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

3
4 **Maud Besançon, Fabien Fenouillet, Rebecca Shankland**

5
6
7 **Abstract**

8
9 It is increasingly acknowledged that creativity has become essential in daily life. Each
10 individual has the potential to be creative and the level of creativity actualization results from
11 different factors that can be cognitive, conative and environmental. In particular, educational
12 methods may impact creativity directly or indirectly through motivation and well-being. We
13 hypothesized that the type of pedagogy influences levels of creativity, motivation and well-
14 being. Furthermore, we hypothesized that creativity was linked to motivation and well-being.
15 This study was conducted on 131 French adolescents attending a Waldorf school (alternative
16 educational method) or a traditional school. Our results highlight differences in well-being
17 and type of motivation when comparing both educational methods. Moreover, our results
18 showed significant correlations between the different types of motivation and creativity
19 scores.

20
21 **Key words:** educational methods; creativity; motivation; well-being; adolescents.
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26 **Influence of school environment on adolescents' creative potential, motivation and well-**
27 **being**

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29

30 **1. Introduction**

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

40 The ability to cope with new situations can thus be acquired through the development of
41 autonomy, self-confidence, motivation and creativity (Carson, et al., 1994; Deci & Ryan,
42 2000; Russ, Robins, & Christiano, 1999; Shankland, Genolini, Riou França, Guelfi, &
43 Ionescu, 2010). All the above factors may be enhanced or hindered by the individual's
44 immediate environment, in particular by the family (Dusek & Danko, 1994; Kliewer & Lewis,
45 1995; McIntyre & Dusek, 1995; Ruchkin, Eisemann, & Hagglof, 1999) and educational
46 settings (Lillard & Else-Quest, 2006; Mellou, 1996; Ogletree, 2000; Shankland, Riou França,
47 Genolini, Guelfi, & Ionescu, 2009). Mellou (1996) suggests that creativity may be nurtured
48 through specific educational settings in three respects: the creative environment (material,
49 classrooms...), creative programs and creative teachers or ways of teaching. These
50 characteristics appear to be particularly present in alternative educational systems such as
51 Montessori and Waldorf schools (e.g., Rose, Jolley, & Charman, 2012; Murdock, 2003;
52 Shankland, 2008).

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

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

70

71 **1.1. Educational methods and creativity**

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

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

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

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

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

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

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

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

138

139 **1.2. Motivation**

140 Little use is made in alternative schools of marks which would operate as rewards or
141 punishments for students (Shankland et al., 2010). Hence this type of education should lead to
142 higher levels of intrinsic motivation (Deci, Koestner & Ryan, 1999, 2001). Furthermore,
143 Amabile (1982) showed that the use of rewards has a negative impact on child creativity.
144 Meta-analyses also underlined that any type of reward and external incitation such as school
145 assessments lead to reduced intrinsic motivation even for an activity considered by the
146 students as interesting in the first place (Cameron & Pierce; 1994; Deci et al., 1999, 2001). As
147 opposed to these types of educational methods, alternative schools support student autonomy
148 and social relationships which enhance student engagement in school activities as they act
149 upon factors which have a positive impact on intrinsic motivation (Deci & Ryan, 2000; Furrer
150 & Skinner, 2003; Ryan, Siller, & Lynch, 1994). Enhancing intrinsic motivation is all the more
151 important as extrinsic motivation reduces creativity (Amabile, 1988; Cooper & Jayatilaka,
152 2006), while intrinsic motivation enhances creative performances (Jesus, Rus, Lens, &
153 Imaginário, 2013). By focalizing individuals on activity results rather than on the activity
154 itself – as does intrinsic motivation – extrinsic motivation may lead to reduced cognitive
155 flexibility which encourages individuals to use specific algorithms which have proved to be
156 efficacious in past experiences rather than to test more innovative solutions (Cooper &
157 Jayatilaka, 2006).

159 1.3. Well-being

160 Alternative educational settings highlight the importance of student well-being at school.
161 Since the definition of Subjective Well-Being (SWB) given by Diener in 1984, many research
162 studies have been carried out on this subject. SWB is referred to as the experience of high
163 levels of positive emotions, low levels of negative emotions, and a high level of satisfaction
164 with life. In line with research studies on the impact of childrearing on well-being (Dusek &
165 Danko, 1994; McIntyre & Dusek, 1995), researchers have suggested that alternative schools
166 such as Steiner and Montessori show a similar pattern of education involving relatively high
167 levels of responsiveness, as well as a high demand for age-appropriate behavior (Lillard &
168 Else-Quest, 2006; Shankland et al., 2009). The hypothesis is thus made that these schools
169 generate greater levels of SWB, which in turn should lead to higher creativity performances as
170 suggested by a growing body of research on the links between positive affect and creativity
171 (e.g., Amabile, Barsade, Mueller, & Staw, 2005; Hirt, Melton, McDonald, & Harackiewicz,
172 1996; Isen, Daubman, & Nowicki, 1987). Fredrickson's "Broaden and Build model" (2001)
173 suggests that positive emotions *broaden* the momentary action and thoughts repertory (e.g.,
174 Fredrickson & Branigan, 2005), leading to higher levels of creativity and problem solving (as
175 initially highlighted by Isen's studies, e.g., Isen, 1999; Isen, Daubman & Nowicki, 1987).
176 These competencies constitute new strengths, thereby *building* sustainable resources to cope
177 with adversity (e.g., Fredrickson, Mancuso, Branigan, & Tugade, 2000).
178 Since the initial work carried out by Isen and colleagues, there has been a growing interest in
179 the link between positive emotions and creativity (for a meta-analysis see Davis, 2009). Isen,
180 and colleagues (1987) showed that positive emotion induction improved creative
181 performances. They originally explained this phenomenon through greater attention towards
182 the task presented which would enhance the perception of details that could generally be
183 ignored. They also argued that positive emotions would facilitate access to positive memories
184 which are assumed to be more numerous than negative ones. A decade later, a neurocognitive
185 model of positive emotions suggested that creative problem solving is improved, in part
186 because of increased dopamine release in the anterior cingulate which enhances cognitive
187 flexibility and facilitates the process of selection among various cognitive perspectives
188 (Ashby, Isen, & Turken, 1999). Research in this field continues to explore the links between
189 positive affect and creativity. A recent study carried out by Masmoudi and Charaf (2013)
190 appears to confirm this assumption. They presented a creative task with positive or negative

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

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

211
212 Even though the benefits of creativity on intrinsic motivation and cognitive tasks have been
213 documented (see Amabile, 1996), formal creativity or arts classes are often considered as less
214 relevant to education or as mainly extra-curricular activities (Aljughaiman & Mowrer-
215 Reynolds, 2005). Contrary to this belief, a survey underlined that in Steiner schools, teachers
216 considered arts and creativity as a central component of all classes (Woods, Ashley, &
217 Woods, 2005). Most of these teachers (95%) also highlighted that artistic and creative skills
218 were an essential feature of Waldorf school teachers. As other studies carried out on
219 alternative schools such as Montessori have also underlined greater levels of intrinsic
220 motivation (Rathunde & Csikszentmihalyi, 2005), and studies on former alternative school
221 students highlighted higher levels of SWB (Shankland et al., 2010) – lower levels of anxiety
222 and depression symptoms and higher levels of satisfaction with life – it was assumed here that
223 these students would perform better on creative tasks compared to traditional school students.

224

225 **1.4. Present Study**

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

231

232 **2. Method**

233 **2.1. Participants**

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

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

241

242 **2.2. Material**

243 *2.2.1. Creativity measure – Evaluation of Potential of Creativity (EPoC, Lubart, Besançon &*
244 *Barbot, 2011)*

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

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

266

267

Insert Table 1 about here

268

269

270

271 Concerning Divergent-Exploratory thinking tasks, several studies show that fluidity is
272 strongly linked to the originality of ideas. Lubart et al. (2003) have shown that the more
273 original ideas tend to be produced later during divergent thinking. Hence Divergent-
274 Exploratory thinking tasks are norm-referenced (comparison of an individual’s number of
275 relevant responses generated in response to the task, in comparison to her or his reference
276 group), while Convergent-integrative tasks are assessed using the Consensual Assessment
277 Technique (CAT, Amabile, 1982), rated by at least three independent and qualified judges
278 (that is, the creative productions are assessed with regard to a set of defined rubrics¹, ranging
279 from “1-low creativity” to “7-high creativity”). Three raters ($M_{age} = 38.9$; $SD = 4.7$) assessed
280 story creativity and drawing creativity. Judges were university professionals or PhD students
281 who work regularly in the field of creativity. The inter-rater reliability is good ($\alpha > .80$) for
282 the four integrative tasks ($\alpha_{IG1} = .83$; $\alpha_{IG2} = .85$; $\alpha_{IV1} = .91$ and $\alpha_{IV2} = .90$).

283

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”.

284 *2.2.2. Motivation measures*

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

299

300 *2.2.3. Well-being measures*

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

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

313

314 **2.3. Procedure**

315 Students were seen in three successive collective sessions, per class, and each session (around
316 45 minutes each) was separated by one week. The battery EPoC was administered in two

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

320

321 **2.4. Data Analyses**

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

326

327 **3. Results**

328 **3.1. Preliminary analyses**

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

332 In order to determine the number of factors to be extracted we used the SPSS procedure
333 developed by O'Connor (2000) using parallel analyses. These analyses are based on Monte
334 Carlo simulations which enable the number of factors which may be extracted from the set of
335 data to be determined while minimizing data loss and without enhancing random data. This
336 method consists of generating a hundred matrices of random numbers of similar size in terms
337 of participants and factors as the actual sample. The Eigenvalue of each factor extracted from
338 the matrices were used to calculate the mean and standard deviation of the distribution
339 randomly selected among the matrices identical to the set of data considered. The value
340 corresponding to the 95th percentile was used as a threshold beneath which the factors are
341 considered as potentially randomly extracted (Cota, Longman, Holden, Fekken, & Xinaris,
342 1993; Turner, 1998). As shown in Table 2, the parallel analyses method enables to select only
343 two factors, as the value of the third factor (1.01) is inferior to the 95th percentile (1.18).

344

345

346

Insert Table 2 about here

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349 We selected an oblimin rotation because we hypothesized that the factors were correlated.
350 The results of the principal component factor analysis with oblimin rotation explained 46.30%
351 of the total variance. The first factor explained 29.82% of the total variance. After rotation,
352 the four integrative thinking items of this factor (IT) presented loadings superior to .40 while
353 the divergent thinking items (DT) all presented loadings inferior to .30. Conversely, on the
354 second factor which explained 16.48% of the variance, after rotation the four DT items
355 presented loadings superior to .40 whereas the IT items all presented loadings inferior to .30.
356

357 **3.2. Main results**

358 *3.2.1. Creativity*

359 For the variance analyses we carried out a MANOVA because the dependent variables were
360 correlated and age difference between the two groups was significant and thus included as a
361 control variable. There were no significant differences between Waldorf (M=0.14, SD=0.60)
362 and traditional schools (M=-.09, SD=0.73) regarding Divergent Thinking (F[1,128]=0.22,
363 $p>.05$) and Integrative Thinking (Waldorf: M=3.98, SD=0.71; traditional schools: M=3.43,
364 SD=0.82; F[1,128]=2.18, $p>.05$, $\eta^2=.11$).
365

366 *3.2.2. Self-determined motivations*

367 The results show a significant difference between the three types of extrinsic regulations
368 (external, introjected and identified) and the type of educational method, as shown in Table 3.
369 Students from the traditional educational system showed more extrinsic motivation than
370 Waldorf school students. However, no significant difference appeared for intrinsic motivation
371 scores (F[1,107]=0.00, ns), external motivation (F[1,107]=0.88, ns) or amotivation scores
372 (F[1,107]=0.20, ns).
373

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Insert Table 3 about here

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Insert Table 4 about here

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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

413 **4. Discussion**

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

422 In what concerns motivation, our results show an effect of the type of school on extrinsic
423 motivation: students from traditional school settings were more extrinsically motivated than
424 students from the Waldorf school. These results are consistent with previous work (Deci et al.,
425 1999, 2001). Regarding well-being, our results did not highlight any difference in general life
426 satisfaction, but in student life satisfaction. This may be explained by the fact that general life
427 satisfaction is influenced by other variables such as personality traits (DeNeve & Cooper,
428 1998) and family relationships (e.g., Bendayan, Blanca, Fernández-Baena, Escobar, &
429 Victoria Trianes, 2013), whereas student life satisfaction is directly impacted by educational
430 methods and systems (e.g., Shankland et al., 2010), and the way they influence teacher-
431 student relationships, type of motivation and general relationships between students at school.

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

447 were correlated to lower levels of satisfaction with life. This bias is recurrently underlined in
448 various research fields. Almost half the studies reported in van de Mortel (2008) showed an
449 influence of social desirability on self-reported measures, and social desirability has been
450 highlighted as being potentially an even greater bias in positive psychology research (Osin,
451 2009), as such studies tackle desirable phenomena such as well-being and flourishing
452 (Seligman & Csikszentmihalyi, 2000).

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

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

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Tables

663 **Table 1**

664 *EPoC Structured framework for tasks sampling*

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

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668 **Table 2**

669 *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

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673 **Table 3**

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

		n	Mean	SD	F[1,128]	η^2
Amotivation	Waldorf	41	1.74	0.90	0.00	0.00
	Traditional	90	1.68	0.87		
	Total	131	1.70	0.88		
EM External	Waldorf	41	3.75	1.14	0.88	0.01
	Traditional	90	4.38	0.63		
	Total	131	4.19	0.87		
EM Introjected	Waldorf	41	2.94	1.06	6.26*	0.05
	Traditional	90	3.76	.99		
	Total	131	3.50	1.08		
EM Identified	Waldorf	41	3.77	.88	5.79*	0.04
	Traditional	90	4.34	0.70		
	Total	131	4.16	0.80		
Intrinsic Motivation	Waldorf	41	3.47	0.87	0.20	0.00
	Traditional	90	3.68	1.02		
	Total	131	3.62	0.98		
SWLS	Waldorf	41	4.76	1.14	1.46	0.01
	Traditional	90	4.85	1.48		
	Total	131	4.82	1.38		
SLSS	Waldorf	41	4.36	0.90	8.20**	.06
	Traditional	90	4.18	1.19		
	Total	131	4.23	1.11		

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

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682 **Table 4**

683 *Divergent and integrative thinking creativity scores partial correlations (with age as*
684 *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

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

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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

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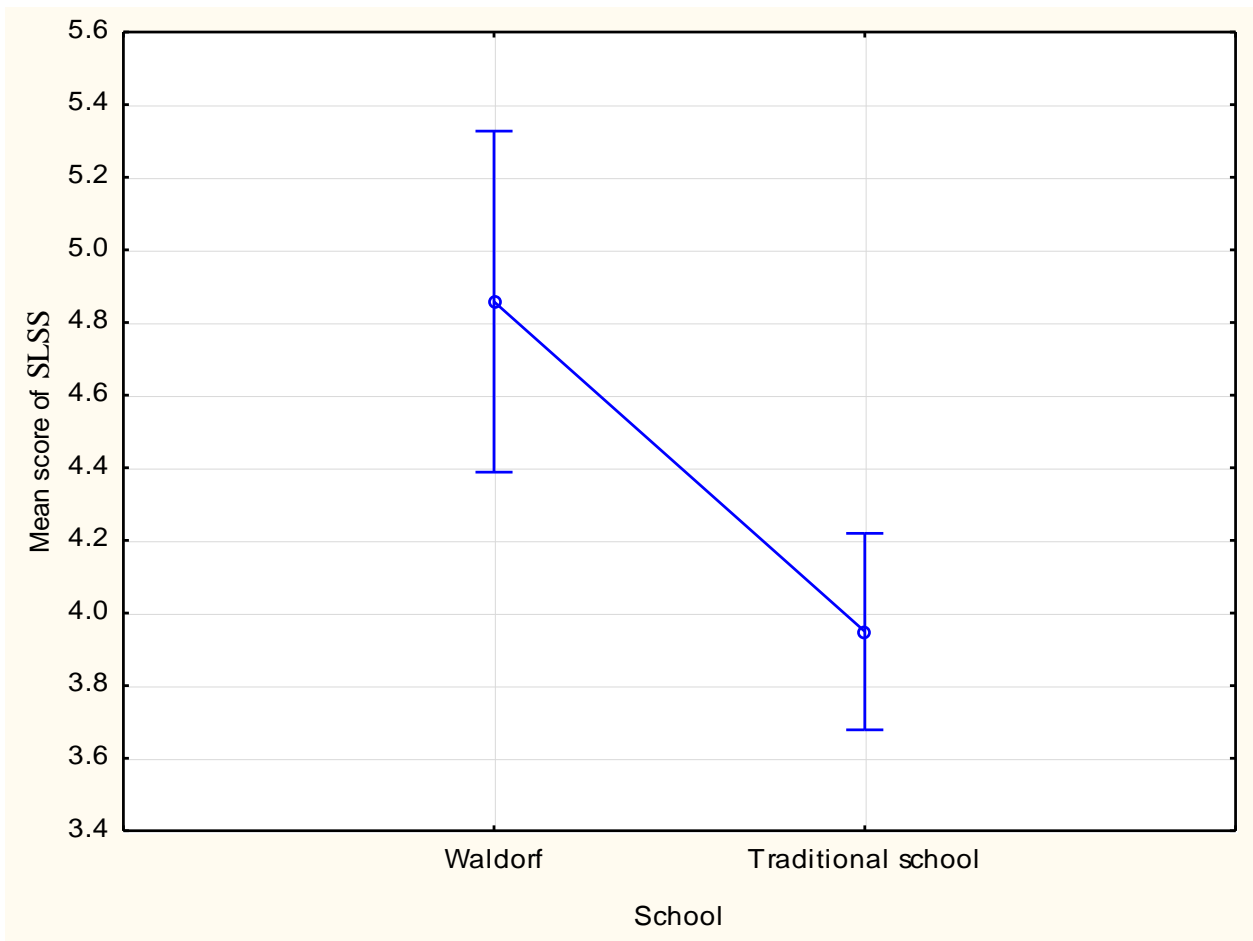
712 **Figures**

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

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