on the CDT and RWDT tasks. More responses were generated in the RWDT ($M = 2.77, SD = 2.94$) than in the positive CDT ($M = 1.66, SD = 2.74$), $t(617) = 8.24, p < 0.001, d = 0.33$, and negative CDT ($M = 2.45, SD = 3.92$) tasks, $t(617) = 2.06, p < 0.05, d = 0.07$. Similarly more original responses were generated in the RWDT task ($M = 0.76, SD = 0.3$) than in the positive CDT ($M = 0.43, SD = 0.47$), $t(617) = 14.58, p < 0.001, d = 0.59$, and negative CDT tasks ($M = 0.45, SD = 0.47$) $t(617) = 13.29, p < 0.001, d = 0.31$. Separate

¹⁰ To predict originality on the positive and negative CDT and RWDT task, a hierarchical multiple regression was computed with the age, gender (not added for positive CDT), education, employment, past diagnosed mental health condition, and experience with therapy added in Step 1, trait anxiety and optimism scores in Step 2, CSE and all KDOCS subscales in Step 3, and fluency and/or originality scores on RWDT task in Step 4.

independent t-tests¹¹ were also computed to compare the differences in fluency and originality in the two CDT tasks. More responses were generated in the negative CDT ($M = 2.45, SD = 3.92$) task than in the positive CDT task ($M = 1.66, SD = 2.74$), $t(1103.6) = -4.18, p < .001, d = -0.24$. However, no significant difference was found in the originality of responses in the two CDT tasks, $t(1233.6) = -0.88, p = 0.38, d = -0.05$.

For RQ2, independent t-tests were computed to compare the differences in creative performance in originality and fluency on the different DT tasks among individuals with and without a history of diagnosed mental health conditions. No significant differences were found in fluency or originality between the two groups of individuals on the DT tasks.

For RQ3 and 4, moderation analysis^{12,13} was computed (see Tables 5-8). Individuals with higher trait anxiety and some experience with therapy were likely to give more numerous responses on the negative CDT task (Figure 1). However, we did not find a significant moderating effect of trait anxiety on the relationship between MH history and fluency on negative CDT. Those with greater optimism and a history of a diagnosed mental health condition gave fewer responses on the negative CDT task (Figure 2). Similarly, those with greater optimism and a routine experience with therapy also gave fewer responses on the negative CDT task (Figure 3). None of the moderations computed involving positive CDT were significant, for both RQ3 and 4. Additionally, when creative performance was measured as originality on the negative CDT, the

¹¹ These were not pre-registered.

¹² To assess whether trait anxiety moderates the relationship between past psychiatric history (diagnosed mental health condition and experience with therapy) and creative performance (fluency and originality) on the CDT tasks four separate moderations were computed with age, gender, education, employment, diagnosis and therapy added in Step 1, followed by diagnosis * trait anxiety (Step 2a) and therapy * trait anxiety (Step 2b).

¹³ To assess whether optimism moderates the relationship between past psychiatric history (diagnosed mental health condition and experience with therapy) and creative performance (fluency and originality) on the CDT tasks four separate moderations were computed with age, gender, education, employment, diagnosis and therapy added in Step 1, followed by diagnosis * optimism (Step 2a) and therapy * optimism (Step 2b).

moderations were not significant.¹⁴

Discussion

When faced with an uncertain event, like a first date, does one's anxious predisposition fuel counterfactual thinking about what could go wrong? Past work has indicated that negative emotions like anxiety can serve as a catalyst for and play a facilitating role in idea generation (Du et al., 2021; Strasbaugh & Connelly, 2021). Therefore, we predicted that individuals with higher trait anxiety would indulge in excessive negative counterfactual thinking, translating into higher fluency and originality in the negative CDT task. Our findings, however, indicate a lack of a straightforward association between trait anxiety and creative performance on counterfactual divergent thinking tasks. Trait anxiety operates as a moderator, influencing the dynamics of this relationship in a non-linear manner. Optimism, on the other hand, has the opposite effect. Whereas high trait anxiety (when combined with therapy experience) made individuals more susceptible to counterfactual thought and presumably negative ruminations, high optimism was associated with a lower likelihood of this happening, thus serving as a protective buffer in the form of fewer ideas.

Trait Anxiety, Mental Health History, and Creative Performance

In the negative CDT task, trait anxiety moderated the relationship only between experience with therapy and creative performance, specifically fluency. Individuals with higher trait anxiety and routine experience with therapy generated more responses in the negative CDT condition. Additionally, individuals with no MH history and some experience with therapy

¹⁴ Results and discussion for additional analyses computed with predictors of flexibility, (moral) valence, and goal-directedness are presented in Supplementary Materials.

generated more responses on the RWDT task. Experience with therapy was also related to generating more original responses on the RWDT task. Although there is, broadly speaking, a paucity of empirical work looking at the impact of traditional therapy on a patients' creativity (Gutterman & Aafjes Van-Doorn, 2022) there are a few studies and related areas that we can draw on to understand this finding.

Research linking mindfulness¹⁵ and creativity has found a significant relationship between the two (Henriksen et al., 2020; Lebuda et al., 2016); however, this relationship was stronger when creativity was measured in terms of insight tasks rather than divergent thinking tasks (Lebuda et al., 2016). Regardless, it is likely that the awareness and open-monitoring (OM) aspects of mindfulness (especially if used in a therapeutic context) enhance creativity. For example, OM training through meditation was found to affect creativity (Colzato et al., 2012). Specifically, OM enhanced divergent thinking by priming a more “distributed” cognitive-control state, which then primes the control state needed to perform a divergent-thinking task. In addition to meditation and mindfulness training, forest therapy was also found to enhance creativity in a word association task (Yu & Hsieh, 2020). The study concluded that forest therapy helped alleviate confusion and bewilderment, which in turn enhanced creativity. In a more recent investigation, cognitive-behavioral psychodrama group therapy (CBPGT) was found to be effective in enhancing participants' creativity and critical thinking (Fallahi et al., 2023).

Viewing our results against this background, a rather multifaceted impact of therapy may be at play— anxious individuals, through routine experience with therapy, could develop a more balanced cognitive approach and are possibly better equipped at accessing negative thoughts and

¹⁵ It is important to note that mindfulness can be a component of therapy, wherein it can be used to enhance psychological health and well-being (Querstret et al., 2020). As no data was gathered on the therapy modality used by participants, it is difficult to make any conclusions regarding the type of therapy or interventions that may have contributed to an enhanced creative potential.

their outcomes. However, the present study did not ask specific details of one's experience with therapeutic techniques, such as mindfulness. With respect to experience with therapy and greater fluency and originality on the RWDT task, regular therapy may have equipped these individuals with cognitive and emotional skills, which can include problem-solving strategies, perspective-taking, and creative thinking—skills that are directly relevant to tasks like RWDT that require several original responses to real-life scenarios. That said, many people still see being in therapy as shameful or embarrassing (eg. Owen et al., 2012) and this stigma, even in an anonymous survey, may have also skewed the results.

In contrast, the same finding was not observed in the positive CDT task. This discrepancy underscores the distinctive cognitive and emotional demands of negative counterfactual thinking. While positive CDT and RWDT tasks may engage more with creative problem-solving and optimistic outlooks, the negative CDT task seems to have tapped into the kind of cognitive patterns that are sharpened by anxiety or stress, such as heightened focus and attention towards a perceived threat (Bishop, 2007; Eysenck et al., 2007). These can potentially lead to the use of various compensatory strategies, which can include anticipating multiple negative outcomes as a means of preparation for potential challenges -- which is strikingly similar to fluency. However, such compensatory strategies may be less pronounced in positive or neutral thinking contexts.

Another interesting finding is the null result obtained when predicting originality on the positive CDT task. First, the cognitive processes involved in envisioning positive outcomes (in the positive CDT) appear to be different from those used in negative or neutral scenarios. Hence, anxiety, often associated with threat sensitivity and risk aversion (eg. Charpentier et al., 2017) might not significantly contribute to or alter the thought processes required for positive counterfactual thinking. Additionally, the instructions for the positive (and negative) CDT task emphasized generating as many responses as possible, without specifically prompting for

originality. This focus on quantity (fluency) over quality (originality) could mean that participants were more oriented towards producing a high number of responses rather than creative/original ones.

Optimism and Creative Performance

Optimism moderated the relationships between MH history and lower fluency and between routine experience with therapy and lower fluency on the negative CDT task. Past research has accounted for optimism's positive effect on creativity during idea generation and divergent thinking tasks (Soroa et al., 2020; Sweetman et al., 2011). Optimism may lead to a positive attitude and is characterized by high dopamine levels, which are conducive to divergent thinking and idea generation (Baas et al., 2008; Chermahini & Hommel, 2010; Duncan et al., 2000). Those with higher levels of optimism may have been unable to generate more responses when asked to think of all the things that may go *wrong* on their first date (NCDT) because their optimistic outlook typically leads them to anticipate positive rather than negative outcomes in various situations or when confronting obstacles (Carver & Scheier, 2003; Grant & Higgins, 2003; Peterson, 2000). In other words, optimism and anxiety function in diametrically opposite ways when predicting negative counterfactual thinking. Although higher trait anxiety (when combined with therapy experience/MH history) makes individuals more susceptible to negative ruminations, higher optimism lowers the likelihood of this occurring.

However, optimism did not influence creative performance on the positive CDT task, which required envisioning optimistic outcomes; here, participants, regardless of their baseline optimism levels, might already be likely to respond by engaging in an optimistic mode of thinking. This could potentially mask any additional effects that trait optimism might have on their creative performance.

Further, optimism was not a significant moderator between MH history and creative performance (fluency and originality) on the positive CDT task. This is notable because optimism is a predisposition to expect positive outcomes, and perhaps participants with higher optimism would think of more responses when asked to think of things that go *right* on their first date (PCDT). However, the optimism tool used in the study is an overall evaluation of the trait. Individuals who are generally optimistic have been found to not be in a constant state of optimism but to also show occasional pessimism (Kluemper et al., 2019; Luthans & Youssef, 2007). It is likely that the PCDT condition's context may not have been conducive for generally optimistic individuals to conceive numerous ways that a particular hypothetical situation (i.e., their first date) would turn out favorably for them.

Other Predictors of Performance on (Counterfactual) Divergent Thinking Tasks

Our results also revealed the role domain-specific creativity plays in performance on divergent thinking tasks. Having lower self-reported scientific creativity was associated with greater fluency in the negative CDT and greater originality in the real-world DT task. Scientific creativity in this context refers to perceiving that one has higher levels of creativity in scientific and related (e.g., technology and mathematical) domains. Individuals with lower scientific creativity might be more attuned to practical, real-world scenarios rather than abstract scientific reasoning. Scientific creativity was also unrelated to openness to new experiences (Kaufman, 2012), a trait characteristically associated with creative performance (eg. Kaufman, 2011). Further, those with lower self-reported performance creativity showed greater fluency in the real-world DT task. Performance creativity is one's self-reported ability to be creative in such ways as acting, singing, and playing music (Kaufman, 2012). It is likely that there is limited overlap between one's

perceived creativity in this domain and their actual performance on a verbal, idea generation task (see also Kaufman, 2019; Reiter-Palmon et al., 2012).

Limitations and Future Scope

The present study is among the very few investigations that have delved into the role of anxiety on creative performance on (counterfactual) divergent thinking tasks. However, it was not without limitations. First, the cultural background of the participants was not extensively controlled or examined. Nisbett et al. (2001) accounted for cultural differences in how people think – with Asians being more holistic (attending to the entire field of references) in their way of thought and those from the West being more analytical. Additionally, cultural differences have also been seen in affective disorders like anxiety and rumination (De Vaus et al., 2018); specifically, European Americans are found to suffer dire outcomes of their rumination when compared to East Asians, despite East Asians reporting more instances of rumination (Chang et al., 2010). Similar cultural factors could have influenced how individuals responded to the given tasks, and either controlling or examining cultural factors in our study could have contributed to the findings. Second, we did not include a measure of rumination, which would have helped examine the cognitive implications of trait anxiety more directly.

Third, we did not explore how therapeutic experiences might intersect with creative performance in the context of anxiety. Focusing on varying types of individuals' experiences with therapy, such as mindfulness-based practices, could be included in future studies. In addition, asking more questions about mental health history and therapeutic experiences, such as whether they felt they were helped by therapy, could also be useful. Assessing measures of overthinking or rumination and diversifying the counterfactual scenarios used in the divergent thinking tasks could offer a more comprehensive understanding of the interplay between anxiety, therapy experiences, and creative performance. Moreover, future studies could consider differentiating between

thinking and creativity tasks more explicitly. This could involve modifying the task instructions or the criteria for response evaluation to separate analytical thinking from creative thinking. It could also involve including a non-DT creativity task to serve as the baseline or control variable.

Further, it is important to acknowledge that the DT tasks, particularly the negative CDT task, may emphasize cognitive processes like problem identification and solution generation more than creative thinking. This can be attributed to the nature of the task, which requires participants to consider realistic, plausible outcomes rather than purely imaginative or novel ones. The instructions provided to the participants — emphasizing generating multiple outcomes or responses without specifically encouraging creativity or novelty — might have steered them towards a more analytical or logical approach rather than creative exploration. Although creativity involves originality and novelty, analytical thinking is more about logical reasoning and problem-solving. The DT tasks might inherently tilt towards the latter due to their focus on practical and realistic scenarios. Indeed, some intelligence and achievement measures include DT-like items that do not tap into originality (such as asking people to name many words starting with the same letter; Kaufman et al., 2011).

Conclusion

Our study contributes to the nuanced understanding of the relationship between anxiety and creativity. We found that trait anxiety serves as a moderator rather than a direct predictor of creative performance, particularly in divergent thinking tasks. These findings highlight the complex interplay between emotional states and creative processes, challenging the notion of a straightforward positive or negative impact of emotions on creativity. The results emphasize the importance of considering individual differences, such as trait anxiety, optimism, and mental health history, in understanding creative abilities and processes. Furthermore, our study underscores the

importance of context, both in terms of the nature of the creative task (in our case, positive and negative counterfactual DT task) and the individual's personal experiences and background.

In conclusion, our research adds to the growing body of literature that seeks to demystify the intricate relationship between various (negative) emotional states and creativity. It opens up new avenues for future research and practical applications, particularly in educational and therapeutic settings, where understanding and fostering creativity is of importance. The insights gained from this study could potentially be applied to enhance creative capacities in individuals, particularly those who experience higher levels of anxiety, thereby harnessing the full spectrum of human creative potential.

References

- Acar, S., Tadik, H., Myers, D., van der Smán, C., & Uysal, R. (2021). Creativity and Well-being: A Meta-analysis. *The Journal of Creative Behavior*, 55(3), 738–751.
<https://doi.org/10.1002/JOCB.485>
- Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2008). A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? *Psychological Bulletin*, 134(6), 779–806. <https://doi.org/10.1037/a0012815>
- Baas, M., De Dreu, C. K. W., & Nijstad, B. A. (2011). Creative production by angry people peaks early on, decreases over time, and is relatively unstructured. *Journal of Experimental Social Psychology*, 47(6), 1107–1115. <https://doi.org/10.1016/j.jesp.2011.05.009>
- Baas, M., de Dreu, C., & Nijstad, B. A. (2012). Emotions that associate with uncertainty lead to structured ideation. *Emotion*, 12(5), 1004–1014. <https://doi.org/10.1037/a0027358>
- Baas, M., Nijstad, B. A., Koen, J., Boot, N. C., & De Dreu, C. K. W. (2020). Vulnerability to Psychopathology and Creativity: The Role of Approach-Avoidance Motivation and Novelty Seeking. *Psychology of Aesthetics, Creativity, and the Arts*, 14(3), 334–352.
<https://doi.org/10.1037/ACA0000223>
- Beghetto, R. A. (2006). Creative self-efficacy: Correlates in middle and secondary students. *Creativity Research Journal*, 18(4), 447–457. https://doi.org/10.1207/s15326934crj1804_4
- Bishop, S. J. (2007). Neurocognitive mechanisms of anxiety: an integrative account. *Trends in Cognitive Sciences*, 11(7), 307–316. <https://doi.org/10.1016/j.tics.2007.05.008>
- Bledow, R., Rosing, K., & Frese, M. (2013). A Dynamic Perspective on Affect and Creativity. *Academy of Management Journal*, 56(2), 432–450. <https://doi.org/10.5465/amj.2010.0894>
- Carlsson, I., Wendt, P. E., & Risberg, J. (2000). On the neurobiology of creativity. Differences in frontal activity between high and low creative subjects. *Neuropsychologia*, 38(6), 873–885.

[https://doi.org/10.1016/S0028-3932\(99\)00128-1](https://doi.org/10.1016/S0028-3932(99)00128-1)

Carver, C. S., & Scheier, M. (2003). Optimism. In *Positive psychological assessment: A handbook of models and measures*. (pp. 75–89). American Psychological Association.

<https://doi.org/10.1037/10612-005>

Chang, E. C., Tsai, W., & Sanna, L. J. (2010). Examining the relations between rumination and adjustment: Do ethnic differences exist between asian and european americans? *Asian American Journal of Psychology*, 1(1), 46–56. <https://doi.org/10.1037/A0018821>

Charpentier, C. J., Aylward, J., Roiser, J. P., & Robinson, O. J. (2017). Enhanced Risk Aversion, But Not Loss Aversion, in Unmedicated Pathological Anxiety. *Biological Psychiatry*, 81(12), 1014–1022. <https://doi.org/10.1016/j.biopsych.2016.12.010>

Chermahini, S. A., & Hommel, B. (2010). The (b)link between creativity and dopamine: Spontaneous eye blink rates predict and dissociate divergent and convergent thinking. *Cognition*, 115(3), 458–465. <https://doi.org/10.1016/j.cognition.2010.03.007>

Coelho, G. L. H., Vilar, R., Hanel, P. H. P., Monteiro, R. P., Ribeiro, M. G. C., & Gouveia, V. V. (2018). Optimism scale: Evidence of psychometric validity in two countries and correlations with personality. *Personality and Individual Differences*, 134(March), 245–251. <https://doi.org/10.1016/j.paid.2018.06.030>

Colzato, L. S., Ozturk, A., & Hommel, B. (2012). Meditate to Create: The Impact of Focused-Attention and Open-Monitoring Training on Convergent and Divergent Thinking. *Frontiers in Psychology*, 3(APR). <https://doi.org/10.3389/FPSYG.2012.00116>

Daker, R. J., Cortes, R. A., Lyons, I. M., & Green, A. E. (2020). Creativity anxiety: Evidence for anxiety that is specific to creative thinking, from STEM to the arts. *Journal of Experimental Psychology: General*, 149(1), 42–57. <https://doi.org/10.1037/XGE0000630>

Daker, R. J., Viskontas, I. V., Porter, G. F., Colaizzi, G. A., Lyons, I. M., & Green, A. E. (2023).

Investigating links between creativity anxiety, creative performance, and state-level anxiety and effort during creative thinking. *Scientific Reports*, 13(1). <https://doi.org/10.1038/S41598-023-39188-1>

Davis, M. A. (2009). Understanding the relationship between mood and creativity: A meta-analysis. *Organizational Behavior and Human Decision Processes*, 108(1), 25–38. <https://doi.org/10.1016/j.obhdp.2008.04.001>

De Dreu, C. K. W., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the mood-creativity link: toward a dual pathway to creativity model. *Journal of Personality and Social Psychology*, 94(5), 739–756. <https://doi.org/10.1037/0022-3514.94.5.739>

De Vaus, J., Hornsey, M. J., Kuppens, P., & Bastian, B. (2018). Exploring the East-West Divide in Prevalence of Affective Disorder: A Case for Cultural Differences in Coping With Negative Emotion. *Personality and Social Psychology Review*, 22(3), 285–304. https://doi.org/10.1177/1088868317736222/ASSET/IMAGES/LARGE/10.1177_1088868317736222-FIG1.JPEG

Du, Y., Yang, Y., Wang, X., Xie, C., Liu, C., Hu, W., & Li, Y. (2021). A positive role of negative mood on creativity: The opportunity in the crisis of the COVID-19 epidemic. *Frontiers in Psychology*, 11(January), 1–14. <https://doi.org/10.3389/fpsyg.2020.600837>

Duncan, J., Seitz, R. J., Kolodny, J., Bor, D., Herzog, H., Ahmed, A., Newell, F. N., & Emslie, H. (2000). A Neural Basis for General Intelligence. *Science*, 289(5478), 457–460. <https://doi.org/10.1126/science.289.5478.457>

Epstude, K., & Roese, N. J. (2008). The Functional Theory of Counterfactual Thinking. *Personality and Social Psychology Review*, 12(2), 168–192. <https://doi.org/10.1177/1088868308316091>

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive

performance: Attentional control theory. *Emotion*, 7(2), 336–353.

<https://doi.org/10.1037/1528-3542.7.2.336>

Fallahi, N., Tashk, A., & Towhidi, A. (2023). The effectiveness of cognitive-behavioral psychodrama group therapy (CBPGT) on inadequate guardian male adolescents' creativity and critical thinking. *Thinking Skills and Creativity*, 47, 101171.

<https://doi.org/10.1016/J.TSC.2022.101171>

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/BF03193146/METRICS>

Forthmann, B., Paek, S. H., Dumas, D., Barbot, B., & Holling, H. (2020). Scrutinizing the basis of originality in divergent thinking tests: On the measurement precision of response propensity estimates. *British Journal of Educational Psychology*, 90(3), 683–699.

<https://doi.org/10.1111/bjep.12325>

George, J. M., & Zhou, J. (2007). Dual tuning in a supportive context: Joint contributions of positive mood, negative mood, and supervisory behaviors to employee creativity. *Academy of Management Journal*, 50(3), 605–622. <https://doi.org/10.5465/AMJ.2007.25525934>

Grant, H., & Higgins, E. T. (2003). Optimism, Promotion Pride, and Prevention Pride as Predictors of Quality of Life. *Personality and Social Psychology Bulletin*, 29(12), 1521–1532.

<https://doi.org/10.1177/0146167203256919>

Gutterman, D., & Aafjes Van-Doorn, K. (2022). An Exploration of the Intersection Between Creativity and Psychotherapy. *Creativity Research Journal*.

<https://doi.org/10.1080/10400419.2022.2127566>

He, W. J. (2023). Positive and negative affect facilitate creativity motivation: Findings on the effects of habitual mood and experimentally induced emotion. *Frontiers in Psychology*, 14, 1014612. <https://doi.org/10.3389/FPSYG.2023.1014612/BIBTEX>

Henriksen, D., Richardson, C., & Shack, K. (2020). Mindfulness and creativity: Implications for thinking and learning. *Thinking Skills and Creativity*, 37, 100689. <https://doi.org/10.1016/j.tsc.2020.100689>

Icekson, T., Roskes, M., & Moran, S. (2014). Effects of optimism on creativity under approach and avoidance motivation. *Frontiers in Human Neuroscience*, 8(1 FEB). <https://doi.org/10.3389/FNHUM.2014.00105>

Ivcevic, Z., Hoffmann, J. D., & Kaufman, J. C. (Eds.). (2023). *The Cambridge handbook of creativity and emotions*. Cambridge University Press.

Kapoor, H., & Kaufman, J. C. (2022). The evil within: The AMORAL model of dark creativity. *Theory and Psychology*, Sec 8. <https://doi.org/10.1177/09593543221074326>

Kaufman, J. C. (2011). Individual differences in creativity. *The Wiley-Blackwell Handbook of Individual Differences*, 679–697. <https://doi.org/10.1002/9781444343120.ch26>

Kaufman, J. C. (2012). Counting the muses: Development of the Kaufman Domains of Creativity Scale (K-DOCS). *Psychology of Aesthetics, Creativity, and the Arts*, 6(4), 298–308. <https://doi.org/10.1037/a0029751>

Kaufman, J. C. (2014). *Creativity and Mental Illness* (J. C. Kaufman (Ed.)). Cambridge University Press. <https://doi.org/10.1017/CBO9781139128902>

Kaufman, J. C. (2019). Self-assessments of creativity: Not ideal, but better than you think. *Psychology of Aesthetics, Creativity, and the Arts*, 13(2), 187–192. <https://doi.org/10.1037/aca0000217>

- Kaufman, J. C., Kaufman, S. B., & Lichtenberger, E. O. (2011). Finding Creative Potential on Intelligence Tests via Divergent Production. *Canadian Journal of School Psychology, 26*(2), 83–106. <https://doi.org/10.1177/0829573511406511>
- Kaufmann, G., & Kaufmann, A. (2014). When good is bad and bad is good: Mood, bipolarity, and creativity. *Creativity and Mental Illness, 205–235*.
<https://doi.org/10.1017/CBO9781139128902.014>
- Kaufmann, G., & Vosburg, S. K. (2002). The effects of mood on early and late idea production. *Creativity Research Journal, 14*(3–4), 317–330. https://doi.org/10.1207/S15326934CRJ1434_3
- Kluemper, D., Taylor, S., Bowler, W., Bing, M., & Halbesleben, J. (2019). How leaders perceive employee deviance: Blaming victims while excusing favorites. *Journal of Applied Psychology, 104*. <https://doi.org/10.1037/apl0000387>
- Kyaga, S., Lichtenstein, P., Boman, M., Hultman, C., Långström, N., & Landén, M. (2011). Creativity and mental disorder: Family study of 300 000 people with severe mental disorder. *The British Journal of Psychiatry, 199*(5), 373–379. <https://doi.org/10.1192/BJP.BP.110.085316>
- Lebuda, I., Zabelina, D. L., & Karwowski, M. (2016). Mind full of ideas: A meta-analysis of the mindfulness–creativity link. *Personality and Individual Differences, 93*, 22–26.
<https://doi.org/10.1016/j.paid.2015.09.040>
- Lei, F., & Lei, L. (2022). How Does the Optimism of Students Learning a Foreign Language Affect Their Creative Self-Efficacy? The Mediating Effects of Hope and Empathy. *Frontiers in Psychology, 13*, 831593. <https://doi.org/10.3389/FPSYG.2022.831593>
- Leung, A. K.-Y., Liou, S., Qiu, L., Kwan, L. Y.-Y., Chiu, C.-Y., & Yong, J. C. (2014). The role of instrumental emotion regulation in the emotions–creativity link: How worries render individuals with high neuroticism more creative. *Emotion, 14*(5), 846–856.
<https://doi.org/10.1037/a0036965>

- Ludwig, A. M. (1995). *The price of greatness : resolving the creativity and madness controversy*. 310. <https://www.guilford.com/books/The-Price-of-Greatness/Arnold-Ludwig/9780898628395>
- Luthans, F., & Youssef, C. M. (2007). Emerging Positive Organizational Behavior. *Journal of Management*, 33(3), 321–349. <https://doi.org/10.1177/0149206307300814>
- Mao, J., Chang, S., Gong, Y., & Xie, J. L. (2021). Team job-related anxiety and creativity: Investigating team-level and cross-level moderated curvilinear relationships. *Journal of Organizational Behavior*, 42(1), 34–47. <https://doi.org/10.1002/JOB.2489>
- Mumford, M. D., & Gustafson, S. B. (1988). Creativity Syndrome: Integration, Application, and Innovation. *Psychological Bulletin*, 103(1), 27–43. <https://doi.org/10.1037/0033-2909.103.1.27>
- Nijstad, B. A., Dreu, C. K. W. De, Rietzschel, E. F., & Baas, M. (2010). The dual pathway to creativity model: Creative ideation as a function of flexibility and persistence. *European Review of Social Psychology*, 21(1), 34–77. <https://doi.org/10.1080/10463281003765323>
- Nisbett, R. E., Choi, I., Peng, K., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review*, 108(2), 291–310. <https://doi.org/10.1037/0033-295X.108.2.291>
- Owen, J., Thomas, L., & Rodolfa, E. (2012). Stigma for Seeking Therapy. *The Counseling Psychologist*, 41(6), 857–880. <https://doi.org/10.1177/0011000012459365>
- Pedrosa, I., Celis-Atenas, K., Suárez-Álvarez, J., García-Cueto, E., & Muñoz, J. (2015). Cuestionario para la evaluación del optimismo: Fiabilidad y evidencias de validez. *Terapia Psicológica*, 33(2), 127–138. <https://doi.org/10.4067/S0718-48082015000200007>
- Peterson, C. (2000). The future of optimism. *American Psychologist*, 55(1), 44–55. <https://doi.org/10.1037/0003-066X.55.1.44>
- Rego, A., Sousa, F., Marques, C., & Cunha, M. P. (2012). Optimism predicting employees'

creativity: The mediating role of positive affect and the positivity ratio. *European Journal of Work and Organizational Psychology*, 21(2), 244–270.

<https://doi.org/10.1080/1359432X.2010.550679>

Reiter-Palmon, R., Robinson-Morrall, E. J., Kaufman, J. C., & Santo, J. B. (2012). Evaluation of self-perceptions of creativity: Is it a useful criterion? *Creativity Research Journal*, 24(2–3), 107–114. <https://doi.org/10.1080/10400419.2012.676980>

Robinson, O. J., Vytal, K., Cornwell, B. R., & Grillon, C. (2013). The impact of anxiety upon cognition: perspectives from human threat of shock studies. *Frontiers in Human Neuroscience*, 7. <https://doi.org/10.3389/fnhum.2013.00203>

RStudio Team. (2023). *RStudio: Integrated Development for R*. RStudio, PBC, Boston, MA. <http://www.rstudio.com/>.

Schlesinger, J. (2009). Creative Mythconceptions: A Closer Look at the Evidence for the “Mad Genius” Hypothesis. *Psychology of Aesthetics, Creativity, and the Arts*, 3(2), 62–72. <https://doi.org/10.1037/a0013975>

Schlesinger, J. (2014). The Cautionary Chapter. In *Creativity and mental illness* (pp. 60–70). Cambridge University Press.

Soroa, G., Aritzeta, A., Muela, A., Balluerka, N., Gorostiaga, A., & Aliri, J. (2020). The Emotional Divergent–Convergent Thinking Program (EDICOP): Design, Implementation, and Results. *European Journal of Investigation in Health, Psychology and Education*, 10(4), 1051–1064. <https://doi.org/10.3390/ejihpe10040074>

Spielberger, C. D. (1989). *State-trait anxiety inventory: Bibliography*. Palo Alto: Consulting Psychologists Press.

Strasbaugh, K., & Connelly, S. (2021). The influence of anger and anxiety on idea generation: Taking a closer look at integral and incidental emotion effects. *Psychology of Aesthetics*,

Creativity, and the Arts. <https://doi.org/10.1037/aca0000400>

Sweetman, D., Luthans, F., Avey, J. B., & Luthans, B. C. (2011). Relationship between positive psychological capital and creative performance. *Canadian Journal of Administrative Sciences / Revue Canadienne Des Sciences de l'Administration*, 28(1), 4–13.

<https://doi.org/10.1002/cjas.175>

To, M. L., Fisher, C. D., & Ashkanasy, N. M. (2015). Unleashing angst: Negative mood, learning goal orientation, psychological empowerment and creative behaviour. *Human Relations*, 68(10), 1601–1622. <https://doi.org/10.1177/0018726714562235>

Wang, X., Li, Y., Li, X., Duan, H., Li, Y., & Hu, W. (2021). Role of Avoidance-Motivation Intensity in Creative Thinking: Similar and Differential Effects across Creative Idea Generation and Evaluation. *Creativity Research Journal*, 33(3), 284–301.

<https://doi.org/10.1080/10400419.2020.1856595>

Yu, C. P. (Simon), & Hsieh, H. (2020). Beyond restorative benefits: Evaluating the effect of forest therapy on creativity. *Urban Forestry & Urban Greening*, 51, 126670.

<https://doi.org/10.1016/J.UFUG.2020.126670>

Zhan, J., Jiang, S., & Luo, J. (2020). The angrier or the happier the more creative? The impact of anger and joy induction on creative problem-solving and divergent thinking. *PsyCh Journal*, 9(6), 864–876. <https://doi.org/10.1002/PCHJ.400>

Table 1. Inter Class Correlations between raters

Task	Creativity	Moral	Goal	Valence
Real-World DT	0.75 [^]	0.88 ^{^^}	0.71 ^{^^}	
Positive CDT	0.39			0.82 [^]
Negative CDT	0.63			0.83 ^{^^}

Note. ^^ indicates ICCs between 5 raters, ^ indicates ICCs between 4 raters

Table 2. Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	22.36	6.8													
2. Gender	1.6	0.52	-0.02												
3. Education	2.73	1.11	.52**	-0.05											
4. Employment	2.27	0.54	.23**	-0.05	.39**										
5. Diagnosis	0.35	0.48	0.07	.11**	0.06	.12**									
6. Therapy	0.66	0.77	0.02	.14**	0	0.02	.62**								
7. RWDT Fluency	2.77	2.94	-.16**	.11**	-.22**	-.17**	-0.04	.10*							
8. RWDT Flexibility	2.15	1.88	-.18**	.08*	-.25**	-.20**	-0.07	0.06	.88**						
9. RWDT Creativity	2.43	1.22	-.14**	-0.01	-.19**	-.14**	-0.04	0.04	.45**	.50**					
10. RWDT Moral															
Valence	3.77	1.67	-.19**	.09*	-.21**	-.18**	-0.02	0.07	.29**	.35**	.61**				

11. RWDT Goal																
Directedness	2.29	0.98	-.21**	0.01	-.27**	-.20**	-0.04	0.06	.34**	.42**	.68**	.71**				
12. RWDT Originality	0.76	0.3	-.20**	0	-.24**	-.19**	-0.06	0.05	.38**	.48**	.84**	.84**	.91**			
13. CDTP Fluency	1.66	2.74	-.12**	.08*	-.13**	-.09*	-0.02	0	.28**	.25**	.14**	.10*	.13**	.13**		
14. CDTP Flexibility	1.3	2.01	-.12**	0.07	-.12**	-.12**	-0.01	-0.02	.26**	.24**	.12**	.11**	.11**	.12**	.93**	
								-								
15. CDTP Originality	0.43	0.47	-0.04	0	-0.03	-0.06	0	0.06	-0.03	-0.02	-0.01	0.03	0	0.01	.66**	
								-								
16. CDTP Valence	1.94	2.14	-0.06	0.01	-0.05	-0.06	0.01	0.06	-0.02	0	0.01	0.05	0.01	0.03	.66**	
															-	
17. CDTN Fluency	2.45	3.92	-.11**	.09*	-.18**	-.08*	0.01	.12**	.37**	.36**	.17**	.12**	.11**	.13**	.38**	
															-	
18. CDTN Flexibility	1.7	2.37	-.14**	.09*	-.18**	-.10*	-0.01	.10*	.32**	.32**	.15**	.12**	.10*	.12**	.43**	

																-
19. CDTN Originality	0.45	0.47	0.01	0.05	0	0.04	-0.01	0.07	0.07	0.05	-0.04	-0.07	-0.05	-0.07	.59**	
																-
20. CDTN Valence	1.47	1.59	0.05	0.01	0.07	.10*	0.01	0.07	0	-0.01	-.10**	-.11**	-.11**	.13**	.56**	
21. Trait Anxiety	47.12	8.78	-0.03	.22**	-0.08	-.15**	.20**	.23**	.14**	.11**	0.05	0.01	0.03	0.02	0.04	
																-
22. KDOC Everyday	40.24	7.14	.10*	-.13**	.26**	.27**	.08*	0.04	-.16**	-.19**	-.08*	-0.01	.12**	-.09*	-.09*	
																-
23. KDOC Scholarly	36.8	8.24	.12**	-.10*	.34**	.20**	.18**	0.06	-.11**	-.14**	-0.06	-0.07	.18**	.13**	-.09*	
																-
24. KDOC Performance	30.69	10.32	.16**	-.13**	.26**	.21**	.12**	0.03	-.20**	-.21**	-.11**	-.12**	.16**	.15**	-.10*	
																-
25. KDOC Scientific	26.07	8.79	.13**	-.26**	.32**	.22**	0.08	0.04	-.20**	-.24**	-.15**	-.18**	.21**	.19**	0.06	

														-	-	-
26. KDOC Artistic	30.48	8.09	.09*	0.07	.22**	.18**	.21**	.12**	-.11**	-.17**	-0.07	-0.04	.13**	.12**	0.05	
27. Creative Self Efficacy	11.61	2.31	0.01	-0.07	.15**	.13**	.09*	0.05	-0.04	-.08*	-0.02	0.02	-0.07	-0.03	0	
								-						-		
28. Optimism	32.94	6.65	-0.02	-.19**	.12**	.22**	-0.07	.14**	-.11**	-.13**	-0.05	0.02	0.06	-0.03	0.01	

Table 2 (continued). Means, standard deviations, and correlations with confidence intervals

	14	15	16	17	18	19	20	21	22	23	24	25	26	27
15. CDTP Originality	.70**													
16. CDTP Valence	.71**	.99**												
17. CDTN Fluency	-.41**	-.57**	-.57**											
18. CDTN Flexibility	-.47**	-.66**	-.65**	.93**										
19. CDTN Originality	-.63**	-.89**	-.89**	.62**	.72**									
20. CDTN Valence	-.60**	-.84**	-.84**	.52**	.61**	.95**								
21. Trait Anxiety	0.03	-0.02	-0.02	.16**	.12**	0.03	-0.03							
22. KDOC Everyday	-.09*	-0.01	-0.02	-.14**	-.14**	-0.04	0.07	-.41**						
23. KDOC Scholarly	-.10*	-0.02	-0.02	-.11**	-.13**	-0.04	0.05	-.17**	.60**					
24. KDOC Performance	-.10**	0.01	0	-.13**	-.16**	-.09*	0	-.10**	.52**	.55**				
25. KDOC Scientific	-0.04	0.01	0	-.21**	-.23**	-.09*	0.01	-.19**	.47**	.53**	.62**			
26. KDOC Artistic	-0.06	-0.03	-0.03	-0.07	-.09*	-0.03	0.04	-0.02	.45**	.55**	.64**	.54**		

27. Creative Self Efficacy	-0.02	-0.01	-0.01	-0.04	-0.03	0	0.06	-.24**	.49**	.48**	.38**	.33**	.42**	
28. Optimism	-0.01	0.01	0.01	-.17**	-.14**	-0.03	0.03	-.68**	.60**	.36**	.26**	.34**	.21**	.46**

Note. *M and SD are used to represent mean and standard deviation, respectively. * indicates $p < .05$. ** indicates $p < .01$. Gender was coded as Man = 1, Woman = 2, Other = 3. Employment was coded as Unemployed/Retired = 1, Student = 2, Employed = 3. Education was linearly measured. Diagnosis was coded as Yes = 1, No = 0, (experience with) Therapy was coded as No = 1, Briefly = 1, Routinely = 3.*

Table 3. Predictors of Fluency on the DT tasks

Variable	Positive CDT		Negative CDT		Real-World DT	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-0.019	0.019	-0.012	0.025	-0.021	0.019
Gender	0.336	0.225	-0.088	0.307	0.305	0.238
Education	-0.038	0.126	-0.320	0.173	-0.365**	0.133
Employment	-0.134	0.221	0.301	0.302	-0.269	0.233
Diagnosis	0.203	0.297	-0.364	0.407	-0.814**	0.314
Therapy	-0.194	0.180	0.430	0.246	0.591**	0.189
Trait Anxiety	0.009	0.017	0.014	0.023	0.035	0.018
Optimism	0.050	0.026	-0.069	0.035	0.008	0.027
Creative Self Efficacy	0.034	0.058	0.086	0.079	0.069	0.061
KDOC_Everyday	-0.036	0.023	0.016	0.031	-0.011	0.024
KDOC_Scholarly	-0.021	0.019	-0.001	0.025	0.032	0.019
KDOC_Scientific	0.019	0.018	-0.058*	0.024	-0.017	0.018
KDOC_Performance	-0.006	0.016	0.005	0.021	-0.043**	0.016
KDOC_Artistic	0.003	0.020	0.014	0.026	-0.001	0.020
RWDT Fluency	0.243***	0.040	0.436***	0.055		
RWDT Originality	0.060	0.392	-0.470	0.535		
R²	0.104		0.182		0.121	
Δ R²	0.062		0.089		0.024	

*Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$*

Table 4. Predictors of Originality on the DT tasks

Variable	Positive CDT		Negative CDT		Real-World DT	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age					-0.005*	0.002
Education					-0.027	0.014
Employment					-0.062*	0.024
Diagnosis	0.072	0.053	-0.09	0.05	-0.049	0.032
Therapy	-0.062	0.032	0.074*	0.03	0.041*	0.020
Trait Anxiety	-0.001	0.003	0.00	0.00	-0.0004	0.002
Optimism	0.000	0.005	0.00	0.00	0.0008	0.003
Creative Self Efficacy	0.000	0.010	0.01	0.01	0.004	0.006
KDOC_Everyday	-0.003	0.004	0.00	0.00	0.001	0.003
KDOC_Scholarly	-0.002	0.003	0.00	0.00	-0.001	0.002
KDOC_Scientific	0.000	0.003	0.00	0.00	-0.004*	0.002
KDOC_Performance	0.003	0.003	0.00	0.00	-0.001	0.002
KDOC_Artistic	-0.003	0.003	0.00	0.00	-0.0001	0.002
RWDT Fluency	-0.003	0.007	0.01	0.01	0.0005	0.002
RWDT Originality	0.033	0.070	-0.187**	0.07		
R²	0.011		0.036		0.1	
Δ R²	0.001		0.013		0.015	

*Note. * indicates $p < .05$. ** indicates $p < .01$. Since the demographic variables did not significantly correlate with originality in positive and negative CDT, they were not added in the respective models.*

Table 5. Trait anxiety as a moderator in the relationship between past psychiatric history and performance on the CDT tasks (Diagnosis)

Variable	Positive CDT (Fluency)		Negative CDT (Fluency)		Positive CDT (Originality)		Negative CDT (Originality)	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-0.029	0.018	-0.016	0.026				
Gender	0.413	0.218	0.392	0.304				
Education	-0.156	0.123	-0.533**	0.172				
Employment	-0.184	0.225	0.144	0.313				
Diagnosis	-1.251	1.306	-4.029*	1.821	-0.208	0.221	0.050	0.217
Therapy	-0.033	0.183	0.765**	0.256	-0.061	0.032	0.08**	0.031
Trait Anxiety	-0.007	0.040	0.028	0.024	-0.002	0.002	0.002	0.002
Trait Anxiety *								
Diagnosis	0.024	0.026	0.066	0.036	0.005	0.004	-0.003	0.004
R^2	0.03		0.08		0.009		0.013	
ΔR^2	-0.01		0.03		0		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$

Table 6. Trait anxiety as the moderator in the relationship between past psychiatric history and performance on CDT tasks (Therapy)

Variable	Positive CDT (Fluency)		Negative CDT (Fluency)		Positive CDT (Originality)		Negative CDT (Originality)	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-0.030	0.019	-0.016	0.026				
Gender	0.396	0.217	0.346	0.302				
Education	-0.149	0.123	-0.519**	0.171				
Employment	-0.179	0.223	0.149	0.312				
Diagnosis	-0.059	0.298	-0.795	0.416	0.061	0.051	-0.096	0.050
Therapy	-1.328	0.826	-2.364*	1.150	-0.28*	0.142	0.134	0.139
Trait Anxiety	-0.016	0.032	0.010	0.025	-0.003	0.003	0.001	0.003
Trait Anxiety *								
Therapy	0.026	0.016	0.064**	0.023	0.004	0.002	-0.001	0.002
R^2	0.03		0.08		0.010		0.012	
ΔR^2	0.00		0.00		0		-0.01	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 7. Optimism as the moderator in the relationship between past psychiatric history and performance on CDT tasks (Diagnosis)

Variable	Positive CDT (Fluency)		Negative CDT (Fluency)		Positive CDT (Originality)		Negative CDT (Originality)	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-0.03	0.02	-0.02	0.03				
Gender	0.437*	0.22	0.33	0.30				
Education	-0.17	0.12	-0.501**	0.17				
Employment	-0.25	0.23	0.21	0.31				
Diagnosis	0.56	1.17	3.260*	1.62	0.13	0.20	-0.10	0.20
Therapy	-0.02	0.18	0.728**	0.25	-0.064*	0.03	0.08**	0.03
Optimism	0.02	0.02	-0.04	0.03	0.00	0.00	0.00	0.00
Optimism *								
Diagnosis	-0.02	0.03	-0.119*	0.04	0.00	0.01	0.00	0.01
R²	0.03		0.09		0.01		0.01	
Δ R²	0.00		0.03		0.00		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$

Table 8. Optimism as the moderator in the relationship between past psychiatric history and performance on CDT tasks (Therapy)

	Positive CDT (Fluency)		Negative CDT (Fluency)		Positive CDT (Originality)		Negative CDT (Originality)	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
Age	-0.03	0.02	-0.03	0.03				
Gender	0.443*	0.22	0.28	0.30				
Education	-0.17	0.12	-0.514**	0.17				
Employment	-0.26	0.23	0.22	0.31				
Diagnosis	-0.06	0.30	-0.76	0.41	0.06	0.05	-0.10	0.05
Therapy	-0.16	0.72	4.432***	1.00	-0.12	0.12	0.24*	0.12
Optimism	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00
Optimism * Therapy	0.00	0.02	-0.111***	0.03	0.00	0.00	0.00	0.00
R²	0.03		0.09		0.01		0.01	
Δ R²	0.00		0.00		0.00		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 1: Fluency on the positive counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency and originality on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
	-							
Age	0.030	0.019	-0.026	0.018	-0.024	0.019	-0.019	0.019
Gender	0.406	0.214	0.416	0.218	0.409	0.232	0.336	0.225
Education	-0.165	0.123	-0.180	0.123	-0.128	0.129	-0.038	0.126
Employment	-0.213	0.221	-0.248	0.225	-0.203	0.226	-0.134	0.221
Diagnosis	-0.061	0.298	-0.103	0.300	0.002	0.305	0.203	0.297
Therapy	-0.034	0.182	-0.283	0.183	-0.047	0.184	-0.194	0.180
Trait Anxiety			0.019	0.018	0.017	0.018	0.009	0.017
Optimism			0.033	0.023	0.053	0.027	0.050	0.026
Creative Self Efficacy					0.051	0.060	0.034	0.058
KDOC_Everyday					-0.038	0.023	-0.036	0.023
KDOC_Scholarly					-0.013	0.019	-0.021	0.019
KDOC_Scientific					0.014	0.018	0.019	0.018
KDOC_Performance					-0.017	0.016	-0.006	0.016
KDOC_Artistic					0.003	0.020	0.003	0.020
RWDT Fluency							0.243***	0.040
RWDT Originality							0.060	0.392
R²	0.027		0.030		0.042		0.104	
Δ R²			0.003		0.012		0.062	

Note. *** indicates $p < .001$.

Table 2: Fluency on the negative counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency and originality on the real-world divergent thinking task

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
Age	-0.015	0.026	-0.020	0.026	-0.020	0.026	-0.012	0.025
Gender	0.522	0.301	0.319	0.304	0.058	0.322	-0.088	0.307
			-		-			
Education	-0.56**	0.173	0.529**	0.172	0.468**	0.180	-0.320	0.173
Employment	-0.059	0.311	0.161	0.315	0.212	0.315	0.301	0.302
Diagnosis	-0.703	0.419	-0.741	0.419	-0.696	0.425	-0.364	0.407
Therapy	0.843**	0.256	0.738**	0.256	0.669**	0.256	0.430	0.246
Trait Anxiety			0.027	0.024	0.029	0.024	0.014	0.023
Optimism			-0.059	0.032	-0.065	0.037	-0.069	0.035
Creative Self Efficacy					0.114	0.083	0.086	0.079
KDOC_Everyday					0.010	0.032	0.016	0.031
KDOC_Scholarly					0.013	0.026	-0.001	0.025
KDOC_Scientific					-0.063*	0.025	-0.058*	0.024
KDOC_Performance					-0.013	0.022	0.005	0.021
KDOC_Artistic					0.013	0.028	0.014	0.026
RWDT Fluency							0.436***	0.055
RWDT Originality							-0.470	0.535
R²	0.058		0.077		0.093		0.182	
Δ R²			0.019		0.016		0.089	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 3: Fluency on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, and optimism.

Variable	Step 1		Step 2		Step 3	
	B	SE B	B	SE B	B	SE B
Age	-0.027	0.019	-0.027	0.019	-0.021	0.019
Gender	0.524*	0.222	0.432	0.226	0.305	0.238
					-	
Education	-0.39**	0.127	-0.39**	0.128	0.365**	0.133
Employment	-0.433	0.23	-0.358	0.234	-0.269	0.233
			-		-	
Diagnosis	-0.815**	0.31	0.874**	0.311	0.814**	0.314
Therapy	0.675***	0.189	0.628**	0.190	0.591**	0.189
Trait Anxiety			0.032	0.018	0.035	0.018
Optimism			0.002	0.024	0.008	0.027
Creative Self Efficacy					0.069	0.061
KDOC_Everyday					-0.011	0.024
KDOC_Scholarly					0.032	0.019
KDOC_Scientific					-0.017	0.018
					-	
KDOC_Performance					0.043**	0.016
KDOC_Artistic					-0.001	0.020
R²	0.089		0.097		0.121	
Δ R²			0.008		0.024	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 4: Originality on the positive counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency and originality on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
Diagnosis	0.058	0.051	0.061	0.051	0.072	0.052	0.072	0.053
	-							
Therapy	0.063*	0.031	-0.062*	0.031	-0.062	0.032	-0.062	0.032
Trait Anxiety			-0.001	0.003	-0.001	0.003	-0.001	0.003
Optimism			-0.001	0.003	0.000	0.004	0.000	0.005
Creative Self Efficacy					0.000	0.010	0.000	0.010
KDOC_Everyday					-0.002	0.004	-0.003	0.004
KDOC_Scholarly					-0.001	0.003	-0.002	0.003
KDOC_Scientific					0.0002	0.003	0.000	0.003
KDOC_Performance					0.003	0.002	0.003	0.003
KDOC_Artistic					-0.002	0.003	-0.003	0.003
RWDT Fluency							-0.003	0.007
RWDT Originality							0.033	0.070
R²	0.007		0.007		0.010		0.011	
Δ R²			0.000		0.003		0.001	

Note. * indicates $p < .05$.

Table 5: Originality on the negative counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, fluency and originality on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
Diagnosis	-0.090	0.050	-0.094	0.050	-0.088	0.051	-0.09	0.05
Therapy	0.082**	0.030	0.080**	0.031	0.073*	0.031	0.074*	0.03
Trait Anxiety			0.0002	0.003	0.0002	0.003	0.00	0.00
Optimism			-0.001	0.003	-0.007	0.004	0.00	0.00
Creative Self Efficacy					0.007	0.100	0.01	0.01
KDOC_Everyday					0.0010	0.004	0.00	0.00
KDOC_Scholarly					0.001	0.003	0.00	0.00
KDOC_Scientific					-0.003	0.002	0.00	0.00
KDOC_Performance					-0.004	0.002	0.00	0.00
KDOC_Artistic					0.002	0.003	0.00	0.00
RWDT Fluency							0.01	0.01
							-	
RWDT Originality							0.187**	0.07
R²	0.011		0.012		0.023		0.036	
Δ R²			0.001		0.011		0.013	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 6: Originality on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, and optimism.

Variable	Step 1		Step 2		Step 3	
	B	SE B	B	SE B	B	SE B
Age	-0.004*	0.002	-0.004*	0.002	-0.005*	0.002
	-		-			
Gender	0.036**	0.013	0.036**	0.013	-0.027	0.014
			-			
Education	-0.06**	0.023	0.064**	0.024	-0.062*	0.024
Employment	-0.061	0.030	-0.059	0.032	-0.049	0.032
Diagnosis	0.044*	0.019	0.045*	0.019	0.041*	0.020
					-	
Therapy	-0.004*	0.002	-0.001	0.001	0.0004	0.002
Trait Anxiety			0.000	0.002	0.0008	0.003
Optimism			-0.004*	0.002	0.004	0.006
Creative Self Efficacy					0.001	0.003
KDOC_Everyday					-0.001	0.002
KDOC_Scholarly					-0.004*	0.002
KDOC_Scientific					-0.001	0.002
KDOC_Performance					-0.0001	0.002
KDOC_Artistic					-0.005*	0.002
R²	0.085		0.085		0.100	
Δ R²			0.000		0.015	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 7: Flexibility on the positive counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, flexibility on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
Age	-0.024	0.014	-0.023	0.014	-0.022	0.014	-0.017	0.014
Education	-0.085	0.090	-0.089	0.091	0.050	0.095	0.004	0.094
Employment	0.324*	0.162	0.330*	0.166	-0.309	0.167	-0.248	0.164
Diagnosis	0.100	0.219	0.087	0.221	0.160	0.225	0.272	0.221
Therapy	-0.086	0.133	-0.086	0.135	-0.091	0.135	-0.162	0.133
Trait Anxiety			0.006	0.013	0.006	0.013	0.004	0.013
Optimism			0.009	0.017	0.022	0.020	0.024	0.019
Creative Self Efficacy					0.019	0.044	0.011	0.043
KDOC_Everyday					-0.018	0.017	-0.015	0.017
KDOC_Scholarly					-0.016	0.014	-0.021	0.014
KDOC_Scientific					0.016	0.013	0.022	0.013
KDOC_Performance					-0.016	0.012	-0.012	0.012
KDOC_Artistic					0.004	0.014	0.006	0.014
RWDT_Flex							0.239***	0.045
R²	0.026		0.027		0.039		0.082	
Δ R²			0.001		0.012		0.043	

Note. * indicates $p < .05$. *** indicates $p < .001$.

Table 8: Flexibility on the negative counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, flexibility on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
		0.01		0.01				
Age	-0.021	6	-0.024	6	-0.023	0.016	-0.017	0.016
		0.18						
Gender	0.352	2	0.269	0.185	0.070	0.195	0.034	0.189
		0.10	-	0.10				
Education	-0.281**	5	0.264*	5	-0.198	0.109	-0.124	0.107
		0.18						
Employment	-0.101	8	-0.004	0.191	0.037	0.191	0.120	0.186
		0.25		0.25				
Diagnosis	-0.451	4	-0.454	5	-0.390	0.257	-0.237	0.250
		0.15	0.416*					
Therapy	0.460**	5	*	0.156	0.365*	0.155	0.269	0.151
				0.01				
Trait Anxiety			0.005	5	0.008	0.015	0.005	0.015
				0.02				
Optimism			-0.033	0	-0.031	0.023	-0.028	0.022
Creative Self Efficacy					0.077	0.051	0.066	0.049
KDOC_Everyday					0.004	0.020	0.008	0.019
KDOC_Scholarly					0.004	0.016	-0.003	0.016
KDOC_Scientific					-0.045**	0.015	-0.038*	0.015
KDOC_Performance					-0.013	0.014	-0.009	0.013
KDOC_Artistic					0.011	0.017	0.015	0.017

RWDT_Flex				0.325**	
				*	0.051
R^2	0.057	0.067	0.091		0.149
ΔR^2		0.010	0.024		0.058

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 9: Flexibility on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, and optimism.

Variable	Step 1		Step 2		Step 3	
	B	SE B	B	SE B	B	SE B
Age	-0.017	0.012	-0.019	0.012	-0.018	0.012
Gender	0.247	0.141	0.189	0.143	0.112	0.151
Education	-0.275***	0.081	-0.266**	0.081	-0.228**	0.085
Employment	-0.376*	0.146	-0.311*	0.148	-0.255	0.148
Diagnosis	-0.537**	0.197	-0.545**	0.197	-0.472*	0.200
Therapy	0.351**	0.120	0.321**	0.121	0.294*	0.120
Trait Anxiety			0.007	0.012	0.009	0.012
Optimism			-0.019	0.015	-0.009	0.018
Creative Self Efficacy					0.034	0.039
KDOC_Everyday					-0.011	0.015
KDOC_Scholarly					0.020	0.013
KDOC_Scientific					-0.022	0.012
KDOC_Performance					-0.014	0.010
KDOC_Artistic					-0.011	0.013
R²	0.098		0.105		0.129	
Δ R²			0.007		0.024	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 10: Valence on the positive counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, moral valence on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
Diagnosis	0.297	0.231	0.311	0.233	0.367	0.239	0.389	0.240
	-							
Therapy	0.292*	0.142	-0.29*	0.144	-0.290*	0.145	-0.308*	0.145
Trait Anxiety			-0.007	0.014	-0.007	0.014	-0.007	0.014
Optimism			-0.007	0.018	0.003	0.021	0.002	0.021
Creative Self Efficacy					-0.002	0.047	-0.004	0.047
KDOC_Everyday					-0.014	0.019	-0.015	0.019
KDOC_Scholarly					-0.005	0.015	-0.005	0.015
KDOC_Scientific					0.000	0.014	0.003	0.014
KDOC_Performance					0.012	0.013	0.013	0.013
KDOC_Artistic					-0.011	0.015	-0.013	0.015
RWDT_Moral							0.079	0.054
R²	0.007		0.007		0.011		0.014	
Δ R²			0.000		0.003		0.004	

Note. * indicates $p < .05$.

Table 11: Valence on the negative counterfactual divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, optimism, moral valence on the real-world divergent thinking task.

Variable	Step 1		Step 2		Step 3		Step 4	
	B	SE B	B	SE B	B	SE B	B	SE B
Employment	0.303*	0.119	0.285*	0.122	0.278*	0.124	0.215	0.125
Diagnosis	-0.259	0.173	-0.250	0.175	-0.294	0.178	-0.317	0.177
Therapy	0.242*	0.106	0.252*	0.107	0.246*	0.107	0.272*	0.107
Trait Anxiety			-0.004	0.010	-0.004	0.010	-0.003	0.010
Optimism			0.002	0.013	-0.012	0.016	-0.010	0.016
Creative Self Efficacy					0.031	0.035	0.034	0.035
KDOC_Everyday					0.019	0.014	0.022	0.014
KDOC_Scholarly					0.005	0.011	0.005	0.011
KDOC_Scientific					-0.003	0.010	-0.007	0.010
KDOC_Performance					-0.014	0.009	-0.016	0.009
KDOC_Artistic					0.007	0.011	0.009	0.011
RWDT_Moral							-	
							0.117**	0.040
R²	0.018		0.019		0.028		0.042	
Δ R²			0.001		0.010		0.014	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 12: Moral valence on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, and optimism.

Variable	Step 1		Step 2		Step 3	
	B	SE B	B	SE B	B	SE B
Age	-0.026*	0.011	-0.024*	0.011	-0.024*	0.011
Gender	0.260*	0.125	0.295*	0.128	0.146	0.135
Education	-0.151*	0.072	-0.159*	0.072	-0.128	0.076
Employment	-0.350**	0.130	-0.392**	0.132	-0.386**	0.132
Diagnosis	-0.198	0.175	-0.199	0.176	-0.195	0.178
Therapy	0.223*	0.107	0.241*	0.108	0.217*	0.107
Trait Anxiety			-0.001	0.010	0.002	0.010
Optimism			0.016	0.014	0.012	0.016
Creative Self Efficacy					0.016	0.035
KDOC_Everyday					0.024	0.014
KDOC_Scholarly					0.002	0.011
KDOC_Scientific					-0.031**	0.011
KDOC_Performance					-0.012	0.009
KDOC_Artistic					0.014	0.012
R²	0.079		0.083		0.107	
Δ R²			0.004		0.024	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 13: Goal directedness on the real-world divergent thinking task will be predicted by sociodemographics, past psychiatric history, trait anxiety, creative-self efficacy, scores on the K-DOCS, and optimism.

Variable	Step 1		Step 2		Step 3	
	B	SE B	B	SE B	B	SE B
Age	-0.013*	0.006	-0.014*	0.006	-0.015*	0.006
Gender	-0.145***	0.042	-0.141***	0.042	-0.098*	0.044
Education	-0.205**	0.075	-0.200**	0.077	-0.195*	0.077
Employment	-0.170	0.101	-0.155	0.102	-0.106	0.104
Diagnosis	0.148*	0.062	0.150*	0.062	0.136*	0.063
Therapy	-0.013*	0.006	-0.007	0.006	-0.006	0.006
Trait Anxiety			-0.009	0.008	-0.002	0.009
Optimism			-0.014*	0.006	0.004	0.020
Creative Self Efficacy					0.003	0.008
KDOC_Everyday					-0.009	0.007
KDOC_Scholarly					-0.012*	0.006
KDOC_Scientific					-0.0005	0.005
KDOC_Performance					0.0002	0.007
KDOC_Artistic					-0.015*	0.006
R²	0.096		0.099		0.116	
Δ R²			0.002		0.017	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 14: Does trait anxiety moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTP Fluency).

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.03	0.02	-0.03	0.02	-0.03	0.02
Gender	0.41	0.21	0.41	0.22	0.40	0.22
Education	-0.17	0.12	-0.16	0.12	-0.15	0.12
Employment	-0.21	0.22	-0.18	0.23	-0.18	0.22
Diagnosis	-0.06	0.30	-1.25	1.31	-0.06	0.30
Therapy	-0.03	0.18	-0.03	0.18	-1.33	0.83
Trait Anxiety			-0.01	0.02	-0.02	0.02
Trait Anxiety *						
Diagnosis					0.03	0.02
Trait Anxiety * Therapy					-0.03	0.02
R²	0.03		0.03		0.03	
Δ R²			-0.01		0.00	

Table 15: Does trait anxiety moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTP Originality).

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Therapy	-0.06*	0.03	-0.06	0.03	-0.28*	0.14
Diagnosis	0.06	0.05	-0.21	0.22	0.06	0.05
Trait Anxiety			-0.003	0.003	-0.004	0.003
Trait Anxiety *						
Diagnosis						
Trait Anxiety * Therapy					0.004	0.003
R²	0.01		0.01		0.01	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 16: Does trait anxiety moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTN Fluency)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.03	-0.02	0.03	-0.02	0.03
Gender	0.52	0.30	0.39	0.30	0.35	0.30
Education	-0.56**	0.17	-0.53**	0.17	-0.52**	0.17
Employment	-0.06	0.31	0.14	0.31	0.15	0.31
Diagnosis	-0.70	0.42	-4.03*	1.82	-0.80	0.42
Therapy	0.84**	0.26	0.77**	0.26	-2.36*	1.15
Trait Anxiety			0.03	0.02	0.01	0.03
Trait Anxiety * Diagnosis						
Trait Anxiety * Therapy					0.06**	0.02
R²	0.06		0.08		0.08	
Δ R²			0.03		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 17: Does trait anxiety moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTN Originality)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Diagnosis	-0.10	0.05	0.05	0.22	-0.10	0.05
Therapy	0.08**	0.03	0.08**	0.03	0.13	0.14
Trait Anxiety			0.002	0.003	0.002	0.003
Trait Anxiety * Diagnosis						
Trait Anxiety * Therapy					-0.001	0.003
R²	0.01		0.01		0.01	
Δ R²			0.00		-0.01	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 18: Does optimism moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTP Fluency)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.030	0.019	-0.03	0.02	-0.03	0.02
Gender	0.406	0.214	0.44*	0.22	0.44*	0.22
Education	-0.165	0.123	-0.17	0.12	-0.17	0.12
Employment	-0.213	0.221	-0.25	0.23	-0.26	0.23
Diagnosis	-0.061	0.298	0.56	1.17	-0.06	0.30
Therapy	-0.034	0.182	-0.02	0.18	-0.16	0.72
Optimism			0.02	0.02	0.01	0.02
Optimism * Diagnosis						
Optimism * Therapy					0.005	0.02
R²	0.03		0.03		0.03	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 19: Does optimism moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTP Originality)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Diagnosis	0.06	0.05	0.13	0.20	0.06	0.05
Therapy	-0.06*	0.03	-0.06*	0.03	-0.12	0.12
Optimism			0.001	0.004	-0.002	0.004
Optimism * Diagnosis			-0.002	0.01		
Optimism * Therapy					0.002	0.004
R²	0.01		0.01		0.01	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 20: Does optimism moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTN Fluency)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.03	-0.02	0.03	-0.03	0.03
Gender	0.52	0.30	0.33	0.30	0.28	0.30
Education	-0.56**	0.17	-0.50**	0.17	-0.51**	0.17
Employment	-0.06	0.31	0.21	0.31	0.22	0.31
Diagnosis	-0.70	0.42	3.26*	1.62	-0.76	0.41
Therapy	0.84**	0.26	0.73**	0.25	4.43***	1.00
Optimism			-0.04	0.03	0.0005	0.03
Optimism * Diagnosis			-0.12*	0.05		
Optimism * Therapy					-0.11***	0.03
R^2	0.06		0.09		0.10	
ΔR^2			0.03		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 21: Does optimism moderate the relationship between past psychiatric history and performance on counterfactual divergent thinking tasks? (CDTN Originality)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Diagnosis	-0.10	0.05	-0.10	0.20	-0.10	0.05
Therapy	0.08**	0.03	0.08**	0.03	0.24*	0.12
Optimism			-0.001	0.004	0.003	0.004
Optimism * Diagnosis			0.0001	0.01		
Optimism * Therapy					-0.005	0.004
R²	0.01		0.01		0.01	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 22: Does trait anxiety moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTP Flex)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.01	-0.02	0.01	-0.02	0.01
Gender	0.27	0.16	0.29	0.16	0.28	0.16
Education	-0.08	0.09	-0.07	0.09	-0.07	0.09
Employment	-0.31	0.16	-0.30	0.16	-0.29	0.16
Diagnosis	0.09	0.22	-1.02	0.96	0.09	0.22
Therapy	-0.11	0.13	-0.10	0.13	-1.24*	0.61
Trait Anxiety			-0.01	0.01	-0.02	0.01
Trait Anxiety *						
Diagnosis			0.02	0.02		
Trait Anxiety * Therapy					0.02	0.01
R²	0.03		0.03		0.04	
Δ R²			0.01		0.00	

Note. * indicates $p < .05$.

Table 23: Does trait anxiety moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTP Valence)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.01	-0.02	0.01	-0.02	0.01
Education	-0.05	0.09	-0.04	0.09	-0.04	0.09
Diagnosis	0.33	0.23	-0.99	1.01	0.35	0.23
Therapy	-0.30*	0.14	-0.29*	0.14	-1.32*	0.65
Trait Anxiety			-0.02	0.01	-0.02	0.01
Trait Anxiety *						
Diagnosis			0.03	0.02		
Trait Anxiety * Therapy					0.02	0.01
R²	0.01		0.01		0.02	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 24: Does trait anxiety moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTN Valence)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	0.01	0.01	0.01	0.01	0.01	0.01
Employment	0.29*	0.12	0.25*	0.12	0.26*	0.12
Diagnosis	-0.26	0.17	0.79	0.75	-0.25	0.17
Therapy	0.24*	0.11	0.25*	0.11	0.62	0.48
Trait Anxiety			0.004	0.01	0.0001	0.01
Trait Anxiety *						
Diagnosis			-0.02	0.02		
Trait Anxiety * Therapy					-0.01	0.01
R²	0.02		0.02		0.02	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 25: Does trait anxiety moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTN Flex)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.02	-0.02	0.02	-0.02	0.02
Gender	0.35	0.18	0.31	0.18	0.28	0.18
Education	-0.28**	0.10	-0.27*	0.10	-0.26*	0.10
Employment	-0.10	0.19	-0.01	0.19	-0.02	0.19
Diagnosis	-0.45	0.25	-2.49*	1.11	-0.49	0.25
Therapy	0.46**	0.16	0.43**	0.16	-1.06	0.70
Trait Anxiety			0.00	0.01	-0.0004	0.02
Trait Anxiety *						
Diagnosis			0.04	0.02		
Trait Anxiety * Therapy					0.030*	0.01
R²	0.06		0.07		0.07	
Δ R²			0.01		0.00	

Note. * indicates $p < .05$. ** indicates $p < .01$.

Table 26: Does optimism moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTP Flex)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.01	-0.02	0.01	-0.02	0.01
Gender	0.27	0.16	0.29	0.16	0.29	0.16
Education	-0.08	0.09	-0.08	0.09	-0.08	0.09
Employment	-0.31	0.16	-0.32	0.17	-0.33*	0.17
Diagnosis	0.09	0.22	0.57	0.85	0.09	0.22
Therapy	-0.11	0.13	-0.10	0.13	-0.27	0.53
Optimism			0.01	0.02	0.003	0.02
Optimism * Diagnosis			-0.01	0.03		
Optimism * Therapy					0.01	0.02
R²	0.03		0.03		0.03	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 27: Does optimism moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTN Flex)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.02	-0.02	0.02	-0.03	0.02
Gender	0.35	0.18	0.26	0.18	0.24	0.18
Education	-0.28**	0.10	-0.25*	0.10	-0.26*	0.10
Employment	-0.10	0.19	0.02	0.19	0.03	0.19
Diagnosis	-0.45	0.25	1.66	0.98	-0.48	0.25
Therapy	0.46**	0.16	0.41**	0.15	2.32***	0.61
Optimism			-0.01	0.02	0.01	0.02
Optimism * Diagnosis			-0.06*	0.03		
Optimism * Therapy					-0.06**	0.02
R²	0.06		0.07		0.08	
Δ R²			0.02		0.01	

Note. * indicates $p < .05$. ** indicates $p < .01$. *** indicates $p < .001$.

Table 28: Does optimism moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTP Valence)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	-0.02	0.01	-0.02	0.01	-0.02	0.01
Education	-0.01	0.10	-0.01	0.10	-0.02	0.10
Employment	-0.22	0.17	-0.22	0.18	-0.23	0.18
Diagnosis	0.36	0.23	0.68	0.91	0.36	0.23
Therapy	-0.31*	0.14	-0.31*	0.14	-0.49	0.56
Optimism			0.01	0.02	-0.001	0.02
Optimism * Diagnosis			-0.01	0.03		
Optimism * Therapy					0.01	0.02
R²	0.01		0.01		0.01	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Table 29: Does optimism moderate the relationship between past psychiatric history and Flexibility/Valence on counterfactual divergent thinking tasks? (CDTN Valence)

Variable	Step 1		Step 2a		Step 2b	
	B	SE B	B	SE B	B	SE B
Age	0.01	0.01	0.01	0.01	0.01	0.01
Employment	0.29*	0.12	0.26*	0.13	0.27*	0.13
Diagnosis	-0.26	0.17	-0.88	0.68	-0.27	0.17
Therapy	0.24*	0.11	0.25*	0.11	0.52	0.42
Optimism			-0.001	0.01	0.01	0.01
Optimism * Diagnosis			0.02	0.02		
Optimism * Therapy					-0.01	0.01
R²	0.02		0.02		0.02	
Δ R²			0.00		0.00	

Note. * indicates $p < .05$.

Supplementary Materials

Hierarchical regressions were computed to assess predictors of flexibility¹ (Table S1) and (moral) valence^{2,3} (Table S2) on the CDT and RWDT tasks. Higher flexibility on the CDT tasks was associated with greater flexibility on the RWDT task as well. Lower scientific creativity was related to greater flexibility on the negative CDT task. Having relatively lower education, no MH history, and experience with therapy were associated with greater flexibility on the RWDT task.

Those having some experience with therapy gave more positive responses on the negative CDT tasks. However, less or no experience with therapy were related to more positive responses on the positive CDT task. More negative responses on the negative CDT were also associated with generating more noble responses on the RWDT task. Being younger, a student, having experience with therapy, and lower scientific creativity was likely to give noble responses on the RWDT task.

Being younger and a student was also associated with giving more goal-oriented responses on the RWDT (Table S2) task along with having relatively lower education. Those with experience with therapy also gave more goal-oriented responses. Among the KDOC dimensions of creativity, only lower scientific creativity was associated with a more goal-oriented response.

Paired t-tests were computed to understand the differences in flexibility scores in the RWDT and CDT tasks. More flexibility in responses was seen in the RWDT condition ($M = 2.15$, $SD = 1.88$) than in the PCDT ($M = 1.3$, $SD = 2.01$) $t(617) = 8.83$, $p < .001$, $d = 0.36$ and NCDT ($M =$

¹ To predict flexibility on the positive and negative CDT and RWDT task, separate hierarchical multiple regressions were computed with age, gender, education, employment, past diagnosed mental health condition, and experience with therapy added in Step 1, trait anxiety and optimism scores in Step 2, CSE and all KDOCS subscales in Step 3, and flexibility on RWDT task in Step 4 (not added for model predicting RWDT flexibility).

² To predict valence on the positive and negative CDT tasks, separate hierarchical multiple regressions were computed with age, education (not added for CDT negative), employment, past diagnosed mental health condition, and experience with therapy added in Step 1, trait anxiety and optimism scores in Step 2, CSE and all KDOCS subscales in Step 3, and moral valence on RWDT task in Step 4.

³ To predict moral valence on the RWDT task, a hierarchical multiple regressions was computed with age, gender, education, employment, past diagnosed mental health condition, and experience with therapy added in Step 1, trait anxiety and optimism scores in Step 2, and CSE and all KDOCS subscales in Step 3.

1.7, $SD = 2.37$) $t(617) = 4.48$, $p < .001$, $d = 0.18$ conditions. Additional moderations were computed^{4,5} to assess whether trait anxiety and optimism moderate the relationship between past psychiatric history and flexibility and valence on the CDT tasks. Individuals with higher trait anxiety and routine experience with therapy were more likely to show greater flexibility in their responses to the negative CDT task (Figure S1). Those with higher optimism and MH history showed lower flexibility in their responses on the negative CDT task (Figure S2). Higher optimism and more experience with therapy were also related to lower flexibility on the negative CDT task (Figure S3). No other moderations were found to be significant.

Discussion

Flexibility on the CDT tasks

Results show the moderating effect of trait anxiety and optimism on the relationship between MH history/experience with therapy and flexibility on the negative CDT task. Individuals with high trait anxiety often exhibit a heightened awareness of potential threats and a tendency to consider a wider range of possibilities, especially negative ones (Robinson et al., 2013; Stegmann et al., 2019). This heightened vigilance could inadvertently lead to greater cognitive flexibility in tasks where imagining negative scenarios is required, as they are more accustomed to shifting their thought processes to consider various negative outcomes.

Similar to our main findings, optimism also moderated the relationship between MH history and flexibility on the negative CDT task where individuals with a MH history and higher

⁴ To assess whether trait anxiety moderates the relationship between past psychiatric history (diagnosed mental health condition and experience with therapy) and creative performance (flexibility and valence) on the CDT tasks four separate moderations were computed with age, gender, education, employment, diagnosis and therapy added in Step 1, followed by diagnosis * trait anxiety (Step 2a) and therapy * trait anxiety (Step 2b).

⁵ To assess whether optimism moderates the relationship between past psychiatric history (diagnosed mental health condition and experience with therapy) and creative performance (flexibility and valence) on the CDT tasks four separate moderations were computed with age, gender, education, employment, diagnosis and therapy added in Step 1, followed by diagnosis * optimism (Step 2a) and therapy * optimism (Step 2b).

optimism showed lesser flexibility on the negative CDT task. Given their optimistic disposition, these individuals may be unable to conjure varied ways in which their first date may go wrong.

Valence on the CDT tasks

The lack of significant moderation effects by anxiety and optimism in the relationships between MH history/experience with therapy and valence on the CDT tasks could hint at the possible role of other unmeasured factors. The propensity to generate more positive or negative outcomes in CDT tasks (valence) may be influenced more directly by individual cognitive styles or personality traits that are not sufficiently captured by general measures of anxiety and optimism. These could potentially further explain other additional findings with respect to valence in our study. For instance, we also found an association between more negative responses in the negative CDT and generating more noble responses in the RWDT task. Given the specific instructions of the negative CDT task, it is likely that participants were inclined to think of more negative responses simply because the task directed them to do so. In contrast, the RWDT task featured a more neutral instruction—not explicitly guiding participants towards either positive or negative responses. Therefore, the pattern of responses observed in the RWDT could more accurately reflect the tendency towards positive and ethical thinking. This tendency might be particularly pronounced in individuals with certain personality traits (Aquino & Reed, 2002; Eisenberg & Miller, 1987; Graziano & Tobin, 2009). These findings provide a new dimension to understanding how certain personality dispositions might also influence responses in cognitive tasks. However, since we did not measure these specific cognitive styles or personality traits, it is difficult for us to draw definitive conclusions about their impact on our findings.

Other factors affecting creative performance on DT tasks

We found younger individuals and students generating more noble (moral valence) and goal-oriented responses on the RWDT task. This may reflect the possible influence of a young

student's educational environment on their thinking which encourages goal-focused and altruistic thinking.

Performance on these dimensions of the RWDT task was also influenced by lower Scientific creativity. It may suggest that individuals who do not align strongly with traditional scientific creativity might compensate or excel in other areas of creativity, such as practical or goal-driven tasks, and may engage in more socially-oriented/noble thinking.

Supplementary Tables

Table S1. Predictors of Flexibility on the Divergent Thinking (DT) Tasks

Variable	Positive CDT		Negative CDT		Real-World DT	
	B	SE	B	SE	B	SE
Age	-0.017	0.014	-0.017	0.016	-0.018	0.012
Education	0.004	0.094	-0.124	0.107	-0.228**	0.085
Employment	-0.248	0.164	0.120	0.186	-0.255	0.148
Diagnosis	0.272	0.221	-0.237	0.250	-0.472*	0.200
Therapy	-0.162	0.133	0.269	0.151	0.294*	0.120
Trait Anxiety	0.004	0.013	0.005	0.015	0.009	0.012
Optimism	0.024	0.019	-0.028	0.022	-0.009	0.018
Creative Self Efficacy	0.011	0.043	0.066	0.049	0.034	0.039
KDOCS Everyday	-0.015	0.017	0.008	0.019	-0.011	0.015
KDOCS Scholarly	-0.021	0.014	-0.003	0.016	0.020	0.013
KDOCS Scientific	0.022	0.013	-0.038*	0.015	-0.022	0.012
KDOCS Performance	-0.012	0.012	-0.009	0.013	-0.014	0.010
KDOCS Artistic	-0.006	0.014	0.015	0.017	-0.011	0.013
RWDT Flexibility	0.240***	0.045	0.325***	0.051		
R²	0.082		0.149		0.129	
Δ R²	0.043		0.058		0.024	

Note. * $p < .05$; ** $p < .01$.

CDT = Counterfactual Divergent Thinking; KDOCS = Kaufman Domains of Creativity Scale;
RWDT = Real World Divergent Thinking

Table S2. Predictors of (Moral) Valence and Goal Directedness on the Divergent Thinking (DT) Tasks

Variable	Positive CDT		Negative CDT		Real World DT (Moral Valence)		Real World DT (Goal-Directedness)	
	B	SE	B	SE	B	SE	B	SE
Age					-0.024*	0.011	-0.015*	0.006
Gender					0.146	0.135		
Education					-0.128	0.076	-0.098*	0.044
Employment			0.215	0.125	-0.386**	0.132	-0.195*	0.077
Diagnosis	0.389	0.240	-0.317	0.177	-0.195	0.178	-0.106	0.104
Therapy	-0.308*	0.145	0.272*	0.107	0.217*	0.107	0.136*	0.063
Trait Anxiety	-0.007	0.014	-0.003	0.010	0.002	0.010	-0.006	0.006
Optimism	0.002	0.021	-0.010	0.016	0.012	0.016	-0.002	0.009
Creative Self Efficacy	-0.004	0.047	0.034	0.035	0.016	0.035	0.004	0.020
KDOCS Everyday	-0.015	0.019	0.022	0.014	0.024	0.014	0.003	0.008
KDOCS Scholarly	-0.005	0.015	0.005	0.011	0.002	0.011	-0.009	0.007
KDOCS Scientific	0.003	0.014	-0.007	0.010	-0.031**	0.011	-0.012*	0.006
							-	
KDOCS Performance	0.013	0.013	-0.016	0.009	-0.012	0.009	0.0005	0.005
KDOCS Artistic	-0.013	0.015	0.009	0.011	0.014	0.012	0.0002	0.007
RWDT Moral Valence	0.079	0.054	-0.117**	0.040				
R²	0.014		0.040		0.107		0.116	
Δ R²	0.004		0.014		0.024		0.017	

Note. * $p < .05$; ** $p < .01$.

CDT = Counterfactual Divergent Thinking; KDOCS = Kaufman Domains of Creativity Scale; RWDT = Real World Divergent Thinking

Valence refers to the rating dimension applied to the CDT tasks. Responses in these tasks were evaluated on a scale ranging from 1 (Very negative) to 7 (Very positive), reflecting their tone or positivity.

Moral Valence was the rating dimension used for the RWDT task where responses were assessed on a scale from 1 (Evil) to 6 (Noble), indicating the moral or ethical quality of the responses. 'Goal-Directedness' was also the dimension only used for the RWDT task where the response was rated based on how likely it was to meet the goal of the given scenario (1 = Very Unlikely to 4 = Very Likely)

Table S3. Trait Anxiety as a Moderator between Past Psychiatric History (Diagnosis) and Performance on the CDT Tasks

Variable	Positive CDT (Flexibility)		Negative CDT (Flexibility)		Positive CDT (Valence)		Negative CDT (Valence)	
	B	SE	B	SE	B	SE	B	SE
Age	-0.02	0.01	-0.02	0.02	-0.02	0.01	0.01	0.01
Gender	0.29	0.16	0.31	0.18				
Education	-0.07	0.09	-0.27*	0.10	-0.04	0.09		
Employment	-0.30	0.16	-0.01	0.19			0.25*	0.12
Diagnosis	-0.10	0.13	-2.49*	1.11	-0.99	1.01	0.79	0.75
Therapy	-1.02	0.96	0.43**	0.16	-0.29*	0.14	0.25*	0.11
Trait Anxiety	-0.01	0.01	0.004	0.01	-0.02	0.01	0.004	0.01
Trait Anxiety * Diagnosis	0.02	0.02	0.04	0.02	0.03	0.02	-0.02	0.02
R²	0.03		0.07		0.01		0.02	
Δ R²	0.01		0.01		0.00		0.00	

Note. * $p < .05$; ** $p < .01$.

CDT = Counterfactual Divergent Thinking

Some demographic variables did not significantly correlate with valence in positive and negative CDT, and hence, they were not added in the respective models.

Table S4. Trait Anxiety as a Moderator between Past Psychiatric History (Therapy) and Performance on the CDT Tasks

Variable	Positive CDT (Flexibility)		Negative CDT (Flexibility)		Positive CDT (Valence)		Negative CDT (Valence)	
	B	SE	B	SE	B	SE	B	SE
Age	-0.02	0.01	-0.02	0.02	-0.02	0.01	0.01	0.01
Gender	0.276	0.159	0.28	0.18				
Education	-0.066	0.090	-0.26*	0.10	-0.04	0.09		
Employment	-0.293	0.164	-0.02	0.19			0.26*	0.12
Diagnosis	0.094	0.219	-0.49	0.25	0.35	0.23	-0.25	0.17
Therapy	-1.242*	0.605	-1.06	0.70	-1.32*	0.65	0.62	0.48
Trait Anxiety	-0.019	0.013	0.00	0.02	-0.02	0.01	0.00	0.01
Trait Anxiety * Therapy	0.024	0.012	0.03*	0.01	0.02	0.01	-0.01	0.01
R²	0.04		0.07		0.02		0.02	
Δ R²	0.00		0.00		0.00		0.00	

Note. * $p < .05$; ** $p < .01$.

CDT = Counterfactual Divergent Thinking

Some demographic variables did not significantly correlate with valence in positive and negative CDT, and hence, they were not added in the respective models.

Table S5. Optimism as a Moderator between Past Psychiatric History (Diagnosis) and Performance on the CDT Tasks

Variable	Positive CDT (Flexibility)		Negative CDT (Flexibility)		Positive CDT (Valence)		Negative CDT (Valence)	
	B	SE	B	SE	B	SE	B	SE
Age	-0.02	0.01	-0.02	0.02	-0.02	0.01	0.01	0.01
Gender	0.29	0.16	0.26	0.18				
Education	-0.08	0.09	-0.25*	0.10	-0.01	0.10		
Employment	-0.32	0.17	0.02	0.19	-0.22	0.18	0.26*	0.13
Diagnosis	0.57	0.85	1.66	0.98	0.68	0.91	-0.88	0.68
Therapy	-0.10	0.13	0.41**	0.15	-0.309*	0.14	0.25*	0.11
Optimism	0.01	0.02	-0.01	0.02	0.01	0.02	0.00	0.01
Optimism * Diagnosis	-0.01	0.03	-0.06*	0.03	-0.01	0.03	0.02	0.02
R²	0.03		0.07		0.014		0.02	
Δ R²	0.00		0.02		0.00		0.00	

Note. * $p < .05$; ** $p < .01$.

CDT = Counterfactual Divergent Thinking

Some demographic variables did not significantly correlate with valence in positive and negative CDT, and hence, they were not added in the respective models.

Table S6. Optimism as a Moderator between Past Psychiatric History (Therapy) and Performance on the CDT Tasks

Variable	Positive CDT (Flexibility)		Negative CDT (Flexibility)		Positive CDT (Valence)		Negative CDT (Valence)	
	B	SE	B	SE	B	SE	B	SE
Age	-0.02	0.01	-0.03	0.02	-0.02	0.01	0.01	0.01
Gender	0.29	0.16	0.24	0.18				
Education	-0.08	0.09	-0.26*	0.10	-0.02	0.10		
Employment	-0.33*	0.17	0.03	0.19	-0.23	0.18	0.27*	0.13
Diagnosis	0.09	0.22	-0.48	0.25	0.36	0.23	-0.27	0.17
Therapy	-0.27	0.53	2.32***	0.61	-0.49	0.56	0.52	0.42
Optimism	0.00	0.02	0.01	0.02	0.00	0.02	0.01	0.01
Optimism * Therapy	0.01	0.02	-0.06**	0.02	0.01	0.02	-0.01	0.01
R²	0.03		0.08		0.145		0.02	
Δ R²	0.00		0.01		0.00		0.00	

Note. * $p < .05$; ** $p < .01$.

CDT = Counterfactual Divergent Thinking

Some demographic variables did not significantly correlate with valence in positive and negative CDT, and hence, they were not added in the respective models.

Supplementary Figures

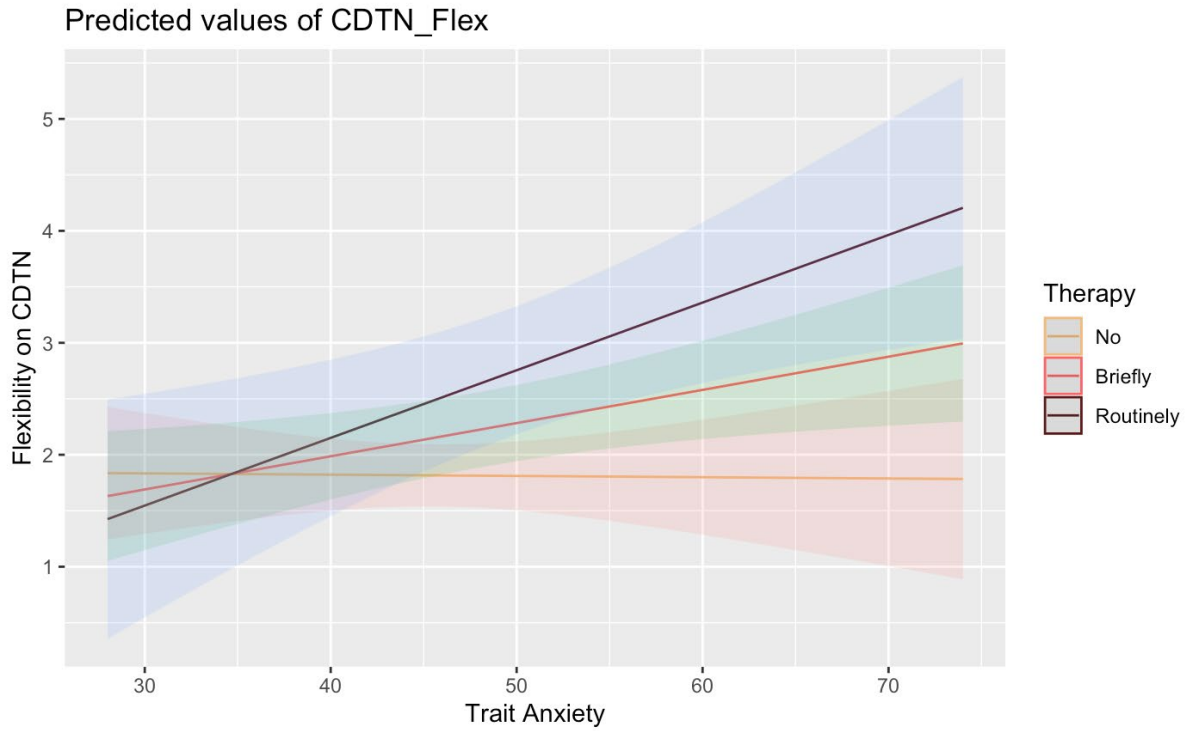


Figure S1. Trait anxiety moderates the relationship between therapy and CDTN Flex

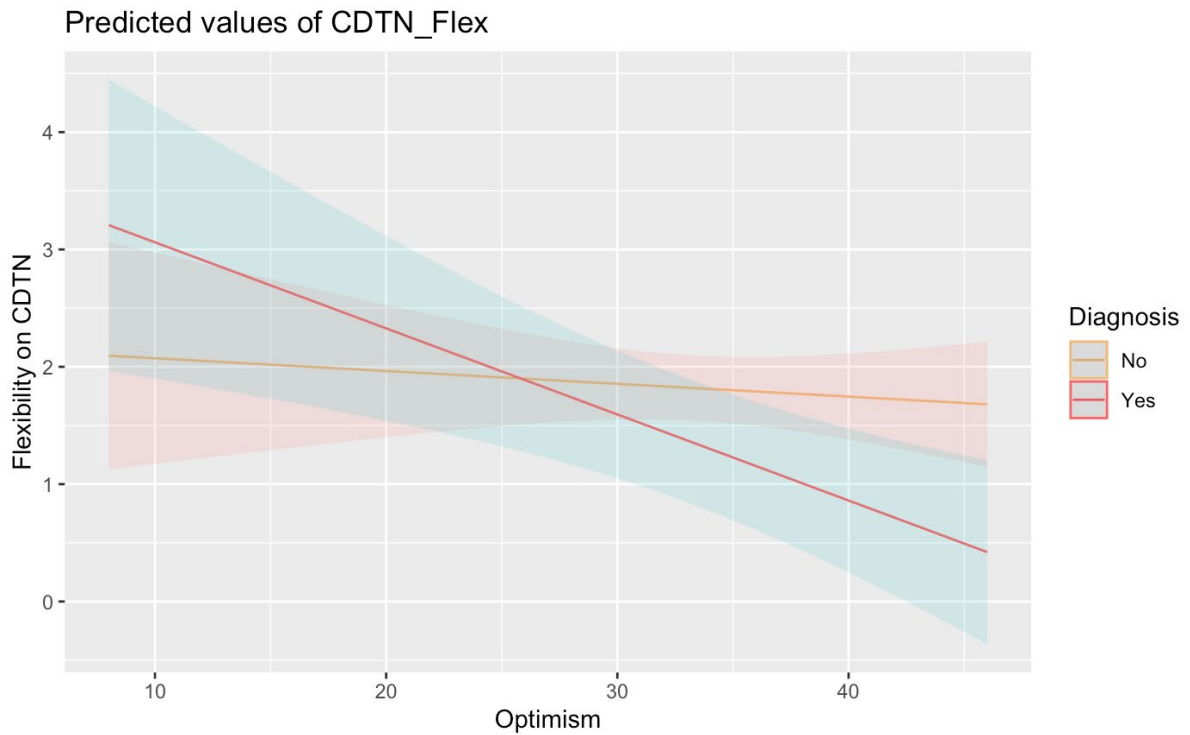


Figure S2. Optimism moderates the relationship between diagnosis and CDTN Flex

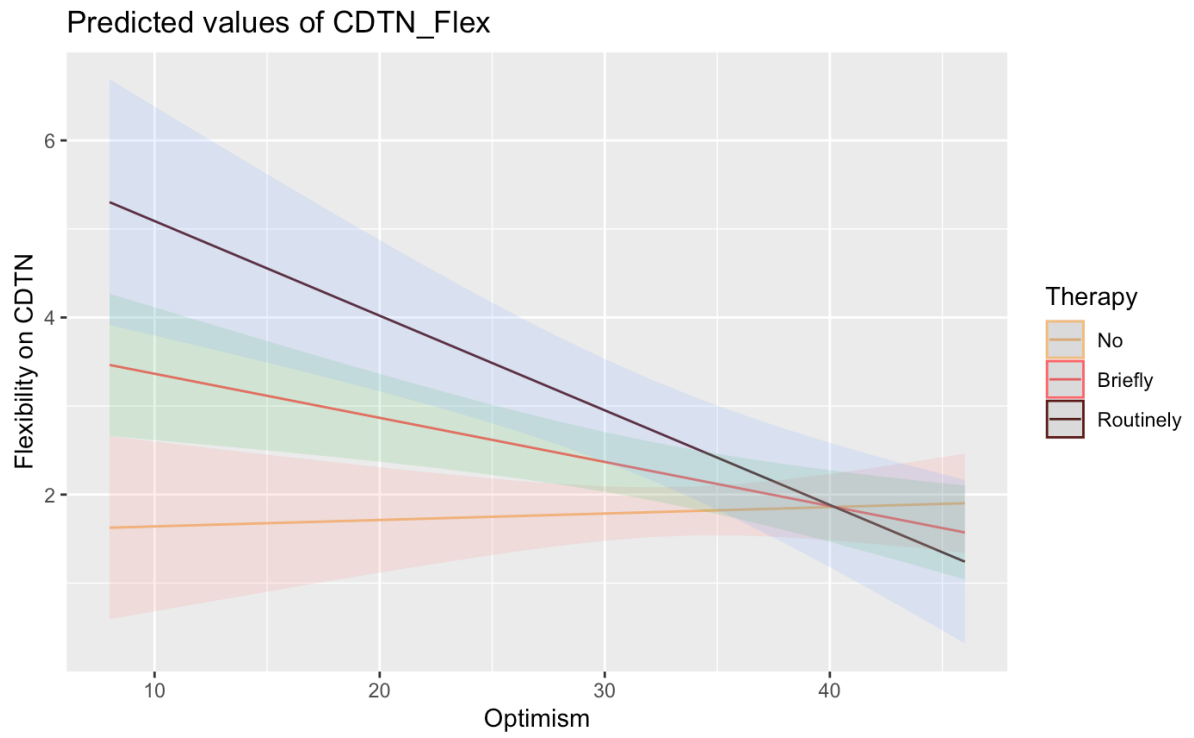


Figure S3. Optimism moderates the relationship between therapy and CDTN Flex

References

- Aquino, K., & Reed, A. (2002). The self-importance of moral identity. *Journal of Personality and Social Psychology*, 83(6), 1423–1440. <https://doi.org/10.1037/0022-3514.83.6.1423>
- Eisenberg, N., & Miller, P. A. (1987). The Relation of Empathy to Prosocial and Related Behaviors. *Psychological Bulletin*, 101(1), 91–119. <https://doi.org/10.1037/0033-2909.101.1.91>
- Graziano, W. G., & Tobin, R. M. (2009). Agreeableness. In *Handbook of individual differences in social behavior* (pp. 46–61). The Guilford Press. <https://psycnet.apa.org/record/2009-12071-004>
- Robinson, O. J., Vytal, K., Cornwell, B. R., & Grillon, C. (2013). The impact of anxiety upon cognition: perspectives from human threat of shock studies. *Frontiers in Human Neuroscience*, 7. <https://doi.org/10.3389/fnhum.2013.00203>
- Stegmann, Y., Reicherts, P., Andreatta, M., Pauli, P., & Wieser, M. J. (2019). The effect of trait anxiety on attentional mechanisms in combined context and cue conditioning and extinction learning. *Scientific Reports*, 9(1), 8855. <https://doi.org/10.1038/s41598-019-45239-3>