Gifted and Talented International

ISSN: 1533-2276 (Print) 2470-9565 (Online) Journal homepage: https://www.tandfonline.com/loi/ugti20

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To cite this article: Ingrid Rita Baum & Nicola Baumann (2019): Autonomous creativity: The implicit autonomy motive fosters creative production and innovative behavior at school, Gifted and Talented International, DOI: 10.1080/15332276.2019.1608136

To link to this article: https://doi.org/10.1080/15332276.2019.1608136

Published online: 16 May 2019.

GIFTED AND TALENTED INTERNATIONAL
https://doi.org/10.1080/15332276.2019.1608136

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Autonomous creativity: The implicit autonomy motive fosters creative production and innovative behavior at school

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ABSTRACT

Theories of creativity and empirical evidence have highlighted the importance of autonomy as a motivational source of creativity. However, we know little about the relationship between the implicit autonomy motive and creativity. Using a multi-method multi-informant design, we investigated the relationship between implicit autonomy motives and creative production. We assessed the implicit and explicit autonomy motives of $N = 108$ adolescents using the Operant Motive Test (OMT) and an explicit motive questionnaire. Then participants completed a creative figural drawing task. In addition, we collected teacher ratings regarding participants' innovative behavior. Results revealed that implicit autonomy dispositions predicted not only production in a figural drawing task, but also teacher ratings of innovative behavior. These positive relationships remained stable when controlling for achievement motivations and other autonomy-related variables. In contrast, explicit autonomy dispositions could not predict creative production or teacher ratings of innovative behavior. We conclude that the implicit autonomy motive is an energizing force of creative production.

KEYWORDS

Autonomy disposition; creativity; motivation

When asked to imagine a very creative person, the image that often comes to mind is a unique individual, someone who marches to their own drummer and is unbound from societal norms. We use those same characteristics, those of a creative person, to describe an autonomous person. An autonomous person functions in a self-determined manner, resists situational and interpersonal constraints, and is in touch with their intrinsic interests (Sheldon, 1995, p. 25). That the characteristics of creativity and autonomy overlap obviously suggests that they somehow go hand in hand. Indeed, empirical studies have confirmed the link between personal autonomy and creativity (Batey & Furnham, 2006; Sheldon, 1995). However, to our knowledge, research has not focused on autonomy as a motivational trait that contributes to creativity. Understanding the motivational forces behind creativity is important especially in school settings, as creativity and intelligence are closely linked (Batey & Furnham, 2006; Kandler, Riemann, Angleitner, Spinath, & Borkenau, 2016; Sternberg & Lubart, 1993). In the present study, we propose and examine the hypothesis that people's inner drive, or motive, for autonomy is an energizing force for creativity.

Motivational dispositions

The link between personality and creativity was identified in early creativity research. Guilford (1950) argued that creative production is the result of an interaction between creative abilities and motivational traits. Traditionally, research on the creative personality has placed focus mainly on the link between Big Five personality traits and creativity (Feist, 1998; Furnham, 2015; Silvia, Nusbaum, Berg, Martin, & O'Connor, 2009) largely neglecting motivational traits, which were an important piece of Guilford's conceptualization of creativity (Guilford, 1950). A few studies do exist that have identified motivational aspects as a factor in creative behavior (Amabile, 1996; Prabhu, Sutton, & Sauser, 2008; Sternberg & Lubart, 1993).

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Of particular note are the so-called task-focusing motivators of creativity suggested by Sternberg and Lubart (1993). In their article on creatively gifted individuals, the authors present a model of creative giftedness that includes intellectual processes, knowledge, intellectual styles, personality attributes, motivational aspects, and environmental context. In regard to motivation, the authors postulated, but did not explicitly test, that task-focusing motivators are energizing sources, drives, or goals that result in individuals concentrating attention to work on a task (p. 12). These stand in contrast to goal-focusing motivators that view tasks as a means to an end (p. 12). They list the motivational traits to achieve excellence, to self-actualize one's potential, and the motivation to satisfy a desire for intellectual novelty as task-focusing motivators and thus energizing sources for creativity. In the motive disposition theory, sources for energizing behavior are referred to as implicit motives.

Implicit motives are motivational traits and are defined as a recurrent concern for a particular state based on a natural incentive (McClelland, 1987). Implicit motives predict spontaneous, or operant, behavior over time, and they are also thought to orient, select, and energize behavior toward achieving these states (McClelland, 1980). For example, the achievement motive is defined as the need to compete and striving to succeed against a standard of excellence in task situations in which an individual can experience either success or failure (McClelland, Atkinson, Clark, & Lowell, 1953). This disposition then orients, selects, and energizes behavior to satisfy the need to achieve excellence. Specifically, individuals with a high implicit disposition for achievement, i.e., a high implicit achievement motive, recognized tachistoscopically presented achievement-related words faster (McClelland & Liberman, 1949; orienting function), learned difficult materials faster (McClelland et al., 1953; selecting function), and showed a larger number of entrepreneurial acts (Wainer & Rubin, 1969); energizing function) compared to individuals with a low implicit achievement motive. Therefore, due to their orienting, selecting, and energizing functions, implicit motives are analogous in function to the task-focusing motivators as described by Sternberg and Lubart (1993). Thus we can expect that implicit motives act as energizing and focusing motivational traits that contribute to creativity. Moreover, the themes of the motivators identified by Sternberg and Lubart (1993), namely the motivation to achieve excellence and self-actualize are analogous to implicit achievement and implicit autonomy motives, respectively.

Consistent with Sternberg and Lubart (1993), recent research identified the implicit achievement motive as a driving force that fosters creativity. Specifically, Schoen (2015) found that the implicit achievement motive was predictive of creative problem solving in an organizational context. As both achievement and autonomy have been theoretically suggested as motivational sources for creativity, we assume that individual differences in implicit autonomy motives explain variance in creativity.

Autonomy motive

Individual differences in people's needs for power, achievement, and affiliation are the focus of the motive disposition theory (McClelland, 1985). Although autonomy has not been classically thought of as a motive in the motive disposition theory, recent research has suggested that autonomy be considered a fourth basic motive. Schüler, Sheldon, Prentice, and Halusic (2016) found that participants with a strong implicit dispositional need for autonomy, or implicit autonomy motive, derived more flow experience from felt autonomy compared to participants with weak autonomy motive dispositions. In this study, the authors used and obtained similar results from the Picture Story Exercise (PSE; Schultheiss & Pang, 2007) and the Operant Motive Test (OMT; Kuhl, 2013) to assess autonomy motive dispositions. Both of these instruments are projective instruments in which participants are presented an ambiguous picture and asked to think of a story that describes what is happening in the picture. In the PSE, participants then write the story and their answers are coded for motive-related content. When completing the OMT, participants are asked to first pick a main protagonist, think of a story involving this person, and then answer three questions as spontaneously as possible:

"What is important to this person in this situation and what is the person doing? How does the person feel? Why does the person feel this way?" Schüler and colleagues used the origin scoring system from deCharms and Plimpton (1992) for the PSE and the autonomy motive coding system from Kuhl (2013) for the OMT.

In the present study, we used the OMT that defines the implicit autonomy motive as a concern for self-definition, self-integration, along with self-determined behavior (Alsleben & Kuhl, 2011). Individuals high in implicit autonomy generate stories that include the themes self-joy, increases in self-esteem through praise and attention, self-growth and self-actualization, integration of negative experiences into the self, rigid self-protection, or expressions of the fear of self-devaluation. Further evidence for the implicit autonomy motive was provided by Sieber, Schüler, and Wegner (2016). They found that participants with strong implicit autonomy dispositions displayed lower stress reactions (salivary alpha-amylase) when presented autonomy supportive vignettes as compared to autonomy restrictive and neutral teaching styles. In contrast, participants with weak autonomy dispositions displayed higher stress reactions when presented autonomy supportive vignettes as compared to autonomy restrictive and control conditions.

These results demonstrate that by using methods that assess implicit motive dispositions using projective instruments, it is possible to discern between individuals with high and low autonomy motives. In other words, we can conclude that there is preliminary evidence for a motive disposition or motivational trait that represents a concern for autonomy. Furthermore, if we regard autonomy as an implicit motive, then we can also expect that it has orienting, selecting, and energizing functions for behavior. Given that research has identified autonomy as an important motivational factor in creativity, we assume that implicit motive dispositions for autonomy as assessed using the OMT fosters creative behavior.

Autonomy and creativity

Traditionally, autonomy has been investigated as a motivational state in the self-determination theory (Deci & Ryan, 2000). The basic needs theory of the self-determination theory (Deci & Ryan, 2000) considers autonomy to be the "organismic desire to self-organize experience and behavior and to have activity be concordant with one's integrated sense of self" (p. 232). Research on the link between autonomy and creativity stemming from the self-determination theory has focused mostly on the benefits of autonomy supportive environments and creative production (Hennessey, 2000; Koestner, Ryan, Bernieri, & Holt, 1984; Oldham & Cummings, 1996). However, some research does exist that examines autonomy orientations as a trait related to creativity that underscores the fostering role of autonomy as a motivational trait for creativity.

Individuals who are high in autonomy orientation, for example, interpret situations as being more autonomy promoting, are more self-determined, and experience a high degree of choice (Deci & Ryan, 1985). It is also assumed that autonomy oriented individuals experience more intrinsic motivation (Hagger & Chatzisarantis, 2011), which, in turn, fosters creativity (Amabile, 1996; Runco, 2004). Sheldon (1995) found a positive correlation between autonomy orientation and self-reported creativity. Furthermore, Liu, Chen, and Yao (2011) found autonomy orientation also correlated with job creativity as assessed by team leaders. Thus autonomy appears to be an important motivational trait for creativity. However, research inspired by self-determination theory has neither measured autonomy orientations beyond self-report nor expected an energizing role for behavior in the same way as implicit motives (for an overview, see Schüler, Baumann, Chasiotis, Bender, & Baum, 2018). Therefore, it is informative to test whether the implicit motive for autonomy has similar or even stronger energizing effects on creativity than explicit autonomy orientation.

Present research

The goal of the present study was to investigate whether individuals with higher implicit autonomy dispositions (henceforth referred to as *n*Autonomy) show more creative behavior. We expect this relationship for several reasons. The

autonomy motive, as defined by Kuhl (2011), represents a need to self-actualize and for self-growth as well as a need to define oneself as different from others. These themes represent not only the themes of the task-focusing motivators that foster creativity as postulated by Sternberg and Lubart (1993) but have also been postulated to underlie the link between autonomy and creativity (Sheldon, 1995). Furthermore, explicit orientations for autonomy either have been identified as a core characteristic of creative individuals (Barron & Harrington, 1981) or have been related to creativity within the framework of the self-determination theory. However, the relationship between the implicit motive for autonomy and creativity has not been examined thus far.

As researchers have also identified dispositional concerns for achievement (henceforth referred to as *n*Achievement) as a potential motivational source for creativity, we also assessed the strengths of our participant's *n*Achievement. We used a multi-method and multi-informant approach in a school setting to test our hypothesis. Creativity has a long history of being examined in relationship to school performance and in school contexts, thus making it appropriate for our study (Hansenne & Legrand, 2012; Runco, 2004). Furthermore, the context allowed us to obtain a multi-method multi-informant measure of creativity. We were able to not only assess creative behavior of students using a drawing task, but we could also acquire ratings of their innovative behavior from their teachers.

To assess creativity, we selected a drawing task to examine spontaneous creative behavior. The drawing task allows for individuals to "actively expand, extend, develop, and create something unique or novel that is satisfying to him/her" (Jellen & Urban, 1989). We were not interested in respondent behavior or self-reported creativity, as these are known to be more associated with the self-concept and explicit motivational system (McClelland, Koestner, & Weinberger, 1989). Instead, we expected a figural drawing task to allow for more operant responses, which are defined as responses that the subject generates spontaneously (McClelland, 1980). This type of behavior is the behavior that can be predicted by implicit motive dispositions (McClelland et al., 1989).

Participants

A total of 108 adolescents aged 13–17 years (M = 14.12 years, SD = 1.10) participated in our study; 38.7% of the participants were female (N = 41), five participants did not indicate a gender, and one participant marked "other" as a gender. Participants attended grades 8 through 10 at a middle-tracked secondary school in Germany. Participation was voluntary and required parental consent. We applied for and received ethical approval from the regional school board as well as the state data protection commissioner. All participants were offered the opportunity to receive feedback regarding the assessed variables as a reward for their participation in the study.

Materials

Creativity

Creativity was assessed using the Test for Creative Thinking–Drawing Production (TCT-DP; Urban & Jellen, 1995). The test consists of a square frame containing six differing figural fragments. The participants are told that the square frame is an unfinished drawing and that it is their task to finish the drawing. They are also told that they can draw what they want, that there is no wrong way to draw the picture, and that they should give their drawing a title when they are done. Participants are given 12 minutes to finish the drawing. If they finish before 12 minutes are up, then the time they took to finish the test is noted.

Drawings are then rated based on the following 13 criteria: continuations of the fragments, completions of the fragments, new elements, connections made with a line, connections made to produce a theme, boundary-breaking that is fragment dependent, boundary-breaking that is fragment independent, perspective, humor, unconventional manipulation of the material, inclusion of surreal and/or abstract elements/themes, combining figures with characters and/or symbols, and time. The ratings for each criterion are then summed up into a single score that can

range from 0 to 72. Only the whole score is used as an indication of creativity, and the individual creativity criteria cannot be analyzed individually (Urban & Jellen, 1995). Two independent raters scored the participants' drawings according to the test manual, and they reached an interrater reliability of ICC = .90

Implicit motives

The Operant Motive Test (OMT; Kuhl, 2013) was employed to assess participants' implicit autonomy motives. We used the 20-picture version of the OMT that assesses implicit affiliation, achievement, power, and autonomy motives. The answers to these questions are first coded for the presence of motive content. Only one motive is coded per picture. If no motive content is apparent, the item is then coded as zero. If motive content is identified, it is then additionally coded as belonging to one of five specific enactment strategies that can be approach or avoidance motivated and represented by the following categories: (1) self-confidence (stories include self-joy, being in the moment, and enjoying something), (2) status (conditional self-esteem, receiving praise, and being the center of attention), (3) self-growth and self-regulation (restoring inner certainty, integration of negative experiences, inner freedom, and working out new insights), (4) self-protection (setting rigid ego-boundaries, justifying oneself, or pretending to act a certain way), and (5) fear of self-devaluation and uncertainty. Stories that are classified as being achievement stories involve flow experiences, achieving an individual standard of excellence, coping with difficulties or failure, achieving under pressure, and fear of failure resulting in avoidance behavior.

The OMT has sufficient reliability (Runge, Lange, Engeser, Schüler, & Den Hartog, 2016), and two independent raters coded the stories and reached a sufficient inter-rater agreement (ICC for both achievement and autonomy > .90). Discrepancies were resolved through discussion before the final scores were analyzed. Consistent with common protocols for projective measures (Schüler et al., 2016; Winter, 1994), we summed up all subcategories across all pictures to compute participants' implicit autonomy and achievement scores, respectively.

Teacher ratings

Teachers rated their students' creativity using an adapted version of the Innovative Work Behavior Scale (IWBS; Janssen, 2000). The IWBS consists of three scales that assess idea generation, idea promotion, and idea implementation. Teachers indicated how often students showed different forms of innovative behavior in school on a 7-point scale ranging from *always* to *never*. Items included how often students found original solutions for problems, searched for support for innovative ideas, and introduced innovative ideas systematically to the class. Innovative behavior as assessed with the IWBS has been used to assess creativity in occupational settings (Janssen, 2000; Scott & Bruce, 1994). The scales had sufficient reliabilities (Cronbach's α = .94 for idea implementation and Cronbach's α = .96 for idea generation and idea promotion).

Mood

Participants' mood was assessed before and after completing the TCT-DP. Before completing the TCT-DP, participants indicated how the good they currently felt on a 7-point scale ranging from *neutral* to *very good*. They also indicated how bad they currently felt on a 7-point scale ranging from *neutral* to *very bad*. After completing the TCT-DP, we assessed participants using the arousal and pleasure scales of the Self-Assessment Manikin (SAM; Bradley & Lang, 1994). Participants were presented pictures of figures who depicted five levels of arousal and pleasantness, respectively, and asked to mark the figure that depicts how they feel right now.

Explicit motives

Explicit motive dispositions were assessed using the Motive Enactment Test (MET; Kuhl, 2000) and its extension to assess explicit autonomy dispositions (Freedom Enactment Test: FET; Kuhl, 2011). Students rated to which extent a statement applies to them in their current situation using a 4-point scale ranging from *not at all* to *completely*. The explicit autonomy motive (e.g., "It is important for me to find personal meaning in all that I do" and "The most important thing in life is to not be led

astray from your own path") and the explicit achievement motive were included in the present analyses. The internal consistencies of the two 4-item scales were not very high in this sample: Cronbach's α = .63 for achievement and α = .65 for autonomy.

Needs satisfaction

We assessed students' subjective experience of need satisfaction using the Basic Psychological Need Satisfaction Scale (Deci & Ryan, 2000; Gagné, 2003). In our study, students only completed the seven items related to autonomy satisfaction (e.g., "I feel free to decide for myself how I would like to live my life" and "I feel generally free to express my ideas and opinions"). Participants indicated the extent to which the statements relate to their life and how true they are for them on a 7-point scale ranging from *not true at all* to *very true*. Reliability analyses revealed that Cronbach's α = .52.

Other measures

We also assessed participants' action-state orientation, current stress levels, and general well-being using questionnaires that were administered to address a different research question and will not be considered in the following analyses.

Procedure

We collected data on two different occasions. During the first session, participants completed computerized versions of the implicit and explicit motive measures. Students were tested in their class groups. The second session occurred between four to six weeks after the first testing session. In the second session, students first gave mood judgments before completing the TCT-DP. Immediately following the TCT-DP, participants' mood and autonomy satisfaction were assessed in addition to the other measures, which are not relevant for the following analyses. We collected the teachers' assessments of students' creativity during the second testing session.

Results

We analyzed the data using IBM SPSS 22. We conducted correlational analyses as well as regression analyses to examine the amount of variance explained by the variables of interest. As some students were not present on the days of testing sessions, the number of students in the analyses range from 108 to 78 participants.

Descriptive statistics and correlations

All means, standard deviations, and correlations between the assessed variables are presented in Table 1. We found significant positive correlations between *n*Autonomy and all indices of creativity. Specifically, the correlation between *n*Autonomy and creative production, as assessed using the TCT-DP, had a medium effect size r (79) = .39, $p < .01$. As can be seen in Figure 1, *n*Autonomy explained 15% of the variance in creativity production scores. The correlations between *n*Autonomy and teacher ratings of innovative behavior also had medium effect sizes. *n*Achievement did not correlate with creative production; however, significant correlations were observed between *n*Achievement and idea generation, idea promotion, and idea

Table 1. Means, standard deviations, and correlations.

	Mean	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. *n*Autonomy	4.56	2.40										
2. *n*Achievement	2.57	1.40	.14									
3. Creative Production	26.13	9.31	.39***	.10								
4. Idea Generation	4.40	1.54	.40***	.25*	.45***							
5. Idea Promotion	4.02	1.64	.42***	.28*	.51***	.90***						
6. Idea Realization	3.74	1.60	.41***	.30*	.47***	.91***	.92**					
7. *san*Autonomy	2.67	0.53	.09	.13	.06	−.06	−.03	.05				
8. *san*Achievement	2.30	0.65	−.02	.25*	.01	.03	.06	.07	.25*			
9. Autonomy Satisfaction	32.69	5.35	.06	.07	−.03	.03	.09	.15	.15	.08		
10. Change in Positive Mood	.01	1.06	.18	−.13	.29**	.15	.15	.31	.27**	−.12	−.14	
11. Change in Negative Mood	.00	1.19	−.08	−.14	−.01	.11	.02	.03	−.10	.10	−.06	−.12

Notes. *$p < .05$, **$p < .01$, ***$p < .001$.

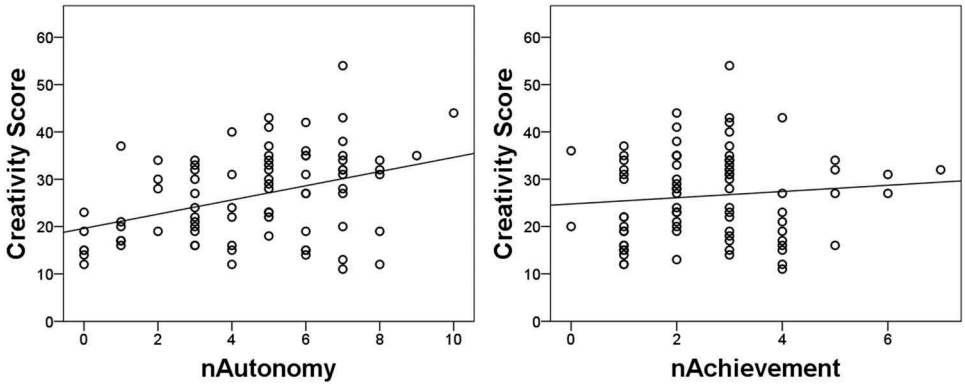

Figure 1. Correlations of implicit motives with creative production (R^2 = .151 for nAutonomy; R^2 = .010 for nAchievement).

realization. Creative production also had strong correlations with the innovative behavior scales. Furthermore, we found strong inter-correlations between the scales of innovative behavior. Other correlations of note include significant positive correlations between creativity production and change in positive affect as well as *san*Autonomy and change in positive mood. Autonomy satisfaction and change in negative mood had no significant correlations with any of the assessed variables.

Regression analyses

To examine the robustness of the relationship between *n*Autonomy and creativity indices as well as *n*Achievement and creativity indices, we conducted four regression analyses. The results of the analyses can be seen in Table 2. In the first analysis, *n*Autonomy and nAchievement were entered as predictors of creative production in the TCT-DP in Step 1. In Step 2 we controlled for *san*Autonomy and *san*Achievement as well as autonomy satisfaction. In both models, *n*Autonomy was the only significant predictor of creative production ß = 3.56, $t(64) = 3.23$, $p = .002$. These results remained stable when additionally controlling for age and sex. Step 2 explained 17% of the variance $R^2 = .17$ $p = .03$.

In the following analyses, *n*Autonomy and *n*Achievement were entered in Step 1 as predictors of idea generation, idea promotion, and idea realization. Again, in Step 2, we entered *san*Autonomy, *san*Achievement, and autonomy satisfaction into the model as control variables. *n*Autonomy was the only significant predictor of idea generation ß = 1.45, $t(63) = 3.00$, $p = .004$. This model explained 18% of the variance $R^2 = .18$ $p = .02$. Idea promotion was predicted by *n*Autonomy as well as *n*Achievement in Step 1. However, only *n*Autonomy remained a significant predictor of idea promotion when we entered the control variables ß = 1.67, $t(63) = 3.28$, $p = .002$. This model explained 20% of the variance $R^2 = .21$ $p = .008$. Finally, both *n*Autonomy ß = 1.63, $t(63) = 3.18$, $p = .002$ and *n*Achievement ß = 1.08, $t(63) = 2.14$, $p = .04$ were significant predictors of idea realization before and after the control variables were entered. This model explained 22% of the variance

Table 2. Regression analyses of implicit motives, explicit motives, and autonomy satisfaction on creativity indices.

	Creativity Performance			Idea Generation			Idea Promotion			Idea Realization		
	R^2	β	*t*	R^2	β	t	R^2	β	*t*	R^2	β	*t*
Step 1	.16**			.16**			.20**			.20**		
*n*Autonomy		3.62**	3.37		1.41**	2.98		1.59**	3.22		1.57**	3.14
*n*Achievement		.72	.70		.77	1.70		.98*	2.04		1.08*	2.14
Step 2	.17*			.18*			.21**			.22**		
*n*Autonomy		3.56**	3.23		1.45**	3.00		1.67**	3.28		1.63**	3.18
*n*Achievement		.69	.638		.80	1.70		.97	1.95		1.08*	2.14
*san*Autonomy		.23	.21		−.48	−1.00		−.47	−.94		−.15	−.30
*san*Achievement		.23	.19		.15	.30		.24	.45		.15	.28
Autonomy Satisfaction		−.86	−.76		−.16	−.33		.26	.51		.58	1.11

Notes. *$p < .05$, **$p < .01$.

R^2 = .20 p = .006 All results remained stable when controlling for age and sex.

Discussion

In this study, we examined the implicit autonomy motive as a motivational source for creative production in adolescents. Using a multi-method multi-informant design, we examined the relationship between *n*Autonomy and production on a creative drawing task as well as innovative behavior. We expected a positive relationship between *n*Autonomy and both indices of creativity. As previous research has also identified *n*Achievement as a potential motivational trait that fosters creativity, we also examined whether our data support this assumption. *n*Autonomy significantly correlated with creative production as well as innovative behavior ratings, supporting our hypotheses, whereas *n*Achievement only correlated with innovative behavior ratings.

Our results demonstrate for the first time that autonomy, assessed as an implicit motive, is related to creative production. The positive relationships between *n*Autonomy and spontaneous creative production and innovative behavior ratings confirm the notion that autonomy as a personality trait plays a role in creativity. Our results are in line with those of Sheldon (1995) and Liu et al. (2011), who found positive relationships between creativity and self-reported autonomy orientation. Our study differs from these studies in two important ways. First, we assessed participants' implicit autonomy motives, which are thought of as the orienting, selecting, and energizing forces behind spontaneous behavior. Second, we used teacher ratings as well as actual behavior on a figural drawing test to examine creativity. It is also important to note that the relationship between *n*Autonomy and creativity indices goes above and beyond the influence of *n*Achievement. Furthermore, the results remained robust when controlling for variables such as autonomy satisfaction and explicit autonomy dispositions. Thus our study provides the first empirical evidence for the role of *n*Autonomy in not only spontaneous creative production but also perceived innovative behavior.

*n*Achievement, on the other hand, did not predict spontaneous creative production. However, we observed positive correlations between *n*Achievement and the three teacher ratings on innovative behavior. *n*Achievement predicted idea realization even when controlling for explicit achievement dispositions and autonomy-related variables. It is of note that *n*Achievement did not predict idea generation and idea promotion when we included autonomy-related variables in the analyses. In light of our results, we suggest that generative or production-related aspects of creativity have a stronger relationship to autonomy than achievement dispositions. Although Schoen (2015) reported a significant relationship between *n*Achievement and creativity, participants' creativity in his study was operationalized as a creative problem-solving task in an organizational context and not as creative production. Kandler et al. (2016) also found different predictors for perceived creativity (one's own and peers' perceptions of one's creative abilities) and figural creativity (video ratings of creativity and figural drawing task production). Thus it is possible that different kinds of creativity exist that are predicted by different factors. We therefore suggest that our results are in line with this assumption and that *n*Achievement is more related to perceived creativity than creative production (or figural creativity).

Practical implications

In addition to contributing to our theoretical understanding of which motivational traits contribute to creativity, the results also have practical implications. First, implicit motive measures can be used as a diagnostic tool to ascertain which students have stronger implicit motive dispositions for autonomy and foster the creative potential of such individuals. As the congruence of implicit motives and situations that satisfy these motives contributes to flow-like experiences (for an overview, see Schüler et al., 2018), it is important to identify which students have high implicit autonomy motive dispositions and give them creative tasks in which they can excel. Furthermore, the results underscore the importance of autonomy in academic settings. Previous research has identified autonomy-supportive settings as being conducive to creativity

(Hennessey, 2000; Koestner et al., 1984; Oldham & Cummings, 1996); however, our results highlight that this can occur on the individual implicit level and foster spontaneous creative production.

Limitations and future directions

A strength of our study is that we conducted it in the students' school setting. Thus the setting was as close to a normal school setting as possible. As creativity and intelligence have been linked in the past (for a review, see Batey & Furnham, 2006), it would be of value to examine the relationship between *n*Autonomy, creativity, and intelligence in all school tracks. Since our population attended a middle-tracked school, it would be interesting to examine whether the same relationship between *n*Autonomy and creativity exists in students who attend academic-tracked schools.

A further aspect that should be examined in future research is the role of intrinsic motivation. Our results show that *n*Autonomy can predict creativity, but the mechanisms that drive this process are unknown. We propose that intrinsic motivation may be the link between *n*Autonomy and creative production. Research has shown that intrinsic motivation fosters creativity (Amabile, 1996) and harmonious passion, which is related to intrinsic motivation. Liu et al. (2011) found that harmonious passion mediated the relationship between autonomy orientations and creativity. Thus it may be that, as is the case with autonomy-oriented individuals, providing an environment or situation for individuals with high *n*Autonomy in which they can be creative may increase intrinsic motivation and this may foster creativity.

Finally, these are preliminary findings that validate autonomy as a motive disposition. Although individual differences in implicit autonomy dispositions have been observed (Schüler et al., 2016; Sieber et al., 2016), there are several factors that need to be addressed. First, this study provides evidence for the energizing function of *n*Autonomy. Future research must examine the orienting and selecting functions of this motive disposition. The measurement of implicit motives originates from studies in which motive states were aroused and subsequent behavior in projective tests was recorded (see McClelland, 1980). Research demonstrating the sensitivity of *n*Autonomy to arousing situations needs to be conducted as a further validation of *n*Autonomy as a motive. Our study is one piece in an important puzzle demonstrating that *n*Autonomy functions as the classic motives affiliation, achievement and power.

Conclusion

Our research substantiates the notion that autonomy is an important factor in creativity. We demonstrated that implicit autonomy dispositions predict creative production in a drawing task as well as teacher ratings of innovative behavior. Thus we show that it is not just autonomy supporting situations that foster creativity, but also the need for autonomy within the person that drives creativity.

Authors' Note

The authors declare that this article has not been published elsewhere, nor has it been simultaneously submitted for publication elsewhere. No potential conflicts of interest exist with respect to the research, authorship, and/or publication of this article.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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References

Alsleben, P., & Kuhl, J. (2011). Touching a person's essence: Using implicit motives as personal resources in counseling. In W. M. Cox & E. Klinger (Eds.), *Handbook of motivational counseling: goal-based approaches to assessment and intervention with addiction and other problems* (pp. 109–129). West Sussex, United Kingdom: John Wiley & Sons Ltd.

Amabile, T. (1996). *Creativity in context*. Boulder, Colorado: Westview Press.

Barron, F. X., & Harrington, D. M. (1981). Creativity, intelligence and personality. *Annual Review of Psychology*, *32*(1), 439–476. doi:10.1146/annurev.ps.32.020181.002255

Batey, M., & Furnham, A. (2006). Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs*, *132* (4), 355–429. doi:10.3200/MONO.132.4.355-430

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*, *25*(1), 49–59.

deCharms, R., & Plimpton, F. (1992). The origin scoring system. In C. R. Smith (Ed.), *Motivation and personality: Handbook of thematic content analysis* (pp. 334–375). Cambridge: Cambridge University Press.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. doi:10.1207/S15327965PLI1104_01

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality & Social Psychology Review (Lawrence Erlbaum Associates)*, *2*(4), 290. doi:10.1207/s15327957pspr0204_5

Furnham, A. (2015). The bright and dark side correlates of creativity: Demographic, ability, personality traits and personality disorders associated with divergent thinking. *Creativity Research Journal*, *27*(1), 39–46. doi:10.1080/10400419.2015.992676

Gagné, M. (2003). The role of autonomy support and autonomy orientation in the engagement of prosocial behavior. *Motivation and Emotion*, *27*, 199–223. doi:10.1023/A:1025007614869

Guilford, J. (1950). Creativity. *The American Psychologist*, *5* (9), 444–454. doi:10.1037/h0063487

Hagger, M. S., & Chatzisarantis, N. L. D. (2011). Causality orientations moderate the undermining effect of rewards on intrinsic motivation. *Journal of Experimental Social Psychology*, *47*, 485–489. doi:10.1016/j.jesp.2010.10.010

Hansenne, M., & Legrand, J. (2012). Creativity, emotional intelligence, and school performance in children. *International Journal of Educational Research*, *53*, 264–268. doi:10.1016/j.ijer.2012.03.015

Hennessey, B. (2000). Self-determination theory and the social psychology of creativity. *Psychological Inquiry*, *11*, 293–298.

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behavior. *Journal of Occupational and Organizational Psychology*, *73*, 287–302. doi:10.1348/096317900167038

Jellen, H. G., & Urban, K. K. (1989). Assessing creative potential world-wide: The first cross-cultural application of the test for creative thinking—Drawing production (TCT-DP). *Gifted Education International*, *6*(2), 78–86. doi:10.1177/026142948900600204

Kandler, C., Riemann, R., Angleitner, A., Spinath, F. M., & Borkenau, P. (2016). The nature of creativity: The roles of genetic factors, personality traits, cognitive abilities, and environmental sources. *Journal of Personality and Social Psychology*, *111*(2), 230–249. doi:10.1037/pspp0000087

Koestner, R., Ryan, R. M., Bernieri, F., & Holt, K. (1984). Setting limits on children's behavior: The differential effects of controlling vs. informational styles on intrinsic motivation and creativity. *Journal of Personality*, *52*(3), 233–248. doi:10.1111/1467-6494.ep7390802

Kuhl, J. (2000). Der motiv-umsetzungs-test (MUT) [The Motive-Enactment Test (MET)] (Unpublished questionnaire). University of Osnabrück, Osnabrück, Germany.

Kuhl, J. (2011). Der Freiheits-Umsetzungs-Test (FUT) [The freedom-enactment-test (FET)] (Unpublished questionnaire). University of Osnabrück, Osnabrück, Germany.

Kuhl, J. (2013). *Auswertungsmanual für den Operanten Multi-Motiv-Test (OMT). Vollständig revidierte Fassung 2013 [Scoring Manual for the Operant Multi-Motive-Test (OMT). Completely revised version 2013]*. Münster, Germany: Sonderpunkt Wissenschaftsverlag.

Liu, D., Chen, X. P., & Yao, X. (2011). From autonomy to creativity: A multilevel investigation of the mediating role of harmonious passion. *The Journal of Applied Psychology*, *96*(2), 294–309. doi:10.1037/a0021294

McClelland, D. C. (1980). Motive dispositions: The merits of operant and respondent measures. In L. Wheeler (Ed.), *Review of Personality and Social Psychology* (Vol. 1, pp. 10–41). Beverly Hills, CA: Sage.

McClelland, D. C. (1985). How motives, skills, and values determine what people do. *American Psychologist*, *40*, 812–825. doi:10.1037/0003-066X.40.7.812

McClelland, D. C. (1987). *Human Motivation*. Cambridge: Cambridge University Press.

McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1953). *The achievement motive*. New York, NY: Appelton-Century-Crofts.

McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? *Psychological Review*, *96*, 690–702. doi:10.1037/0033-295X.96.4.690

McClelland, D. C., & Liberman, A. M. (1949). The effect of need for achievement on recognition of need-related words. *Journal of Personality*, *18*, 236–251. doi:10.1111/jopy.1949.18.issue-2

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *The Academy of Management Journal*, *39*, 607–634.

Prabhu, V., Sutton, C., & Sauser, W. (2008). Creativity and certain personality traits: Understanding the mediating effect of intrinsic motivation. *Creativity Research Journal*, *20*(1), 53–66. doi:10.1080/10400410701841955

Runco, M. A. (2004). Creativity. *Annual Review of Psychology*, *55*(1), 657–687. doi:10.1146/annurev.psych.55.090902.141502

Runge, J. M., Lange, J. W. B., Engeser, S., Schüler, J., & Den Hartog, S. C. (2016). Modeling motive activation in the Operant Motive Test: A psychometric analysis using dynamic Thurstonian item response theory. *Motivation Science*, *2*(4), 268–286. doi:10.1037/mot0000041

Schoen, J. L. (2015). Effects of implicit achievement motivation, expected evaluations, and domain knowledge on creative performance. *Journal of Organizational Behavior*, *36*(3), 319–338. doi:10.1002/job.1982

Schüler, J., Baumann, N., Chasiotis, A., Bender, M., & Baum, I. (2018). Implicit motives and basic psychological needs. *Journal of Personality*. doi:10.1111/jopy.12431

Schüler, J., Sheldon, K., Prentice, M., & Halusic, M. (2016). Do some people need autonomy more than others? Implicit dispositions toward autonomy moderate the effects of felt autonomy on well-being. *Journal of Personality*, *84*(1), 6–20. doi:10.1111/jopy.12133

Schultheiss, O. C., & Pang, J. S. (2007). Measuring implicit motives. In R. W. Robins, R. C. Fraley, & R. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 322–344). New York, NY: Guilford.

Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of Management Journal*, *37*(3), 580–607. doi:10.5465/256701

Sheldon, K. M. (1995). Creativity and self-determination in personality. *Creativity Research Journal*, *8*(1), 25–36. doi:10.1207/s15326934crj0801_3

Sieber, V., Schüler, J., & Wegner, M. (2016). The effects of autonomy support on salivary alpha-amylase: The role of individual differences. *Psychoneuroendocrinology*, *74*(1), 173–178. doi:10.1016/j.psyneuen.2016.09.003

Silvia, P. J., Nusbaum, E. C., Berg, C., Martin, C., & O'Connor, A. (2009). Openness to experience, plasticity, and creativity: Exploring lower-order, high-order, and interactive effects. *Journal of Research in Personality*, *43*(6), 1087–1090. doi:10.1016/j.jrp.2009.04.015

Sternberg, R. J., & Lubart, T. I. (1993). Creative giftedness: A multivariate investment approach. *Gifted Child Quarterly*, *37*(1), 7–15. doi:10.1177/001698629303700102

Urban, K. K., & Jellen, H. G. (1995). *TSD-Z - Test zum schöpferischen Denken - Zeichnerisch*. Göttingen, Germany: Hogrefe.

Wainer, H. A., & Rubin, I. M. (1969). Motivation of research and development entrepreneurs: Determinants of company success. *Journal of Applied Psychology*, *53*(3, Pt.1), 178–184. doi:10.1037/h0027414

Winter, D. G. (1994). Manual for scoring motive imagery in running text (Unpublished instrument). University of Michigan, Ann Arbor, Michigan, USA.