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From Inner Sensations to Creative Innovations: Uncovering the Links Between Interoceptive Sensitivity and Creative Traits

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ABSTRACT

This study explored the relationship between interoceptive sensitivity (IS) – the subjective ability to perceive internal bodily sensations – and creative traits, framed within the dual-process theory, which highlights the interplay between associative and analytical thinking. While interoception is known to influence cognitive and emotional processes, its impact on creativity remains largely unexplored. Individual differences in creative traits, such as idea generation, evaluation, and implementation, mode shifting, and inspiration, may be shaped by how individuals perceive and process their internal bodily states. Participants completed questionnaires measuring IS, alexithymia, distractibility, and various creative traits, such as mode shifting, inspiration, ideation, evaluation, and idea implementation. Results showed that IS was positively correlated with all measured creative traits, with the strongest relationships found between IS and both inspiration and idea implementation. Alexithymia, which was negatively correlated with IS, also showed negative correlations with most creative traits. Additionally, distractibility was negatively associated with both IS and most creative traits and was found to partially mediate the relationship between IS and creative traits. These findings suggest a complex interplay between bodily awareness, emotional processing, and attentional control in shaping creativity, revealing a hitherto unknown connection between interoception and creativity.

Introduction

Creativity is commonly defined as the production of novel and useful ideas (Runco & Jaeger, 2012) and is often studied through divergent thinking tasks (Silvia et al., 2008) and self-report scales (Silvia et al., 2012). An influential framework for understanding creativity is the dual-process theory of cognition (Evans & Stanovich, 2013), which emphasizes the dynamic shifting between two dominant modes of thought – spontaneous, associative thinking and controlled, analytical thinking (Chrysikou et al., 2014; Mok, 2014; Pringle & Sowden, 2017). In the creative process, associative thinking is generally linked to idea generation while analytical thinking supports evaluation and implementation (Dietrich, 2004; Ellamil et al., 2012). Building on this framework, this study investigates individual differences in interoceptive sensitivity – the subjective ability to perceive internal bodily sensations – and in preferences for engaging with idea generation, evaluation, and implementation, as well as the flexibility with which individuals switch between these modes (Pringle & Sowden, 2017; Sowden et al., 2019). Additionally, this study investigates if IS may be associated with the sensitivity to transcendent states triggered by external stimuli – such as inspiration – which may serve as a distinct driver of creativity beyond internal volition (Thrash & Elliot, 2003). Together, these measures can provide a multifaceted view on individual tendencies in creativity.

Interoception, the integration of the bodily sensations with mental processes, plays a fundamental role in human cognition (Barsalou, 2009; Borghi & Cimatti, 2010). It involves the brain receiving continuous visceral feedback from the body across multiple physiological axes and over different time scales (Critchley & Harrison, 2013). This interoceptive system, which processes bodily sensations, provides a moment-by-moment mapping of the body's internal landscape, both consciously and unconsciously (Azzalini et al., 2019). Given the influence of interoception on cognitive processes, it would be widely beneficial to study its potential role in creativity.

Subjective bodily awareness, or interoceptive sensitivity (IS), refers to the subjective ability to perceive internal bodily sensations, such as hunger, tiredness, and illness (Craig, 2002, 2003). While the present study focuses on this traditional definition of IS, the

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broader concept of interoception encompasses a range of psychological experiences and health-related aspects. Traditionally, the research on interoception has focused on interoceptive differences between clinical populations and neurotypical individuals, examining conditions such as anxiety disorders (Domschke et al., 2010), eating disorders (Jenkinson et al., 2018), schizophrenia (Ardizzi et al., 2016), autism spectrum conditions (Garfinkel et al., 2016), and attention deficit hyperactivity disorder (Wiersema & Godefroid, 2018). Recently, the scope of interoception research has broadened, linking it to the subjective experience of emotions (Critchley & Garfinkel, 2017; Herbert et al., 2007; Luft & Bhattacharya, 2015), the physical grounding of concepts (Connell et al., 2018), the construction of bodily representations (Tajadura-Jiménez & Tsakiris, 2014; Tsakiris et al., 2011), and the experience of selfhood (Suzuki et al., 2013). Furthermore, interoception's role has been demonstrated in several cognitive processes, such as memory (Garfinkel et al., 2013; Umeda et al., 2016), error monitoring (Bury et al., 2019), and response inhibition (Rae et al., 2018). Given this burgeoning research landscape, investigating interoception's role in higher-order cognitive processes like creativity is both timely and necessary.

Neural systems in creativity and interoception

As previously mentioned, the process of switching between spontaneous, associative thoughts and controlled, analytic thoughts is essential to creative thinking (Chrysikou et al., 2014; Lloyd-Cox et al., 2023; Mok, 2014; Sowden et al., 2019). Supporting literature in cognitive neuroscience suggests that these processes are sustained by two large-scale brain networks: the executive control network and the default mode network, respectively (Bashwiner et al., 2016; Beaty et al., 2015, 2016; Benedek et al., 2014; Dietrich, 2004; Gabora, 2018; Rosen et al., 2020; Shi et al., 2017, 2018; Wise & Braga, 2014). The switching between these two networks is commonly attributed to a third network, the salience network (SN; Chen et al., 2016; Seeley et al., 2007), which includes regions such as the anterior cingulate cortex (ACC) and the insular cortex (IC). These brain areas have been found to be active during creative tasks (Goulden et al., 2014; Sridharan et al., 2008) and are proposed to mediate awareness between different types of thinking based on creative task demands.

Notably, the same neural regions involved in cognitive switching are also implicated in interoceptive processing (Ceunen et al., 2016; Chong et al., 2017; Craig, 2009; Critchley et al., 2004; García-Cordero et al., 2017; Haruki & Ogawa, 2021; Pollatos et al., 2005; Zaki et al., 2012). The SN is thought to orient attention toward relevant stimuli based on their salience (Menon & Uddin, 2010; Seeley et al., 2007). While this study does not measure neural activities, prior research highlights overlapping neural circuitry associated with both interoception and creative cognition (Ceunen et al., 2016; Chong et al., 2017; Goulden et al., 2014; Sridharan et al., 2008). This suggests a theoretical basis for investigating behavioral associations between IS and creative traits. In particular, this overlap suggests a potential link between IS and cognitive flexibility, such as the ability to shift between modes of thought.

Flexibility and distractibility

Beyond their shared neural circuitry, interoceptive and creative processes are intrinsically intertwined through the flexible allocation of attentional resources. The visceral signals of the interoceptive system automatically influence spontaneous large-scale network dynamics (Azzalini et al., 2019) and continuously regulate behavior depending on both internal and external stimuli (Skora et al., 2022). Research indicates that visceral feedback directs attention (Azzalini et al., 2019; Critchley & Harrison, 2013; Herman & Tsakiris, 2021; Mehling, 2016; Mendoza-Medialdea & Ruiz-Padial, 2021; Ren et al., 2022; von Mohr et al., 2021). For instance, Ren et al. (2022) found that cardiac signals significantly affect response inhibition at both behavioral and neural levels, with stop signals presented at the systolic phase of the cardiac cycle significantly impeding response inhibition, suggesting that interoceptive processes guide the flexible allocation of attentional resources.

The dynamic management of attentional resources is a recurrent theme in creativity research, impacting optimal creative performance (Gabora & Ranjan, 2013; Howard-Jones, 2002), higher creative achievement (Zabelina et al., 2016), and better performance on divergent thinking tasks (Dorfman et al., 2008; Vartanian, 2009; Vartanian et al., 2007). Zabelina and Robinson (2010) investigated individual differences in cognitive control, measured via the Stroop task, and its relationship with divergent thinking, measured via the Torrance Test of Creative Thinking. They found that individuals with more flexible cognitive control outperformed those with more rigid cognitive control in the divergent thinking tasks. Given the role of interoceptive processes in flexible thinking and attentional allocation, it is plausible that individual differences in IS may contribute to differences in creative traits, such as the ability to switch between modes of thought or to generate multiple ideas. Creative task performance is notably enhanced when there is an optimal balance between cognitive control and the ability to filter out irrelevant information (Chrysikou et al., 2014). Therefore, we aimed to discern whether the relationship between IS and creative traits is mediated by distractibility – which we defined as the susceptibility to engage with task-irrelevant information (Harriott et al., 1996).

Subjective emotional experience

Interoception also plays a key role in shaping emotional experiences (Connell et al., 2018; Critchley & Garfinkel, 2017; Herbert & Pollatos, 2012; Herbert et al., 2007; Quigley et al., 2021; Sel et al., 2017; Vigliocco et al., 2009), which in turn may influence creativity (Ivcevic et al., 2023). The somatic marker hypothesis postulates that emotional experiences are shaped by feedback from bodily signals to the cortex (Damasio, 1996). Research strongly supports the link between subjective emotions and internal physiological states, suggesting that a stronger brain-body connection – through interoceptive accuracy or IS – is associated with more intense emotional experiences (Critchley & Garfinkel, 2017; Gendron & Feldman Barrett, 2009; Herbert et al., 2007, 2011; Schandry, 1981; Zaki et al., 2012). For instance, Herbert et al. (2007) found that individuals with higher IS reported heightened sensitivity to emotions compared to those with lower IS. Their study also revealed that individuals who were more accurate in detecting their heartbeats showed greater neural and behavioral responses to emotionally salient stimuli. A related concept, alexithymia, is characterized by difficulties in identifying and communicating emotions, often resulting in reliance on external cues rather than internal bodily states (Taylor & Bagby, 2000). Alexithymia is widely recognized as a marker of poor interoception, with studies consistently demonstrating that individuals with high levels of alexithymia tend to score lower on both self-reported and task-based measures of interoception (Herbert et al., 2011; Murphy et al., 2018; Trevisan et al., 2019; Zamariola et al., 2018). This diminished emotional sensitivity may negatively impact creative performance. Indeed, both the intensity and valence of emotions can influence creativity (Baas et al., 2008; De Rooij et al., 2017). De Rooij et al. (2017) found that positive emotions of higher intensity were associated with more original ideas during a creativity task. Similarly, several studies have shown a negative relationship between alexithymia and creativity (Czernecka & Szymura, 2008; Lennartsson et al., 2017). For instance, Czernecka and Szymura (2008) found that individuals with high alexithymia performed significantly worse on creative visualization tasks compared to those with low alexithymia. Lennartsson et al. (2017) found similar results where individuals with lower alexithymia tended to have a greater number of creative achievements than individuals with high alexithymia. Given the inverse relationship between alexithymia and IS, where individuals high in alexithymia tend to report low internal bodily awareness, and the negative relationship between alexithymia and creativity, it was plausible that a similar trend would be observed between interoception and creativity. Furthermore, alexithymia may moderate the relationship between IS and creative traits, where lower levels of alexithymia might reveal a stronger link between IS and creativity. Based on previous studies, we also expected that creative traits would be negatively associated with alexithymia.

The present study

Despite widespread evidence that communication from bodily organs plays a key role in human cognition (Engelen et al., 2023), the link between interoception and creativity remains largely unexplored. The potential relevance of interoception to creativity can be inferred from various factors, including shared neural circuitry (Beaty et al., 2015, 2016; Chen et al., 2016; Critchley et al., 2004; Zaki et al., 2012), the role of interoceptive processes in the flexible allocation of attentional resources necessary for creativity (Azzalini et al., 2019; Benedek & Jauk, 2019; Chrysikou et al., 2014; Mehling, 2016; Menon & Uddin, 2010; Murphy et al., 2020; Seeley et al., 2007; Skora et al., 2022; Vartanian, 2009), and the influence of interoception on subjective emotional experiences, which strongly affect creativity (Baas et al., 2008; Critchley & Garfinkel, 2017; De Rooij et al., 2017; Herbert et al., 2007; Icekson et al., 2014).

The present study sought to explore the potential connections between subjective bodily awareness and creative traits. Additionally, we examined whether these relationships were affected by distractibility and alexithymia. Specifically, we hypothesized that individuals with higher levels of IS would demonstrate higher levels of creative traits. We expected IS to be most strongly correlated with the ability to switch between modes of thought, as mode shifting relies on flexible attentional control, and both mode shifting and interoceptive processes share neural circuitry. Therefore, we predicted that the relationship between IS and mode shifting would be mediated by distractibility, defined as the difficulty in filtering out task-irrelevant information (Harriott et al., 1996).

Similarly, we predicted that preferences for idea generation, development, and implementation would be positively associated with IS, as sensitivity to bodily signals may benefit ideation, evaluation, and implementation. Likewise, individuals who are more attuned to their bodily responses may have a heightened sensitivity to inspiration. We expected that these relationships would also be mediated by distractibility, as individuals easily distracted by irrelevant information may struggle to attend to relevant physical and emotional cues.

Furthermore, previous research has suggested that alexithymia, which is negatively correlated with IS, is also negatively associated with creative thinking and achievements (Czernecka & Szymura, 2008; Lennartsson et al., 2017). We expected our results to support these findings, with alexithymia being negatively associated with creative traits. This relationship may have been especially evident in preferences influenced by mood, such as the tendency to generate, evaluate, and implement ideas. Additionally, we expected that individuals with higher levels of alexithymia to report a reduced tendency to experience inspiration, as inspiration is an emotional experience that may be difficult to detect by individuals with diminished emotional sensitivity. Furthermore, we hypothesized that alexithymia would moderate the relationship between IS and preferences for ideation, evaluation, and implementation, as well as the predisposition to experiencing inspiration. This is because the relationship between internal bodily awareness and creative traits may be less apparent in individuals with high levels of alexithymia.

Materials and methods

Participants

We conducted a power analysis using G*Power3 (Faul et al., 2007) and calculated that a sample size of 68 participants was required to detect a medium effect (f^2 = .15) with a statistical power of .80 at a = .05 for multiple linear regression analyses with two predictors. This sample size was also deemed appropriate for studying individual differences in creativity (Puccio & Grivas, 2009; Rominger et al., 2019) and interoceptive sensitivity (Pearson & Pfeifer, 2020). We recruited 136 participants (57 males, 76 females, 3 unspecified), aged between 18 and 65 years (M = 30, SD = 12.1). All participants were fluent in English and were recruited via Prolific (www.prolific.com) and SONA (www.sona-systems.com), receiving a small cash incentive and course credit, respectively.

Materials

The study employed several self-reported trait scales as follows.

Interoceptive Sensitivity: For measuring interoceptive sensitivity, we used the Body Awareness Questionnaire (BAQ; Shields et al., 1989), an eighteen-item scale designed to gauge one's awareness of non-emotional bodily processes. Its reliability and validity have been extensively supported (Shields et al., 1989; Unal et al., 2021), and it is considered to be a robust measure of internal bodily awareness (Mehling et al., 2009). Some items include: "I am always aware of changes in my energy level when I eat certain foods," and "I can distinguish between tiredness because of hunger and tiredness because of lack of sleep." Participants responded on a seven-point Likert scale ranging from "Not at all true about me" to "Very true about me."

Creativity traits: For measuring creativity traits, we used a variety of scales: the Mode Shifting Index (MSI; Pringle & Sowden, 2017), the FourSight scale (Puccio & Grivas, 2009), the Runco Ideational Behavior scale (RIBS; Runco et al., 2001), and the Inspiration scale (Thrash & Elliot, 2003).

The MSI, consisting of thirteen items on a five-point Likert scale, assesses an individual's propensity to switch between analytical and associative modes of thought in various contexts. A sample item is: "When working on a task, I like to think both in depth about the details and drift out of focus and let my mind wander (e.g. looking out of the window)." Pringle and Sowden (2017) reported alpha coefficients above .73 for this scale, which assesses shifting competence and metacognitive awareness of shifting in both everyday and professional contexts.

The FourSight scale, consisting of thirty-six items on a five-point Likert scale, identifies individuals' preferences across different stages of the creative process. It is used to study creative styles in business and management research (Puccio & Acar, 2015; Puccio et al., 2019). Items are divided into four subscales: clarifier, ideator, developer, and implementer, with each subscale showing alpha coefficients above .70 (Puccio & Grivas, 2009). Each subscale captures specific strengths and preferences in creative thinking:

Clarifier: Refers to the preference for gathering information and clarifying the problem before exploring solutions. A sample item is: "I like identifying the most relevant facts pertaining to a problem."

Ideator: Refers to the preference for generating multiple ideas and thinking flexibly. A sample item is: "I enjoy stretching my imagination to produce many ideas."

Developer: Refers to the preference for analyzing ideas, comparing them to alternatives, and seeking to improve them. A sample item is: "I like to explore strengths and weaknesses of a potential solution."

Implementer: Refers to the preference for finding solutions and taking satisfaction in seeing tasks through to completion. A sample item is: "I enjoy turning rough ideas into concrete solutions."

These subscales assess different stages of the creative process, and while they are related, they each measure distinct aspects of creative thinking, which is why they are treated as separate constructs in our analysis.

The RIBS, a unidimensional measure consisting of twenty-three items, measures creative ideation behaviors, with a reported alpha coefficient of .91 (Runco et al., 2001). A sample item of this scale is: "When writing papers or talking to people, I often have trouble staying with one topic because I think of so many things to write or say." To complement the FourSight measure of creative preferences, we also included the RIBS because it captures individuals' general tendencies to engage in ideational behavior across everyday contexts rather than in problem-solving contexts.

Lastly, the Inspiration Scale (Thrash & Elliot, 2003), consisting of eight items on a seven-point Likert scale, is based on three core characteristics of inspiration: evocation, transcendence and motivation. Items are divided into two component processes: frequency of experiencing inspiration and the intensity of these experiences. The authors reported an alpha coefficient of > .90 (Thrash & Elliot, 2003). Participants are asked to rate how frequently and intensely they experience inspiration or encounter something that inspires them.

Potential mediating/moderating factors: To explore potential mediating or moderating factors, we included additional trait measures such as alexithymia and distractibility. The Toronto Alexithymia Questionnaire (TAS-20; Kooiman et al., 2002) is a twenty-item scale with an alpha coefficient of .84 designed to measure difficulties in recognizing and communicating emotions, as well as a tendency toward externally oriented thinking. A sample item is: "I am often confused about what emotion I am feeling." The Distractibility Scale, a subscale of the larger Imaginal Processes Scale (Singer & Antrobus, 1963), is a twelve-item inventory designed to measure an individual's susceptibility to task-irrelevant distractions. The scale has an alpha coefficient of .78 (Harriott et al., 1996; Singer & Antrobus, 1963). This scale was chosen because it is a measure of the tendency to mind-wander rather than a measure of clinical levels of attention deficit. A sample item is: "I have difficulty in keeping my mind focused on a long, tedious task."

Procedures

We collected data online via Qualtrics (Qualtrics, Provo, UT). All participants gave informed consent. The survey was presented in English. First, participants were presented with an information sheet, a quick screener for inclusion criteria, the researchers' contact information and the GDPR form. Next, informed consent was obtained before the beginning of the experiment. They completed the battery of questionnaires and two items of three divergent thinking tasks (data which is not within the scope of this study), they also provided basic demographic information including sex, age, and education level. After completing the experiment, participants were debriefed and compensated within a week. Participants from SONA were granted course credit, while participants from Prolific were reimbursed with £7. All responses were anonymized before data analysis. The study protocol was approved by the Local Ethics Committee of Goldsmiths, University of London.

Results

Differences between SONA and prolific participants

All data analyses were conducted using SPSS (version 27.0, IBM Corp., Armonk, NY, USA). We collected data from 136 participants but excluded one from the final analysis due to poor engagement, resulting in a sample size of $N = 135$. To investigate potential differences across all measures between participants recruited via SONA ($N = 75$) and those from Prolific ($N = 58$), we conducted independent samples *t*-tests. There were no significant differences in mean scores between the two groups, SONA and Prolific, across almost all measures. The only exception was a minor difference in the developer subscale of the FourSight scale, with SONA participants scoring slightly lower ($M = 6.35$, SD = 1.18) than Prolific participants ($M = 7.19$, SD = 1.55), t (127) = 4.39, $p = .04$. Given the marginal nature of this difference, we combined both groups for further analysis.

Descriptive statistics & correlations

To assess the significance of the relationships between interoceptive sensitivity, alexithymia, distractibility, and creative traits, we conducted correlation analyses for all relevant variables. We used a Benjamini-Hochberg test to adjust for multiple comparisons (Haynes, 2013). Descriptive statistics (mean and standard deviation) and bivariate correlations are shown in Table 1. As expected, BAQ was positively associated with all (but one – RIBS) creative traits, notably, all subscales of the FourSight scale: developer ($r = .40$, $p < .001$); clarifier

Table 1. Pearson correlation matrix of individual measures.

	M	SD	1	2	3	4	5	6	7	8	9	10
1. MSI	40.95	5.05	(.73)									
2. BAQ	80.78	16.21	.34*	(.87)								
3. Developer	6.73	1.42	.21	.40*	(.85)							
4. Clarifier	7.13	1.27	.23*	.42*	.82*	(.87)						
5. Implementer	6.69	1.26	.23*	.46*	.62*	.59*	(.76)					
6. Ideator	6.07	1.18	.32*	.39*	.59*	.51*	.55*	(.67)				
7. RIBS	72.83	16.62	.32	.21	.35*	.33*	.30*	.63*	(.93)			
8. Inspiration	35.96	9.05	.31*	.45*	.36*	.37*	.45*	.50*	.57*	(.93)		
9. TAS-20	46.48	13.36	.09	−.26*	−.30*	−.30*	−.30*	−.23*	.14	−.12	(.84)	
10. Distractibility	44.29	7.74	.01	−.25*	−.51*	−.45*	−.55*	−.36*	−.16	−.31*	.42*	(.50)

Note. Values that are significant when adjusting for multiple comparisons using Benjamini- Hochberg tests are marked with an asterisk (*) at $p < .05$. Cronbach's alpha reported in correlation matrix diagonal. MSI = Mode Shifting Index. BAQ = Body Awareness Questionnaire. Developer, Clarifier, Implementer, Ideator = Subscales of FourSight. RIBS = Runco Ideational Behaviour scale. TAS-20 = Toronto 20 Alexithymia Questionnaire.

(r = .42, $p < .001$); implementer ($r = .46$, $p < .001$); and ideator ($r = .39$, $p < .001$) and the inspiration scale (r = .45, $p < .001$). Moreover, we found that trait alexithymia (TAS-20) was negatively associated with BAQ and some creative traits including all FourSight subscales. Finally, correlations revealed negative relationships between distractibility and BAQ and some creative traits including the FourSight subscales and inspiration. Notable correlations are depicted in Table 1 with asterisks.

Distractibility and mode shifting

Distractibility was explored as a mediator between interoceptive sensitivity and creative traits by using PROCESS (version 4.2) by Hayes (2022) in SPSS (version 27.0) with 95% confidence intervals and 5000 bootstrapping resamples (Hayes, 2012). We found that BAQ was a significant predictor of MSI when ignoring distractibility ($b = .10$, t (126) = 3.99, $p < .001$); BAQ was also found to significantly predict distractibility (b = −.12, t (126) = −2.91, $p = .004$). The regression of distractibility on MSI, controlling for BAQ was significant, $b = .11$, t (125) = 4.16, $p < .001$. However, we did not find that distractibility significantly mediated the regression of BAQ on the MSI ($b = .07$, t (125) = 1.15, $p = .25$), with an R^2 change of .01.

Distractibility and foursight

Given the significant correlations between distractibility and the subscales of FourSight, we extended our mediation analyses to each of these, with findings detailed in Table 2. For the developer subscale of FourSight, BAQ scores directly predicted this trait without considering distractibility ($b = .03$, t (126) = 4.82, $p < .001$).

Table 2. Regressions of interoceptive sensitivity on FourSight mediated by distractibility.

Effect	B	SE	T	p
Developer (FourSight)				
a: BAQ - > Distractibility	−.119	.041	−2.913	.004
b: Distractibility - > Developer	−.081	.010	−5.890	.000
c (total): BAQ - > Developer	.034	.007	4.822	.000
c′ (direct): BAQ - > Developer	.025	.007	3.775	.000
ab (indirect): BAQ - > Distractibility - > Developer	.010	.004	2.732	.004
Clarifier (FourSight)				
a: BAQ - > Distractibility	−.119	.041	−2.913	.004
b: Distractibility - > Clarifier	−.061	.013	−4.818	.000
c (total): BAQ - > Clarifier	.033	.006	5.173	.000
c′ (direct): BAQ - > Clarifier	.025	.006	4.220	.000
ab (indirect): BAQ - > Distractibility - > Clarifier	.007	.003	2.468	.003
Implementer (FourSight)				
a: BAQ - > Distractibility	−.119	.041	−2.913	.004
b: Distractibility - > Implementer	−.073	.011	−6.449	.000
c (total): BAQ - > Implementer	.034	.006	5.747	.000
c′ (direct): BAQ - > Implementer	.026	.005	4.776	.000
ab (indirect): BAQ - > Distractibility -> Implementer	.009	.003	2.659	.003
Ideator (FourSight)				
a: BAQ - > Distractibility	−.119	.041	−2.913	.004
b: Distractibility - > Ideator	−.042	.012	−3.463	.001
c (total): BAQ - > Ideator	.028	.006	4.779	.000
c′ (direct): BAQ - > Ideator	.028	.006	3.953	.000
ab (indirect): BAQ - > Distractibility - > Ideator	.005	.002	1.010	.003

Note. BAQ = Bodily Awareness Questionnaire.

Controlling for BAQ, distractibility significantly predicted the developer scores ($b = -.08$, t (125) = −5.89, $p < .001$) and was a significant mediator in the relationship between BAQ and the developer trait ($b = .02$, t (125) = 3.78, $p < .001$). The Sobel test confirmed a partial mediation ($z = 2.73$, $p < .001$). Including distractibility in the model increased the explained variance in Developer scores from $R^2 = .21$ to $R^2 = .27$, indicating an R^2 change of .06.

We found similar results for the clarifier, implementer, and ideator subscales of FourSight. Specifically, for the clarifier subscale, BAQ was a significant predictor ($b = -.06$, t (126) = −4.82, $p < .001$), with distractibility significantly mediating the relationship ($b = .03$, t (125) = 4.22, $p < .001$). There was a partial mediation confirmed by the Sobel test ($z = 2.47$, $p < .05$) and an R^2 change of .03. For the implementer subscale, BAQ significantly predicted the trait ($b = -.07$, t (126) = −6.45, $p < .001$), with significant mediation by distractibility ($b = .03$, t (125) = 4.78, $p < .001$). There was a partial mediation confirmed by Sobel test ($z = 2.66$, $p < .05$) and an R^2 change of .09. Finally, for the ideator subscale, BAQ was a significant predictor ($b = -.04$, t (126) = −3.46, $p < .001$), with distractibility significantly mediating the relationship ($b = .03$, t (125) = 3.95, $p < .001$). There was a partial mediation confirmed by the Sobel test ($z = 1.01$, $p < .05$) and an R^2 change of .03.

Moderating role of alexithymia

Given the observed negative relationship between alexithymia and IS, we investigated whether alexithymia moderated the relationship between IS and creative traits. The interaction between MSI and TAS-20 was not significant ($p = .53$), indicating that the relationship between BAQ and MSI scores was not moderated by trait alexithymia. Also, no significant moderation effect of alexithymia was found on the relationship between BAQ and any of the FourSight subscales: developer ($p = .81$); clarifier ($p = .95$); implementer ($p = .67$); and ideator ($p = .62$). Due to the relationship between BAQ and inspiration, we tested whether alexithymia moderated the relationship between BAQ and inspiration but found no significant moderation effect, ($p = .27$).

Discussion

The present study aimed to explore the relationship between interoceptive sensitivity (IS) and creative traits, while examining the roles of alexithymia and distractibility as potential moderators and mediators. Our findings reveal that IS, or the awareness of internal bodily sensations, is positively associated with various creative traits, including the inclination to generate ideas, evaluate and develop ideas, implement ideas, the tendency to experience inspiration, and the propensity to shift between different modes of thought. These results underscore the potential role of bodily awareness in the creative process, suggesting that how individuals perceive and respond to their internal physiological states could influence their creative preferences. Additionally, our exploration of distractibility and alexithymia offers further insights into how attentional control and emotional awareness might shape the connection between IS and creativity, emphasizing the roles of metacognitive control and self-regulation. This discussion will integrate these findings, consider their broader implications, and suggest directions for future research to deepen our understanding of the intricate links between internal bodily awareness, alexithymia, and creative thinking.

Interoceptive sensitivity and creative traits

We found a positive relationship between interoceptive sensitivity (IS) and creative traits, supporting our first hypothesis. This suggests that individuals who report heightened awareness of their internal bodily sensations are more likely to perceive themselves as possessing higher creative traits in general.

Implementer and inspiration

The strongest correlations with IS were observed in the implementer subscale of the FourSight scale and the Inspiration scale. The implementer trait assesses an individual's preference to pursue and accomplish creative ideas (Puccio & Grivas, 2009), while the Inspiration scale measures one's disposition toward experiencing inspiration, which is viewed as a sensitivity to transcendent states evoked by external stimuli (Thrash & Elliot, 2003). Notably, research highlights a strong association between inspiration and idea implementation. For example, Thrash et al. (2010) found that individuals prone to inspiration were more likely to hold patents. Similarly, Milyavskaya et al. (2012) found that proneness to inspiration predicts goal achievement and progress. One possible explanation for the strong relationship between IS and both inspiration and implementation is that individuals with high IS may possess a heightened sensitivity to motivational cues. Differences in IS may influence motivational responsiveness, as individuals more attuned to their internal bodily sensations may exhibit a heightened physiological response to motivational cues. Motivation, characterized by its emotional valence (Campbell et al., 2021), can be affected by the intensity of subjective emotional experiences, which are associated with interoceptive sensitivity (Critchley & Garfinkel, 2017; Herbert et al., 2007; Zaki et al., 2012). This increased sensitivity may bolster an individual's responsiveness to motivation, potentially explaining why those with higher IS have a preference to implement their ideas and a predisposition to experience moments of inspiration. However, this interpretation should be considered with caution, and future research should explore the possible effect of IS on motivation in creativity more thoroughly. We discuss this reasoning further in the subsequent section on alexithymia.

Developer trait

We also found a significant positive relationship between IS and the developer trait, which corresponds to the evaluation and refinement of ideas. This relationship may stem from heightened sensitivity to emotions, better emotional regulation, or possessing greater metacognitive control. First, individuals with high IS may have preference for evaluating ideas due to their attunement to their physiological responses (Herbert et al., 2007, 2011; Zaki et al., 2012). Research by Cabbai et al. (2023) found that individuals with a better objective ability to detect internal bodily sensations (measured through heartbeat counting), and those with higher self-reported IS exhibited stronger emotional reactions to art. While this sensitivity did not extend to art appraisal – consistent with findings by Stephenson et al. (2024) – it suggests that individuals with higher IS might have a more acute sense of their emotional reactions to creative stimuli. Whether this attunement is conscious, indicating greater metacognitive control, or unconscious, this heightened emotional sensitivity could facilitate discerning between "bad" and "good" ideas. This line of reasoning is further explored in the section on alexithymia. Second, individuals with higher IS may be better equipped to regulate their emotions during the process of developing ideas. This capacity for emotional regulation could help them manage internal and external criticisms during the evaluative process, a critical skill since the expectation of judgment often stifles the development of creative ideas (Amabile, 1979; Gibson & Mumford, 2013). Indeed, research indicates that individuals with high IS are more adept at self-regulating their emotions (Füstös et al., 2013; Kever et al., 2015; Schuette et al., 2021; Zamariola et al., 2019). Thus, the relationship between heightened internal bodily awareness and the preference for evaluating and refining ideas may be attributed to differences in emotional regulation, particularly in the face of criticism.

Ideator trait

Our findings also suggest that individuals with heightened awareness of their internal bodily sensations have a strong preference for generating ideas. Ideation is often influenced by mood, with positive moods typically leading to greater idea generation (Baas et al., 2008). High IS has also been associated with greater psychological and emotional well-being (Ferentzi et al., 2019; Hanley et al., 2017). One possible explanation for our finding is that higher psychological well-being may provide a more favorable disposition for generating ideas in those with high IS. However, this explanation is indirect and likely mediated by several variables. An alternative explanation involves shared cognitive and neural mechanisms underlying IS and ideation. As noted in the introduction, both IS and ideation are linked to brain regions such as the anterior cingulate cortex and insula, which support attentional switching and internally directed cognition (Critchley et al., 2004; Seeley et al., 2007). These neural systems may facilitate the flexible generation of novel associations – a core component of ideation – by enhancing internal signal monitoring and salience detection. From this perspective, heightened IS may support ideation not through mood states but through cognitive flexibility and salience detection. While our results are based on self-reported traits rather than direct neural measures, these findings may suggest a potential cognitive overlap between bodily sensitivity and ideational thinking: individuals who are more attuned to bodily signals may also be more inclined to engage in ideational thinking, potentially through greater perceived cognitive flexibility or internal salience monitoring.

Mode shifting

Contrary to our second hypothesis, the ability to switch flexibly between associative and analytical thinking (mode shifting) exhibited one of the weakest correlations with IS. However, the relationship between IS and mode shifting was still significant, suggesting that individuals with greater awareness of their internal bodily sensations may be more adept at switching between cognitive modes. One possible explanation lies in sensitivity to changes in arousal, alertness, or fatigue, which could facilitate individuals recognizing when to shift modes of thought (Azzalini et al., 2019; Critchley & Harrison, 2013; Herman & Tsakiris, 2021; Mehling, 2016; Mendoza-Medialdea & Ruiz-Padial, 2021). From this perspective, individuals with higher IS may regulate their cognitive processes more fluidly based on bodily feedback. Although the relationship is modest, the finding is consistent with theoretical accounts linking IS to adaptive cognitive control, including the regulation of emotional and attentional states in response to bodily signals. It may also reflect overlapping neural mechanisms involved in salience detection and cognitive flexibility. However, given the relative weakness of this association and this theoretical relationship was not tested directly, these interpretations should be viewed with caution.

Alexithymia and creative traits

Our results also supported our hypothesis that alexithymia would be negatively linked to creative traits. Consistent with previous findings (Herbert et al., 2011; Trevisan et al., 2019; Zamariola et al., 2018), our results showed a negative association between alexithymia and IS, indicating that individuals who struggle to identify and describe their emotions tend to have lower bodily awareness. Furthermore, the negative relationship between alexithymia and creative traits was evident in the ideator, developer, and implementer traits. These findings align with earlier studies, which showed that individuals with high alexithymia perform poorly on creative visualization tasks and achieve fewer creative accomplishments (Czernecka & Szymura, 2008; Lennartsson et al., 2017).

The link between alexithymia and the ideator trait may be explained by differences in well-being and a predisposition to negative affect, both of which are commonly associated with alexithymia (Bamonti et al., 2010; Lundh & Simonsson-Sarnecki, 2001; Yelsma, 2007). Given that poor well-being and negative affect may hinder creativity (Baas et al., 2008; De Rooij et al., 2017), individuals with high alexithymia may be less inclined to generate ideas. Future studies should investigate whether differences in well-being mediate the relationship between alexithymia and creative traits.

Regarding the developer trait, which involves the ability to evaluate and refine ideas, differences in metacognitive control may offer an explanation. Metacognitive control involves initiating, adjusting, or terminating effort during cognitive tasks (Ackerman, 2019; Ackerman & Thompson, 2017). While the role of metacognition across different stages of the creative process remains unclear (Jia et al., 2019), it is widely recognized as crucial during evaluative stages (Lebuda & Benedek, 2023) where it serves to select, assess, and develop previously-generated ideas (Fox & Christoff, 2014). Individuals with high alexithymia, who often have poorer metacognition (Babaei et al., 2015, 2016; Hoffman & Spatariu, 2008; Rostamoghli et al., 2013; Yousefy et al., 2012; Zhu & Leung, 2011), may show less of a preference for the evaluative aspects of the creative process than individuals with low alexithymia. Additionally, their tendency to focus on external rather than internal cues might further impair their metacognitive processes (Kooiman et al., 2002).

Regarding the implementer trait, which involves bringing ideas to fruition, the negative association with alexithymia could stem from differences in self-efficacy and motivation. Implementing ideas requires strong self-efficacy, determination, and resilience (Helson et al., 1995; Ivcevic & Nusbaum, 2017), all of which tend to be lower in individuals with high alexithymia (Baranauskas et al., 2017; Preece et al., 2023; Rostamoghli et al., 2013).

While we found a positive relationship between IS and inspiration, there was no significant relationship between alexithymia and inspiration, nor did alexithymia moderate the IS-inspiration link. Earlier, we suggested that the relationship between IS and inspiration might be explained by heightened sensitivity to motivational cues. Given that individuals with high alexithymia tend to show diminished sensitivity to motivational cues (Babaei et al., 2016; Mitrovic & Brown, 2009; Starita & DiPellegrino, 2018), we expected a negative association between alexithymia and inspiration. However, an alternate explanation for the lack of a significant findings may be that the Inspiration Scale is specifically designed to measure reactions to external stimuli rather than self-initiated motivation, which may not be strongly influenced by alexithymia, a trait more associated with difficulties in processing self-related cues. Furthermore, the relationship between IS and inspiration may be better explained by sensitivity to external motivators rather than internal ones.

When testing whether alexithymia moderated the relationship between IS and the ideator, developer, and implementer traits, we found no significant moderating effects. This suggests that the relationship between IS and these creative traits, as well as the relationship between alexithymia and these creative traits, may be independent. The underlying factor driving the relationships between alexithymia and IS with these creative traits could be differences in metacognitive control and sensitivity to external motivators, although further research is needed to explore these questions.

Distractibility and its impact on IS and creative traits

Another facet of the relationship between creativity and IS we investigated was the mediating role of distractibility, defined as the susceptibility to extraneous or task-irrelevant information (Harriott et al., 1996; Singer & Antrobus, 1963). This line of inquiry was based on the premise that flexible attention facilitates creative thinking (Gabora & Ranjan, 2013; Vartanian et al., 2007; Zabelina et al., 2016) and interoception influences how attention is allocated (Critchley & Harrison, 2013; Herman & Tsakiris, 2021). We hypothesized that distractibility might mediate the relationship between IS and creative traits such as mode-shifting, the ideator, developer, and implementer traits, with higher internal bodily awareness predicting higher creative traits through reduced susceptibility to distractions.

We found that when controlling for distractibility, IS significantly predicted all subscales of FourSight and inspiration, albeit distractibility partially mediated these relationships. Notably, the strongest mediation effects of distractibility were observed for the implementer and developer traits, suggesting that these creative preferences may be explained by the ability to stay on-task. We also found that the ideator, developer, and implementer traits were all independently negatively associated with distractibility. This suggests that the relationship between IS and these traits are independent of susceptibility to distraction, although it may be tangentially related.

The strongest mediation effects were observed for the implementer and developer traits, suggesting that these creative preferences require a stronger ability to remain on task. Additionally, IS was negatively associated with distractibility, which may reflect enhanced metacognitive monitoring and self-regulation. Individuals with higher IS may be better equipped to manage their attention and reduce distractions, thereby increasing their preference to evaluate and implement ideas. The negative relationship between distractibility and the ideator aligns with previous research, which found that higher susceptibility to distractions impairs both the quantity and quality of ideas (Hao et al., 2015).

We also hypothesized that distractibility would mediate the relationship between IS and mode shifting. Although IS was positively correlated with mode shifting and negatively correlated with distractibility, we found no significant relationship between distractibility and mode shifting. This may suggest that the self-perceived ability to switch between associative and analytical thinking is not significantly influenced by susceptibility to distraction.

Finally, these results contribute to the ongoing debate regarding whether IS primarily measures attention or internal bodily awareness. Our results support the notion that these constructs are distinct yet interact in cognitive and perceptual processing. This aligns with a study by Buldeo (2015), which found that participants could accurately assess their internal bodily states even when their attention was compromised, suggesting that distractibility and IS operate within distinct, though interconnected, domains.

Limitations and future directions

Our study is not without limitations. One significant limitation is the online nature of the data collection, which, as noted by Bianco et al. (2021), may not capture participant engagement as effectively as in-person studies. The differences between online and in-person engagement levels suggest caution when generalizing the findings, as the virtual setting could impact the validity of participant response. Also, our reliance on self-report trait scales, while informative, cannot wholly substitute for objective, task-based measures that might offer more precise, or different, insights into the studied constructs. While self-reported IS can provide valuable information, it does not always correlate with task-based measures of interoceptive accuracy, as these tools measure distinct aspects of interoceptive ability (Garfinkel et al., 2015). As such, there is a possibility that our participants over- or underestimated their IS. Recent research by Rominger and Schwerdtfeger (2024) suggests that individuals with lower metacognitive abilities may overestimate their interoceptive sensitivity, underscoring the importance of considering metacognition in future research on the relationship between interoception and creativity. That said, self-reported creativity scales are generally considered appropriate for measuring creative traits (Silvia et al., 2008). However, we recognize the limitations of relying exclusively on self-report measures. For example, we observed that the Runco Ideational Behavior scale (RIBS) did not significantly correlate with IS, alexithymia, or distractibility. This discrepancy may arise because the RIBS assesses general tendencies toward ideation in everyday life, whereas the FourSight ideator subscale measures ideation within the specific context of creative problem-solving. The inclusion of RIBS was intended to provide a complementary measure of ideational behavior beyond the goal-directed settings of FourSight. The fact that the RIBS did not yield significant correlations highlights the importance of task context in understanding the relationship between interoceptive sensitivity and creativity. It also suggests that IS may be more closely related to structured, evaluated aspects of creative cognition rather than more diffuse everyday ideation. The contrast in findings highlights the value of using multiple creativity measures and suggests that IS may relate more closely to creativity expressed in structured or goal-oriented contexts. Finally, caution must be exercised when interpreting our findings related to alexithymia.

Individuals with high trait alexithymia may inaccurately report their creative traits due to tendency to rely on external cues rather than internal ones (Kooiman et al., 2002). This potential discrepancy highlights the need for careful interpretation when drawing conclusions about the creative abilities of individuals with alexithymia. Future studies should aim to validate these findings using objective measures of interoceptive awareness, creative task performance, and attention. Controlling for metacognitive control may also yield alternate insights, particularly in understanding the relationship between interoception, alexithymia, and creativity. Similarly, our study would have benefitted from measures of well-being, emotional regulation, and sensitivity to motivational cues – factors that were central to our discussion.

Our findings have important implications for future creativity research, especially in considering a more holistic understanding of creative cognition by integrating bodily responses. Future investigations could utilize methods typical in interoception research, such as observing creative responses during different phases of the cardiac cycle (Saltafossi et al., 2023; Skora et al., 2022), examining neural signatures time-locked to heartbeats (Montoya et al., 1993), and using objective measures of interoceptive accuracy, such as heartbeat detection tasks (Ring & Brener, 2018). Theoretically, our findings suggest that visceral sensations may play a role in guiding creative thinking, particularly in the development and implementation of ideas. Furthermore, it raises the possibility that individuals rely on bodily sensations to process motivational cues in creative thinking, such as those experienced during moments of inspiration.

Conclusion

This study provided valuable insights into how interoceptive sensitivity (IS) relates to individual differences in creative traits, with additional consideration of alexithymia and distractibility as potential moderators and mediators. Our findings suggest that greater subjective internal bodily awareness is generally associated with stronger creative traits, including the preferences for idea generation, evaluation, implementation, and the propensity to experience inspiration. These relationships highlight the potential role of bodily awareness on creative cognition, suggesting that how individuals respond to their physiological states might shape their creative output. Alexithymia and distractibility further demonstrated the influence of emotional awareness and attentional control on the IS-creativity link. Alexithymia, negatively correlated with IS, may impact creative traits by reducing emotional responsiveness, sensitivity to motivational cues, and metacognitive control. Distractibility, as a partial mediator, highlighted the role of attentional regulation in creative idea development and implementation.

In conclusion, this study contributes to a deeper understanding of the cognitive and emotional foundations of creativity, revealing the critical roles of interoceptive sensitivity, alexithymia, and distractibility. By highlighting how bodily awareness intersects with creative traits, our findings open new avenues for exploring how internal states contribute to creativity. Future research incorporating objective, task-based measures of these constructs will help to further clarify how the mind and body work together in the creative processes, offering new directions for understanding and cultivating creativity in diverse contexts.

Author contributions

J.B. and F.T.J. conceived and designed the study; F.T.J. conducted the experiment, collected and analyzed the data, and wrote the first draft; C.D.B.L. and J.B. edited the manuscript; J.B. and C.D.B.L provided research supervision.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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