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Exploring creative mindsets: Variable and person-centered approaches

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Previous studies on creative mindsets have demonstrated that people do not necessarily conceptualize creativity as either fixed (unchangeable) or malleable (able to be grown) but instead use both terms while describing creative behaviors and traits. Because people can see creative ability as both a fixed and malleable trait, this seemingly contradictory view may stem from the fact that people use information about different components and levels of creative expertise when making that judgment. Here, by integrating variable- and person-centered approaches to studying creative mindsets, we aimed to provide a more authoritative answer to this issue. A large sample (N = 3,876) of Polish adults completed the Creative Mindset Scale, with smaller subsamples also completing different measures of creative self concept, creative ability, creative activity, and creative achievement. A series of confirmatory and exploratory factor analyses confirmed that the 2-factor model, with correlated yet relatively independent fixed and growth creative mindsets, fit the data better than did the general factor model, in which fixed and malleable mindsets are seen as being on a continuum. We found that although the better fit of the 2-factor model demonstrated that people indeed describe creativity in both fixed and malleable ways, the general factor orientation may shape their perception as well. A latent profile analysis revealed the existence of 4 classes of people: those holding high growth and low fixed mindsets and those holding low growth and high fixed mindsets but also those holding high growth and high fixed mindsets as well as those holding low fixed and malleable mindsets. The high growth-high fixed type was characterized by the highest creative self-concept (especially creative self-efficacy and creative personal identity), average activity and achievement, and relatively low creative ability. We discuss these findings in terms of creative mindsets theory and propose further research areas.

Keywords:

creative mindsets, bifactor models, latent profile analysis, creative self-concept, creative achievement

How do laypeople conceptualize creativity? Do they perceive it as a trait-like characteristic, largely innate and unchangeable? Or conversely, do they view creativity as a state or skill that can be trained and effectively developed? Although the creativity literature has devoted hundreds of pages to studies on implicit theories of creativity since Sternberg's (1985) seminal article in which implicit theories of creativity were first described as lay beliefs of creative ability, only relatively recently have creativity scholars begun to explore more specific questions related to the subset of implicit theories of creativity, namely, creative mindsets (Hass, Katz-Buonincontro, & Reiter-Palmon, 2016; Karwowski, 2014). Following previous works (e.g., Karwowski, 2014), we define *creative mindsets* as implicit theories referring to the perceived sources of creativity. Thus, mindsets focus on perceived roots of creativity, as well as on their perceived stability versus changeability. Some people, known as *entity theorists* (individuals holding fixed mindsets), believe that creativity is innate and difficult to change, whereas others holding an *incremental theory* (growth or malleable mindsets) perceive it as a skill that can be developed. Of importance, we posit that people's perceptions and beliefs, even if standing in opposition to research findings, play important regulatory functions. For instance, even though creativity training was generally proven to be effective in developing creative potential (Scott, Leritz, & Mumford, 2004), there are reasons to believe that people holding a fixed mindset may not benefit from such interventions as much as would someone holding a growth mindset. Therefore, those holding a fixed mindset, that is, those who believe that creative ability is largely unchangeable, would likely not see any real reason to engage in such training. In the same vein, it seems that holding a growth mindset may be more beneficial when dealing with difficult creative tasks and failures, because it allows for more sustained effort and engagement (Puente-Díaz & Cavazos-Arroyo, 2017b). Therefore, educational (Karwowski & Barbot, 2016; Paek & Sumners, 2017) and organizational (PuenteDíaz & Karwowski, 2017) consequences of creative mindsets for creative behavior and, subsequently, creative achievements or business innovations are far-reaching and crucial to consider.

mindsets have been studied extensively in other domains, such as intelligence, ability, and academic performance (e.g., Dweck, 1986; Dweck, Chiu, & Hong, 1995b; Dweck & Leggett, 1988). Individuals with fixed mindsets tend to credit their performance to their innate ability, whereas those with malleable mindsets tend to attribute their performance to the level of effort they put forth (Dinger & Dickhauser, 2013; Dweck, 1986). Further, those holding a fixed mindset generally feel the need to demonstrate or validate their ability and may experience feelings of frustration and helplessness when confronted with challenges (Dweck, 1986, 1989; Dweck & Leggett, 1988; Smiley & Dweck, 1994). In contrast, those holding malleable views of their ability are more likely to try again after setbacks, seek to increase their competence, and show increased self-esteem and higher academic performance (Hong, Chiu, Dweck, Lin, & Wan, 1999; Smiley & Dweck, 1994).

Logically, fixed and growth mindsets should form two ends of the same continuum—if people believe that a certain psychological characteristic (be it creativity or anything else) is fixed, they should not believe it may be developed. However, is there a chance that people could perceive psychological constructs in terms of both rather than one mindset or the other? In this study, we sought to determine whether individuals can hold both fixed and growth creative mindsets simultaneously. This possibility was already suggested in the case of mindsets of intelligence, and as Dweck and colleagues (1995b, p. 323) noted, “It is perfectly possible for an individual to hold both theories.” Similarly, in a growing body of research on creative mindsets (Hass et al., 2016; Karwowski, 2014; Tang, Werner, & Karwowski, 2016), a two-factor solution was found to be a better fit than was the one-factor solution. In other words, people tended to define *creativity* more in terms of both (or neither) *fixed-and-growth* mindsets instead of *fixed-versus-growth* mindsets. Indeed, although the correlations between fixed and growth factors obtained in previous studies were consistently negative, their strength varied between studies, with the estimates ranging from $r = -.10$ (Hass et al., 2016) and $r = -.12$ (Karwowski, 2014, Study 3) to $r = -.38$ (Pretz & Nelson, 2017) or even $r = -.51$ (Tang et al., 2016, German sample). Thus, at least in the case of creativity, fixed and growth mindsets do not have to be opposites but rather are separate dimensions altogether. Such a pattern was not previously demonstrated in the case of intelligence mindsets, but it is very likely that observed unidimensionality of intelligence mindsets was caused by the measures used in previous studies. As Dweck and colleagues explain, in investigations focused on intelligence mindsets, scholars intentionally used very short scales (usually consisting of only three items) and tended to operationalize people holding growth mindsets as those who did not endorse fixed mindset items. However, equating the lack of endorsement of fixed items with endorsement of growth characteristics seems problematic.

In this study, we aimed to answer the question of whether the coexistence of two seemingly conflicting mindsets is possible. To this end, we synthesized variable-centered and person-centered approaches. In terms of a variable-centered approach, we examined different factor structures of the Creative Mindset Scale (CMS; Karwowski, 2014), an instrument used in recent studies to measure creative mindsets. Apart from testing one- versus twofactor models, we also applied bifactor solutions to test the possibility that a latent dimension composed of fixed-versus-growth mindset complements the two separate fixed and growth factors. In terms of the person-centered approach, we applied a latent profile analysis (Collins & Lanza, 2013) to classify individuals and examine the size and characteristics of a hypothesized class that holds high levels of both mindsets (i.e., a high fixed-high growth profile). We use several creativity-oriented characteristics (creative self-concept, creative ability, creative activity, and creative achievement) to examine the possible differences across the mindset classes. Understanding whether different classes of mindsets exist has theoretical implications in understanding how individuals view creative ability. In addition, because mindsets also predict how individuals respond to challenges, understanding whether different classes of mindsets exist has practical implications for

education and organizations. First, however, we briefly review previous studies on creative mindsets and discuss hypothetical reasons for the possibility that both creative mindsets are indeed possible.

Correlates, Antecedents, and Consequences of Creative Mindsets

Although interest in creative mindsets has been growing in the field in recent years, the number of identified studies on this topic is still limited. We were able to identify 10 studies from different labs dealing explicitly with creative mindsets. In a chronologically first, though unpublished study, Makel (2008) measured creative mindsets using items adapted from Dweck (1999) and viewed fixed and growth mindsets as being on two ends of a continuum. In his investigation, the term *intelligence* originally used in Dweck's scale was replaced with *creativity*. Contrary to expectations, no differences in insight problem solving among people holding the fixed mindset and the growth mindset were observed. In another study, O'Connor, Nemeth, and Akutsu (2013) generated five items reflecting a malleable creative mindset and similarly viewed both mindsets as being on two ends of a continuum, though they did not specify how they determined an individual to hold either a fixed or malleable mindset. They demonstrated that a fixed mindset translated into lower interest in creative thinking, lower self-reported creativity, and divergent thinking production as well as creative achievements. It is striking that when the growth creative mindset was primed, participants tended to behave more creatively than when the fixed mindset was primed, suggesting that creative mindsets can be at least temporarily influenced.

Searching for a more complex measurement of creative mindsets, Karwowski (2014) proposed the CMS, a short scale that allows for measurement of both fixed and growth mindsets. In a series of exploratory and confirmatory factor analyses, and using item response theory analyses, the author demonstrated a stable, two-factor structure of this instrument. Across three studies, fixed and growth mindsets formed two separate factors rather than two ends of the same continuum. Additionally, Karwowski demonstrated that a growth mindset was strongly related to creative self-beliefs (i.e., creative self-efficacy and creative personal identity) and predicted the efficiency of insight problem solving.

Introducing the CMS initiated a number of other investigations across labs and countries. Hass et al. (2016) recently showed that CMS items work better than do items adapted from Dweck's (1999) original scales that measured implicit theories of intelligence. Using confirmatory factor analysis and structural equation modeling, Hass and colleagues confirmed that fixed and growth mindsets indeed form separate factors, with the growth mindset factor significantly relating to the creative self-efficacy factor and the fixed mindset factor being independent from creative self efficacy. In another study, the same authors (Hass, Reiter-Palmon, & Katz-Buonincontro, 2017) demonstrated that a fixed mindset tended to be negatively related to self-reported creativity, whereas a growth mindset was positively related to self-reported creativity as measured by the Kaufman Domains of Creativity Scale (KDOCS; Kaufman, 2012;

McKay, Karwowski, & Kaufman, 2017). Yet, the effect size of these relationships varied across both creativity domains and the academic domain in which the participants were trained. Pretz and Nelson (2017) showed statistically significant and robust positive correlations between growth mindsets, creative self-efficacy, and creative personal identity. Pretz and Nelson also found negative correlations between creative personal identity and fixed mindsets. Additionally, only a growth mindset positively correlated with rated creativity of participants' collages. Kwasnik (2016) found a negative relationship between fixed mindsets and a tendency to describe oneself in terms of agency or individualism (e.g., self-directed and independent), as well as communion or collectivism (Abele & Wojciszke, 2007). Conversely, the growth mindset was positively related to communion. Essentially, individuals who showed a growth mindset regarding creativity were more likely to describe themselves as being part of a group or in relation to others.

Finally, recent works have searched for potential antecedents and consequences of both mindsets. Tang and colleagues (Karwowski & Tang, 2016; Tang et al., 2016) examined cross-national differences in the level of creative mindsets among students in Poland and Germany and proposed cultural orientations as factors that may be responsible for potential differences. Indeed, they observed that Polish students held higher fixed and lower growth mindsets, but these differences were fully mediated by cultural syndromes, namely vertical and horizontal individualism and collectivism (Singelis, Triandis, Bhawuk, & Gelfand, 1995). More specifically, fixed mindset was primarily driven by vertical individualism (i.e., a status- and competition-oriented type of individualism), whereas the growth mindset was driven by horizontal individualism and both vertical and horizontal collectivism. A subsequent study on a larger and more differentiated sample of students from eight countries (Karwowski & Tang, 2016) replicated this pattern.

Two recent articles examined the possible consequences of holding either a fixed or growth mindset. Puente-Díaz and Cavazos-Arroyo (2017b) hypothesized that fixed and growth mindsets should have different effects on different kinds of achievement goals. Indeed, across two studies with Mexican business students, they demonstrated that whereas a growth mindset consistently predicted task-approach achievement goals or mastery at a given task, a fixed mindset was related to other-approach achievement goals (i.e., a tendency to "show-off" one's performance to other people rather than perceiving it as purely informative). Further, the growth creative mindset was positively related to perceived effort put into studying. This study confirms that entity theorists and incremental theorists may differently perceive situations that require effort or are difficult. Whereas people who hold a growth mindset see these situations as potentially informative about their functioning and view them as a learning opportunity, fixed theorists tend to perceive these situations as a threat. Because fixed theorists equate failure with a lack of skills, they tend to avoid potentially difficult situations.

Regarding the potential educational consequences of creative mindsets, Paek and Sumners (2017) examined the links between teachers' creative mindsets and their perception of students' creative potential. They demonstrated that not only were teachers' growth mindset positively related and fixed mindset negatively related to the perceived creative potential of their students but that an interaction of growth and fixed mindsets plays a role as well. More specifically, the more teachers believed creativity to be innate, the less they perceived every student to possess creative potential and felt less confident that they are able to teach for creativity. It is interesting that the negative indirect effect of a fixed creative mindset was attenuated by teachers' growth creative mindset. Thus, following Karwowski's (2014) findings, Paek and Sumners (2017) showed that different configurations of mindsets (e.g., low-low or high-high) may play different roles when explaining other beliefs and behaviors.

How Are Two Mindsets Possible?

Karwowski (2014) proposed that holding both mindsets of creativity may stem from a higher value applied to creativity and an awareness that creativity is indeed a complex construct. This line of reasoning was recently developed in the form of two complementary hypotheses, namely the *expertise hypothesis* and the *complexity hypothesis* (Karwowski & Brzeski, 2017). The expertise hypothesis assumes that having high fixed and growth mindsets may be caused by a higher level of knowledge (cognitive aspect) about creativity and expertise in creative functioning (behavioral aspect), as well as emotional engagement in creative work. People who devote more time and effort to creative endeavors are not necessarily professional creators; they may simply be more aware of the nuances and complexity of creativity. Indeed, Karwowski and Brzeski (2017) demonstrated that among those who hold high growth and high fixed mindsets, two thirds (66%) were characterized by high creative personal identity (CPI), meaning they highly valued creativity as a part of their self-concept, whereas only 17% of such high-CPI people were found among low fixed-low growth group. The complexity hypothesis focuses on the nature of creativity rather than on individual characteristics and may be perceived as a natural extension of the expertise hypothesis. It assumes that the people who are more aware of different levels, aspects, styles, and facets of creativity (e.g., Sternberg, 1999) are more likely to hold both mindsets. Those who perceive creativity exclusively as a high-level or eminent (big-C) creative endeavor will likely hold a fixed mindset. If they define creativity in terms of everyday, mundane behaviors, such as mini-c, or little-c, creativity (Kaufman & Beghetto, 2009), they will be more likely to possess a stronger growth mindset. Karwowski and Brzeski proposed that those who are able to take the multilevel perspective and integrate the perception of creativity as a multifaceted phenomenon (i.e., perceiving creativity as both mini-c and Big-C) may have higher chances for holding both mindsets. Keeping in mind that previous studies have demonstrated that even laypeople are able to easily differentiate between levels of creativity (Kaufman & Beghetto, 2013), we expected that even among novices, there would be a substantial number of people holding both mindsets. Additionally, the possibility exists that different

profiles or configurations of mindsets are to a certain extent caused by perceived domain-specificity of creativity. Because the art bias (Glăveanu, 2014) influences how people define and perceive creativity, those who associate creativity with one specific domain (e.g., art) rather than perceiving it as saturating different domains may hold different profiles of growth or fixed mindsets.

The Present Investigation

Despite the growing number of studies and plausible hypotheses proposed, within-subject perspectives in creative mindsets research have clearly been overlooked to date (see Puente-Díaz & Cavazos-Arroyo, 2017a, for an exception). Here, we aimed to fill this gap by profiling different groups or classes of people who hold different levels of fixed and growth mindsets. This study was primarily driven by two research questions. First, we were interested in a more complete answer to the question about the structure of CMS. This question has not only psychometric but also substantial theoretical consequences. Are there indeed two (relatively) independent mindsets, or is there perhaps also a latent fixed-versus-growth dimension that influences how people define creativity? We used bifactor modeling to examine the potentially more complex structure of CMS and people's perceptions of the fixedness and malleability of creative ability. Second, we were interested in determining the proportion of people who hold both mindsets. Are there such people at all, and if so, what differentiates them from others who hold different profiles of fixed or growth mindsets? Are these people indeed more experienced in creativity as the expertise hypothesis assumes, or do they perhaps differ in creative self-concept rather than in creative ability or achievement? These partially explorative questions drove our inquiry here.

Because we were interested in determining the structure of creative mindsets, as well as exploring the within-subject profiles of creative mindsets, we decided to integrate the variable-centered and person-centered approaches. The variable-centered approach focused on the factor structure of CMS. More specifically, we tested several factor solutions, starting from one-factor to two-factor and bifactor models, using both more restrictive (confirmatory factor analysis) and less restrictive (exploratory factor analysis) models. The person-centered approach was applied using latent profile analyses, with an aim to classify and describe individuals who hold different configurations of growth and fixed mindsets. Apart from the quite natural high fixed-low growth (HFLG) and low fixed-high growth (LFHG) classes, we were especially interested in the size of classes holding both mindsets—that is, high fixed-high growth (HFHG) and low fixed-low growth (LFLG) mindset as well as their characteristics. To achieve these goals, we used a large data set based on both aggregated previous studies on creative mindsets (n = 1,191; Karwowski, 2014), as well as newly collected data within different research projects that applied CMS (in total n = 2,685).

Method

Participants and Procedure

There were 3,876 participants (1,977 women; 51%) who completed the CMS, whereas the number of participants who filled other instruments varied (see details later). Participants' age ranged between 16 and 90 years (M = 36.84, SD =13.70). The majority held a university-college degree (51%) or were high school graduates (37%). All participants took part in online research projects and were panel members of different research companies. They were remunerated for their participation by gift vouchers of different values depending on specific study lengths. Table 1 summarizes the main characteristics of participants and measures used.

Table 1
Measures and Socio-Demographic Characteristics of Samples Included in This Investigation

Characteristic	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total *N*	1,191	302	826	803	754
Men/women	588/603	165/137	386/440	391/412	369/385
Age: *M* (*SD*); range	34.77 (11.89); 16–60	33.54 (11.45); 16–59	46.62 (16.47); 18–90	38.00 (13.10); 17–77	29.47 (6.24); 18–40
Education (% with university degree)	54.4	49.8	35.5	54.3	61.6
Measures					
CMS	Yes	Yes	Yes	Yes	Yes
SSCS	Yes	No	No	Yes	Yes
IRT	No	No	No	Yes	No
ICAA	No	No	No	Yes	Yes
CAQ	No	No	No	Yes	Yes
DTT	Yes	No	No	Yes	No
IPST	Yes	No	No	No	No
Published	Yes[a]	No	No	No	No

Note. CMS = Creative Mindset Scale; SSCS = Short Scale of Creative Self; IRT = intellectual risk taking; ICAA = Inventory of Creative Activity and Achievement; CAQ = Creative Achievement Questionnaire; DTT = divergent thinking tasks; IPST = insight problem solving tasks.
[a] Dataset from Karwowski (2014).

Measures

Creative mindsets. The 10-item Creative Mindset Scale (CMS; Karwowski, 2014) was applied to measure fixed (α =.76) and growth (α =.67) mindsets.[1] A sample item measuring growth mindsets was "Anyone can develop his or her creative abilities up to a certain level," whereas a sample item measuring fixed mindsets was "You either are creative or you are not—even trying very hard you cannot change much." Responses were provided on a 5-point Likert scale ranging from 1 (*definitely not*) to 5 (*definitely yes*).

Creative self-concept. The 11-item Short Scale of Creative Self (Karwowski, 2012) was used to measure both participants' trait-like creative self-efficacy (tCSE[2] ; α=.86; six items; sample items included "I trust my creative abilities" and "Compared to my friends, I am distinguished by my imagination and ingenuity") and creative personal identity (CPI; α = .84; five items; sample items included "My creativity is important to who I am" and "Being a creative person is important to me"). Responses were provided on a 5-point Likert scale ranging from 1 (*definitely not*) to 5 (*definitely yes*). Data on tCSE and CPI were collected from 1,994 participants (1,015 women).

Intellectual risk taking. A six-item scale (α = .87) developed by Beghetto (2009) was used to measure intellectual risk taking (IRT), which retrospectively asked participants about experiences related to intellectual risk taking, such as asking questions, sharing tentative ideas, and willingness to try new things. A sample item

included “I like doing new things even if I am not very good at them.” Participants responded on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*very true*). The IRT scale was completed by 803 people (412 women).

Creative potential. Under the broad umbrella of “creative potential,” we measured cognitive abilities linked to creativity. More specifically, we used insight problems and divergent thinking tasks.

Insight problems. Seven insight problems in a counterbalanced order (α = .82[3]) were completed by a sample totaling 1,191 individuals. There were two sample problems: (1) A number of lilies in a pond doubles each day. At the beginning of summer there is only one lily. After 30 days, the whole pond is full of lilies. On which day is the pond half-full with lilies? Answer: 29. (2) Earth weighs 6 sextillion tons. How much would it weigh if one were to build a wall weighing 1 sextillion tons? Answer: 6 sextillion tons (see Karwowski, 2014).

Each correct answer was scored 1 point. Results were averaged, so scores ranged between 0 and 1 (*M* = .42, *SD* = .28).

Divergent thinking tasks. We used two divergent thinking tasks on a sample of 1,191 participants. This included one unusual uses task (generating unusual uses for toothpaste) and one consequences task (“what would happen if there were no cell phones or Internet?”). The fluency index was created by summing up all the answers across two tasks (α = .80). Additionally, two trained judges—junior creativity researchers with experience in scoring divergent thinking tasks—were asked to read all answers provided to each task first and then use the snapshot method (Silvia, Martin, & Nusbaum, 2009) to assess the originality of solutions provided separately for each task using a 5-point Likert scale ranging from 1 (*completely unoriginal*) to 5 (*very original*). The reliability assessed across tasks and raters was good (α = .88).[4]

1.Because our further analyses are based on latent variables models, we provide Cronbach’s alphas only for comparability purposes with previous studies.

2. Recently, Beghetto and Karwowski (2017) suggested that to differentiate more trait-like, or traditionally measured CSE, from a more dynamic, state-like and task-oriented CSE, an acronym like tCSE (standing for traditional or traitlike CSE) should be used. As in some of our recent works (e.g., Karwowski, Lebuda, Szumski, & Firkowska-Mankiewicz, 2017), we decided to follow this recommendation in the current study.

3. Because the items were scored as either incorrect (0) or correct (1), the alpha coefficient was calculated based on a matrix of tetrachoric correlations.

4. An anonymous reviewer suggested that our judges should have assessed the global creativity rather than originality alone, given that there could be unique, yet irrelevant or even weird, ideas. Although indeed in recent works, using judges’ scoring of global creativity instead of the classic “originality” has sometimes been evaluated (see e.g., Silvia, Martin, & Nusbaum, 2009), we decided to follow classic categories of divergent thinking (Guilford, 1967).

Creative activity. We used a modified version of Jauk, Benedek, and Neubauer's (2014) Inventory of Creative Activity and Achievement on a sample of 1,557 individuals (797 women). We used items related to creative activity, asking whether a participant engaged in a particular creative activity within the last year (0 = *no*, 1= *yes*). Sample activities included "Wrote a short literary work (e.g., poem, short story)," "made up a joke," or "reinterpreted a piece of music in a creative way."

Creative achievement. Carson, Peterson, and Higgins's (2005) 96-item Creative Achievement Questionnaire (CAQ) was completed by 2,085 participants (1,061 women). This measure assesses participants' creative accomplishments across 10 domains of creativity (visual arts, music, creative writing, dance, drama, architecture, humor, scientific discovery, invention, and culinary arts). We used log-transformed total CAQ scores in our analyses.

Results

Consistent with our goals to resolve the issue of the structure of creative mindsets and integrate between- and within-subject approaches, we conducted data analyses in two steps. We started with variable-centered analyses, that is, factor analysis. To this end, we randomly divided our total sample into two subsamples (subsample A*: n* = 1,936; subsample B*: n* = 1,940). On both samples, we tested two different factor solutions: (a) a one-factor solution to examine whether growth and fixed mindsets form two ends of the same continuum and (b) a two-factor solution, obtained in previous studies (e.g., Karwowski, 2014), with correlated, yet still relatively independent, mindsets. Additionally, in both subsamples, we tested a third, bifactor solution with separate fixed and growth mindsets but also one general factor loading all items. In subsample A, we proceeded with more restrictive, confirmatory factor analyses (CFAs). In subsample B, we relaxed the restrictions and allowed items to load on both factors using exploratory factor analysis in the structural equation modeling environment (ESEM; Asparouhov & Muthén, 2009), including bifactor ESEM (see, e.g., Howard, Gagné, Morin, & Forest, 2016).

When evaluating model fit, we relied on the usually applied criteria (Hu & Bentler, 1999), in which a comparative fit index (CFI) and Tucker-Lewis Index (TLI) above .90 indicate adequate fit, whereas a root-mean-square error of approximation (RMSEA) below .08 and a standardized root-mean-square residual (SRMR) below .06 indicate no misfit. Our reasoning regarding the best fitting model was based on comparisons between subsequent models within each of the subsamples. Because these models were characterized by a growing complexity (each subsequent model was nested within the previous one), while assessing models' superiority we relied on cutoff criteria recommended for testing measurement invariance (Chen, 2007; Cheung & Rensvold, 2002). More specifically, ΔCFI .01, ΔRMSEA .015, and ΔSRMR .01 would indicate that two compared models do not differ in terms of model fit.

As illustrated in Table 2, the one-factor model in both subsamples showed a visible misfit. In other words, in two independent checks, we were able to demonstrate that growth and fixed mindsets do not form two ends of the same continuum. Consequently, holding a high fixed mindset is not the same as having a low growth mindset and vice versa. The two-factor model fit was reasonably good and, in both cases, better than the fit of one-factor model, based on change in CFI, RMSEA and SRMR. The latent correlation between growth and fixed mindset was similar in sample A (r = -.19, p < .001) and sample B (r = -.17, p = .001). Thus, just as we hypothesized and as demonstrated by previous research, although creative mindsets were negatively correlated, the mindsets were also quite independent: The correlation between the two factors was relatively low.

The bifactor model fit estimated on subsample A was better than was the fit of the two-factor model (∆CFI = .04, ∆RMSEA = -.01, ∆SRMR = -.025). In other words, despite fixed and growth items' loading on factors representing two relatively independent mindsets, all CMS items also loaded onto a factor indicating a more general tendency to perceive creativity in either fixed or growth ways. As illustrated in Table 3, this fixed-versus-growth tendency was clear in all but Item 3 ("Anyone can develop his or her creative abilities up to a certain level"), which, although originally developed to measure the growth mindset and indeed loaded on the growth mindset factor, also showed a tendency to measure creativity as perceived in fixed terms. The last part of this item (i.e., "up to a certain level") may suggest that it is not possible for individuals to develop beyond a certain level, therefore suggesting a fixed mindset as well. Comparison of factor loadings between the two original mindset factors and the bifactor loadings demonstrated that the specificity of the items was still high. This was particularly apparent in the growth mindset case, with the loadings on the growth factor in the two-factor model's being several times higher than in the bifactor model. In other words, the CMS items were more saturated by specific mindsets than by the general fixed-versus-growth orientation.

In the case of the bifactor ESEM model estimated on Subsample B, the model fit—although good—was not significantly better than this of the two-factor model: ∆CFI = .008, ∆RMSEA = -.004, ∆SRMR = -.005. As illustrated in Table 3, although the items belonging to each of the specific mindset factors did load these factors significantly (λ between .53 and .71, with a median λ =.64, in the case of fixed mindset and λ between .23 and .54, with a median λ = .41, in the case of growth mindset), the loadings observed in the case of a common factor were far less systematic. Although fixed factor items indeed tended to load on the general factor negatively and the growth factor items positively, the size of loadings and their significance was not very consistent. Out of 10 items, only five loaded the common factor significantly: two fixed items ("You either are creative or you are not—even trying very hard you cannot change much" [λ = -.17, p =.02] and "Creativity can be developed, but one either is or is not a truly creative person" [λ= .22, p= .04]) and three growth items ("Anyone can develop his or her creative abilities up to a certain level" [λ = .27, p = .02], "Practice makes perfect—

perseverance and trying hard are the best way to develop and expand one's capabilities" [λ = .65, *p* = .008], and "It doesn't matter what creativity level one reveals—you can always increase it" [λ = .35, *p*= .02]). Two additional notes are important here. First, all these loadings despite the one (λ = .65) were low, even if significant. Second, one item ("Creativity can be developed, but one either is or is not a truly creative person") seemed to significantly load on the fixed mindset (the factor for which it was developed) but also showed tendencies toward loading on a growth mindset factor, as illustrated by a positive loading on the common factor in the bifactor model.

The next step of our analyses focused on within-subject explorations. To this end, we employed latent profile analysis (LPA; Collins & Lanza, 2013) on both samples. To determine the number of classes (profiles), we examined the model fit indices and sought to retain the most parsimonious model. As recommended (Nylund, Asparouhov, & Muthén, 2007), we used the bootstrapped likelihood ratio test and the Bayesian information criterion to decide which model to choose when comparing the different solutions. We examined one to five class solutions to avoid too many classes that are unlikely to be replicated in future studies. Bearing in mind our theoretical assumptions, the four-class solution (low-low, low-high, high-low, and high-high) seemed to be the most natural solution to examine. Indeed, as Table 4 demonstrates, the four-class solution was preferred across both samples over solutions with 1, 2, 3, or 5 classes, although the entropy value was slightly below the recommended cutoff of .80 and, based on this index, three classes could be considered as well.[5] Therefore, we decided to proceed with the four-class solution, which resulted in three large (25%–42% of participants) and one small (4% of participants) classes. When profiled (see Figure 1), it became apparent that the smallest group was a low fixed-low growth (LFLG) group,[6] whereas the remaining groups demonstrated clear profiles in terms of the intensity of fixed versus growth mindsets. The largest group (42%) was characterized by a low fixed and high growth mindset (LFHG). Two other classes, similar in size, were characterized by either high fixed-low growth (HFLG; 29%) or high fixed-high growth (HFHG; 25%) mindsets. Thus, the latter group that showed endorsement of both mindsets provides a reason to believe that mindsets are not necessarily opposite if people can hold both at the same time.

5For exploratory purposes, we also explored the structure and characteristics of the alternative, three-profile solution. It resulted in two large profiles (51% and 40%) and one smaller profile (9%). The largest profile (n 1,977) was characterized by a high fixed and low growth mindset (M_{growth} = -.04, SD .81; M_{fixed} =.75, SD = .59), whereas the second profile (n 1,564), was characterized by a relatively high growth and low fixed mindset (M_{growth} = .45, SD .70; M_{fixed} = -.87, SD = .59). The smallest profile (*n* =335) was a low fixed-low growth profile (M_{growth} = -1.85, SD 1.02; Mfixed = -.38, SD .89).

6 Alternatively, the members of this group could be described as belonging to the "don't care mindset" class, because it seems justified to conclude that they were generally not very interested and had no real opinion about the sources of creativity—be it fixed or growth.

Table 2
Model Fit Indices for CFA and ESEM Models Testing Different Structures of the Creative Mindsets Scale

Model and factors	Model fit				Model comparison		
	CFI	TLI	RMSEA [90% CI]	SRMR	ΔCFI	ΔRMSEA	ΔSRMR
Sample A (CFA)[a]							
One factor	.592	.475	.130 [.124, .137]	.122			
Two factors	.928	.904	.056 [.049, .062]	.058	2 vs. 1: .33	2 vs. 1: −.074	2 vs. 1: −.064
Bifactor	.966	.938	.045 [.037, .053]	.033	3 vs. 2: .04	3 vs. 2: −.01	3 vs. 2: −.025
Sample B (ESEM)[b]							
One factor	.605	.492	.122 [.116, .128]	.116			
Two factors	.983	.971	.029 [.021, .038]	.017	2 vs. 1: .38	2 vs. 1: −.093	2 vs. 1: −.099
Bifactor	.991	.978	.025 [.015, .036]	.012	3 vs. 2: .008	3 vs. 2: −.004	3 vs. 2: −.005

Note. CFA = confirmatory factor analysis; ESEM = structural equation modeling environment; CFI = comparative fit index; TLI = Tucker−Lewis Index; RMSEA = root-mean-square error of approximation; CI = confidence interval; SRMR = standardized root-mean-square residual.
[a] n = 1,936. [b] n = 1,940.

Table 3
Factor Loadings Obtained in a Bifactor CFA of Creative Mindset Scale

Item	Bifactor CFA			Bifactor ESEM		
	Growth	Fixed	Bifactor	Growth	Fixed	Bifactor
1. Everyone can create something great at some point if he or she is given appropriate conditions	.46***		.30***	.54***	−.02	.22
2. You either are creative or you are not—even trying very hard you cannot change much		.48***	−.56***	−.11	.71***	−.17*
3. Anyone can develop his or her creative abilities up to a certain level	.39***		−.16**	.23*	−.11	.27**
4. You have to be born a creator—without innate talent you can only be a scribbler		.49***	−.49***	.21	.64***	−.06
5. Practice makes perfect—perseverance and trying hard are the best way to develop and expand one's capabilities	.65***		.12*	.28	−.03	.65**
6. Creativity can be developed, but one either is or is not a truly creative person		.47***	−.29**	.03	.56***	.22*
7. Rome wasn't built in a day—each creativity requires effort and work, and these two are more important than talent	.62***		.18*	.41	−.002	.39
8. Some people are creative, others aren't—and no practice can change it		.37**	−.55***	−.03	.66***	−.11
9. It doesn't matter what creativity level one reveals—you can always increase it	.53***		.32***	.47***	.06	.35*
10. A truly creative talent is innate and constant throughout one's entire life		.55***	−.23	−.12	.53***	−.05

Note. CFA = confirmatory factor analysis; ESEM = structural equation modeling environment.
* $p < .05$. ** $p < .01$. *** $p < .001$.

In the next step, we profiled the four classes in terms of remaining creativity variables available; that is, those related to creative self-concept (tCSE and CPI) and creative potential (insight problem solving, fluency and originality of divergent thinking ideas), as well as creative activity and achievement. As illustrated in Figure 1 and confirmed by a set of independent analyses of variance,[7] the four classes obtained were characterized by different profiles on creativity variables.

Four profiles differed significantly in terms of their tCSE, F(3, 1993) = 54.84, p < .001, η_p^2 = .08. Pairwise comparison with Sidak correction for multiple tests demonstrated that all differences between profiles except one (HFHG vs. LFHG, p = .16) were statistically significant (all remaining *ps* < .001). This pattern replicated in the case of CPI, F(3, 1993) = 51.86, p < .001, η_p^2 = .07. Again, the only nonsignificant difference in terms of CPI was this between the HFHG and LFHG profiles (p = .36); all remaining differences illustrated in Figure 2 were highly significant (*ps* < .001).

7 Because our profiling variables differed between subsamples, there were a large number of missing values when we aggregated our data sets, so we had to proceed with a series of analyses of variance rather than a statistically more robust single multivariate analysis of variance.

Differences in IRT were significant yet weak in terms of the effect size, F(3, 802) = 4.53, *p* = .004, η_p^2 = .017. Pairwise comparisons demonstrated that the HFHG profile obtained higher IRT scores than did the HFLG profile (p = .006) and marginally higher results than did the LFLG profile (p =.05). All remaining differences were not significant (*ps* >.20).

Observed differences in creative potential scores were significant yet weak. In the case of insight problems, F(3, 1190) = 5.58, p .001, η_p^2 = .014, the only significant difference was observed between the LFHG and HFHG profiles (p =.004) and the LFH-G-LFLG groups (p = .035; see Figure 2). In the case of fluency, F(3, 1190) = 14.17, p < .001, η_p^2 = .021, the LFHG profile obtained significantly higher scores than did all other groups (all *ps* < .001), but no differences between the remaining profiles were observed (all *ps* >.27). The level of originality across profiles did not differ significantly, F(3, 1190) = 2.34, p = .067, η_p^2 =.01.

Creative activity and achievement were quite similar across profiles (see Figure 2). Although the omnibus F test was significant in the case of creative activity, F(3, 1556) = 4.49, p = .004, η_p^2 = .01, the only significant difference was observed between the LFHG profile and HFLG profile (p= .027); all remaining differences were not significant (*ps* >.069). In the case of CAQ scores, the omnibus F was significant as well, F(3, 2084) = 2.94, p = .032, η_p^2 =.004, but none of the pairwise comparisons achieved the standard level of significance (all *ps* >.078).

To summarize, the smallest group, LFLG, scored the lowest on creative self-concept, creative ability, and creative activity, while reporting moderate creative achievement. A similar pattern was observed among those who defined creativity in fixed terms, that is, the HFLG, or high fixed-low growth group. This class was characterized by low tCSE, CPI, and IRT and moderate skills in solving insight problems and divergent thinking tasks, as well as low reported creative activity and achievement. The largest group that defined creativity in terms of malleable skills, that is, the LFHG, or low fixed-high growth, mindset class, was consistently profiled as the most creative class, with above-average results on creative self-concept variables and creative ability, as well as creative activity and achievement. Finally, the group holding both mindsets, that is, the HFHG, or high fixed-high growth, class, presented a much more diversified profile. As illustrated in Figure 2, of the four classes, the HFHG group was characterized by the highest intensity of creative self-concept, yet their creative ability (with the exception of originality) was significantly below average.[8] This group was also characterized by moderate creative activities and accomplishments.

8 An additional one-sample t test with 0 as a reference category did indeed demonstrate that the HFHG group was characterized by a higher creative self-concept than was the mean: tCSE, t(459) = 5.97, *p*< .001, *d* = .28; CPI, t(459) = 5.50, *p* < .001, *d* = .26; and IRT, t(185) = 2.15, *p* = .03, *d* = .16, but lower insight skills, t(273) = -2.80, *p* = .006, *d* = .17, and fluency, t(459) =-2.82, *p* = .005, *d* = .13. Their scores in terms of originality, t(273) =-54, *p* = .59, *d* = .03; creative activity, t(321) =-1.13, *p* = .26, *d* = .06; and creative achievement, t(443) =-1.43, *p* = .15, *d* =.07, did not differ from average.

Table 4
Latent Profile Analysis of Creative Mindsets Scale - Model Fit Indices for Latent Profile Solutions

Sample and class	Entropy	Bootstrapped LRT difference test[a]	AIC	BIC
Sample A (n = 1,936)				
2-class solution	.767	2,066.16***	55,973.93	56,146.55
3-class solution	.835	1,131.29***	54,851.05	55,084.92
4-class solution	**.789**	**512.41***	**54,354.49**	**54,649.61**
5-class solution	.759	282.08	54,091.02	54,447.40
Sample B (n = 1,940)				
2-class solution	.759	1,905.67***	55,573.12	55,745.80
3-class solution	.837	1,208.25***	54,372.35	54,606.31
4-class solution	**.775**	**380.86***	**54,008.92**	**54,304.15**
5-class solution	.755	292.77*	53,734.63	54,091.14
Total sample (N = 3,876)				
2-class solution	.758	3,950.98***	111,527.17	111,721.31
3-class solution	.834	2,325.50***	109,198.09	109,461.11
4-class solution	**.771**	**850.61****	**108,360.11**	**108,692.03**
5-class solution	.738	535.16	107,841.06	108,241.87

Note. The four-class solution, in bold, was preferred and therefore retained for both samples. LRT = likelihood ratio test; AIC = Akaike information criterion; BIC = Bayesian information criterion.
[a]Based on 100 bootstrap samples.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

What kind of creative mindsets do people tend to hold? And do they perceive creativity as being both a fixed and a malleable trait, or do they hold only one of these mindsets? This study aimed to answer these questions by integrating variable-centered and person-centered approaches. Although exploratory, this investigation was informed by previous studies and hypotheses regarding the reasons for expecting two separate mindset factors rather than one-factor with fixed and growth ends. Building on a large sample that allowed for the application of more complex psychometric models, that is, either variable-centered (bifactor modeling) or person-centered (latent profile analysis), this study sheds some new light on this issue. Next, we discuss our main findings in relation to (a) the variable-centered question about the structure of mindsets and the most appropriate factor structure of the CMS and (b) the person-centered characteristics of a group that holds both mindsets.

The Structure of Perceived Mindsets: One, Two, or a Mix of Both?

Previous studies (Hass et al., 2016; Karwowski, 2014; Tang et al., 2016) have consistently demonstrated a two-factor rather than one-factor structure of the CMS, leading researchers to the conclusion that it is indeed possible to hold both fixed and growth mindsets and not necessarily either a growth or a fixed mindset. This very conclusion was strengthened by the usually weak negative correlations between both mindsets. To date, however, analyses of the CMS structure have relied heavily either on

comparisons of CFA models, or, as presented by Karwowski (2014), item response theory modeling of items' and scales' parameters. To the best of our knowledge, this is the first study to examine the possible bifactor structure of the CMS.

Our results demonstrate that the bifactor solution, with one general fixed-versus-growth dimension and two uncorrelated fixed and growth mindsets, indeed fit the data better than did the comparative two-factor model. This finding may indicate that the ure of perceived mindsets is even more complex than previous studies have suggested. An analysis of factor loadings on both a bifactor solution and two separate factors clearly indicates that CMS items still loaded more strongly by specific factors than did a single general factor. On the other hand, however, almost all loadings on the general factor (at least in the bifactor CFA) were statistically significant as well, even if weak. This pattern suggests that individuals indeed hold both fixed and growth creative mindsets but that a latent dimension of growth-versus-fixed mindsets does play a role here as well. In other words, although the general factor indicates that people can take the either - or perspective while perceiving the sources of creativity, two independent factors suggest that holding both factors is still possible.

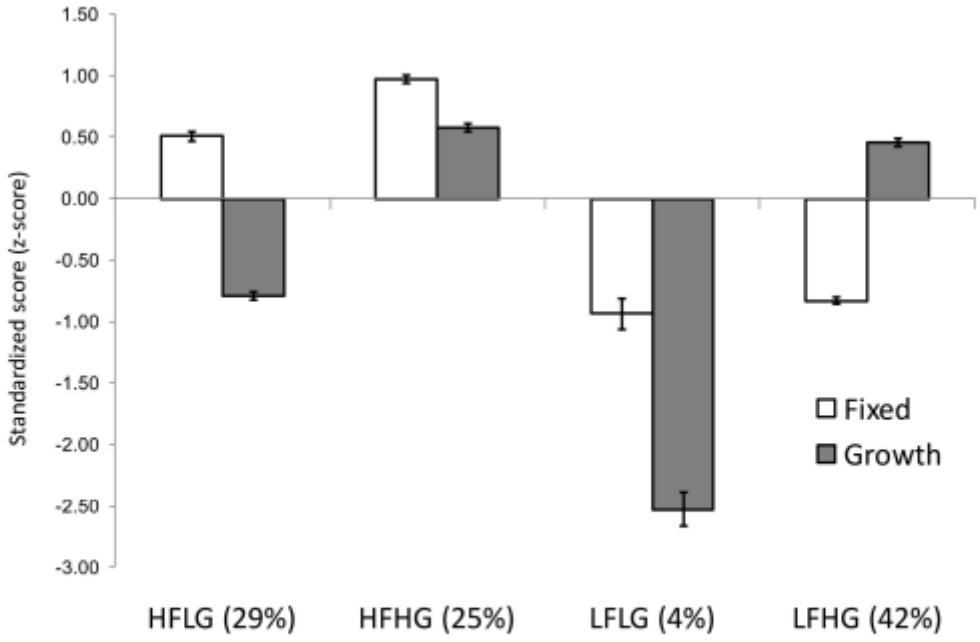

Figure 1. Profiles of obtained classes in terms of fixed and growth mindsets. Error bars indicate standard error of the means. HFLG = high fixed−low growth; HFHG = high fixed−high growth; LFLG = low fixed−low growth; LFHG = low fixed−high growth.

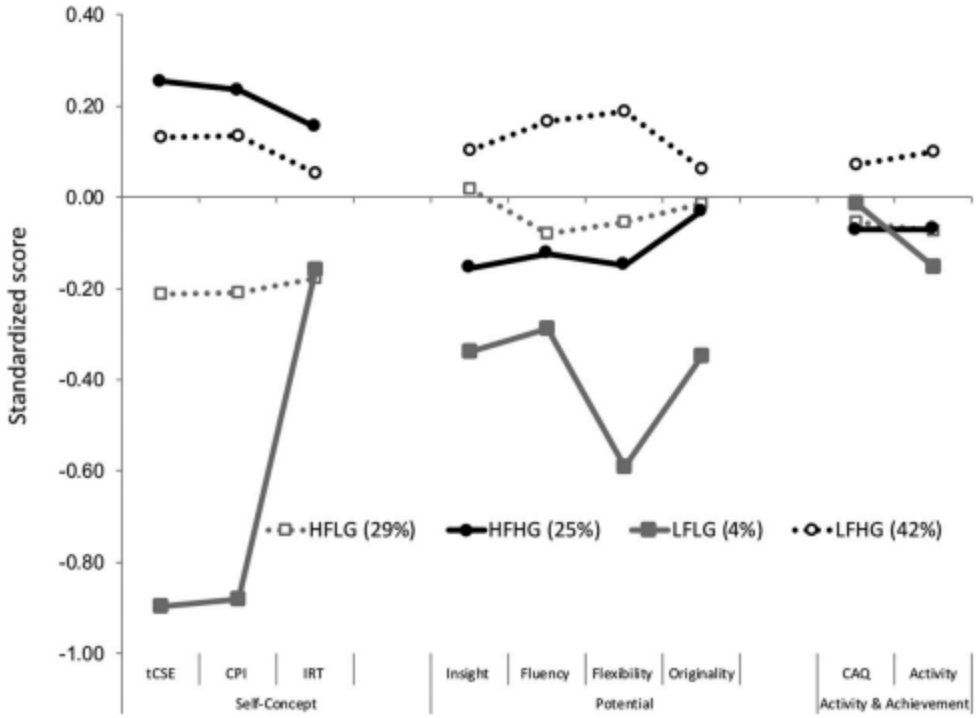

Figure 2. Profiling of obtained classes in terms of creativity-related variables. HFLG = high fixed−low growth; HFHG = high fixed−high growth; LFLG = low fixed−low growth; LFHG = low fixed−high growth; tCSE = trait-like creative self-efficacy; CPI = creative personal identity; IRT = intellectual risk taking; CAQ = Creative Achievement Questionnaire.

Although this conclusion seems to contradict the findings observed in intelligence-related mindsets (e.g., Dweck et al., 1995a, 1995b), it should be emphasized that the difference may be caused by some methodological decisions applied in previous studies. Because intelligence mindsets were assumed a priori to be unidimensional and their measurement scales were very short—usually based on three items—classification of people as entity or incremental theorists was done based on their low or high scores, respectively. Although this solution was justified on both a theoretical level (the assumed unidimensionality of fixed-growth perception) and a methodological level (avoiding risk that growth mindset items are more prone to social desirability bias), we perceive this as suboptimal. Indeed, as was recently demonstrated (Hass et al., 2016), not only does the longer CMS scale work better than do short mindset scales based on previous items from Dweck's studies but also using CMS makes it possible to explore the question about the coexistence of two qualitatively different perceptions of creativity.

We emphasize that our bifactor models—in both CFA and ESEM analyses—made it possible to detect specific problems related to two items of the current CMS scale. Bifactor CFA highlighted that Item 3 of the CMS ("Anyone can develop his or her creative abilities up to a certain level," originally developed to reflect the growth mindset [and indeed significantly loaded on the growth factor; $\lambda = .39$]) was also found to be weakly, yet significantly, saturated by the fixed factor ($\lambda = .16$). Very likely, the slightly

confusing meaning of that item stems from an idiosyncrasy of the Polish language, with quite a strong emphasis placed on the end of the sentence (thus, the “up to a certain level” but implicitly “not beyond it”). A similar pattern was found in the bifactor ESEM with relation to the Item 6 (“Creativity can be developed, but one either is or is not a truly creative person”). Although this item originally loaded on the fixed mindset scale, bifactor analysis demonstrated that it was also saturated by a growth factor. This observation suggests room for further refinements of the CMS and informs work on the next, more elaborated version of this scale.

In sum, even with a good fit of the bifactor solutions, the main conclusion of previous studies about two mindsets rather than one continuum still stands. Even if the CMS items load on a general factor, the existence of two factors was confirmed. In other words, our analyses conceptually replicated and extended previous works but did not change the main conclusion stemming from them. Yet, how are two mindsets possible, and who holds them both?

Who Holds Both Mindsets?

Two previously formulated hypotheses—one focusing on the complexity of creativity and the second assuming that the increased experience some people may possess results from creative activity—were proposed to explain the possibility of simultaneously holding two mindsets. Yet to date, intrapersonal analyses of creative mindsets have been conducted sparingly (see Karwowski & Brzeski, 2017, or Puente-Díaz & Cavazos-Arroyo, 2017a, for exceptions). Here, we applied the LPA methodology to single out and profile different categories of people, that is, those who have different configurations of both fixed and growth mindsets. The fact that we were able to demonstrate the existence of not only high fixed-low growth mindsets and low fixed-high growth mindsets groups but also much more specific low fixed-low growth and high fixed-high growth mindsets may serve as an argument that indeed holding both mindsets (or neither mindset) is possible. From the point of view of our endeavors in this study, the HFHG category seems especially interesting. A possible example of this might be individuals who believe they can increase their skills and abilities as a dancer but that there is an upper limit to how much their efforts will allow them to enhance their performance, perhaps due to recognition of physical limitations.

Are HFHG people indeed more experienced in creative activity, and do they value creativity more, as previous research has suggested (e.g., Karwowski, 2014; Karwowski & Brzeski, 2017)? On the one hand, the profile of this group is consistent with previous predictions. Indeed, the HFHG people were characterized by the highest creative self-concept, especially (trait-like) creative self-efficacy and creative personal identity. Their creative self-concept was similar (or even slightly, yet not significantly, higher) compared to the LFHG group—serving as clearly the most creative category in our LPA analysis. It is interesting, however, that other elements of the HFHG group’s profile demonstrate an even more complicated picture. As we observed, these individuals had below-average creative potential, as measured by insight and fluency of

thinking, whereas their creative activity and creative achievement were moderate. Does this mean that members of the HFHG group overestimate their creativity? Although indeed possible, this is not the only plausible explanation. Another explanation may link their high fixed mindset to the lack of endorsement—or even lack of understanding—of how insight or divergent thinking tasks may be related to creativity (see Baer, 2011; Beaty, Nusbaum, & Silvia, 2014). Thus, one would rather expect that the high fixed mindset of these people (despite their high growth mindset) would direct them toward the more professionalized, perhaps more domain-specific (Kaufman et al., 2010), forms of creative activity rather than divergent thinking or insight tasks. Naturally, further studies, including qualitative investigations, are necessary to fully understand reasons that stand behind the possibility of holding both mindsets and allowing for an even more in-depth characteristic of the HFHG group. It seems fair, however, to conclude that the expertise hypothesis provides only partial support—holding both mindsets was more strongly related to creative self-concept than to creative activity and achievement, as hypothesized.

Despite the complicated nature of the HFHG group, the profiles obtained and their characteristics were in line with our expectations. The group that could be considered as almost consistently the most creative was the one holding high growth and low fixed mindsets (LFHG). These individuals not only scored the highest on the insight and divergent thinking tasks but also reported the highest (albeit not significantly higher than other groups) creative activity and achievement, as well as high creative self-concept. It is important to note, though, that observed differences were quite trivial in terms of effect size. The smallest group, which had a “no mindset” or an “I don’t care mindset,” almost consistently scored the lowest on the measures we used for profiling groups. The only difference was that their average scores achieved on the CAQ were similar to those of other groups, a finding that definitely requires future investigation. Other characteristics, such as self-concept, insight and divergent thinking, and activity, placed them significantly below other classes.

Finally, the HFLG group, or individuals who endorsed more fixed than growth perspectives on creativity, were also the people who did not believe in their own creative capabilities (low tCSE and IRT) and did not consider creativity especially important for their identity (CPI). Still, they were moderately successful while dealing with creative tasks (insight and divergent thinking) and reported an average level of previous creative activity and achievement. Therefore, it seems that the perception of creativity as fixed and innate makes these people believe that they are not creative, even if they are able to solve creativity-related problems and demonstrate some level of creative achievement. Quite likely, however, their fixed mindset makes them less likely to believe that such skills are really relevant for creativity and serve as a proxy of creative capabilities. Creativity perceived as fixed may rather be seen as something much more serious than just generating ideas (as in divergent thinking tasks) or even taking part in creativity classes (as measured by creative activity inventories).

Limitations and Future Directions

The results we obtained should be read in light of the limitations of this study. We see at least three of them as influencing our findings and worth addressing in future studies. First, although our sample was large and representative for Polish Internet users, it is also characterized by a relatively low level of creative activities and achievements. Therefore, although it may serve as an accurate description of what laypeople think about creativity and what mindset they hold, such a sample is less appropriate to examine the predictions of the expertise hypothesis. Because this hypothesis assumes more complex mindsets among experts, and there were few individuals who could be described as truly experienced in creative activity and reporting high levels of creative achievement in our study, future studies should more directly test this hypothesis. Second, we were unable to directly test the complexity hypothesis, because it assumes that among the people who hold more differentiated and elaborated views on creativity, there is a higher likelihood of holding both fixed and growth mindsets. Thus, future studies should explore creative mindsets together with implicit theories of a creative person, process, or product or the implicit theories of the very construct of creativity to examine whether people holding both mindsets also perceive creativity in a more complex way. Third and finally, it goes without saying that mindsets in general (Narvaez & Hill, 2010) and creative mindsets in particular (Tang et al., 2016) may be culture-dependent. Creativity literature offers dozens of studies showing that not only do people from different cultures differ in their creative abilities (e.g., Niu & Sternberg, 2001; Saeki, Fan, & Dusen, 2001, but see also Karwowski, 2017) but also they operationalize creativity differently (e.g., Niu & Sternberg, 2002; Rudowicz, 2003). Therefore, we note that the results obtained in the present study may not replicate outside Poland. Indeed, a variety of cultural factors may differentiate the intensity of the growth and fixed mindsets. As we discussed in the introduction, one study (Tang et al., 2016) has shown that whereas the fixed mindset tended to be positively linked to a competition-oriented type of individualism, the growth mindset was rather linked to horizontal individualism and vertical and horizontal collectivism. Further, Narvaez and Hill (2010) demonstrated that more intense multicultural experiences translated into more growth and less fixed intelligence and creativity mindsets. Consequently, future studies should explore potential cultural-level factors standing behind different levels of creative mindsets and rigorously test the measurement invariance of the CMS across countries.

Last but not least, we believe that future studies would benefit from a refinement of the current CMS instrument as well as from examining creative mindsets regarding the possible moderating nature of level and domain of creativity. We were not only able to demonstrate a bifactor structure of the CMS but found that at least two of its items (at least as worded in Polish) show some problematic properties. Additionally, across different studies (Kwasnik, 2016; Paek & Sumners, 2017), reliability of the growth mindset scale was just above the boundary of acceptable values. Therefore, at a minimum, researchers may benefit from developing and validating a more

comprehensive and more nuanced list of fixed and growth mindset items. A more ambitious research project, we believe, would be to construct a different measure allowing researchers to assess fixed and growth mindsets across levels and domains of creativity. Such an instrument not only would allow for a more sensitive profiling of the growth and fixed mindsets across domains but also could bring substantial and relevant research findings regarding how different creative domains are perceived and what levels of creativity are indeed perceived in terms of malleability versus fixedness.

Conclusion

This study integrated psychometric and theoretical research questions regarding whether individuals possess both fixed and malleable creative mindsets and who holds both mindsets, using both between-subjects and within-subject approaches. It demonstrated that although indeed there may be a fixed-versus-growth continuum in laypeople's perception of creativity, in fact a much more prominent tendency was to characterize creativity in both fixed and growth terms. One fourth of our sample held high fixed and high growth mindsets. In essence, these individuals realized the complexity of the creativity construct and avoided simple either-or dichotomizations. Because mindsets play an important role in regulating people's behaviors, including their motivation and effort or dealing with difficult tasks, the high fixed-high growth mindset group forms an especially interesting category for future studies.

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