

**The Effect of Mindfulness on the Relationship between Creativity and Wellbeing in
University Students**

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Abstract

Background Creativity is proven to have a positive link to wellbeing in individuals. Since the concept of creativity is broad, it can be differentiated between different types of creativity. In this study the focus is placed on little-c and mini-c. Little-c can also be called everyday creativity and concerns everyday creative activities that are performed by non-professionals. Mini-c or learning creativity includes interpreting experiences or events in personally meaningful and novel ways. The concept of mindfulness is not only proven to strengthen wellbeing but also to increase creativity. Mindfulness involves having a non-judgemental moment-to moment awareness.

Aim This study aims to test whether mindfulness supports the positive effect that different types of creativity have on students' wellbeing.

Methods To test the hypothesis that mindfulness strengthens the positive effect that little-c and mini-c have on students' wellbeing an online survey was carried out which was distributed among university students.

Results The results showed an insignificant moderation effect of mindfulness on the relationship between little-c and wellbeing while a significant positive moderation effect of mindfulness on the relationship between mini-c and wellbeing was observed.

Conclusion The results indicate that mindfulness strengthens the positive effect that mini-c has on wellbeing whereas mindfulness does not impact the effect little-c has on wellbeing. Nevertheless, it needs to be acknowledged that only the attention or awareness component of mindfulness was assessed in this study and hence the results cannot be generalized to all facets of mindfulness. Therefore, only attentive mindfulness is proven to increase the effect that mini-c creativity has on wellbeing in the current study and not the complete concept of mindfulness.

Keywords: Creativity, little-c, mini-c, everyday creativity, learning creativity, mindfulness, wellbeing, university students

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Introduction

Creativity

Creativity not only holds the potential to bring about ingenious innovations that advance society, but it also affects the individual life of virtually everyone. Traditionally, creativity is defined as the generation of useful as well as novel ideas and products (Walia, 2019).

Historically, scholars differentiate between big-c or eminent creativity (high level creativity majorly impacting culture) and little-c or everyday creativity (hobbies or problem-solving in leisure situations) (Fürst & Grin, 2018). Beghetto and Kaufmann (2009) further refine the traditional classification of creativity in their Four C model by adding two more dimensions, namely pro-c (professional creative activity) and mini-c (creativity inherent to learning). Hence, creativity does not necessarily need to generate ground-breaking innovations but can also solely be personally meaningful.

As little-c and mini-c are the most prevalent dimensions of creativity in society, they are especially important to focus on in research. As stated in the Four C model, the type of creativity that most people experience daily is called little-c creativity or everyday creativity (Kauffmann & Beghetto, 2009). Since little-c concerns creative activities that are practiced by non-experts, it is the most common form of creative expression (Benedek et al., 2019). Everyday creative activities come to mind easily, as most people engage in a creative hobby or passion themselves. For instance, everyday creative activities include painting, dancing, or creating new cooking recipes. Moreover, they can also entail how individuals deal with ordinary situations such as searching an object or dealing with conflicts (Ilha Villanova & Pina e Cunha, 2021). Instead of analytical abilities, often relating to IQ, traits like unconventionality, curiosity or imagination are essential to little-c creativity. Hence, a wide range of people engage in little-c creativity, highlighting its potential to positively impact the lives of these individuals.

Besides little-c, the category mini-c also offers great potential to impact the lives of many in society as it entails interpreting actions, experiences or events in a personally meaningful and novel way which often occurs when learning new things (Kauffmann & Beghetto, 2009). The concept of mini-c creativity is similar to notions of personal or individual creativity. Therefore, mini-c creativity is best assessed by measuring someone's creative self-efficacy as it entails the subjective perspective of an individual's personal creativity (Beghetto et al., 2011). Additionally, creative self-efficacy postulates that each individual has a creative potential, starting with transforming incoming information based on personal characteristics and knowledge.

When solely considering little-c creativity, creative insights that occur during learning can be missed easily. This leads to an underestimation of individuals' creativity who do not engage in everyday creative practices but still possess intrapersonal creativity (Kauffmann & Beghetto, 2009). Not encouraging mini-c creativity could hinder these individuals from exploring their creativity further. Therefore, mental constructions that are not expressed concretely should still be considered creative. By including mini-c creativity in research more people are integrated and can benefit from its positive effects.

One positive effect that creativity has on individuals is that it can improve their emotional functioning (Conner, 2018). Particularly, in modern western society levels of wellbeing are declining and especially university students are a vulnerable population nowadays since they are exposed to various stressors (Reddy et al., 2018; Carlisle et al., 2016). Positive techniques that help to improve wellbeing in students are needed and creativity might be a useful tool (Carlisle et al., 2016). According to Conner et al. (2018) creativity emerges from a positive emotional state in most individuals. Conversely, research suggests that creativity has a positive effect on well-being. For instance, engagement in creative activity is associated with higher positive affect and increased flourishing (Conner, 2018). Examples are art-making interventions which are proven to reduce stress as well as anxiety or creative expression projects in schools that improve students' mental health (Forgeard et al., 2014). According to Benedek (2019), especially everyday creativity can be cause as well as consequence of wellbeing, showing its capacity to improve people's lives (Benedek et. al, 2019). Hence, particularly through little-c and mini-c creativity this mutual effect could benefit a wide range of students, stressing the importance to investigate this connection.

Furthermore, everyday creativity is associated with personality factors that promote mental health. More precisely, Ivcevic (2007) found that everyday creativity is related to the Big Five traits of openness to new experience and conscientiousness. While everyday creativity is defined as a component of general adaptability, conscientiousness and extraversion are positively correlated with psychological adjustment (Benedek, 2019). Moreover, people scoring high on extraversion are more likely to engage in self-expression regarding social contexts which is part of everyday creativity and promotes wellbeing. Additionally, little-c creativity is positively correlated with experiencing personal growth, a component of psychological wellbeing, stressing everyday creativity's positive link to wellbeing once more (Ivcevic, 2007). Accordingly, the traits little-c creativity is related to have a positive impact on wellbeing, directly as well as indirectly.

Mindfulness

Like creativity, mindfulness also positively influences individual's wellbeing but to understand this effect, mindfulness needs to be defined first. According to Kabat-Zinn (2015) mindfulness is a moment-to-moment awareness which is promoted by paying attention to the present moment in a non-reactive, curious way without judgement. Moreover, mindfulness can be classified either as a personality trait or a state. As a state, mindfulness can vary according to the situation (Brown & Ryan, 2003). In contrast, when seen as a trait, mindfulness is stable over extended time periods and in diverse circumstances. Hence, the general degree to which individuals are mindful is stable while their experience of mindfulness may fluctuate according to the situation (Brown & Ryan, 2003). Additionally, it is possible to learn and enhance mindfulness by practice, for example through mindfulness meditation (Greenson & Pearce, 2015). Thus, for the purpose of the current study, mindfulness is assessed as a personality trait and will only be measured at one point in time. Simultaneously, I recognise that mindfulness can fluctuate over time and is trainable.

In a world overflowing with distraction, stress, and distress, which are all factors that negatively impact creativity and wellbeing, mindfulness can become a valuable resource (Henriksen et al., 2020). Long-term practice of mindfulness meditation and mindfulness-based treatments are consistently associated with positive mental health (Baer et al., 2012). Furthermore, scholars found that mindfulness correlates positively with various indicators of wellbeing, such as low emotional disturbance, high levels of subjective wellbeing and high levels of eudaimonic wellbeing (Brown et al., 2007). Mindfulness promotes wellbeing directly as it adds clarity to current experience and encourages one to be in close sensory contact with momentary life. In addition, mindfulness enhances wellbeing indirectly by heightening self-regulation, which is expanded by paying attention to environmental, somatic as well as psychological cues (Brown et al., 2007). Through these paths, mindfulness strengthens the frequency and intensity of positive emotions that are experienced. Thereby, mindfulness might encourage more frequent creativity which could in turn increase wellbeing (Carruthers & Hood, 2011). Thus, mindfulness positively contributes to wellbeing not only directly but also through indirect routes. By this mindfulness could also strengthen creativity, reinforcing the link creativity has to wellbeing.

Creativity and Mindfulness

Mindfulness not only positively influences wellbeing but is also proven to increase creativity. Henriksen et al. (2020) argue that high levels of self-reported mindfulness correspond to creative activity. Mindful practices such as mindfulness meditation, regardless of their duration, are proven to strengthen people's creativity (Henriksen et al., 2020). This

link emerges as aspects of mindfulness or skills which can be increased by mindfulness practices strengthen creativity. For instance, mindfulness practice expands openness to new experience and curiosity which are important factors for creativity (Rybak, 2013). Furthermore, as creative self-beliefs are the fundament of creative capacity, mindfulness supports by reducing fear of judgement and aversive self-conscious thinking (Henriksen, 2020). Further stressing the connection between mindfulness and creativity, mindfulness increases individual's ability to respond to situations in unusual ways, a key characteristic of creativity (Henriksen, 2020). Consequently, expanding individual's mindfulness increases creativity, pointing to the possibility that mindfulness can promote the positive impact creativity has on wellbeing.

In combination with mindfulness, mini-c also seems to be connected to wellbeing. Purposefully including mindfulness in learning environments benefits students' learning, creativity, and wellbeing (Henriksen, 2020). This finding indicates that mindfulness could positively moderate the effect mini-c creativity has on wellbeing. Nevertheless, research regarding specifically the connection between mini-c creativity, mindfulness and wellbeing is scarce and further investigation of their interrelationship is needed.

The effect that mindfulness has on the relationship between creativity and wellbeing needs to be researched further and particularly regarding the specific creativity dimensions of little-c and mini-c. The potential that is offered when creativity and mindfulness work together in synergistic ways is immense but further investigation is needed due to the complexity of the relationship (Henriksen et al., 2020). Especially students could benefit from integrating creative mindfulness practices in their everyday lives as it would help them to be non-judgmental towards themselves and to detach from university stressors (Hall et al., 2018). These adaptive functions do not only help students in their university lives. When students learn to perceive stressful thoughts and negative self-talk more objectively through mindfulness, they can think and act more freely in their creativity which helps them in developing wellbeing (Henriksen & Shack, 2020).

Therefore, this study examines the interrelationship among mindfulness, creativity and wellbeing in university students. Specifically, this research will focus on the question whether mindfulness strengthens the positive effect that creativity has on wellbeing. A particular focus is placed on little-c and mini-c creativity. As explained above, little-c and mini-c are dimensions of creativity that the majority of society experiences on a daily basis. Accordingly, focusing on these two dimensions is predicted to bring about the benefits of

combining mindfulness and creativity to a wide range of students. To examine this effect, the following hypotheses are proposed:

H1: Mindfulness moderates the positive effect little-c creativity has on students' wellbeing.

H2: Mindfulness moderates the positive effect mini-c creativity has on students' wellbeing.

Figure 1

Research Design Hypothesis 1

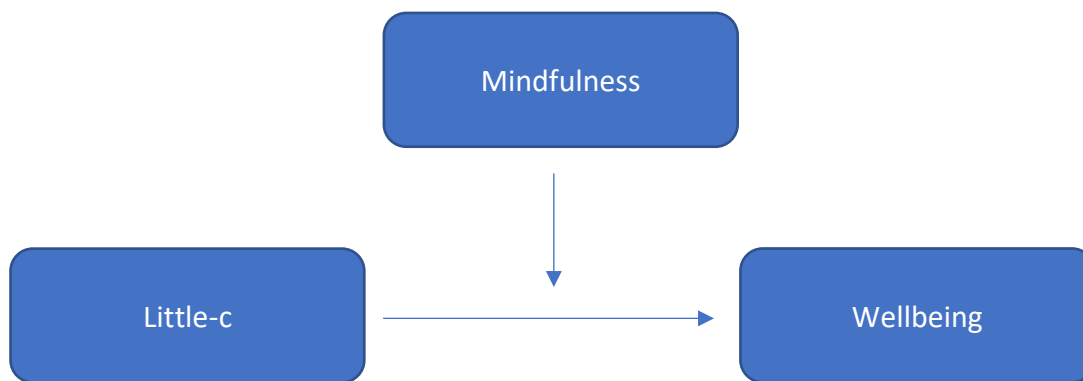
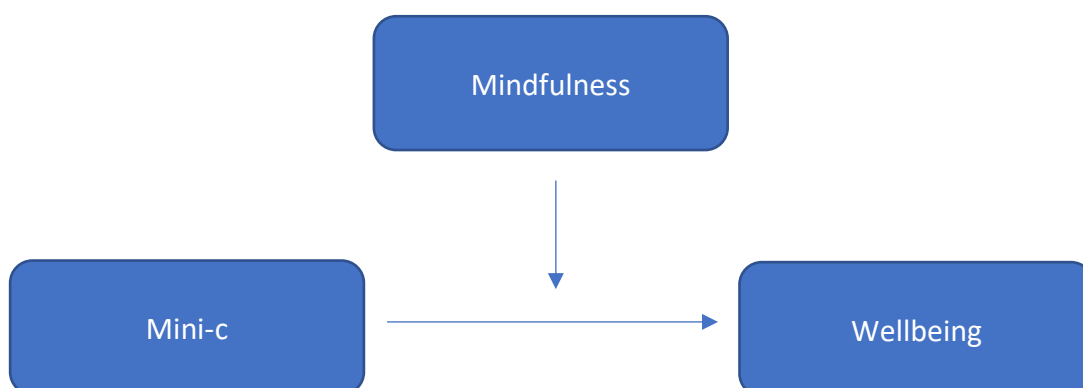


Figure 2

Research Design Hypothesis 2



Methods

Study Design

In the current research, a quantitative survey design was utilised in order to investigate whether mindfulness moderates the relationship between little-c or mini-c creativity and wellbeing. As the study was a collaborative research project of two Bachelor students from the University of Twente, who focused on different variables, various questionnaires were used. The Ethics Committee of the Faculty of Behavioural Sciences at the University of Twente accepted the study and assigned the registration number 220324 to it.

Participants

The participants were recruited by means of convenience and snowball sampling. The survey was distributed through social media pages, more specifically through Instagram and WhatsApp. Moreover, the survey was published via SONA Systems, the online test subject pool of the University of Twente. There, each participant received 0.25 credit points when taking part in the study.

The inclusion criteria for the participation in the study were that participants needed to be at least 16 years old, be University students and have sufficient English skills. The sample consisted of 187 participants. In sum, 112 of the participants were left who fulfilled the needed criteria once incomplete responses or participants who withdrew the informed consent were excluded from the sample. Additionally, 74 of the participants identified as female, 14 as male, one as non-binary and one participant preferred not to mention their gender. The ages of the participants ranged from 16 to 47 while the mean age was 22.7 (Table 1).

Table 1

Demographic Characteristics of the Sample (n=112)

Characteristics	n	%
Mean Age	22.7	
Age SD	4.6	
Gender		
Female	74	66.1
Male	14	32.1
Non-binary	1	0.9
Prefer not to say	1	0.9

Nationality		
German	59	52.7
Dutch	16	14.3
Other	37	33.0

Note. n = total number

Materials

The study was conducted online using the survey software Qualtrics. In total, four different scales were used, each measuring one of the variables that were investigated.

The Mental Health Continuum Short Form (MHC-SF)

To assess the participant's wellbeing the Mental Health Continuum Short Form (MHC-SF) was utilised. The MHC-SF is based on Keyes' (2007) Mental Health Continuum Long Form which consists of 40 items and measures emotional wellbeing, psychological wellbeing, and social wellbeing. The 14-item questionnaire consists of three subscales that each entail a construct of the facets of wellbeing. Three items represent emotional wellbeing while six items represent psychological wellbeing, and five items represent social wellbeing. The items are answered with a six-point Likert scale (1 = *never* to 6 = *everyday*), indicating how frequently the named aspect is experienced. The MHC-SF can be scored between zero and 70 points with higher scores indicating a higher level of wellbeing. The psychometric properties of the MHC-SF demonstrate excellent internal consistency in past studies with a Cronbach's alpha of .80. For the current sample, Cronbach's alpha is .79 and is thus satisfactory. Moreover, the measure's test-retest reliability which has been consecutively tested three times over a three-month period is .68 with a 9-month test-retest reliability of .65 which is moderate (Keyes, 2005b, 2006; Keyes et al., 2008; Lamers et al., 2011; Westerhof & Keyes, 2009).

The Mindfulness Attention Awareness Scale (MAAS)

For determining mindfulness, the Mindfulness Attention Awareness Scale (MAAS) was utilised (Brown & Ryan, 2003). The MAAS consists of 15 items and measures trait mindfulness. The questionnaire consists of one scale which is composed of items like "I rush through activities without being really attentive to them." or "I find myself preoccupied with the future or the past." (see Appendix D). Participants had to rate their experience of each item on a six-point Likert scale ranging from 1 = *almost always* to 6 = *almost never*. By calculating the mean score of all items, the degree to which an individual possesses trait

mindfulness was measured with high scores indicating a high level of mindfulness. With a test-retest reliability of .81, the MAAS is generally a reliable measure for trait mindfulness. Cronbach's alpha with a value of .88 was satisfactory in the current sample confirming the test's high reliability. Further, the MAAS is already validated in samples of college students.

The Biographical Inventory of Creative Behaviours (BICB)

Everyday creativity was measured by means of the Biographical Inventory of Creative Behaviours (BICB) by Batey (2007). The BICB is a popular measure for the self-assessment of everyday creativity (Silvia et al., 2021). The questionnaire is composed of 34 items describing various everyday creative activities. Participants are instructed to choose the creative activities from the questionnaire which they engaged in during the last 12 months. This is done by using a binary checklist response scale on which the participants indicate whether they engaged (1 = *yes*) or did not engage (0 = *no*) in the creative activity. The indicated behaviours are diverse and include creative activities related to arts and writing but also to science, intellect or interpersonal acts. The items, for instance, include "During the past 12 months have you produced a short film" or "During the past 12 months have you designed and planted a garden" (see Appendix E). In the end a single score is obtained, ranging from zero to 34 points, with a higher score pointing to higher possession of everyday creativity. The BICB's internal consistency in past studies is excellent as Cronbach's alpha is high ($\alpha = .86$). In case of the current sample Cronbach's alpha is .79 which is satisfactory. Furthermore, the scale's reliability is greatest for the middle to high end of the trait (Silvia et al., 2021).

Creative Self-efficacy (CSE)

To assess mini-c creativity a measure of domain specific creative self-efficacy (CSE) was used. Inspired by Hartley et al. (2016) five questions were used to measure CSE. As the study by Hartley et al. focused on science class students the researcher adapted all questions to university students. For example, one of Hartley et al.'s (2016) items is "I am good at coming up with new ideas during science class" (see Appendix F). For the purpose of this study the item was changed to "I am good at coming up with new ideas during university tutorials/projects". The items were answered on a five-point Likert scale which ranged from 1 = *not true* to 5 = *always true*. In total, a score ranging from five to 25 points was possible with higher scores indicating higher possession of CSE and thereby mini-c creativity. Furthermore, Cronbach's alpha with .88 was high in the current sample indicating good internal consistency.

Procedure

In the beginning of the study an informed consent form was completed by each participant. First the content of the study was shortly provided. Then it was stated that all information which is collected during the study remains confidential and that participants can withdraw from the survey at any point in time (see Appendix A). By choosing “I agree to participate in this study” the participants gave their informed consent and could start to fill in the remaining part of the survey. Afterwards the participants were asked to specify their demographic information, for instance, their nationality, age, and gender (see Appendix B). Subsequently, the participants filled in the Mental Health Continuum Short Form (MHC-SF), the Biographical Inventory of Creative Behaviours (BICB), the questions regarding creative self-efficacy and the Mindfulness Attention Awareness Scale (MAAS) (see Appendix C to F). As the research project was collaborative, some further questionnaires were filled in by the participants which were not included in the current study. In the end of the survey the participants were provided with the E-mail addresses of the researchers in case of any questions, and they were thanked for their participation (see Appendix G).

Data Analysis

To analyse the obtained data, the statistical software SPSS was utilised. In the beginning, all data that failed to fulfil the inclusion criteria were excluded. For example, this concerned participants who did not fill in all necessary questions or did not finish the survey. Then, by using descriptive statistics, means, frequencies and standard deviations of the demographic information were calculated. Moreover, the means, standard deviations and Pearson correlations of the relevant variables were obtained.

For answering the first hypothesis, *H1: Mindfulness moderates the positive effect little-c creativity has on students' wellbeing*, Hayes' (2017) PROCESS macro for SPSS was utilised. A conceptual model with one moderation variable was investigated to check if mindfulness moderates the positive effect that little-c has on wellbeing. The analysis was conducted with little-c as independent variable, wellbeing as dependent variable and mindfulness as the moderator. In order to answer the second hypothesis, *H2: Mindfulness moderates the positive effect mini-c creativity has on students' wellbeing*, a similar command was carried out on SPSS in which little-c was exchanged with mini-c. Hence, the PROCESS macro was used with mini-c as independent variable, wellbeing as dependent variable and mindfulness as moderator.

Results

Descriptive Statistics

The descriptive statistics for the variables wellbeing, mindfulness, little-c and mini-c are displayed in Table 2.

Table 2

Mean and Standard Deviations of the MHC-SF, MAAS, BICB and CSE

	<i>M</i>	<i>SD</i>	<i>n</i>
Wellbeing	3.88	.93	112
Mindfulness	3.74	.81	112
Little-c	6.42	4.09	112
Mini-c	3.38	.89	112

In Table 3 the Pearson correlations between the variables are displayed. Significant positive correlations between wellbeing and mindfulness, between wellbeing and little-c as well as between wellbeing and mini-c were found. Additionally, little-c and mini-c were also positively correlated.

Table 3

Pearson Correlations between the Variables

	Wellbeing	Mindfulness	Little-c	Mini-C
Wellbeing	.			
Mindfulness	.35**	.		
Little-c	.21**	.01	.	
Mini-c	.47**	.12	.59**	.

Note. **. Correlation is significant at the 0.01 level (2-tailed)

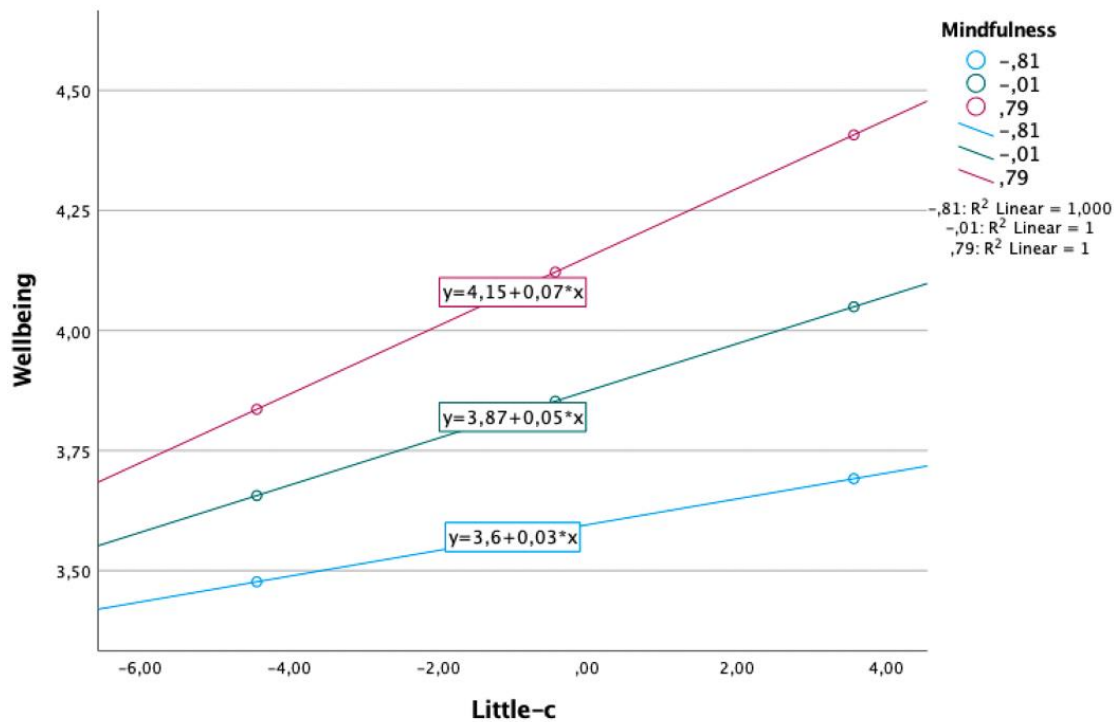
*. Correlation is significant at the 0.05 level (2-tailed)

The relation between Little-c and Wellbeing and the Moderation of Mindfulness

Regarding the first hypothesis, *H1: Mindfulness moderates the positive effect little-c creativity has on students' wellbeing*, the moderation analysis showed that mindfulness had no significant effect on the relationship between little-c and wellbeing [$B = .03$, $se = .02$, $t(3, 108) = 1.56$, $p = .12$] (Figure 3).

Figure 3

Levels of Wellbeing in relation to Levels of Little-c and Mindfulness

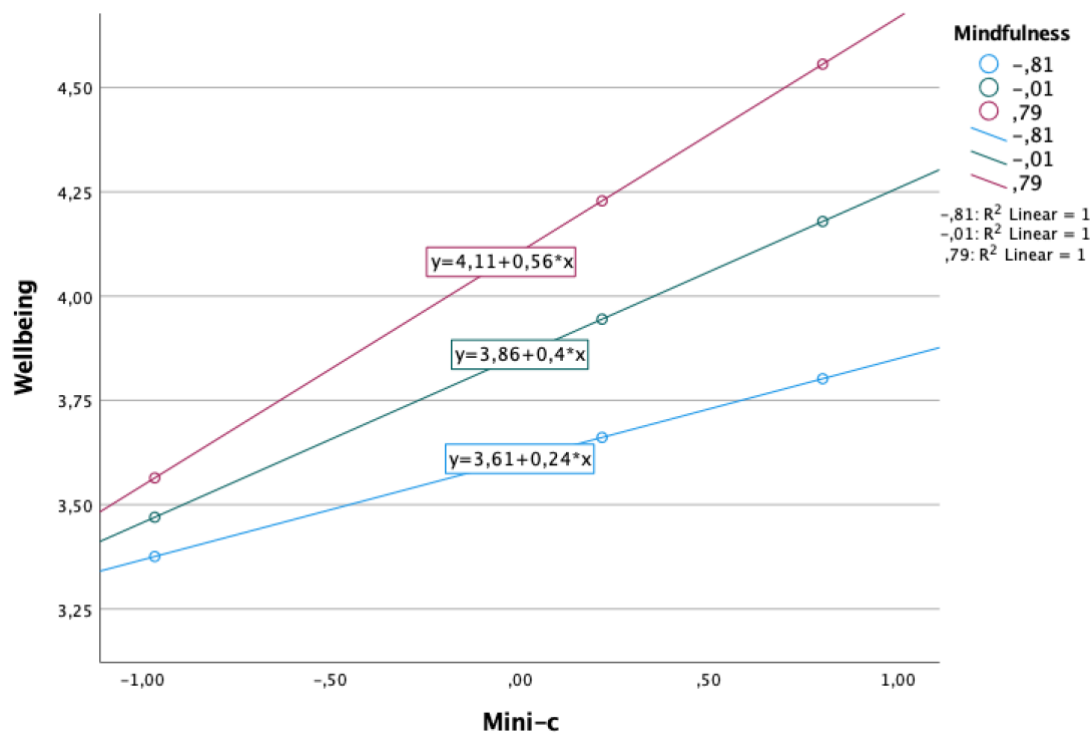


The relation between Mini-c and Wellbeing and the Moderation of Mindfulness

Concerning the second hypothesis, *H2: Mindfulness moderates the positive effect mini-c creativity has on students' wellbeing*, a significant interaction effect between mini-c and mindfulness was found [$B = .20$, $se = .08$, $t(3, 108) = 2.58$, $p = .01$]. The main effect of mindfulness was significant [$B = .31$, $se = .09$, $t(3, 108) = 3.42$, $p = .00$]. Additionally, the conditional effect of mini-c turned out to be significant too [$B = .40$, $se = .08$, $t(3, 108) = 4.82$, $p = .00$]. In line with this, at low levels of mindfulness, there was a positive conditional effect of mini-c on wellbeing [$B = .24$, $se = .11$, $t(3, 108) = 2.10$, $p = .04$]. At medium levels of mindfulness, there was a positive conditional effect of mini-c on wellbeing as well which is increased compared to the effect for low levels of mindfulness [$B = .40$, $se = .08$, $t(3, 108) = 4.81$, $p = .00$]. For high levels of mindfulness there was again a positive conditional effect which is higher than the effect for low or middle levels of mindfulness [$B = .56$, $se = .09$, $t(3, 108) = 6.03$, $p = .00$]. Hence, the positive effect of mini-c on wellbeing was stronger for people scoring high on mindfulness (Figure 4).

Figure 4

Levels of Wellbeing in relation to Levels of Mini-c and Mindfulness



Discussion

The purpose of the current study was to investigate the interrelationship between different types of creativity, namely little-c and mini-c, mindfulness and wellbeing. More precisely, it was hypothesized that mindfulness strengthens the positive effect that little-c and mini-c have on students' wellbeing.

Concerning the first hypothesis, *H1: Mindfulness moderates the positive effect little-c creativity has on students' wellbeing*, the moderation effect was not significant. The results indicate that mindfulness does not strengthen the positive effect that little-c creativity has on wellbeing. Hence, the first hypothesis was rejected. Regarding the second hypothesis, *H2: Mindfulness moderates the positive effect mini-c creativity has on students' wellbeing*, a significant positive interaction effect between mini-c and mindfulness was found. Accordingly, the data suggest that mindfulness increases the positive effect that mini-c creativity has on students' wellbeing and therefore the second hypothesis is accepted.

Mindfulness as a moderator of the relationship between little-c and wellbeing

The unexpected result that there was no significant interaction effect between mindfulness and little-c creativity implies that mindfulness does not support the positive effect that little-c has on wellbeing. There was no past research examining exactly this

moderation effect but based on the fact that mindfulness has been proven to increase creativity in past research, it was assumed that this might lead to a strengthened effect of little-c on wellbeing (Henriksen, 2020). Contrary to this expectation, the results did not show a significant correlation between mindfulness and little-c nor was there a moderation effect between the variables.

A possible explanation for these findings could be that mindfulness is a very complex concept as it is comprised of various skills (Lebuda et al., 2016). For instance, mindfulness entails paying attention to different stimuli, avoiding immediate evaluation, or focusing with complete awareness. These different skills could be related to creativity in disparate ways. For example, Lebuda et al. (2016) claim that focused-attention meditation can hamper creativity while open-monitoring meditation expands creativity. When considering that mindfulness might have inconsistent effects on creativity generally, it emerges that it can have contradictory influences on little-c creativity too. According to the current study, it seems that mindfulness does not increase everyday creativity, or the effect everyday creativity has on wellbeing. To check whether these findings can be generalised it needs to be considered which type of mindfulness is measured exactly.

The Mindful Attention Awareness Scale (MAAS), which was used to measure mindfulness in this study, mainly focuses on the attention or awareness aspect of mindfulness (Brown & Ryan, 2003). This facet of mindfulness concerns focusing one's attention with full awareness, thereby restricting the focus on a specific target. Awareness mindfulness can be trained by focused-attention meditation during which attention is focused on a specific task or stimuli, for instance one's breath. In past research the MAAS was found to be only slightly positively, or negatively correlated to creativity which is in line with the findings from the current study (Baas et al., 2014). As the results indicate that the awareness aspect of mindfulness does not contribute to the effect little-c creativity has on wellbeing it can be assumed that being attentive is not a crucial part of everyday creativity. In contrast, disinhibition or mind wandering have been linked to creativity by Schooler et al. (2004). Since little-c is based primarily on traits like unconventionality or curiosity it seems like these factors are not necessarily promoted by attentiveness in an everyday context but could rather be supported by other aspects of mindfulness which have a disinhibiting effect on the individual. This would be in line with the fact that open-monitoring meditation increases little-c by training to observe sensations and thoughts without a specific focus (Zedelius & Schooler, 2015).

Despite the non-existent link between little-c creativity and mindfulness in the current study, both variables were positively correlated to wellbeing which is in line with former research findings (Benedek et al., 2019; Brown et al., 2007). This implies that the attentive part of mindfulness and little-c creativity both impact wellbeing independently of each other without a moderation effect taking place.

Mindfulness as a moderator of the relationship between mini-c and wellbeing

Henriksen et al. (2020) found that students' wellbeing and creativity were increased when including mindfulness in learning environments. Based on these findings it was theorised that mindfulness supports the positive link between mini-c or learning creativity and wellbeing which could be confirmed by the results of the current research. Confirming the second hypothesis, mindfulness strengthened the positive effect that mini-c creativity had on wellbeing in the current research.

In contrast to the effect little-c had on wellbeing, awareness mindfulness, which is assessed by the MAAS, did strengthen the positive link between mini-c and students' wellbeing. This could have several reasons. For instance, the skills needed for the dynamic and interpretative manner in which incoming information is integrated during mini-c creativity could be different to the skills that are important for little-c creativity. Mini-c entails the restructuring of incoming information according to the individual's past experiences (Kauffmann & Beghetto, 2009). This process seems to require the attention and awareness of the individual while being too attentive can hamper the skills needed for little-c. Due to this it could emerge that the attentive aspect of mindfulness is beneficial for the effect mini-c creativity has on wellbeing.

A more precise explanation for this can be extracted from Schooler et al.'s (2014) findings which indicate that attentive mindfulness is linked to creative analytical problem solving and not to creative insight problem-solving. To understand the relation to the current study, these concepts need to be explained first. Creative problems can be solved in two different ways. More specifically, it is possible to solve a creative problem through spontaneous insight or through analytical processing (Schooler et al., 2014). In analytical problem-solving, creative problems are solved incrementally by searching associative networks in one's long-term memory whereas in insight problem-solving the solution arises spontaneously (Schooler et al., 2014). These two ways of creative problem-solving are related to considerably disparate patterns of brain activity. While insight problem-solving is related to increased default mode network (DMN) activity, analytic problem-solving is related to decreased activity in the DMN. The DMN is known for states of wakeful rest during which a

person is not focused on the outside world but engages in self-referential introspection, indicating that such a state is needed in insight problem solving but not in analytical problem-solving (Mak et al., 2017).

In attentive mindfulness, activity in the DMN is also low, implying a possible link to analytical problem-solving. This assumption was confirmed in Schooler et al.'s (2014) study in which they asked participants who solved creative problems whether they solved each problem analytically or with insight. The findings demonstrated that attentive mindfulness correlates positively with analytical creative processes. Accordingly, when relating these findings to the current study, learning creativity might benefit from attentive mindfulness specifically through analytical creative processes. In learning creativity, analytical thinking might be important in order to interpret events in personally meaningful and novel ways. Thus, the current study's results indicate that the processes which are essential in mini-c creativity seem to be promoted by attentive mindfulness through analytical creative processes.

A further aspect which could have contributed to the current study's results concerns the different stages of creativity little-c and mini-c refer to in the creative process. In their paper, Henriksen et al. (2020) acknowledge that it is probable that different aspects of mindfulness or meditation are important at different stages of creativity. Mini-c accentuates the intrapersonal and ideation-focused facets of creativity while little-c refers to the creative activity itself (Kaufmann & Beghetto, 2009). It could be possible that attentive mindfulness supports the early ideation stage of creativity whereas the processing stage is not supported. This could also be connected to the previous arguments. As mini-c belongs to the intrapersonal ideation stage of creativity it seems likely that attentive mindfulness is beneficial for this stage of the creative process which is achieved by supporting individuals in their analytical creative problem-solving skills.

Strengths and Limitations

There are several strengths and limitations that need to be considered when interpreting the validity of the current study's results. For example, one limitation is that the scales which were used for the research were all based on self-ratings. This could raise the question whether their results reflect the actual creative ability of the participants or only their creative self-concepts (Lebuda, 2016). For instance, it could happen that someone who is self-conscious underestimates their creativity in a questionnaire but is in fact very creative. In the current research this problem is especially applicable to mini-c, for which creative self-efficacy was used as a measure. Nevertheless, there are no scales to measure mini-c directly yet and therefore creative-self efficacy is currently the best option to assess this variable.

An additional limitation of the study is that mindfulness, as a very broad concept, was only assessed with a questionnaire that measures certain aspect of it, namely attention or awareness mindfulness. Despite its strong psychometric properties and suitability for the scope of the current study, the MAAS scale focuses specifically on attentive or awareness mindfulness (Brown & Ryan, 2003). To get a better understanding of the participants' level of mindfulness more generally a measure with different subscales measuring various aspects of mindfulness, such as nonjudgement of experience or observing feelings, sensations, and thoughts, should be considered (Baer et al., 2006).

Another limitation concerns the Biographical Inventory of Creative Behaviours (BICB), which was used as a measure for little-c, as it is most reliable for middle to high scores on this test (Silvia et al., 2021). Nonetheless, the participants of the study generally scored on the lower end of this measure which could put the validity of the results regarding little-c creativity into question. Another limitation of the BICB is that although little-c also includes ordinary activities (e.g. the way in which someone deals with conflicts) the scale only includes primarily more traditional creative practices (e.g. drawing a cartoon). This could lead to an underestimation of the participants level of little-c.

A strength of the current research is its focus on specific types of creativity, namely little-c and mini-c. If creative mindful practices are to be integrated in universities it is important to find out more about what kind of creativity should be considered for a specific context and which types of meditation might be beneficial for it (Henriksen et al., 2020). To properly understand the interrelationship between mindfulness, creativity, and wellbeing, it is important to differentiate between specific kinds of creativity as they can be affected by or effect the variables differently.

Future Recommendations

Based on the named limitations for this study, recommendations for future research can be made. Regarding the measurement instruments that are used to assess the variables it would make sense to consider adding techniques which can be scored more objectively. For example, the Remote Associations Test (RAT) by Mendick and Mendick (1967) would be an option for measuring little-c without using self-ratings of the participants. An additional recommendation regarding the scales concerns that the use of the BICB to assess little-c should be reconsidered. A questionnaire that measures lower ranges of little-c more reliably could be a better choice. Next, the use of the MAAS in isolation to measure mindfulness should be reconsidered in future research. Since mindfulness is a very broad concept which includes variable aspects, it would be interesting to use a measure that covers all its aspects

instead (Lebuda, 2016). For instance, the Kentucky Inventory of Mindfulness Skills Scale (KIMS) could be a good choice (Baer et al., 2006). Another possibility would be to use separate questionnaires for each facet of mindfulness that is of interest for the study. Especially regarding mindfulness' influence on little-c, different aspects of mindfulness should be investigated further.

The results of the current study suggest that there is more to find out regarding the potential that the interrelationship between creativity, mindfulness and wellbeing offers. Future research should be conducted especially regarding the influence of different aspects of mindfulness on the relationship between creativity and wellbeing. Thereby it can be explored which types of interventions should be focused on when attempting to enhance the effects of little-c or mini-c on wellbeing. Particularly regarding the impact of different mindfulness aspects on little-c creativity, further research should be initiated. For instance, a facet of mindfulness which would be interesting to focus on regarding mini-c is avoiding immediate evaluation. This facet concerns being non-judgemental and is trained by open-monitoring meditation which was already linked to everyday creativity in research (Lebuda, 2016). Hence, by researching the relationship between specific facets of mindfulness and creativity types, these can be matched optimally in order to maximise their positive effects.

Another aspect which should be explored further in research concerns how different facets of mindfulness influence creativity at different stages of the creative process. For instance, it could be possible that one facet of mindfulness is beneficial for the ideation phase of creativity while it has no effect on creative expression (Henriksen et al., 2020). Gaining more knowledge about this could, for example, help to stimulate creativity at specific phases and thereby increase its positive effects on wellbeing. Thus, by refining the knowledge of the interplay between specific phases of creativity with different facets of mindfulness, beneficial effects for wellbeing could be optimised.

Furthermore, research regarding mindful creativity interventions should be conducted in real-world contexts, for instance, in university classes. Thereby educators could learn how to use mindful creativity to support their students in different tasks or needs (Henriksen et al., 2020). Especially in universities, promoting wellbeing in students can be approached through such interventions by means which are inexpensive and easy to integrate by the students independently (Hall et al., 2018). Mindful creative practices could be integrated in university classes or other mental health services on campus to promote the students' wellbeing and could attract student who do not want to partake in traditional counselling. Engaging in mindful creativity practices can be done by almost anyone and once the students are equipped

with the knowledge of using mindful creative practices, they are flexible and can utilize these skills for instance in times of stress (Hall et al., 2018). Accordingly, testing out different mindful creativity interventions in universities could help to create cost-efficient and accessible means to increase wellbeing in students.

Conclusion

Despite some limiting factors, the results of this study stress the importance to research the potential of integrating mindful creativity practices among university students further. Both concepts, mindfulness and creativity, have already been connected in research but now they should be integrated together in education, as it seems that once the concepts are combined, their benefits for students' wellbeing can be increased. This research showed that in case mindful creativity activities are considered, it is important which types of practices should be utilised for a given purpose. For instance, not every facet of mindfulness is beneficial for each type of creativity. Moreover, this research accentuated that little-c and mini-c creativity are very different from each other which leads them to interact with mindfulness in different ways and hence it is important to distinguish between these two concepts in research and practice.

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Appendix A

Informed Consent

You are being invited to participate in a research study titled Exploring **Creativity, Mindfulness, Flow and Well-being**. This study is being done by **Jannik Wessling** (j.wessling@student.utwente.nl) **and Jana Marquardt** (j.marquardt-1@student.utwente.nl) from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

The purpose of this research study is **to investigate the relationship between creativity, mindfulness, flow and well-being** and will take you approximately **20 to 30** minutes to complete. The data will be used for research purposes only.

Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any question via E-mail.

We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by **deleting the data two years after the data collection**.

Appendix B

Demographic Data

Please indicate your nationality.

Dutch

German

Other

Please indicate the gender you identify with.

Female

Male

Non-binary

Prefer not to say

Please indicate your age.

Appendix C

The Mental Health Continuum Short Form

Please answer the following questions, they are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month how often did you feel...

happy

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

interested in life

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

satisfied with life

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that you had something important to contribute to society

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that you belonged to a community (like a social group, or your neighbourhood)

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that our society is a good place, or is becoming a better place, for all people

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that people are basically good

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that the way our society works makes sense to you

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that you liked most parts of your personality

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

good at managing the responsibilities of your daily life

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that you had warm and trusting relationships with others

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that you had experiences that challenged you to grow and become a better person

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

confident to think or express your own ideas and opinions

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

that your life has a sense of direction or meaning to it

Never

Once or twice

About once a week

About two or three times a week

Almost every day

Everyday

Appendix D

The Mindfulness Attention Awareness Scale (MAAS)

Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

I could be experiencing some emotion and not be conscious of it until some time later.

Almost always

Very frequently

Somewhat frequently

Somewhat infrequently

Very infrequently

Almost never

I break or spill things because of carelessness, not paying attention, or thinking of something else.

Almost always

Very frequently

Somewhat frequently

Somewhat infrequently

Very infrequently

Almost never

I find it difficult to stay focused on what's happening in the present.

Almost always

Very frequently

Somewhat frequently

Somewhat infrequently

Very infrequently

Almost never

I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I tend not to notice feelings of physical tension or discomfort until they really grab my attention.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I forget a person's name almost as soon as I've been told it for the first time.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

It seems I am "running on automatic," without much awareness of what I'm doing.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I rush through activities without being really attentive to them.

Almost always

Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I do jobs or tasks automatically, without being aware of what I'm doing.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I find myself listening to someone with one ear, doing something else at the same time.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I drive places on 'automatic pilot' and then wonder why I went there.

Almost always
Very frequently

Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I find myself preoccupied with the future or the past.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I find myself doing things without paying attention.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

I snack without being aware that I'm eating.

Almost always
Very frequently
Somewhat frequently
Somewhat infrequently
Very infrequently
Almost never

Appendix E

The Biographical Inventory of Creative Behaviours (BICB)

Please answer as truthfully as you can. Click the box next to the activities you have been actively involved in.

In the past 12 months have you...

Written a short story

Written a novel

Organized an event, show, performance or activity

Produced a TV/Play script

Designed and produced a textile product (e.g. made an item of clothing or household object)

Redesigned and redecorated a bedroom, kitchen, personal space, etc.

Invented and made a product that can be used

Drawn a cartoon

Started a club, association or group

Produced a picture, i.e. NOT a doodle (using paint, pencils, charcoal, acrylic, etc.)

Had an article published

Formed a sculpture using any suitable materials

Recognised where an accepted scientific theory/approach does not explain what it purports to

Produced your own food recipes

Produced a short film

Produced your own website

Produced a theory to explain a phenomenon

Invented a game or other form of entertainment

Selected to lead/manage others

Made someone a present

Composed a poem

Adapted an item and used it in a way that it was not designed to be, in what you consider to be an ingenious way

Published research

Choreographed a dance

Designed and planted a garden

Produced a portfolio of photographs (NOT photographs of a holiday, party, etc.)

Acted in a dramatic production

Delivered a speech

Mentored/Coached someone else to improve their performance

Devised an experiment to help understand something

Made up a joke

Been made a leader/captain of a team/group (e.g. Debating society chairperson, Captain of the Hockey team, etc.)

Composed a piece of music

Made a collage

Appendix F

Creative Self-Efficacy (CSE)

How true is each statement for you?

I am good at coming up with new ideas during university projects/tutorials.

Not true

Rarely true

Somewhat true

Often true

Always true

I have a good imagination during university projects/tutorials.

Not true

Rarely true

Somewhat true

Often true

Always true

I have a lot of good ideas during university projects/tutorials.

Not true

Rarely true

Somewhat true

Often true

Always true

I am good at coming up with my own university projects.

Not true

Rarely true

Somewhat true

Often true

Always true

I am good at coming up with new ways of finding solutions to problems coming up during the university projects/tutorials.

Not true

Rarely true

Somewhat true

Often true

Always true

Appendix G

Closing Statement

Thank you for your participation. If you have any questions about this study, please do not hesitate to contact us at (j.marquardt-1@student.utwente.nl; j.wessling@student.utwente.nl).

Jana & Jannik