How Adolescents Develop and Implement Their Ideas? On Self-Regulation of Creative Action

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Abstract

This study explores how adolescents regulate their activity while working on creative projects. A large sample ($N = 739$) of Polish adolescents reported on their most creative, complex project conducted within the last year and answered retrospectively framed self-regulation items related to this specific activity. Exploratory and confirmatory factor analyses demonstrated a consistent pattern of self-regulation, capturing pre-task self-regulatory strategies (obstacles expectations, uncertainty acceptance), during-task strategies (adjusting approach, managing and reframing ambiguous goals, emotion regulation and dealing with obstacles), and post-task strategies (improving approach, readiness for sharing). Participants' personality, creative self-concept, and creative mindsets were robustly related to the different strategies reported. Additionally, strategies resulted in differences in judges-assessed creativity of the projects conducted. We discuss the theoretical consequences and future research directions for creative self-regulation studies.

Keywords: adolescents; creativity; creative activity; creative self-regulation; creative self-concept; creative mindsets

How Adolescents Develop and Implement Their Ideas? On Self-Regulation of Creative Action

I want to suggest that to write to your best abilities, it behooves you to construct your own toolbox and then build up enough muscle so you can carry it with you. Then, instead of looking at a hard job and getting discouraged, you will perhaps seize the correct tool and get immediately to work.

Stephen King, *On Writing*

Creativity literature provides comprehensive answers to questions concerning personal and social factors that facilitate creative thinking. Over the years, creativity scholars identified and described essential components of creative potential (Feist, 2019; Hennessey, 2019; Runco & Acar, 2019) and examined environmental factors that influence creativity (Dul, 2019; Sternberg & Kaufman, 2010), as well as attributes of creative products (Kaufman & Baer, 2012; Kaufman & Beghetto, 2009). However, what seems to be the most challenging aspect of creativity to study is the creative process (Jankowska et al., 2018), or creative action (Glăveanu, 2013; Glăveanu et al., 2019). How people transform their ideas into creative products? Is this process different from pursuing less creative goals? What happens between an idea and its realization? Do goals change, and—if yes—how and why? In this paper, we attempt to answer these questions by taking a closer look at the self-regulation of creative activity. We are particularly interested in adolescents' everyday creativity and understanding of how they plan, monitor, change, and assess their creative activity.

Why should we care about creative self-regulation? The short answer is that after decades of research, it is evident that creative potential alone explains only a small part of the variability of creative behavior (see, e.g., Kim, 2008, for a meta-analysis). One missing factor that was recently theorized as playing an overlooked role in explaining creative performance is creative self-beliefs: creative confidence, creative self-awareness, and creative self-image beliefs (Karwowski et al., 2019a). Indeed, a person's belief system participates in the agentic action of transition from creative potential to creative behavior (Karwowski & Beghetto, 2019). People often choose not to try creative behaviors when they are unsure of their abilities (i.e., they hold low creative confidence, Chen, 2016; Choi, 2004), or when the perceived personal value of creativity is low (Plucker & Makel, 2010), or see

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the situation as unfavorable to creative activity (Kaufman & Beghetto, 2013). Similarly, when people believe that creative abilities are unchangeable (a so-called fixed creative mindset), they are less likely to engage in a creative activity (Hass et al., 2016; Karwowski, 2014). Thus, creative behavior depends not only on abilities but also creative self-beliefs. Simultaneously, however, creative self-beliefs alone explain a limited part of creative activity's variance and are instead engaged in more complex relationships as factors that shape motivation and help to more effectively self-regulate creative actions. This is when more dynamic, self-regulatory aspects of creative activities come to play.

Creative Self-Regulation

Relatively recently scholars started to explore the creative process from the self-regulation perspective. The creative problem or the purpose of creative activity needs to be found and formulated because of its essentially ill-defined nature (Lubart, 1994; Reiter-Palmon et al., 1997, 1998). Actions that lead to a creative outcome are unspecified too: the adopted strategies are often revised when they do not yield the expected results. What's more, usually, it is not the author herself who decides whether a given product will be considered original and useful. Although even lay people can distinguish more and less prototypical acts of creativity (Ivcevic, 2007), there is an inherent role of audience, reviewers, and critics in selecting or rejecting creative products.

The effectiveness of self-regulation and achieving success in well-defined and well-structured tasks is predicted by self-regulating related traits, such as conscientiousness (Dudley et al., 2006; Noftle & Robins, 2007; Poropat, 2009) and its facet grit: the combination of perseverance and consistency of interests (Duckworth et al., 2011). But creativity requires flexibility—the readiness to change or redefine goals and strategies of thinking and acting. A creative individual often faces ambiguity and makes decisions based on incomplete or contradictory information. A creative act might seem messy, improvisational, and intuitive, so grit alone is not sufficient. A recent study has found grit to be unrelated to creativity: both everyday and professional (Grohman et al., 2017). Creativity is instead associated with broad interests, openness, curiosity, constant evaluation of own

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actions, readiness to modify them, and often the ability to discard their work (Ivcevic & Nusbaum, 2017). Creative individuals are described by laypersons as persistent in the face of obstacles and passionate about the subject matter (Grohman et al., 2017). While assessing one's passion and perseverance, people seem to emphasize the emotional components, e.g., the intensity of affect. Such a perspective more accurately captures the flexible nature of pursuing creative goals.

A recently proposed model of self-regulation in creativity described two sets of processes: (1) revising and re-strategizing and (2) supporting and sustaining creativity (Ivcevic & Nusbaum, 2017). Creative work is usually ill-defined—the problem that one intends to solve needs to be well-understood first (Reiter-Palmon et al., 1998). Problem finding or project-outlining involves constant revisions and reformulations (Csikszentmihalyi, 1988; Csikszentmihalyi & Getzels, 1971). During the creative process, people often begin with a vague idea and then refine it as the process continues. Adjusting approach implies goal calibration, using the advantages of defocused attention, and reacting effectively to constraints or obstacles. To transform ideas into activities, an individual has to accept doubts, ambiguities, and uncertainties. Revising and re-strategizing processes take the form of managing ambiguous goals: the regulation of two types of risk—that the original ideas will fail and that one's reputation will suffer. Proper goal management requires outcomes to be ambitious, yet not too easy or too difficult (Sternberg & Lubart, 1991). An individual should also be able to disengage from set goals when they become perceived as unfeasible.

Supporting and sustaining processes enable one to persevere in creative activities despite obstacles, uncertainties, concerns, and disappointments (Ivcevic & Nusbaum, 2017). The persistence necessary to actualize creative products or performances (Helson et al., 1995) is supported in part by creative self-beliefs (Beghetto et al., 2011; Karwowski et al., 2019a) and in part from one's capacity to manage emotions (Ivcevic & Brackett, 2015; Ivcevic & Hoffmann, 2019). The creative process is rife with the whole gamut of emotions, which influence creative performance. Thus, the crucial role in self-regulation for creativity is played by managing one's feelings and managing feelings of other

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people in the creative process. In sum, the support-and-sustain component of self-regulation rests on planning and implementation, persistence in the face of obstacles, and managing emotions.

Creativity in Self-Regulated Learning Models

Traditionally, the creative process has been theorized in terms of its stages or steps, mostly centered around cognitive operations (Finke et al., 1992; Wallas, 1926). Self-regulatory processes standing behind this process have been overlooked (Rubenstein et al., 2018). This theoretical and empirical gap is recently filled with research examining the creative process within a self-regulated learning perspective (SRL; Callan et al., 2019; Rubenstein et al., 2018, 2020). This approach draws on Zimmerman's (2000) cyclical model that emphasizes contextual aspects of SRL, such as metacognitive knowledge or self-efficacy to control own affect and behavior.

On the SRL grounds, the creative processes' self-regulation goes across three phases: forethought, performance, and self-reflection (Rubenstein et al., 2018). Individuals use different strategies of acting and ways of thinking before engaging in a particular task (e.g., setting goals and planning), during its performance (e.g., managing emotions and self-monitoring), and after the completion of this action (e.g., self-evaluation and causal attributions). Motivational beliefs and attitudes are involved in this cyclical process, and a unique role is played by intrinsic motivation and self-efficacy. An individual's motivation, personal interest, and enjoyment related to action enable and activate a creative activity (Agnoli et al., 2019). Creative self-efficacy is vital for the very decision to undertake or avoid a creative activity. Moreover, during task engagement, a high level of creative self-efficacy may help sustain effort when facing difficulties. It also plays a role following task engagement as an individual recalibrates beliefs about performing similar tasks in the future (Beghetto & Karwowski, 2017).

Importantly, creative self-regulation may depend on the developmental level. Let's take the example of adolescents' activities. In this period, both identity and creativity are subjects to intensive changes (e.g., Barbot & Heuser, 2017). Adolescents progressively crystalize their creative pursuits and transform their creative potential into more specialized, domain-specific ability (Barbot, 2020).

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As recently demonstrated, creative self-efficacy, creative self-concept, and—especially—creative metacognition mediate the relationship between adolescents’ personal (e.g., persistence in learning) and environmental (e.g., perceived support for creativity in school) factors and their creative production (Anderson & Haney, 2020). Thus, presumably, individual differences in self-regulation processes that characterize young people’s creative activities are even more dynamic and strongly affected by social context (Agnoli et al., 2018) than established adults’ creativity.

The Present Study

The present study has two main goals. First, more psychometric is to develop and validate a scale to measure creative activities’ self-regulation. To this end, we present the results of exploratory and confirmatory factor analyses conducted on a large sample of adolescents. Our second—more substantial—goal is gaining an insight into self-regulation of everyday creative activities undertaken by adolescents and potential predictors and effects of more-versus-less efficient self-regulation. Among predictors, we include creative self-beliefs: creative self-efficacy and creative personal identity, as well as creative mindsets and adolescents’ personality. We are also interested in possible differences in the self-regulation of individuals who created more-versus-less creative projects. We focus on adolescents, so people who usually do not present Big-C or pro-c (Kaufman & Beghetto, 2009) levels of creativity, yet are often engaged in different forms of everyday creative projects and activities (Anderson & Haney, 2020; Xue et al., 2020; Zielinska, in press). These activities—while overlooked—are crucial for both developmental and educational purposes. Therefore, understanding how these processes develop and change is an important gap in creativity literature.

Method

Participants

In total, there were 739 participants (537 women, 72%) aged 14-18 ($M = 17.47$, $SD = 0.75$) out of a larger sample of 975 participants of the study (see the *Measures* section for exclusion criteria we applied). In their majority (92%) participants were high school students attending public schools in Poland (3% attended university, 2%—vocational school, 0.54%—primary school, and 2%—none of

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the above). The sample was nationwide: participants came from all country regions and lived in towns and cities of different sizes. They were recruited by online panels.

Measures

Creative Activity. Participants were asked about their most creative project in the past year. They were acquainted with an introduction that read: “We often do creative things: we write, we paint, we invent something. But creativity is not only art: it can also relate to coming up with an original gift for a friend, designing clothes or jewelry, solving a technical problem, or finding a new and meaningful way to spend your free time. Think for a moment about your most creative activity in the past year, i.e., about action that required your ingenuity and a fresh perspective and brought an effect that you were happy with. Briefly describe this activity below. Note—if you think that nothing like this happened, think about your interests/hobbies, extracurricular activities, or interesting tasks that might occur at school. It should be a complex project—not just a good idea, but something that you implemented from beginning to end.” Two judges (the first two authors of this article) scored the creativity level of all responses using an ordinal scale with *1 = not creative*, *2 = somehow creative*, and *3 = creative*. The judges' scores were reliable (Krippendorff's $\kappa = .79$ [95% CI: .76-.83]; Hayes & Krippendorff, 2007), so they were averaged. Given our interest in creative self-regulation of potentially creative activity, we excluded all cases where participants provided either examples of short-term activities and ideas rather than longer-term projects ($N = 75$; e.g., “finding a way to deal with a math problem”) or projects that both judges assessed as not creative ($N = 161$; e.g., “I prepared a presentation for biology lesson”).

Creative Self-Regulation (CSR). Thirty-three items measured creative self-regulation: 25 adapted from Ivcevic (2020) and five explicitly developed for this study. Participants were asked to answer the items referring to the activity they described. Ten items explicitly asked about the period before the task started (forethought, pre-task: “Before you started the project...”), 17 were related to during-task activities (performance, “During the work on the project...”), and six related to post-task behavior

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(self-reflection, “After finishing the project...”). All original items we used are present in the Appendix.

Creative Self-Concept. To measure creative self-concept, we used the Short Scale of Creative Self (SSCS, Karwowski, et al., 2018). SSCS contains eleven items with answers provided on a 7-point Likert scale (*1 = definitely not, 7 = definitely yes*) that measure creative self-efficacy (CSE, six items, sample item: “I trust my creative abilities,” McDonald’s $\omega = .85$) and creative personal identity (CPI, five items, sample item: “My creativity is important for who I am,” $\omega = .86$).

Creative Mindsets. We used Creative Mindset Scale (CMS, Karwowski, 2014): a ten-item instrument that measures the growth creative mindset (5 items, sample item: “Everyone can create something great at some point if he or she is given appropriate conditions,” $\omega = .70$), and the fixed creative mindset (5 items, sample item: “You either are creative or you are not – even trying very hard you cannot change much,” $\omega = .81$). The responses are provided on a 5-point Likert scale with *1 = definitely not* and *5 = definitely yes*.

Personality. We used a Polish adaptation of Ten-Item-Personality-Inventory (TIPI, Gosling, et al., 2003) to measure participants’ personality (Sorokowska et al., 2014). There are two items per each of the five personality factors: openness to experience (sample item: “I see myself as open to new experiences, complex,” $\omega = .25$), conscientiousness (sample item: “I see myself as dependable, self-disciplined,” $\omega = .63$), extraversion (sample item: “I see myself as extraverted, enthusiastic,” $\omega = .71$), agreeableness (sample item: “I see myself as sympathetic, warm,” $\omega = .51$) and neuroticism (sample item: “I see myself as anxious, easily upset,” $\omega = .65$). The responses were provided using a 7-point Likert scale with *1 = definitely not* and *7 = definitely yes*. We note that the internal consistency of some of the TIPI’s scales in our sample was low, yet this is considered typical, given this instrument’s length (see Gosling et al., 2003).

Procedure. The study was conducted online. Students completed the online questionnaire starting with demographic questions. Then, they completed the SSCS, described their most creative activity in the past year, and answered questions about self-regulation for this specific activity. We applied the

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randomized order of these measures to avoid potential order effects (Czerwinka & Karwowski, 2018). TIPI-PL and CMS ended the test session.

Data Analysis and Data Availability

Our analysis utilized the latent variables approach. We started with a random division of the whole sample into two subsamples. The first ($n = 378$) served for exploratory purposes, so we conducted a series of exploratory factor analyses on CSR items. The second subsample ($n = 361$) was used for confirmatory factor analysis. Given that participants' responses were related to creative self-regulation strategies at the exact moment of the creative activity (i.e., pre-, during, and post-task), we modeled them using a CFA model with a multi-trait-multi-method (MTMM) approach (see, e.g., Eid et al., 2016), so items loaded both: self-regulation strategies and a certain phase they referred to. In the next step, we repeated the CFA on a whole sample. Our third step consisted of structural equation modeling with self-regulation strategies regressed on latent variables of mindsets, creative self-concept, and observed variables of personality factors. Finally, we compared the strategies observed among participants whose projects were assessed as more and less creative. All analyses were conducted in R packages *psych* (Revelle, 2020) and *lavaan* (Rosseel, 2012). The data and research materials are available at Open Science Framework [LINK].

Results

Descriptive statistics and correlations between creative self-concept (creative self-efficacy and creative personal identity), creative mindsets, personality traits, and assessed level of creativity of participants' projects and their demographic variables are presented in Table 1. All correlations were in the expected directions: there were significant links between creative self-concept and the growth mindset and significant correlations between CSE and CPI with openness and extraversion. The level of creativity in the participants' projects was significantly linked with CSE and CPI (both $r_s = .13$, $p < .001$).

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Table 1. Descriptive Statistics and Correlations between Creative Self-Concept, Creative Mindsets, Personality, Project's Creativity, and Participants' Age and Sex

		<i>M</i>	<i>SD</i>	2	3	4	5	6	7	8	9	10	11	12
1	CSE	5.05	0.99	.71	-.01	.26	.25	.26	.25	.07	.17	.13	.08	.06
2	CPI	5.39	1.06	1	-.05	.29	.31	.10	.15	.09	.04	.13	.03	.00
3	Fixed	2.81	0.88		1	-.32	-.12	-.04	-.01	-.07	.09	.02	.05	-.02
4	Growth	3.95	0.67			1	.18	.12	.17	.22	-.04	.06	.05	-.09
5	O	4.80	1.09				1	.03	.19	.14	-.02	.02	-.02	-.02
6	C	4.85	1.33					1	.25	.20	.20	-.02	.06	-.02
7	E	4.60	1.50						1	.19	.41	-.02	.04	.02
8	A	4.98	1.20							1	.15	-.01	.01	-.07
9	N	3.58	1.52								1	.02	.00	.21
	Creat	2.06	0.48									1	.00	.04
10	Act													
	Age	17.4	0.75										1	-.03
11		7												
	Sex	73%	--											1
12		W												

Note. *N* = 739. CSE = Creative Self-Efficacy; CPI = Creative Personal Identity; O = Openness to Experience; C = Conscientiousness; E = Extraversion; A = Agreeableness; N = Neuroticism; Creat Act = The Level of Creativity as Scored by Judges. Sex coded 1 = man, 2 = women, W = Woman. All statistically significant correlations are bolded. In the case of creative activity the correlation are Spearman's rho.

We conducted a series of exploratory factor analyses (EFA) with the oblimin rotation based on a randomly selected subsample of participants. Given this analysis's exploratory nature, we decided to conduct EFA separately on items describing each of the three phases (pre-task, during, and post-task) rather than put all items into one analysis. The detailed results are present in the Supplementary Online Material (SOM, see Table S1).

In the case of pre-task self-regulation, the EFA suggested a three-factor solution. The first two described the broad theoretical factor of regulating of process expectations (Ivcevic & Nusbaum, 2017) and were related to either accepting that the process might not be pre-determined (i.e., *uncertainty acceptance*, sample items: "I knew that I wouldn't always have a clear picture of how my project would look in the end" or "I knew that I would not be able to predict all the steps to my project") or that there may be obstacles during the project (*obstacles expectations*, sample items: "I reminded myself that some parts of my work would be boring, frustrating, or even painful" or "I knew that working on this project would not always be enjoyable"). The third factor obtained was less relevant from the perspective of self-regulation, as it referred to a lack of self-regulation actually (sample items: "This activity was not a planned project - I just played with it, not planning any specific

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results to achieve” or “The whole this activity was largely improvised: without a specific purpose or plan”), so we decided to omit this factor in further analyses.

For self-regulation items that described a during-task strategies, EFA suggested an initial four-factor solution. The first factor described clearly the *adjusting approach* (Ivcevic & Nusbaum, 2017) (sample items: “I adjusted the way I worked to best achieve certain goals” or “When I encountered obstacles, I tried different ways of solving the problem”). The second factor resembled *managing and reframing ambiguous goals* (sample items: “My goals changed from what I had originally envisioned” and “While working on my project, I set more specific goals as time went on”). The third factor touched *emotion regulation and dealing with obstacles* (sample items: “When things seemed difficult, I reminded myself that I was capable of doing it well” and “I told myself that mistakes I made were learning opportunities”). Finally, the fourth factor consisted of items describing *project crafting* (sample items: “I created a plan to work on my project that was best suited to my working style” and “I adapted how I organized my work depending on where I was in the process”).

For post-task strategies, EFA indicated a two-factor solution. The first factor described the *improving approach* (sample items: “I was wondering if it could be done even better” and “I decided that I would try it again, but better”) while the second was related to *readiness for sharing* (“I was happy to share the results of my work with others” and “I was afraid to show the results of my work to others” [reversed-scored]).

The next step involved an MTMM CFA that attempted to replicate in one analysis the structure obtained in three independent EFAs, while simultaneously controlling for the phase of working on a project (pre-, during, and post-task). Given that two factors describing the post-project strategies: the improving approach and the readiness for sharing, were weakly and negatively related ($r[378] = -.16, p = .003$), we decided against modeling the post-task common factor. The initial CFA model failed to converge, and misfit analysis has shown that the reason for misfit was one of the items (“I go with the flow and don’t plan what to do”). When this item was excluded, the project crafting factor consisted of only two items that resulted in non-identification. Therefore, the whole

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factor of project crafting was excluded, and we repeated the CFA on seven factors: two for the pre-task phase (uncertainty acceptance and obstacles expectations), three for the during-project phase (adjusting approach, managing and reframing ambiguous goals, and emotion regulation and dealing with obstacles), and two for the post-task phase (improving approach and readiness for sharing). The model fit of this solution was above the usually recommended criteria (e.g., Hu & Bentler, 1999), namely the comparative fit index (CFI) = .966, the Tucker-Lewis Index (TLI) = .957, Root Mean Square Error of Approximation ($RMSEA$) = .032, 90% CI : .024, .040, and Standardized Root Mean Square Residual ($SRMR$) = .060. Factors loadings were generally robust and statistically significant (see SOM Table S2). Given the appropriate fit of the seven-factor solution, we repeated the CFA on the whole sample. Also in this case, the model fit was appropriate, CFI = .956, TLI = .946, $RMSEA$ = .036, 90% CI : .031, .041, $SRMR$ = .049. Table 2 shows descriptive statistics for the final set of items altogether with their factor loadings.

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Table 2. Descriptive Statistics and CFA Item Loadings for a Creative Self-Regulation Scale

	<i>M</i>	<i>SD</i>	Factor Loading
Forethought			
Obstacles Expectations			
I reminded myself that some parts of my work would be boring, frustrating, or even painful.	4.09	1.69	0.64
I knew that working on this project would not always be enjoyable.	4.85	1.63	0.59
Uncertainty Acceptance			
I knew that my initial idea may not be the one I end up with.	5.07	1.57	0.67
I understood that sometimes I would put in work that would be discarded later on.	5.19	1.43	0.57
I expected to encounter obstacles that I would need to overcome.	5.23	1.51	0.48
I knew that I wouldn't always have a clear picture of how my project would look in the end.	4.71	1.41	0.47
I knew that I would not be able to predict all the steps to my project	4.63	1.45	0.33
Performance			
Adjusting Approach			
I adjusted the way I worked to best achieve certain goals.	5.24	1.23	0.31
When I encountered obstacles, I tried different ways of solving the problem.	5.28	1.25	0.55
I was open to new opportunities when they came up during my project.	5.54	1.33	0.56
I was mindful not to get too attached to certain ways of working.	4.91	1.48	0.37
I adapted how I organized my work depending on the where I was in the process.	4.88	1.37	0.25
Managing and Reframing Ambiguous Goals			
When I had a new idea, I dropped what I was doing already to pursue it.	3.96	1.48	0.35
My goals changed from what I had originally envisioned.	4.29	1.63	0.54
Throughout my project, I would test out my ideas before fully committing to them.	4.72	1.52	0.40
While working on my project, I set more specific goals as time went on	5.07	1.42	0.46
Emotion Regulation And Dealing with Obstacles			
When things seemed difficult, I reminded myself that I was capable of doing it well	4.96	1.38	0.39
I told myself that mistakes I made were learning opportunities	5.10	1.42	0.39
When something didn't go according to plan, I accepted it and moved on	4.82	1.52	0.19
I found ways to stay motivated even when I was uninspired	5.12	1.32	0.42
Self-Reflection			
Improving Approach			
I was not entirely convinced that this was "it" - I thought about how to improve the solution	4.44	1.76	0.71
I was wondering if it could be done even better	5.19	1.59	0.78
I decided that I would try it again, but better	3.63	1.85	0.41
Readiness for Sharing			
I was happy to share the effects of my work with other people	5.40	1.58	0.55
I was afraid to show the results of my work to others	3.76	1.79	-0.30
I was proud of what came out of my activity	5.35	1.35	0.68

How stable individuals' characteristics—their personality, creative self-concept, and perceiving creativity as growth or fixed—are linked with their creative self-regulation? We estimated structural

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equation models with seven correlated CSR factors regressed on these predictors to answer this question. Given that CSE and CPI latent variables were strongly correlated, we estimated two models: one with CSE and the remaining predictors. The other was with CPI and the remaining variables. The model fit was good according to some indices: $RMSEA = .036$, 90% CI : .033, .039, $SRMR = .060$, yet held some room for improvement in the case of others: $CFI = .89$, $TLI = .88$. Given that we tested quite a general model with many variables, we decided not to modify the model by excluding non-significant predictors, that would likely improve model fit.

As illustrated in Table 3, the predictors were associated with robust variability of creative self-regulation strategies: R^2 varied from 10% in the case of obstacles expectation, adjusting approach, and managing and reframing ambiguous goals to 29% in the case of readiness for sharing. Uncertainty acceptance was higher for people who appreciated creativity (higher CPI) and were higher in openness, yet lower in extraversion and neuroticism. Obstacles' expectations decreased with agreeableness, yet increased with introversion and adjusting approach was significantly linked with CSE, CPI, and conscientiousness. Managing and reframing ambiguous goals was positively related to emotional stability and fixed mindset, while emotion regulation increased with CSE and conscientiousness. The improving approach was more typical for people with higher CPI and growth mindset and a fixed mindset. Finally, the readiness to share the effects was positively predicted by CSE, CPI, growth mindset, extraversion, and agreeableness.¹

¹ We note a surprising null effect in the case of openness to experience. This, however, could be caused by the low reliability of this two-item scale in our study. Therefore, we decided to estimate the models summarized in Table 3 using separate items ("I see myself as open to new experiences, complex" and "I see myself as conventional, uncreative," reverse-coded), instead of an aggregate score. The analysis with items did demonstrate that uncertainty acceptance was positively linked with feeling that a participant is an open and complex person ($\beta = .11$, $p = .034$), but not with being a person who is (not) uncreative and conventional ($\beta = .05$, $p = .29$). Obstacles expectations was unrelated to neither being open ($\beta = .04$, $p = .56$), nor (not) being conventional ($\beta = -.04$, $p = .50$). Adjusting approach was linked to being open and complex ($\beta = .13$, $p = .053$), but not to not being conventional and uncreative ($\beta = -.02$, $p = .78$), while managing and reframing ambiguous goals was unrelated to any of openness items (open, complex: $\beta = .09$, $p = .30$; uncreative, conventional: $\beta = .02$, $p = .76$). Emotion regulation and dealing with obstacles was predicted by being open and complex ($\beta = .21$, $p = .006$), but not by (not being) conventional and uncreative ($\beta = -.02$, $p = .73$). Improving approach was marginally related to being open ($\beta = .09$, $p = .072$), but not conventional ($\beta = .01$, $p = .905$), and the readiness for sharing was unrelated to none of the items (open, $\beta = .08$, $p = .162$, conventional, $\beta = -.03$, $p = .59$).

Table 3. A Summary of Structural Equation Modeling Analysis

	Forethought			Performance		Self-Reflection	
	Uncertainty Acceptance	Obstacles Expectations	Adjusting Approach	Managing and Reframing Ambiguous Goals	Emotion Regulation and Dealing with Obstacles	Improving Approach	Readiness for Sharing
CSE	.11 [-.02, .24]	.08 [-.06, .21]	.18 [.02, .33]	.03 [-.12, .18]	.40 [.23, .57]	.11# [-.01, .23]	.27 [.14, .39]
CPI	.15 [.02, .28]	.12 [-.03, .27]	.22 [.06, .38]	.04 [-.12, .19]	.19# [-.01, .39]	.13 [.01, .25]	.24 [.10, .37]
Fixed	.05 [-.11, .21]	-.02 [-.19, .13]	-.06 [-.27, .15]	.17 [.004, .33]	-.06 [-.31, .18]	.19 [.04, .35]	.13 [-.02, .28]
Growth	.19# [-.01, .39]	.05 [-.14, .24]	.07 [-.26, .40]	-.10 [-.32, .12]	-.12 [-.47, .23]	.29 [.12, .46]	.33 [.16, .50]
O	.11 [.02, .21]	-.01 [-.12, .10]	.07 [-.05, .18]	.07 [-.05, .18]	.12# [-.01, .25]	.06 [-.03, .15]	.03 [-.07, .12]
C	-.08 [-.17, .02]	-.10 [-.23, .03]	.17 [.07, .28]	-.10 [-.23, .03]	.19 [.04, .34]	-.06 [-.15, .04]	.10# [-.01, .21]
E	-.16 [.26, .06]	-.16 [.29, .03]	-.03 [-.15, .08]	.00 [-.12, .13]	.06 [-.10, .21]	-.08 [-.18, .03]	.14 [.03, .26]
A	.03 [-.07, .12]	-.11 [.22, .01]	.09 [-.02, .20]	-.02 [-.13, .10]	.06 [-.08, .21]	-.08 [-.17, .02]	.13 [.02, .23]
N	-.17 [.26, .07]	-.07 [-.18, .04]	-.02 [-.14, .09]	-.15 [.27, .03]	.02 [-.12, .16]	-.06 [-.15, .03]	.05 [-.06, .16]
R ²	.15	.10	.10	.10	.22	.13	.29

Note. All coefficients are latent regression coefficients with 95% CI in brackets. Variables were included in the model simultaneously except for CSE and CPI that were included separately. CSE, CPI, growth, and fixed mindset, as well as CSR factors, were modeled as latent variables, personality factors were included as manifest variables.

$p \leq .08$

How the process of creative self-regulation looked like in the case of students who created more-versus-less creative projects? To explore this question, we proceeded with a mixed-model ANOVA, with seven CSR strategies as a repeated factor and the judges-assessed level of creative projects as between-people factor. ANOVA demonstrated a statistically significant effect of CSR strategy, $F(6, 4416) = 34.57, p < .001, \eta^2 = .045$, but no *CSR x Creativity* interaction, $F(12, 4416) = 1.22, p = .26$. Therefore, the overall profile of CSR tended to be similar across groups, with the highest reported level of the *adjustment approach* ($M = 5.17, SD = 0.90$), followed by *emotion regulation* ($M = 5.00, SD = 0.98$), *uncertainty acceptance* ($M = 4.97, SD = 0.94$), *readiness for sharing* ($M = 4.84, SD = 0.86$), *managing goals* ($M = 4.51, SD = 1.06$), *obstacles expectations* ($M = 4.47, SD = 1.38$) and *improving approach* ($M = 4.42, SD = 1.33$). Post-hoc tests with Bonferroni corrections demonstrated that the level of *obstacles expectations* was significantly lower than *uncertainty acceptance* ($M_{diff} = -$

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0.46, $SE = 0.07$, $p < .001$), *adjustment approach* ($M_{diff} = -0.65$, $SE = 0.09$, $p < .001$), *emotion regulation* ($M_{diff} = -0.46$, $SE = 0.09$, $p < .001$), and *readiness for sharing* ($M_{diff} = -0.34$, $SE = 0.09$, $p < .001$).

Uncertainty acceptance was lower than *adjustment approach* ($M_{diff} = -0.19$, $SE = 0.06$, $p = .02$), but higher than *managing goals* ($M_{diff} = 0.50$, $SE = 0.06$, $p < .001$) and *improving approach* ($M_{diff} = 0.61$, $SE = 0.08$, $p < .001$). *Adjustment approach* was also higher than *managing goals* ($M_{diff} = 0.70$, $SE = 0.06$, $p < .001$), *emotion regulation* ($M_{diff} = 0.19$, $SE = 0.05$, $p = .002$), *improving orientation* ($M_{diff} = 0.80$, $SE = 0.08$, $p < .001$) and *readiness for sharing* ($M_{diff} = 0.31$, $SE = 0.06$, $p < .001$). Reported *managing goals* was lower than *readiness to share* ($M_{diff} = -0.38$, $SE = 0.07$, $p < .001$), and *emotion regulation* was higher than *improvement approach* ($M_{diff} = 0.61$, $SE = 0.08$, $p < .001$). Finally, the *improvement approach* was lower than *readiness for sharing* ($M_{diff} = -0.49$, $SE = 0.08$, $p < .001$).

When we compared participants who created more-versus-less creative projects, there were significant differences in the overall creative self-regulation between highly creative projects authors and moderate creatives ($M_{diff} = 0.20$, $SE = 0.06$, $p = .004$) and less creative projects' authors ($M = 0.31$, $SE = 0.09$, $p = .002$). The least creative and moderately creative groups did not differ ($M_{diff} = 0.11$, $SE = 0.08$, $p = .42$). When the groups were compared with regard to all specific strategies, it became apparent that the only significant differences were observed in the *improving approach* ($p < .001$).

Figure 1. Creative Self-Regulation Profiles among Authors of Less and More Creative Projects. Note. OE = Obstacles Expectations, UA = Uncertainty Acceptance, AA = Adjusting Approach, MG = Managing Ambiguous Goals, ER = Emotion Regulation, RS = Readiness to Share, IA = Improvement Approach.

Discussion

How do people transform their initial ideas into final creative products? The present study explored this question by examining adolescents' creative self-regulation during longer-term projects. Below, we discuss the main findings, grouped into three broad categories: the structure of creative self-regulation, its antecedents, and links with creative effects.

The Structure of Creative Self-Regulation

Consistently with previous research (e.g., Rubenstein et al., 2018), our analyses confirm that adolescents apply different strategies while working on creative projects. These strategies could be broadly categorized into three phases: a forethought, with two pre-task self-regulatory strategies (obstacles expectations and uncertainty acceptance), performance, with three strategies applied during the task (adjusting approach, managing and reframing ambiguous goals, and emotion regulation and dealing with obstacles), and self-reflection with two strategies observed when the project is done (improving approach and readiness for sharing). The seven factors of creative self-regulation we obtained might be further categorized into two broad groups: revising and re-

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strategizing, and sustaining and maintaining efforts, as previously theorized (Ivcevic & Nusbaum, 2017).

The creative self-regulation aspects obtained in this investigation are well-aligned with the strategies people use while solving both short-term creative tasks (be it creativity tests: Jankowska et al., 2018) and in more professionalized creative processes (Glăveanu et al., 2013). Indeed, artists often begin with a vague vision of their work, followed by continuous revisions and reworks until the product is ready (e.g., Botella et al., 2013; Bourgeois-Bougrine et al., 2014). Similarly, people solving creative tasks tend to engage in initial exploratory activities that might seem chaotic at first sight but inform other phases of the creative process (Jankowska et al., 2018). Yet both people solving creativity tests (Gilhooly et al., 2007; Jankowska et al., 2018) and professionals (Beeftink et al., 2012) in the long-term benefit from setting priorities, planning their steps, and monitoring how these steps progress. Notably, the tendency to engage in creative self-regulation is related to creators' characteristics; in this study, we demonstrated robust links between CSR and participants' personality, creative self-beliefs, and creative mindsets.

Individual-Level Antecedents of Creative Self-Regulation

We observed that both uncertainty acceptance and obstacles expectations were more typical for introverts. Whether it indicates a more realistic perspective of the creative process among introverts who are more aware of its nuances or rather shows that extraverts underestimate the struggles associated with the creative process is an open question that warrants future investigations. Introverts may forecast negative effects more generally (see Zelenski et al., 2013), so their perspective on the creative process is more open to seeing potential difficulties and unpleasant aspects of the creative process. Still, we emphasize the consistency of introversion's effect on the initial phases of creative processes and potential problems extraverts might have in creative self-regulation. While extraverts are more eager to share their works' effects when ready, they seem to underestimate the effort and struggles present during the process.

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Uncertainty acceptance was also positively related to openness to experience and emotional stability: while these links' effect size was weak (β s = .11 and -.17 respectively), both relationships were significant. Higher uncertainty acceptance is almost a definitional aspect of openness to experience, confirmed empirically (Gocłowska et al., 2017), similarly as negative effects of neuroticism on uncertainty acceptance (Carleton, 2016; Hirsh & Inzlicht, 2008), making these specific findings fit well into a broader personality literature. Given the imperfect measurement of openness applied in our study, we invite fellow creativity researchers to replicate and extend these findings using more elaborated measures of openness to experience. Additionally, we found people who value creativity more, so score higher on CPI, to present higher uncertainty acceptance, which might illustrate a more generalized openness of such people to undefined situations. Obstacles' expectations were weakly yet negatively linked with agreeableness; more agreeable participants tended to expect fewer obstacles during the creative process. Whether their perception was accurate is a different question, though.

The strategies we observed in the performance phase of the creative process (adjusting approach, managing and reframing ambiguous goals, and emotion regulation and dealing with obstacles) were primarily driven by creative self-beliefs, conscientiousness, and emotional stability. Managing and reframing ambiguous goals was linked to emotional stability, which is in line with the abovementioned association between neuroticism and uncertainty acceptance. There was also an unexpected, weak, yet significant and positive relationship between managing and reframing ambiguous goals and a fixed creative mindset. Contrary to what could be predicted based on mindsets literature, we observed people who perceived creativity as stable to be more efficient in managing goals. This result is at odds with many studies that showed that "entity theorists" tend to maladaptive strategies when learning (e.g., Elliot, 1999). Further research should not only replicate this finding but also explore potential mechanisms of this relationship.

Adjusting approach during creative task performance requires an individual to balance goal commitment and even willingness to drop the work if new, promising opportunities and ideas occur

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(Ivcevic & Nusbaum, 2017). In this way, adjusting approach is incompatible with the grit dimension of consistency of interests (Duckworth et al., 2011), which commonly predicts achievement in more structure tasks. Adjusting approach is akin to prolonged problem finding throughout the creative process. Instead of directly executing or building, adjusting approach denotes revisions, exploration, and reformulation of ideas and approaches to them. Csikszentmihalyi (1988) defined this process of problem finding as the key to creativity, significantly more so than the process of problem solving. Aspects of the creative self related to adjusting approach support this theoretical connection with a core process of creativity and the relationship with conscientiousness denotes the aspect of goal-oriented hard work and dedication.

Such an exploratory attitude is also conceptually related to a trait curiosity (Kashdan & Silvia, 2009; Silvia & Christensen, 2020). A previous study found robust links between creative self-concept (CSE and CPI) and two components of curiosity: stretching—a tendency to seek out new experiences and embracing—an acceptance of unpredictability (Karwowski, 2012). The current investigation confirms these links; we observed that both CSE and CPI robustly predict adjusting one's approach while endeavoring to attain a creative purpose. Also, this strategy was more prevalent among highly conscientious adolescents, pointing to the importance of being diligent and goal-oriented in allowing for a better understanding of the alterable nature of the creative process. It was already demonstrated that the cognitive ability related to flexibility, adapting to a changing environment, and task demands are strongly associated with conscientiousness (Fleming et al., 2016).

Emotion regulation items assessed the use of regulation strategies that are likely to lead to successful task completion, likely strengthening creative self-efficacy. Longitudinal research in educational psychology suggests that self-efficacy beliefs are built through time based on previous achievement (Simpkins et al., 2006). It is likely that creative self-efficacy beliefs are acquired through previous successes and social feedback about creative achievements. Through this developmental process, adolescents can learn that they are able to cope with difficult emotions that arise during the creative process and learn what strategies tend to be successful.

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We have also found emotion regulation to be positively related to conscientiousness. This is consistent with previous research exploring how personality contributes to managing emotions (e.g., John & Gross, 2007; Stanton et al., 2016). A recent meta-analysis (Barańczuk, 2019) found conscientiousness related to reappraisal, problem-solving, mindfulness, and acceptance—regulatory processes that tend to be adaptive. In this study, the effective coping with emotions and obstacles during creative task performance also engaged strategies of acceptance (“When something didn’t go according to plan, I accepted it and moved on”), reappraisal (“I told myself that mistakes I made were learning opportunities”), and developing ways to solve a problem (“I found ways to stay motivated even when I was uninspired”). Moreover, highly conscientious individuals are more goal-oriented, and persistent in the face of difficulties (MacCann et al., 2009; Roberts et al., 2005), which are components of conscientiousness that predicts creativity measured through peer ratings (Grohman et al., 2017) and creative achievement (Reiter-Palmon et al., 2009). Thus, being conscientious might support effective emotion regulation and successful dealing with obstacles.

During the self-reflection phase, the improving approach strategy was applied more intensively by adolescents with higher CPI, growth, and fixed mindset. The more central role creativity occupied in one’s identity, the more willing to improve the finished project a person presented. This reflects research on adolescence as a period of intensive alteration of identity and creativity (Barbot & Heuser, 2017). Furthermore, this finding mirrors research with pro-c creative individuals who describe the continuity of the creative work process, such as when artists talk about their pieces being “never finished” or scientists continuing a series of studies or a line of research (Glaveanu et al., 2013). Creative personal identity creates a commitment toward an area of work or a domain where reflecting on the completed project can give rise to new ones.

Finally, the readiness to share the effects with others, was positively related to a person’s creative self-beliefs (both CSE and CPI), growth mindset, as well as extraversion, and agreeableness. Given previously established links between creative self-beliefs and creative activity in more general (see, e.g., Czerwonka & Karwowski, 2018; Diedrich et al., 2018), the higher willingness to present the

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effects of one's works to others seems natural. Indeed, higher creative confidence (CSE) and valuing creativity (CPI) were demonstrated not only to intervene in the links between creative potential and behavior (Karwowski & Beghetto, 2019), but also to explain a robust part of creative behavior's variability. In terms of development of creativity, the willingness to present one's work might make a difference between those whose creativity remains at little-c level and those who rise to pro-c level.

Because incremental theorists perceive abilities as malleable and are more mastery-oriented, they use feedback as a driver for development (e.g., Dweck, 2017). It is not surprising that extraverts are more eager to share their ideas and display their work since they are more likely to seek attention of others and are generally more comfortable in social situations (Kandler et al., 2016; LePine & Van Dyne, 2001). What is less expected are links between agreeableness and willingness to share the effect of the work. It was pointed out that it is rather being self-content, argumentative, or even hostile could help to present and, if necessary, defend the results of creative work (Batey & Furnham, 2006). Perhaps in the case of adolescents' works, which have the character of everyday creativity, criticism and severe judgments are less expected. Moreover, the type of creative projects young people report are often engagement in some prosocial actions (helping others, promoting some socially valuable ideas or preparing gifts for the closest ones). This kind of expression is socially appreciated and probably more often undertaken by a person more sensitive and open towards others.

Self-Regulation and the Level of Creativity

In our study, adolescents who developed more creative projects self-regulated their creative activity more effectively than their peers, whose projects were assessed as less creative. The tendency we obtained suggests quite a generalized pattern—there was a significant main effect, with higher self-regulation observed among more creative adolescents. However, the most prevalent differences were in improving approach at the post-task, self-reflection stage. It may suggest that the difference between students who created more-versus-less creative projects are in the commitment to the ongoing creative process. For the less creative people, one project might be the end of it. They

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might be satisficing—settling on the good enough (Kaufmann & Vosburg, 2002). Those who are improving approach post-task are likely examining alternative solutions or avenues of work and creation. Paired up with creative identity (Barbot & Heuser, 2017), this will result in an ongoing creative work (like when an artist works on a cycle of thematically or stylistically related paintings or a scientist working on a line of research). Nevertheless, we find this results intriguing, given that this specific strategy denotes a lack of full satisfaction with the effect obtained and a tendency to polish it even further. Thus, although this group of our participants already engaged in more creative projects than their less-creative counterparts, they still searched for an opportunity to be even better in future endeavors. This effect might be driven by standards and aspirations people have (Moran, 2010), passion for given creative activities (Fredricks et al., 2010; Moeller et al., 2017), or differences in their creative metacognition (Karwowski et al., 2020).

Previous research tended to associate more creative results at both mini-c and pro-c levels, with differences in the initial phases of creative process, mainly problem identification and problem construction (Arreola & Reiter-Palmon, 2016; Rubenstein et al., 2020) or strategic planning (Callan et al., 2019). In this study, the differences in forethought and performance phases we observed were mostly minor. We found participants who developed more creative projects as scoring higher in uncertainty acceptance and adjustment approach than their peers who worked on moderately or low creative projects². However, we note that our sample included young people whose projects could have been, at least partially, initiated by teachers. It seems likely that if participants have referred to the projects chosen and clarified entirely on their own, the pre-task strategies would more strongly differentiate the assessment of the projects' creativity. Future studies using more established levels of creativity of adult participants would shed new light on this.

² Planned contrast for differences between the most creative group and the remaining participants, $t(736) = 2.38$, $p = .017$ and $t(736) = 2.39$, $p = .02$ respectively, yet overall, omnibus effects we observed were not statistically significant ($p = .057$ and $p = .053$ – see Figure 1). Here, however, we emphasize two-tailed tests applied, while the hypothesis was directional, so our test is conservative.

Limitations and Future Directions

The findings of this investigation should be read in light of its limitations. We see at least four of them: the retrospective character of data we obtained, the nature of the sample, our measure of level of creativity, and possible domain-specific effects that should be addressed in future studies.

The first limitation refers to the retrospective character of reports participants provided. In a sense, participants in our study had to use doubly-retrospective thinking: remind themselves of their creative projects and processes associated with this project, and then—think deeply about their activity before, during, and after the project was finished. While this strategy was found fruitful in the current study, we emphasize that it should be supplemented by more dynamic, micro-longitudinal designs (Beghetto & Karwowski, 2017; 2019). Experience sampling and diary methods were successfully employed to explore the role of emotion in creativity (e.g., Benedek et al., 2017; Conner & Silvia, 2015; Karwowski et al., 2017; Silvia et al., 2014), so adapting them to creative self-regulation studies could shed light on the dynamic of the creative process.

Moreover, when interpreting this study's result, it is worth bearing in mind that we focused on adolescents' everyday creativity. As creativity is characterized by discontinuous and task-specific development in this period (e.g., Barbot, 2020; Barbot & Heuser, 2017), we cannot rule out the possibility that the strategies we obtained are more typical for young people and everyday creativity (see Agnoli et al. 2018) than for more professionalized creative functioning. Therefore, future research should examine the structure and predictors of creative self-regulation among adults, including professional creators.

Our measure of level of creativity was basic. Participants provided a brief description of their creative project and these descriptions were rated on a 3-point scale. These ratings were done by necessity; the descriptions were short and did not allow for finer-grained differentiation of creative activity. Future research should examine self-regulation for creativity in a sample engaged in similar projects, where resulting products can be evaluated for creativity by independent judges. In the artistic domain, these samples could include students in art schools or creative writing programs and

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in the scientific/intellectual domains, they can include students in robotics competitions or international innovation challenges such as the Odyssey of the Mind. In adult samples, individuals identified as professionally creative can be compared with general population samples, which can be expected to differ on creative achievement, creative identity, and commitment to creative activity.

The third issue worth considering in future research is the domain-specificity of creative self-regulation strategies, especially in Pro-C level of creativity (Kaufman & Beghetto, 2009). Previous research points to domain-specific personality traits (Feist, 1998); for instance, while both artists and scientists tend to be open and driven, artists are also likely to be nonconforming and independent and scientists are likely to be dominant and arrogant. Different relationships with personality traits also emerge in college students (late adolescents/young adults) who self-report creative behavior in everyday, performing arts, and intellectual domains (Ivcevic & Mayer, 2009). Some of these personality differences can be related to different aspects of self-regulation in creativity (e.g., neuroticism limiting uncertainty acceptance) and others can be related to differing nature of creative activity across domains (e.g., where artists can continually make changes while working on a project, many aspects of scientific research have to be planned upfront and cannot be changed once data are being collected).

Conclusion

This investigation extends our understanding of creative self-regulation and sheds light on specific strategies supporting and facilitating the creative process in adolescents. The seven specific strategies, further organized into forethought, performance, and self-reflection, were both predicted by personality traits and creative self-beliefs and predictive for the projects' differences in creativity. The new measure we presented in this article allows for a time-effective measurement of the creative self-regulation and filling the gap currently observed in the creativity literature.

References

- Agnoli, S., Franchin, L., Rubaltelli, E., & Corazza, G. E. (2019). The emotionally intelligent use of attention and affective arousal under creative frustration and creative success. *Personality and Individual Differences, 142*, 242–248. <https://doi.org/10.1016/j.paid.2018.04.041>
- Agnoli, S., Runco, M. A., Kirsch, C., & Corazza, G. E. (2018). The role of motivation in the prediction of creative achievement inside and outside of school environment. *Thinking Skills and Creativity, 28*, 167–176. <https://doi.org/10.1016/j.tsc.2018.05.005>
- Anderson, R. C., & Haney, M. (2020). Reflection in the creative process of early adolescents: The mediating role of creative metacognition, self-efficacy, and self-concept. *Psychology of Aesthetics, Creativity, and the Arts*, advance online publication. <http://dx.doi.org/10.1037/aca0000324>
- Arreola, N. J., & Reiter-Palmon, R. (2016). The effect of problem construction creativity on solution creativity across multiple everyday problems. *Psychology of Aesthetics, Creativity, and the Arts, 10*, 287–295. <https://doi.org/10.1037/a0040389>
- Barańczuk, U. (2019). The five factor model of personality and emotion regulation: A meta-analysis, *Personality and Individual Differences, 139*, 217–227.
- Barbot, B. (2020). Creativity and self-esteem in adolescence: A study of their domain-specific, multivariate relationships. *Journal of Creative Behavior, 54*, 279–292. <https://doi.org/10.1002/jocb.365>
- Barbot, B., & Heuser, B. (2017). Creativity and identity formation in adolescence: A developmental perspective. In M. Karwowski & J.C. Kaufman (Eds.), *The creative self: Effect of beliefs, self-efficacy, mindset, and identity* (pp. 87–98). Academic Press.
- Batey, M., & Furnham, A. (2006). Creativity, intelligence, and personality: A critical review of the scattered literature. *Genetic, Social, and General Psychology Monographs, 132*, 355–429. <https://doi.org/10.3200/MONO.132.4.355-430>

SELF-REGULATION AND CREATIVITY

- Beefink, F., Van Eerde, W., Rutte, C. G., & Bertrand, J. W. M. (2012). Being successful in a creative profession: The role of innovative cognitive style, self-regulation, and self-efficacy. *Journal of Business and Psychology, 27*, 71-81.
- Beghetto, R. A., & Karwowski, M. (2019). Unfreezing creativity: A dynamic, micro-longitudinal approach. In R. A. Beghetto & G. Corazza (Eds.). *Dynamic perspectives on creativity* (7-25). Springer. https://doi.org/10.1007/978-3-319-99163-4_2
- Beghetto, R. A., & Karwowski, M. (2017). Toward untangling creative self-beliefs. In M. Karwowski & J. C. Kaufman (Eds.), *The creative self: Effect of beliefs, self-efficacy, mindset, and identity* (3-22). Academic Press.
- Beghetto, R. A., Kaufman, J. C., & Baxter, J. (2011). Answering the unexpected questions: Exploring the relationship between students' creative self-efficacy and teacher ratings of creativity. *Psychology of Aesthetics, Creativity, and the Arts, 5*, 342-349. <https://doi.org/10.1037/a0022834>
- Benedek, M., Jauk, E., Kerschenbauer, K., Anderwald, R., & Grond, L. (2017). Creating art: An experience sampling study in the domain of moving image art. *Psychology of Aesthetics, Creativity, and the Arts, 11*, 325–334. <https://doi.org/10.1037/aca0000102>
- Botella, M., Glăveanu, V., Zenasni, F., Storme, M., Myszkowski, N., Wolff, M., & Lubart, T. (2013). How artists create: Creative process and multivariate factors. *Learning and Individual Differences, 26*, 161–170. <https://doi.org/10.1016/j.lindif.2013.02.008>
- Bourgeois-Bougrine, S., Glăveanu, V., Botella, M., Guillou, K., De Biasi, P. M., & Lubart, T. (2014). The creativity maze: Exploring creativity in screenplay writing. *Psychology of Aesthetics, Creativity, and the Arts, 8*(4), 384–399. <https://doi.org/10.1037/a0037839>
- Callan, G. L., Rubenstein, L. D., Ridgley, L. M., & McCall, J. R. (2019). Measuring self-regulated learning during creative problem-solving with SRL microanalysis. *Psychology of Aesthetics, Creativity, and the Arts*. <http://dx.doi.org/10.1037/aca0000238>

SELF-REGULATION AND CREATIVITY

- Carleton, R. N. (2016). Into the unknown: A review and synthesis of contemporary models involving uncertainty. *Journal of Anxiety Disorders*, 39, 30-43.
- Chen, B. B. (2016). The creative self-concept as a mediator between openness to experience and creative behaviour. *Creativity. Theories – Research – Applications*, 3, 408–417.
- Chen, C., Kasof, J., Himsel, A. J., Greenberger, E., Dong, Q., & Xui, G. (2002). Creativity in drawing of geometric shapes: A cross-cultural examination with the consensual assessment technique. *Journal of Cross-Cultural Psychology*, 33, 171-187.
- Choi, J. N. (2004). Individual and contextual predictors of creative performance: The mediating role of psychological processes. *Creativity Research Journal*, 16, 187–199.
- Conner, T. S., & Silvia, P. J. (2015). Creative days: A daily diary study of emotion, personality, and everyday creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 9, 463–470.
<https://doi.org/10.1037/aca0000022>
- Csikszentmihalyi, M. (1988). Motivation and creativity: toward a synthesis of structural and energistic approaches to cognition. *New Ideas in Psychology*, 6, 159–176.
- Csikszentmihalyi, M., & Getzels, J. W. (1971). Discovery-oriented behavior and the originality of creative products: a study with artists. *Journal of Personality and Social Psychology*, 19(1), 47–52.
- Czerwonka, M., & Karwowski, M. (2018). The order matters: Asking about creative activity calibrates creative self-concept. *Creativity Research Journal*, 30, 179–186.
<https://doi.org/10.1080/10400419.2018.1446499>
- Diedrich, J., Jauk, E., Silvia, P. J., Gredlein, J. M., Neubauer, A. C., & Benedek, M. (2018). Assessment of real-life creativity: The inventory of creative activities and achievements (ICAA). *Psychology of Aesthetics, Creativity, and the Arts*, 12, 304-316.
<http://dx.doi.org/10.1037/aca0000137>

SELF-REGULATION AND CREATIVITY

- Duckworth, A. L., Kirby, T. A., Tsukayama, E., Berstein, H., & Ericsson, K. A. (2011). Deliberate practice spells success: Why grittier competitors triumphs at the National Spelling Bee. *Social Psychological and Personality Science*, 2, 174-181.
- Dudley, N. M., Orvis, K. A., Lebiecki, J. E., & Cortina, J. M. (2006). A meta-analytic investigation of conscientiousness in the prediction of job performance: Examining the intercorrelations and the incremental validity of narrow traits. *Journal of Applied Psychology*, 91, 40–57.
<https://doi.org/10.1037/0021-9010.91.1.40>
- Dul, J. (2019). The physical environment and creativity: A theoretical framework. In J. C. Kaufman & R. S. Sternberg (Eds.), *Cambridge handbook of creativity* (pp. 481-510). Cambridge University Press.
- Dweck, C. S. (2017). The journey to children’s mindsets—and beyond. *Child Development Perspectives*, 11, 139–144. <https://doi.org/10.1111/cdep.12225>
- Eid, M., Geiser, C., & Koch, T. (2016). Measuring method effects: From traditional to design-oriented approaches. *Current Directions in Psychological Science*, 25, 275-280.
- Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, 34, 149–169.
- Feist, G. J. (2019). The functions of personality in creativity: Updates on the creative personality. In J. C. Kaufman & R. S. Sternberg (Eds.), *Cambridge handbook of creativity* (pp. 353-373). Cambridge University Press.
- Feist, G. J. (1998). A Meta-Analysis of Personality in Scientific and Artistic Creativity. *Personality and Social Psychology Review*, 2, 290–309. https://doi.org/10.1207/s15327957pspr0204_5
- Finke, R. A., Ward, T. B., & Smith, S. M. (1992). *Creative cognition: Theory, research, and applications*. MIT Press.
- Fleming, K. A., Heintzelman, S. J. & Bartholow, B. D. (2016). Specifying associations between conscientiousness and executive functioning: mental set shifting, not prepotent response

SELF-REGULATION AND CREATIVITY

- inhibition or working memory updating. *Journal of Personality*, 84, 348-360,
<https://doi.org/10.1111/jopy.12163>
- Fredricks, J. A., Alfeld, C., & Eccles, J. (2010). Developing and fostering passion in academic and nonacademic domains. *Gifted Child Quarterly*, 54, 18–30.
<https://doi.org/10.1177/0016986209352683>
- Gilhooly, K. J., Fioratou, E., Anthony, S. H., & Wynn, V. (2007). Divergent thinking: Strategies and executive involvement in generating novel uses for familiar objects. *British Journal of Psychology*, 98, 611-625.
- Glăveanu, V. P. (2013). Rewriting the language of creativity: The Five A's framework. *Review of General Psychology*, 17, 69-81.
- Glăveanu, V., Lubart, T., Bonnardel, N., Botella, M., de Biais, P.-M., Desainte- Catherine, M., Georgsdottir, A., Guillou, K., Kurtag, G., Mouchiroud, C., Storme, M., Wojtczuk, A., and Zenasni, F. (2013). Creativity as action: Findings from five creative domains. *Frontiers in Psychology*, 4, 1-14.
- Glăveanu, V. P., Gillespie, A., & Karwowski, M. (2019). Are people working together inclined towards practicality? A process analysis of creative ideation in individuals and dyads. *Psychology of Aesthetics, Creativity, and the Arts*, 13, 388-401.
- Gocłowska, M. A., Baas, M., Elliot, A. J., & De Dreu, C. K. (2017). Why schema-violations are sometimes preferable to schema-consistencies: The role of interest and openness to experience. *Journal of Research in Personality*, 66, 54-69.
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big Five personality domains. *Journal of Research in Personality*, 37, 504-528.
- Grohman, M. G., Ivcevic, Z., Silvia, P., & Kaufman, S. B. (2017). The role of passion and persistence in creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 11, 376-385.

SELF-REGULATION AND CREATIVITY

- Hass, R. W., Katz-Buonincontro, J., & Reiter-Palmon, R. (2016). Disentangling creative mindsets from creative self-efficacy and creative identity: Do people hold fixed and growth theories of creativity? *Psychology of Aesthetics, Creativity, and the Arts*, 10, 436-446.
- Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures*, 1, 77-89.
- Helson, R., Roberts, B., & Agronick, G. (1995). Enduringness and change in creative personality and the prediction of occupational creativity. *Journal of Personality and Social Psychology*, 69, 1173-1183. <http://dx.doi.org/10.1037/0022-3514.69.6.1173>
- Hennessey, B. A. (2019). Motivation and creativity. In J. C. Kaufman & R. S. Sternberg (Eds.), *Cambridge handbook of creativity* (pp. 273-295). Cambridge University Press.
- Hirsh, J. B., & Inzlicht, M. (2008). The devil you know: Neuroticism predicts neural response to uncertainty. *Psychological Science*, 19, 962-967.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1-55.
- Ivcevic, Z. (2007). Artistic and everyday creativity: An act-frequency approach. *The Journal of Creative Behavior*, 41, 271-290. <https://doi.org/10.1002/j.2162-6057.2007.tb01074.x>
- Ivcevic, Z., & Brackett, M. A. (2015). Predicting creativity: Interactive effects of openness to experience and emotion regulation ability. *Psychology of Aesthetics, Creativity, and the Arts*, 9, 480-487. <https://doi.org/10.1037/a0039826>
- Ivcevic, Z., & Hoffmann, J. D. (2019). Emotions and creativity: From process to person and product. In J. C. Kaufman & R. S. Sternberg (Eds.), *Cambridge handbook of creativity* (pp. 273-295). Cambridge University Press.
- Ivcevic, Z., & Mayer, J. D. (2009). Mapping dimensions of creativity in the life-space. *Creativity Research Journal*, 21, 152-165. <http://dx.doi.org/10.1080/10400410902855259>

SELF-REGULATION AND CREATIVITY

- Ivcevic, Z., & Nusbaum, E. C. (2017). From having an idea to doing something with it: Self regulation for creativity. In M. Karwowski & J. C. Kaufman (Eds.), *The creative self: Effects of beliefs, self-efficacy, mindset, and identity* (343-365). Academic Press.
- Ivcevic, Z., Cotter, K. N., Nusbaum, E. C., & Silvia, P. J. (2020). *Self-regulation for creativity: The how of the creative process*. Unpublished manuscript.
- Jankowska, D. M., Czerwonka, M., Lebuda, I., & Karwowski, M. (2018). Exploring the creative process: integrating psychometric and eye-tracking approaches. *Frontiers in Psychology*, 9, 1931.
- John, O. P., & Gross, J. J. (2007). Individual differences in emotion regulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (351-372). The Guilford Press.
- Kandler, C., Riemann, R., Angleitner, A., Spinath, F. M., Borkenau, P., & Penke, L. (2016). The nature of creativity: The roles of genetic factors, personality traits, cognitive abilities, and environmental sources. *Journal of Personality and Social Psychology*, 111, 230–249.
<https://doi.org/10.1037/pspp0000087>
- Karwowski, M. (2012). Did curiosity kill the cat? Relationship between trait curiosity, creative self-efficacy and creative personal Identity. *Europe's Journal of Psychology*, 8, 547-558.
- Karwowski, M. (2014). Creative mindset: Measurement, correlates, consequences. *Psychology of Aesthetics, Creativity, and the Arts*, 8, 62-70.
- Karwowski, M., & Beghetto, R. A. (2019). Creative behavior as agentic action. *Psychology of Aesthetics, Creativity, and the Arts*, 13, 402-415.
- Karwowski, M., Czerwonka, M., & Kaufman, J. C. (2020). Does intelligence strengthen creative metacognition? *Psychology of Aesthetics, Creativity, and the Arts*, 14, 353–360.
<https://doi.org/10.1037/aca0000208>
- Karwowski, M., Lebuda, I., & Beghetto, R. (2019a). Creative self-beliefs. In J. Kaufman & R. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 396-418). Cambridge University Press.
- Karwowski, M., Lebuda, I., Szumski, G., & Firkowska-Mankiewicz, A. (2017). From moment-to-moment to day-to-day: Experience sampling and diary investigations in adults' everyday

- creativity. *Psychology of Aesthetics, Creativity, and the Arts*, 11, 309–324.
<https://doi.org/10.1037/aca0000127>
- Karwowski, M., Lebuda, I., & Wiśniewska, E. (2018). Measuring Creative Self-efficacy and Creative Personal Identity. *The International Journal of Creativity and Problem Solving*, 26, 45–57.
- Kashdan, T. B., & Silvia, P. (2009). Curiosity and interest: The benefits of thriving on novelty and challenge. In C. R. Snyder & S. J. Lopez (Eds.), *Oxford handbook of positive psychology* (2nd ed., 367-374). Oxford University Press.
- Kaufman, J. C., & Baer, J. (2012). Beyond new and appropriate: Who decides what is creative? *Creativity Research Journal*, 24, 83–91. <https://doi.org/10.1080/10400419.2012.649237>
- Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The four c model of creativity. *Review of General Psychology*, 13, 1–12. <https://doi.org/10.1037/a0013688>
- Kaufman, J. C., & Beghetto, R. A. (2013). In praise of Clark Kent: Creative metacognition and the importance of teaching kids when (not) to be creative. *Roeper Review*, 35, 155-165.
- Kaufmann, G., & Vosburg, S. K. (2002). The effects of mood on early and late idea production. *Creativity Research Journal*, 14(3-4), 317–330. https://doi.org/10.1207/S15326934CRJ1434_3
- Kim, K. H. (2008). Meta-analyses of the relationship of creative achievement to both IQ and divergent thinking test scores. *Journal of Creative Behavior*, 42, 106-130.
- LePine, J. A., & Van Dyne, L. (2001). Voice and cooperative behavior as contrasting forms of contextual performance: Evidence of differential relationships with Big Five personality characteristics and cognitive ability. *Journal of Applied Psychology*, 86, 326–336.
<https://doi.org/10.1037/0021-9010.86.2.326>
- Lubart, T. I. (1994). Creativity. In R. J. Sternberg (Ed.), *Thinking and problem solving* (pp. 289–332). Academic Press.
- MacCann, C., Duckworth, A. L., & Roberts, R. D. (2009). Empirical identification of the major facets of conscientiousness. *Learning and Individual Differences*, 19, 451–458.
<http://dx.doi.org/10.1016/j.lindif.2009.03.007>

SELF-REGULATION AND CREATIVITY

- Moeller, J., Dietrich, J., Eccles, J. S., & Schneider, B. (2017). Passionate experiences in adolescence: Situational variability and long-term stability. *Journal of Research on Adolescence*, 27, 344–361. <https://doi.org/10.1111/jora.12297>
- Moran, S. (2010). Changing the world: Tolerance and creativity aspirations among American youth. *High Ability Studies*, 21, 117-132.
- Noftle, E. E., & Robins, R. W. (2007). Personality predictors of academic outcomes: Big Five correlates of GPA and SAT scores. *Journal of Personality and Social Psychology*, 93, 116–130.
<http://dx.doi.org/10.1037/0022-3514.93.1.116>
- Plucker, J. A., & Makel, M. C. (2010). Assessment of creativity. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (48-73). Cambridge University Press.
- Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin*, 135, 322–338. <http://dx.doi.org/10.1037/a0014996>.
- Reiter-Palmon, R., Illies, J. J., & Kobe-Cross, L. M. (2009). Conscientiousness is not always a good predictor of performance: The case of creativity. *International Journal of Creativity & Problem Solving*, 19, 27-45.
- Reiter-Palmon, R., Mumford, M. D., O'Connor Boes, J., & Runco, M. A. (1997). Problem construction and creativity: The role of ability, cue consistency, and active processing. *Creativity Research Journal*, 10, 9-23.
- Reiter-Palmon, R., Mumford, M. D., & Threlfall, K. V. (1998). Solving everyday problems creatively: The role of problem construction and personality type. *Creativity Research Journal*, 11, 187-197.
- Revelle, W. (2020). *Psych: Procedures for personality and psychological research*. Northwestern University, Evanston, Illinois, USA, <https://CRAN.R-project.org/package=psych> Version = 2.0.8.

SELF-REGULATION AND CREATIVITY

- Roberts, B. W., Chernyshenko, O., Stark, S., & Goldberg, L. (2005). The structure of conscientiousness: An empirical investigation based on seven major personality questionnaires. *Personnel Psychology, 58*, 103–139. <http://dx.doi.org/10.1111/j.1744-6570.2005.00301>
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software, 48*, 1-36. URL <http://www.jstatsoft.org/v48/i02/>
- Rubenstein, L. D., Callan, G. L., & Ridgley, L. M. (2018). Anchoring the creative process within a self-regulated learning framework: Inspiring assessment methods and future research. *Educational Psychology Review, 30*, 921-945.
- Rubenstein, L. D., Callan, G. L., Speirs Neumeister, K., Ridgley, L. M., & Hernández Finch, M. (2020). How problem identification strategies influence creativity outcomes. *Contemporary Educational Psychology, 60*, 101840. <https://doi.org/10.1016/j.cedpsych.2020.101840>
- Runco, M. A., & Acar, S. (2019). Divergent thinking. In J. C. Kaufman & R. S. Sternberg (Eds.), *Cambridge handbook of creativity* (pp. 374-395). Cambridge University Press.
- Silvia, P. J., Beaty, R. E., Nusbaum, E. C., Eddington, K. M., Levin-Aspenson, H., & Kwapil, T. R. (2014). Everyday creativity in daily life: An experience-sampling study of “little c” creativity. *Psychology of Aesthetics, Creativity, and the Arts, 8*, 183–188. <https://doi.org/10.1037/a0035722>
- Silvia, P. J., & Christensen, A. P. (2020). Looking up at the curious personality: Individual differences in curiosity and Openness to Experience. *Current Opinion in Behavioral Sciences, 35*, 1-6.
- Simpkins, S. D., Davis-Kean, P. E., & Eccles, J. S. (2006). Math and science motivation: A longitudinal examination of the links between choices and beliefs. *Developmental Psychology, 42*, 70–83. <https://doi.org/10.1037/0012-1649.42.1.70>
- Sorokowska, A., Słowińska, A., Zbieg, A., & Sorokowski, P. (2014). *Polska adaptacja testu Ten Item Personality Inventory (TIPI)–TIPI-PL–wersja standardowa i internetowa*. Wrocław.
- Stanton, K., Rozek, D. C., Stasik-O’Brien, S. M., Ellickson-Larew, S., & Watson, D. (2016). A transdiagnostic approach to examining the incremental predictive power of emotion

SELF-REGULATION AND CREATIVITY

- regulation and basic personality dimensions. *Journal of Abnormal Psychology*, 125, 960-975.
<https://doi.org/10.1037/abn0000208>
- Sternberg, R. J., & Kaufman, J. C. (2010). Constraints and creativity: Obvious and not so obvious. In J. C. Kaufman & R. S. Sternberg (Eds.), *Cambridge handbook of creativity* (pp. 467-482). Cambridge University Press.
- Sternberg, R. J., & Lubart, T. I. (1991). An investment theory of creativity and its development. *Human Development*, 34, 1–31.
- Wallas, G. (1926). *The art of thought*. Jonathan Cape.
- Xue, Y., Gu, C., Wu, J., Dai, D. Y., Mu, X., & Zhou, Z. (2020). The effects of extrinsic motivation on scientific and artistic creativity among middle school students. *Journal of Creative Behavior*, 54, 37–50. <https://doi.org/10.1002/jocb.239>
- Zelenski, J. M., Whelan, D. C., Nealis, L. J., Besner, C. M., Santoro, M. S., & Wynn, J. E. (2013). Personality and affective forecasting: Trait introverts underpredict the hedonic benefits of acting extraverted. *Journal of Personality and Social Psychology*, 104, 1092-1108, <https://doi.org/10.1037/a0032281>
- Zielinska, A. (in press). Mapping adolescents' everyday creativity. *Creativity. Theories – Research – Applications*.
- Zimmerman, B. J. (2000). Attaining self-regulation: a social-cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (13-39). Academic Press.

Appendix

Table A1. Original Items Used to Measure Creative Self-Regulation (CSR) and Their Descriptive Statistics

	<i>M</i>	<i>SD</i>
Forethought		
I knew that I wouldn't always have a clear picture of how my project would look in the end.	4.71	1.41
I knew that I would not be able to predict all the steps to my project	4.63	1.45
I reminded myself that some parts of my work would be boring, frustrating, or even painful.	4.09	1.69
I knew that my initial idea may not be the one I end up with.	5.07	1.57
I understood that sometimes I would put in work that would be discarded later on.	5.19	1.43
I expected to encounter obstacles that I would need to overcome.	5.23	1.51
I knew that working on this project would not always be enjoyable.	4.85	1.63
I could not begin working before the steps of the project were clear	4.26	1.64
This activity was not a planned project - I just played with it, not planning any specific results to achieve	3.91	1.86
All this activity was largely improvised: without any specific purpose or plan	3.61	1.86
Performance		
I adjusted the way I worked to best achieve certain goals.	5.24	1.23
When I encountered obstacles, I tried different ways of solving the problem.	5.28	1.25
I was open to new opportunities when they came up during my project.	5.54	1.33
I was mindful not to get too attached to certain ways of working.	4.91	1.48
When I had a new idea, I dropped what I was doing already to pursue it.	3.96	1.48
My goals changed from what I had originally envisioned.	4.29	1.63
While working on my project, I set more specific goals as time went on	5.07	1.42
Throughout my project, I would test out my ideas before fully committing to them	4.72	1.52
I created a plan to work on my project that was best suited to my working style	4.45	1.76
I go with the flow and don't plan what to do	4.38	1.79
I adapted how I organized my work depending on the where I was in the process.	4.88	1.37
When things seemed difficult, I reminded myself that I was capable of doing it well	4.96	1.38
I found ways to stay motivated even when I was uninspired	5.12	1.32
I told myself that mistakes I made were learning opportunities	5.10	1.42
I blamed myself when things went wrong.	4.04	1.75
I took breaks when I was feeling overwhelmed in my project	5.17	1.50
When something didn't go according to plan, I accepted it and moved on	4.82	1.52

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Self-Reflection		
I was happy to share the effects of my work with other people	5.40	1.58
I was afraid to show the results of my work to others	3.76	1.79
I was proud of what came out of my activity	5.35	1.35
I was not entirely convinced that this was "it" - I thought about how to improve the solution	4.44	1.76
I was wondering if it could be done even better	5.19	1.59
I decided that I would try it again, but better	3.63	1.85