Influence of school environment on adolescents' creative potential, motivation and well-being

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Abstract

It is increasingly acknowledged that creativity has become essential in daily life. Each individual has the potential to be creative and the level of creativity actualization results from different factors that can be cognitive, conative and environmental. In particular, educational methods may impact creativity directly or indirectly through motivation and well-being. We hypothesized that the type of pedagogy influences levels of creativity, motivation and well-being. Furthermore, we hypothesized that creativity was linked to motivation and well-being. This study was conducted on 131 French adolescents attending a Waldorf school (alternative educational method) or a traditional school. Our results highlight differences in well-being and type of motivation when comparing both educational methods. Moreover, our results showed significant correlations between the different types of motivation and creativity scores.

Key words: educational methods; creativity; motivation; well-being; adolescents.

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1. Introduction

The rapid evolution of society obliges individuals to adapt constantly. Flexibility and creativity give the possibility to cope with the numerous changes people may have to face during their lives. Creativity is considered to be a necessary component of the problem-solving process (e.g., Mumford, Mobley, Uhlman, Reiter-Palmon & Doares, 1991), and creative ideation develops greater flexibility (e.g., Runco, 1986), hence fostering well-being (e.g., Carson, Bittner, Cameron, Brown & Meyer, 1994). Creativity has not only been described as a reaction to changes and as means of coping with it (Shaw & Runco, 1994), but it has also been conceptualized as contributing to social and societal advances (Paulus & Nijstad, 2003).

The ability to cope with new situations can thus be acquired through the development of autonomy, self-confidence, motivation and creativity (Carson, et al., 1994; Deci & Ryan, 2000; Russ, Robins, & Christiano, 1999; Shankland, Genolini, Riou França, Guelfi, & Ionescu, 2010). All the above factors may be enhanced or hindered by the individual's immediate environment, in particular by the family (Dusek & Danko, 1994; Kliewer & Lewis, 1995; McIntyre & Dusek, 1995; Ruchkin, Eisemann, & Hagglof, 1999) and educational settings (Lillard & Else-Quest, 2006; Mellou, 1996; Ogletree, 2000; Shankland, Riou França, Genolini, Guelfi, & Ionescu, 2009). Mellou (1996) suggests that creativity may be nurtured through specific educational settings in three respects: the creative environment (material, classrooms…), creative programs and creative teachers or ways of teaching. These characteristics appear to be particularly present in alternative educational systems such as Montessori and Waldorf schools (e.g., Rose, Jolley, & Charman, 2012; Murdock, 2003; Shankland, 2008).

The term creativity is used in this article as the ability to produce novel, original work that fits within particular task or domain constraints (Amabile, 1996; Gardner, 1996; Lubart, Mouchiroud, Tordjman, & Zenasni, 2003; Ochse, 1990; Runco, & Jaeger, 2012; Sternberg, & Lubart, 1995). According to Sternberg and Lubart (1995), creativity is a cognitive aptitude which requires a confluence of three distinct and interrelated resources: cognitive factors

(such as intelligence, knowledge), conative factors (such as personality, motivation, emotion) and environmental context. According to Snow (1994), levels of ability development and patterns of ability differentiation may result from different types of educational systems. However, each individual's learning history is also unique because individuals perceive situations differently according to their own background and interests. Thus, children's creative performances can be influenced by their conative aptitude, by their learning environment, and by the interaction between these two variables. The learning environment may have an impact on creative performances through explicit creativity development, for example by enhancing pretend play and role play in children according to their age (e.g., Russ et al., 1999) and by scheduling arts classes – as it can be observed in Waldorf schools (Rose, et al., 2012). Schools may also impact creativity indirectly through intrinsic motivation (Rathunde & Csikszentmihalyi, 2005) and well-being enhancement (Fredrickson, 2001).

1.1. Educational methods and creativity

The French traditional educational system is based on norms and rules that allow the class to remain as calm and structured as possible. Therefore, autonomy and risk taking are not emphasized, and pupils often remain passive. Memorization and theory applications are more practiced than integration or active thinking. Generally, teachers give exercises, which support the development of convergent thinking. There is usually one single right answer to the problem presented, leaving little room for divergent thinking. Moreover, creative thinking is rarely solicited except in arts classes. In addition, students are often in competition with one another. Therefore they cannot develop perseverance and intrinsic motivation, which are two important components of creative performances.

Alternative educational practices based on Freinet, Montessori or Waldorf pedagogical methods appear to be characterized by: (1) autonomy development, (2) active participation in knowledge and skills acquisition and integration (not only memorization), (3) development of intrinsic motivation through activity choices (students may choose specific projects they wish to work on), and reduced competition (absence of marks, cooperation…; Lillard & Else-Quest, 2006). According to Deci and Ryan's model (1985), autonomy-supportive and competence-focused educational methods meet students' fundamental psychological needs – feelings of autonomy, competence and relatedness – thereby increasing intrinsic motivation and well-being (Ryan & Deci, 2001). Through these pedagogical methods, both convergent and divergent thinking may be used, and learning is aimed at developing autonomy through

the acquisition of skills and the development of psychosocial competencies rather than being mainly aimed at acquisition of knowledge (Kendal, 1992; Shankland, et al., 2009; Shankland, et al., 2010). Creative thinking is also particularly solicited through artistic activities – mainly in Waldorf (Steiner) schools – such as painting, modeling, sculpting and theatre.

During the latter of the 20th century, several studies compaired children's performances in traditional and in alternative educational systems. Horwitz (1979) conducted a literature review from the 1930s to the late 1970s. Globally, children who were exposed to alternative educational methods showed less cognitive rigidity, more nuanced and imaginative thinking; they took more initiatives, were more open, and less conventional. Nevertheless, children exposed to alternative education outperformed those in traditional classes.

Thomas and Berk (1981) conducted a literature review concerning the effects of different school environments on children's creativity, which also yielded inconclusive results. Their hypothesis was that the environment that best supports the development of creative performance is an intermediate one, neither too structured, nor too open or flexible. Their results highlighted a complex relation for the development of creativity, which is influenced by gender, type of educational system, and creativity type (verbal or figural). In particular, they found that (1) an intermediate environment best promoted creativity, and (2) that in general, boys were more creative than girls.

Ogletree (2000), using Torrance's creativity tests (1976), also compared Waldorf and classical schools students' productions. Waldorf schools students showed greater creativity than traditional schools students (cited by Rose, et al., 2012). These results may also be explained by the diversity of artistic classes proposed in Waldorf schools and autonomous creative exercises carried out by the students themselves at home (Shankland, 2008). For example, based on the classes given by the teachers, students have to create their own folder composed of the class contents, adding information they have looked up, and decorated by drawings aiming at illustrating the lesson or simply aiming at making their folder more agreeable to read. The higher levels of creativity may also be explained by the fact that in these schools, parents are strongly recommended to restrict television use at home. As the number of hours watching television is correlated to reduced creativity (Christakis & Zimmerman, 2006), this constitutes a potential creativity factor in Waldorf students.

Another study comparing Montessori, Waldorf and classical school students (Cox & Rowlands, 2000) underlined that Waldorf students productions were more accurate (proportions, perspective), detailed and also imaginative than those of other pupils. Where differences were found between classical school and Montessori pupils, the Montessori

children tended to do better than the others. More recently, Besançon and Lubart (2008) also studied the influence of educational methods on the development of children's creativity. Their results indicated that, in general, children attending alternative education systems (Montessori and Freinet in that study) obtained higher performances than children attending traditional schools. In what concerns the positive influence of alternative educational methods on creative development from year 1 to year 2, the results show that Montessori curriculum was associated with an overall increase in creativity, for all children whatever their initial creative ability levels. However, this was not observed for children in Freinet classes. This difference could be explained by the fact that the teaching staff varied in the schools in which some teachers used Freinet pedagogical practices, whereas other teachers only used classical methods. Thus, some children in year 2 had a teacher who used traditional methods. These variations across the two years of the study support the hypothesis concerning the influence of educational methods on creativity development.

1.2. Motivation

Little use is made in alternative schools of marks which would operate as rewards or punishments for students (Shankland et al., 2010). Hence this type of education should lead to higher levels of intrinsic motivation (Deci, Koestner & Ryan, 1999, 2001). Furthermore, Amabile (1982) showed that the use of rewards has a negative impact on child creativity. Meta-analyses also underlined that any type of reward and external incitation such as school assessments lead to reduced intrinsic motivation even for an activity considered by the students as interesting in the first place (Cameron & Pierce; 1994; Deci et al., 1999, 2001). As opposed to these types of educational methods, alternative schools support student autonomy and social relationships which enhance student engagement in school activities as they act upon factors which have a positive impact on intrinsic motivation (Deci & Ryan, 2000; Furrer & Skinner, 2003; Ryan, Siller, & Lynch, 1994). Enhancing intrinsic motivation is all the more important as extrinsic motivation reduces creativity (Amabile, 1988; Cooper & Jayatilaka, 2006), while intrinsic motivation enhances creative performances (Jesus, Rus, Lens, & Imaginário, 2013). By focalizing individuals on activity results rather than on the activity itself – as does intrinsic motivation – extrinsic motivation may lead to reduced cognitive flexibility which encourages individuals to use specific algorithms which have proved to be efficacious in past experiences rather than to test more innovative solutions (Cooper & Jayatilaka, 2006).

1.3. Well-being

Alternative educational settings highlight the importance of student well-being at school. Since the definition of Subjective Well-Being (SWB) given by Diener in 1984, many research studies have been carried out on this subject. SWB is referred to as the experience of high levels of positive emotions, low levels of negative emotions, and a high level of satisfaction with life. In line with research studies on the impact of childrearing on well-being (Dusek & Danko, 1994; McIntyre & Dusek, 1995), researchers have suggested that alternative schools such as Steiner and Montessori show a similar pattern of education involving relatively high levels of responsiveness, as well as a high demand for age-appropriate behavior (Lillard & Else-Quest, 2006; Shankland et al., 2009). The hypothesis is thus made that these schools generate greater levels of SWB, which in turn should lead to higher creativity performances as suggested by a growing body of research on the links between positive affect and creativity (e.g., Amabile, Barsade, Mueller, & Staw, 2005; Hirt, Melton, McDonald, & Harackiewicz, 1996; Isen, Daubman, & Nowicki, 1987). Fredrickson's "Broaden and Build model" (2001) suggests that positive emotions *broaden* the momentary action and thoughts repertory (e.g., Fredrickson & Branigan, 2005), leading to higher levels of creativity and problem solving (as initially highlighted by Isen's studies, e.g., Isen, 1999; Isen, Daubman & Nowicki, 1987). These competencies constitute new strengths, thereby *building* sustainable resources to cope with adversity (e.g., Fredrickson, Mancuso, Branigan, & Tugade, 2000).

Since the initial work carried out by Isen and colleagues, there has been a growing interest in the link between positive emotions and creativity (for a meta-analysis see Davis, 2009). Isen, and colleagues (1987) showed that positive emotion induction improved creative performances. They originally explained this phenomenon through greater attention towards the task presented which would enhance the perception of details that could generally be ignored. They also argued that positive emotions would facilitate access to positive memories which are assumed to be more numerous than negative ones. A decade later, a neurocognitive model of positive emotions suggested that creative problem solving is improved, in part because of increased dopamine release in the anterior cingulate which enhances cognitive flexibility and facilitates the process of selection among various cognitive perspectives (Ashby, Isen, & Turken, 1999). Research in this field continues to explore the links between positive affect and creativity. A recent study carried out by Masmoudi and Charaf (2013) appears to confirm this assumption. They presented a creative task with positive or negative

valance words or with neutral ones and measured creative performances comparing these three groups. The results indicate that positive words generated greater verbal fluency, flexibility and originality.

With time, the models conceptualized to understand the relationship between emotions and creativity have become more complex and differentially explain the role of emotions on various creativity facets according to valance, arousal and intensity (De Dreu, Baas, & Nijstad, 2008; Kaufman & Vosbung, 2002; Lin, Tsai, Lin, & Chen, 2014; To, Fisher, Ashkanasy, & Rowe, 2012; Tsai, Lin**,** & Lin**,** 2013). Indeed, emotions appear to influence the different creative performances through distinct mechanisms. For example, Lin and colleagues (2014) showed that positive emotions enhanced creative performances either through cognitive flexibility (which totally mediated the relationship between positive emotional states and insight problem solving), while divergent thinking was rather associated with arousal levels. However, positive emotions remain central to these models, and ways of enhancing positive emotions in students have been tested since the early developments of positive psychology at school (see in particular publications on the Penn Resiliency Program; for a meta-analysis of its effects, see Brunwasser, Gillham, & Kim, 2009). Although these research studies focused on positive moods or states – most frequently induced (Kaufman & Beghetto, 2009) – rather than on general well-being, some studies have shown that happier students are more creative (e.g., Cacha, 1976). In the same way, happy workers appear to be more creative (Yuan, 2015).

Even though the benefits of creativity on intrinsic motivation and cognitive tasks have been documented (see Amabile, 1996), formal creativity or arts classes are often considered as less relevant to education or as mainly extra-curricular activities (Aljughaiman & Mowrer-Reynolds, 2005). Contrary to this belief, a survey underlined that in Steiner schools, teachers considered arts and creativity as a central component of all classes (Woods, Ashley, & Woods, 2005). Most of these teachers (95%) also highlighted that artistic and creative skills were an essential feature of Waldorf school teachers. As other studies carried out on alternative schools such as Montessori have also underlined greater levels of intrinsic motivation (Rathunde & Csikszentmihalyi, 2005), and studies on former alternative school students highlighted higher levels of SWB (Shankland et al., 2010) – lower levels of anxiety and depression symptoms and higher levels of satisfaction with life – it was assumed here that these students would perform better on creative tasks compared to traditional school students.

1.4. Present Study

In the current study, we examined the relationship between learning environment and students' creative performances, as well as its correlations with motivation and well-being. Based on the literature, we first tested the hypothesis according to which the type of pedagogy influenced the level of creativity, motivation and well-being. Secondly, we tested whether (1) creativity related to motivation, and (2) how creativity related to well-being.

2. Method

2.1. Participants

The data analyzed in this study was obtained from a sample of 131 French adolescents (48.9% boys, 51.1% girls; mean age = 12.74, SD = 0.97): 41 from a Waldorf school, alternative education; 90 from a traditional school. Each sample was recruited from schools in the vicinities of Paris.

Authorizations were first sought from the headmaster and teachers and then the students' parents. Only children whose parents had agreed to participate were included in the results of this research.

2.2. Material

2.2.1. Creativity measure – Evaluation of Potential of Creativity (EPoC, Lubart, Besançon & Barbot, 2011)

The authors considered creativity as a multifaceted, domain-specific construct, so instruments to measure creativity may vary as a function of the domain-component aimed at being measured. Moreover, it is possible to categorize the numerous micro-processes involve in creative potential into two main sets, called divergent-exploratory processes, and convergent-integrative processes. According to this point of view, these tests battery measures two key creative thinking-process clusters (divergent-exploratory and convergent-integrative) in verbal-literary and graphic domains (with forthcoming extensions in other domains such as social, scientific and musical domains, see Table 1). In the Divergent-Exploratory thinking tasks for graphic domain (DG index), test-takers must generate as many drawings as possible using a simple abstract shape (DG1 – Abstract Stimulus) or a familiar object (DG2 – Concrete Stimulus) as starting point, in a limited time (10 minutes). Similarly, divergent-exploratory thinking tasks in the verbal domain (DV index) consist of generating either multiple simple story-endings in response to a unique story-beginning (DV1 – Story Endings), or multiple

story-beginnings in response to a unique story-ending (DV2 – Story Beginnings), in 10 minutes. In contrast, the convergent-integrative tasks in the graphic domain (IG index) engage test-takers to produce a complete, original drawing, using at least four out of eight abstract shapes (IG1 – Abstract Stimuli) or familiar objects (IG2 – Concrete Stimuli) provided as a basis for their composition (within the 15 minutes allowed for these tasks). Similarly, in the convergent-integrative tasks applied to the literary-verbal domain, test takers have to produce a complete story either based on a provided story title (IV1 – Story Title), or on the integration of imposed fictional characters (IV2 – Story Characters).

Insert Table 1 about here

Concerning Divergent-Exploratory thinking tasks, several studies show that fluidity is strongly linked to the originality of ideas. Lubart et al. (2003) have shown that the more original ideas tend to be produced later during divergent thinking. Hence Divergent-Exploratory thinking tasks are norm-referenced (comparison of an individual's number of relevant responses generated in response to the task, in comparison to her or his reference group), while Convergent-integrative tasks are assessed using the Consensual Assessment Technique (CAT, Amabile, 1982), rated by at least three independent and qualified judges (that is, the creative productions are assessed with regard to a set of defined rubrics[1], ranging from "1-low creativity" to "7-high creativity"). Three raters (M_{age} = 38.9; SD = 4.7) assessed story creativity and drawing creativity. Judges were university professionals or PhD students who work regularly in the field of creativity. The inter-rater reliability is good ($\alpha > .80$) for the four integrative tasks (αIG1 = .83; αIG2 = .85; αIV1 = .91 and αIV2 = .90).

[1] For example, score 1 in the integrative task graphic corresponds to the rubric "very poor, total lack of idea" whereas score 7 corresponds to "a very original idea that encompassed all elements". For the verbal integrative task, score 2 means "a story which includes banal or traditional ideas" and score 7 corresponds to an "original story, well built with many details".

2.2.2. Motivation measures

We used an adapted version of the 20 items Academic Motivation Scale (Vallerand, Blais, Brière, & Pelletier, 1989). The adaptation consisted of adapting items to be more comprehensive to early teenage students and we measured only one form of intrinsic motivation out of three. Participants had to fill out the questionnaire by answering on a 5 point Likert scale ranging from: "Totally disagree" to "Totally agree". This scale enables one to measure: intrinsic motivation for knowledge (α=.84, eg. Because I experience pleasure and satisfaction while learning new things), external regulation extrinsic motivation (α=.75, eg. Because I want to have good life later on), introjected regulation extrinsic motivation (α=.82, eg. Because of the fact that when I succeed in school I feel important), identified regulation extrinsic motivation (α=.74, eg. Because this will help me make a better choice regarding my career orientation), and amotivation (α=.77, eg. Honestly, I don't know; I really feel that I am wasting my time in school). We only used intrinsic motivation because in the present study the other types of intrinsic motivation did not yield more information on the self-determination continuum contrary to the types of extrinsic motivation.

2.2.3. Well-being measures

We used the 5 items Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) which is one of the most cited subjective well-being scale in research studies. The aim of integrating this scale was to have a global measure of individual subjective well-being through the assessment of general life satisfaction. The French validation was carried out by Blais, Vallerand, Pelletier, and Brière (1989). Participants answered each item (eg. In most ways my life is close to my ideal) on a seven-point Likert scale ranging from: "Totally disagree" to "Totally agree". Internal consistency of the scale was satisfactory (α=.86).

A second well-being measure was used: the 7 items Students' Life Satisfaction Scale (Huebner, 1991). This scale aims at assessing student general satisfaction (eg. My life is better than most kids). Participants rated their satisfaction on a six-point Likert scale ranging from: "Totally disagree" to "Totally agree". Internal consistency of the scale was satisfactory (α=.83).

2.3. Procedure

Students were seen in three successive collective sessions, per class, and each session (around 45 minutes each) was separated by one week. The battery EPoC was administered in two

sessions, each of which included four tasks (DG1, DV1, IG1, IV1 in the first session, and DG2, DV2, IG2, IV2 in the second session). During the last session, students completed motivation and well-being questionnaires.

2.4. Data Analyses

For the following statistical analyses, missing data (less than 5%) were imputed in order to complete the scale by using the SPSS (version 22) expectation-maximization procedure. This procedure is considered as superior to other methods (Allison, 2002) such as removing participants with missing data (list-wise deletion).

3. Results

3.1. Preliminary analyses

The results show that Waldorf students were slightly older (M=12.83, SD=0.66) than traditional school students (M=12.24, SD=.60; $t(129)=13.70$, $p<.001$). We will therefore control for age in further analyses.

In order to determine the number of factors to be extracted we used the SPSS procedure developed by O'Connor (2000) using parallel analyses. These analyses are based on Monte Carlo simulations which enable the number of factors which may be extracted from the set of data to be determined while minimizing data loss and without enhancing random data. This method consists of generating a hundred matrices of random numbers of similar size in terms of participants and factors as the actual sample. The Eigenvalue of each factor extracted from the matrices were used to calculate the mean and standard deviation of the distribution randomly selected among the matrices identical to the set of data considered. The value corresponding to the 95^{th} percentile was used as a threshold beneath which the factors are considered as potentially randomly extracted (Cota, Longman, Holden, Fekken, & Xinaris, 1993; Turner, 1998). As shown in Table 2, the parallel analyses method enables to select only two factors, as the value of the third factor (1.01) is inferior to the 95^{th} percentile (1.18).

Insert Table 2 about here

We selected an oblimin rotation because we hypothesized that the factors were correlated. The results of the principal component factor analysis with oblimin rotation explained 46.30% of the total variance. The first factor explained 29.82% of the total variance. After rotation, the four integrative thinking items of this factor (IT) presented loadings superior to .40 while the divergent thinking items (DT) all presented loadings inferior to .30. Conversely, on the second factor which explained 16.48% of the variance, after rotation the four DT items presented loadings superior to .40 whereas the IT items all presented loadings inferior to .30.

3.2. Main results

3.2.1. Creativity

For the variance analyses we carried out a MANOVA because the dependent variables were correlated and age difference between the two groups was significant and thus included as a control variable. There were no significant differences between Waldorf (M=0.14, SD=0.60) and traditional schools (M=-.09, SD=0.73) regarding Divergent Thinking ($F[1,128]=0.22$, $p>.05$) and Integrative Thinking (Waldorf: M=3.98, SD=0.71; traditional schools: M=3.43, SD=0.82; $F[1,128]=2.18$, $p>.05$, $\eta^2=.11$).

3.2.2. Self-determined motivations

The results show a significant difference between the three types of extrinsic regulations (external, introjected and identified) and the type of educational method, as shown in Table 3. Students from the traditional educational system showed more extrinsic motivation than Waldorf school students. However, no significant difference appeared for intrinsic motivation scores ($F[1,107]=0.00$, ns), external motivation ($F[1,107]=0.88$, ns) or amotivation scores ($F[1,107]=0.20$, ns).

Insert Table 3 about here

Insert Table 4 about here

As shown in Table 4, significant correlations appear between the different types of motivations and the creativity scores: negative correlations between extrinsic regulations and integrative thinking scores, but the greater the degree of self-determination of the motivation type the weaker the correlation: for the total sample, a negative correlation is observed for IT and external regulation ($r=-.27$, $p<.01$), while the weakest negative correlation is between IT and introjected regulation ($r=-.22$, $p<.05$) but no relation is observed with identified regulation ($r=-.14$, ns). However, this effect of the type of extrinsic motivation is mainly observed for the Waldorf students. For this subsample, the relationship between IT and the different types of regulations ranges from a .50 correlation ($p<.01$) to a -.39 correlation ($p<.05$), while in the traditional school subsample there was no significant correlation between these variables. In the traditional school subsample, the significant correlations concern IT and amotivation scores ($r= -.29$, $p<.01$), and DT and introjected regulation ($r= -.33$, $p<.01$). The correlational patterns between motivation and creativity are thus different according to the educational methods under study.

3.2.3. Well-being

No significant difference between Waldorf (M=4.76, SD=1.14) and traditional school (M=4.85, SD=1.48) students was observed for general satisfaction with life ($F[1, 128]=0.12$, ns), but there were significant differences between Waldorf (M=4.36, SD=0.90) and traditional school (M=4.18, SD=1.19) student life satisfaction scores $F[1, 128]=8.20$, $p<.01$). When analyzing the Waldorf school subsample data, a negative correlation appears between well-being measures and Integrative Thinking: SWLS and IT ($r= -.48$, $p<.001$), and SLSS and IT ($r=-.41$, $p<.001$). The results suggest that the students who scored high on IT reported lower levels of life satisfaction. No correlation was shown for the traditional school subsample in what concerns the link between well-being and creativity.

Insert Table 5 about here

4. Discussion

Two main set of hypotheses were examined. The first one concerned the relationship between pedagogical methods and creativity, motivation and well-being. Contrary to our expectations, our results do not show an effect of the type of pedagogy on creative potential on Divergent or Integrative Thinking. Several explanations can be put forward. First, the pedagogical methods studied were different from the previous study carried out on this question (Waldorf for the present study vs. Montessori and Freinet in the previous study). Second, the experimental design was different: collective versus individual task completion. These differences should be controlled in future research.

In what concerns motivation, our results show an effect of the type of school on extrinsic motivation: students from traditional school settings were more extrinsically motivated than students from the Waldorf school. These results are consistent with previous work (Deci et al., 1999, 2001). Regarding well-being, our results did not highlight any difference in general life satisfaction, but in student life satisfaction. This may be explained by the fact that general life satisfaction is influenced by other variables such as personality traits (DeNeve & Cooper, 1998) and family relationships (e.g., Bendayan, Blanca, Fernández-Baena, Escobar, & Victoria Trianes, 2013), whereas student life satisfaction is directly impacted by educational methods and systems (e.g., Shankland et al., 2010), and the way they influence teacher-student relationships, type of motivation and general relationships between students at school.

Our second set of hypotheses concerned the relationship between creativity and motivation on the one hand and creativity and well-being on the other hand. Our results highlighted a negative relationship between creativity and extrinsic motivation: the stronger the extrinsic motivation, the less creative the children were on integrative thinking tasks. A pedagogy focused on the development of individual potentialities generates less extrinsic motivation and hence does not diminish the potential of integrative thinking. This finding is congruent with previous work (Cooper & Jayatilaka, 2006; Furrer & Skinner, 2003; Ryan et al., 1994). However, contrary to our expectations, our results did not show any relationship between creativity and well-being, except for Waldorf school pupils with the opposite correlation to that hypothesized: the more creative the pupils were, the less satisfied they were with their current life. While only speculations can be proposed in the present case, we could hypothesize that well-being measures may generally be completed with the intent to communicate a good impression (social desirability). Therefore, the more the participant tries to correspond to an awaited standard, the less creative they may be. The social desirability bias could thus help us understand why greater creative performances in Waldorf students

were correlated to lower levels of satisfaction with life. This bias is recurrently underlined in various research fields. Almost half the studies reported in van de Mortel (2008) showed an influence of social desirability on self-reported measures, and social desirability has been highlighted as being potentially an even greater bias in positive psychology research (Osin, 2009), as such studies tackle desirable phenomena such as well-being and flourishing (Seligman & Csikszentmihalyi, 2000).

Hence, a first limitation of the present study is the absence of use of a social desirability scale. A second important limitation concerns the fact that students were not randomly assigned to a particular school setting. Therefore, it is not possible to determine whether the educational method in itself leads to higher creative performances as other factors have not been controlled for. A third limitation concerns the focus on a single alternative pedagogy (Waldorf). Indeed, each alternative school has it specificities which may differently impact creativity and well-being. Further research studies should therefore include various pedagogical methods, such as Montessori, Freinet and Waldorf. Moreover, it would be interesting to compare the results on the EPOC battery obtained by these adolescent groups with a more consequent reference group and to verify the factorial structure of the test. A further limitation is the lack of information about the time the students have spent in their present school system, information which should be included in future research in order to control for this variable when measuring impact on creative potential.

To conclude, the results obtained in the present research study highlight lower levels of extrinsic motivation in Waldorf schools which is linked to higher divergent creativity scores. Future research studies on well-being may want to use other types of measures which can be considered as health promotion factors rather than current life satisfaction.

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Tables

Table 1

EPoC Structured framework for tasks sampling

Domain	**Thinking Process**	
	Divergent-Exploratory	*Convergent-Integrative*
Graphic	DG1 - Abstract Stimulus DG2 - Concrete Stimulus	IG1 - Abstract Stimuli IG2 - Concrete Stimuli
Verbal	DV1 - Story Endings DV2 - Story Beginnings	IV1 - Story Title IV2 - Story Characters

Table 2

Parallel analysis results

Factor	Eigenvalue	Mean	95%
1	2.39	1.39	1.53
2	1.32	1.23	1.32
3	1.01	1.12	1.18

Table 3

Motivation types, well-being, descriptive and inferential statistical analyses according to the group (with age as controlled variable)

		n	Mean	SD	F[1,128]	η2
Amotivation	Waldorf	41	1.74	0.90		
	Traditional	90	1.68	0.87	0.00	0.00
	Total	131	1.70	0.88		
EM External	Waldorf	41	3.75	1.14		
	Traditional	90	4.38	0.63	0.88	0.01
	Total	131	4.19	0.87		
EM Introjected	Waldorf	41	2.94	1.06		
	Traditional	90	3.76	.99	6.26*	0.05
	Total	131	3.50	1.08		
EM Identified	Waldorf	41	3.77	.88		
	Traditional	90	4.34	0.70	5.79*	0.04
	Total	131	4.16	0.80		
Intrinsic Motivation	Waldorf	41	3.47	0.87		
	Traditional	90	3.68	1.02	0.20	0.00
	Total	131	3.62	0.98		
SWLS	Waldorf	41	4.76	1.14		
	Traditional	90	4.85	1.48	1.46	0.01
	Total	131	4.82	1.38		
SLSS	Waldorf	41	4.36	0.90		
	Traditional	90	4.18	1.19	8.20**	.06
	Total	131	4.23	1.11		

Note: *p<.05 **p<.01

Table 4

Divergent and integrative thinking creativity scores partial correlations (with age as controlled variable) with the different types of motivations

	Am	External	Introjected	Identified	IM	Group
DT	-.16	-.03	-.20*	-.07	-.11	n=131
IT	-.23**	-.27**	-.22*	-.14	-.10	Total
DT	-.14	.02	.14	.15	.19	n=41
IT	-.09	-.51**	-.50**	-.39*	-.12	Waldorf
DT	-.14	-.05	-.32**	-.15	-.19	n=90
IT	-.29**	-.11	-.08	.01	-.08	Traditional

Note: * p<.05; ** p<.01; ***p<.001

Table 5

Partial correlations (with age as controlled variable) between divergent or integrative thinking creativity scores and mean well-being score (n=131).

	DT	IT	SWLS	Group
DT	1			
IT	.28**	1		
SWLS	-.08	-.08	1	Total
SLSS	.02	-.01	.84***	n=131
DT	1			
IT	-.12	1		
SWLS	-.20	-.48**	1	Waldorf
SLSS	-.11	-.41**	.77***	n=41
DT	1			
IT	.41***	1		
SWLS	-.04	.02	1	Traditional
SLSS	.07	.07	.86***	n=90

Note: * p<.05; ** p<.01; ***p<.001

Figures

Figure 1: Mean score of Students' Life Satisfaction Scale (SLSS) according to the type of educational method with age as controlled variable (Vertical bars denote 0.95 confidence intervals*).*

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