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Desire for control, perception of control: their impact on autonomous motivation and psychological adjustment

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Abstract The purpose of the present research was to test the relevance of a theoretical framework based on the matches and the mismatches between desire for control and perception of control (Evans et al. in Br J Psychol 84(2):255–273, 1993), in order to predict autonomous motivation (Deci and Ryan in Intrinsic motivation and self-determination in human behavior. Plenum, New York, 1985, 2012), depression, and anxiety (Bradley in Handbook of psychology and diabetes: A guide to psychological measurement in diabetes research and practice. Harwood Academic Press, Chur, 1994; Bruchon-Schweitzer in Psychologie de la Santé: Modèles, concepts et méthodes. Dunod, Paris, 2002). Two prospective studies were run among undergraduate students. Results of Study 1 confirmed the relevance of Evans et al.'s (in Br J Psychol 84(2):255–273, 1993) theoretical framework. More specifically, four clusters reflecting different levels of desire for control and perception of control were found. Moreover, results revealed that profiles characterized by high scores on both desire for control and perception of control were more autonomously motivated than those characterized by the three other possible combinations. Results of Study 2 replicated those of Study 1 and showed that participants combining a low desire for control and a high perception of control were the less depressed, followed by participants with high scores on both measures. No significant effects were found for anxiety.

Keywords Desire for control · Perception of control · Autonomous motivation · Depression · Anxiety

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Introduction

Having a sense of control over the environment has been found to be particularly positive. The more people actually have control and/or the more they believe they have control, the better their psychological (Thompson and Spacapan 1991; Thompson 2009) and/or health states (Christensen et al. 1991). However, some well-known studies have shown that this is not always the case. For instance, Rotter (1966) showed that a strong belief that reinforcement is controlled by the individual might be dysfunctional. Moreover, Averill (1973) showed that having control over a stressor can be stressful for some people (about 20 % of his sample). One of the variables proposed to better understand the conditions under which the perception of control can or cannot have a positive effect is the Desire for Control (DC; Burger 1992; Burger and Cooper 1979). Indeed, according to Evans et al. (1993), people differ in their DC and the level of control that people desire can moderate their reaction to perceived control. These authors argue that if perceiving control in a situation can lead to positive outcomes for people who wish to control it, it can be problematic for people who do not want or do not wish to have control over it. Several studies (e.g., Brouillard et al. 1999; Garant and Alain 1995; Tetrault

and Alain 1999) show that low DC people may experience negative psychological consequences such as depression, anxiety and psychological ill-being because of the mismatch between their DC and their Perception of Control (PC; Paulhus 1983; Paulhus and Van Selst 1990). But no research investigated other consequences of these mismatches such as autonomous motivation (Deci and Ryan 1985, 2012). This is particularly surprising when the Self-Determination Theory (SDT) has been drawn on the concept of control (Deci 1975) and autonomous motivation is a good predictor of affective, cognitive and behavioral outcomes (Vallerand 1997). Indeed, the concept of control is rooted in the need for competence (Adler 1930; Bandura 1977; White 1959) and for autonomy (DeCharms 1968).

So, is Evans' et al. model relevant in a real life context? What really are the consequences of a match versus a mismatch between the DC and the PC? These are the questions underlying the two present studies that aim to explore Evans' et al. theoretical model and the simultaneous impact of DC and PC on autonomous motivation and psychological adjustment (depression and anxiety) in an educational context.

Perception of control

Among the different conceptualizations of "perceived control" (see Skinner 1996 for a review), is the Spheres of Control model (SOC; Paulhus 1983, Paulhus and Van Selst 1990) which is a multidimensional conception of the Locus of Control (LOC; Rotter 1966) in three major spheres of life: Personal, interpersonal and sociopolitical (see below for their definitions). This conceptualization is interesting insofar as it gathers two major control constructs called by Evans et al. (1993) 'cognitions of control': Locus for Control (LOC; Rotter 1966) and Self-Efficacy (SE; Bandura 1977, 1995). LOC refers to a *"generalized expectancy that reinforcements occur as a result of one's own behavior of characteristics"* (Rotter 1992, p. 1), and SE refers to *"the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations"* (Bandura 1995, p. 2). Some authors have highlighted (Biddle 1999) that a 'true' measure of perceived control must involve perceived competence (SE) and contingency (LOC). As mentioned before, the SOC theory considers the individual as a global actor and postulates that individuals can perceive control over three distinct spheres of life (Paulhus and Christie 1981; Paulhus and Van Selst 1990), personal control, interpersonal control and sociopolitical control.

Personal Control is close to SE (Bandura 1977; Skinner 1996). It refers to the individuals' perception (or belief) that performing the required behaviors can lead to a desired outcome. In other words, personal control is a *"judgment that one has the ability, resources, or opportunities to take action to increase the likelihood of obtaining positive outcomes or avoiding negative ones"* (Thompson and Schlehofer 2008, p. 42). Interpersonal Control refers to the fact that individuals interact and attempt to have positive relationships with others (e.g., friends, colleagues, family members). Sociopolitical Control refers to the individuals' attempts to defend their personal goals and values in the political and social world. Assessed together, personal control, interpersonal control and sociopolitical control are good indicators of global perceived control (Paulhus 1983). Indeed, Thompson and Spacapan (1991) have shown that good psychological dispositions are more likely to be observed among individuals who have a high sense of control in these different spheres of life.[1]

To the best of our knowledge, no study has linked PC assessed with the SOC model and autonomous motivation (Deci and Ryan 1985, 2012). Nevertheless, PC seems to be an antecedent of autonomous motivation as suggested by studies that explored the links between autonomous motivation and LOC (Rotter 1966), as well as studies that link autonomous motivation and SE (Bandura 1977). Deci et al. (1991) have theoretically grounded the role of LOC in the behavioral regulations on which the SDT is based. Also, the LOC is hypothesized to be systematically related to the Perceived Locus of Causality (PLOC; Ryan and Connell 1989, p. 753) which is a causal attribution (deCharms 1968) referring to the degree to which people believe to be responsible for their own behavior. It can be impersonal (amotivation), external (extrinsic regulation), somewhat external (introjected regulation), somewhat internal (identified regulation) or internal (integrated regulation and intrinsic motivation; Deci and Ryan 1985; Ryan and Connell 1989). The PLOC is illustrated by the Self-Determination Continuum (Deci and Ryan 1985; Ryan and Deci 2000) which is a graphical representation of the motivational and behavioral regulations (ranging from the less autonomous -Amotivation- to the more autonomous -Intrinsic motivation) according to the PLOC.

Self-efficacy is "intrinsically" linked to SDT in the sense that autonomous motivation occurs when the three basic psychological needs are satisfied: the need for relatedness, the need for autonomy and the need for competence. The need for competence is sometimes considered as equivalent to the need for effectance (control/efficacy) or SE (Ryan and Deci 2000). However, the former refers to a feeling that one has mastered one's environment based on past experience (Van den Broeck et al. 2010) while the latter refers to an acquired cognition about one's abilities to

[1] The SOC-Scale which assesses the PC in those three spheres of life has been identified as a better tool than the Rotter's I-E Locus of Control Scale to explain psychological adjustment (Tetrault and Alain 1999).

achieve in a *specific future task* (Bandura 1997). According to Ryan and Deci (2000), assessing the need for competence equates to assessing SE, especially in an educational context (Deci et al. 1991).

So far were reviewed studies showing that LOC and SE, constructs on which the SOC model is based, are good antecedents of autonomous motivation. Thus, PC assessed with the SOC theory should logically predict autonomous motivation. However, the interaction between perception and desire for control needs to be considered for a better understanding of the process of autonomous motivation.

Desire for control

Desire for control (Burger 1992; Burger and Cooper 1979) is a personality trait defined the extent to which individuals generally are "motivated to feel as if they are in control of the events in their lives" (Burger 1992, p. 148). High desire for control people are described as assertive, decisive, active, seeking to influence others when such an influence is advantageous. This is not the case of low DC people who are described as nonassertive, passive, indecisive, less likely to attempt to influence others in social situations.

Desire for control has been found to be an antecedent of autonomous motivation. Burger (1992) administrated the Desire for Control Scale (Burger and Cooper 1979) and the General Causality Orientation Scale (Deci and Ryan 1985) to 120 students in order to assess autonomy, controlled and impersonal motivational orientations in life. Results showed a significant positive correlation between DC and autonomy orientation ($r = .18$, $p = .03$) and a negative correlation between DC and impersonal orientation ($r = -.28$, $p < .001$). Similar correlations were reported by Thompson (1990) in the educational context. More recently, Amoura et al. (2013) have shown in a sample of first year undergraduate students that DC was an antecedent of autonomous motivation toward studies mediated by the satisfaction of the need for competence. However, as already mentioned, the DC is a personality trait which deserves to be considered in relation to perceived control (Burger 1992).

Matches versus mismatches between PC and DC

The consequences of the matches between desire and perceived control (both can be either high or low) have been extensively studied. Evans et al. (1993, p. 256) have suggested to go beyond the "simplistic linear function between control and well-being" by proposing a theoretical framework highlighting the consequences of matches versus mismatches between environmental affordance (PC) and control cognitions (DC).

Garant and Alain (1995) have studied the conjoint effects of DC and PC on psychological adjustment in a sample of 224 first-year undergraduate students of psychology. Results showed the existence of a quadratic relation between the difference (in absolute value) of PC and DC, and psychological adjustment (i.e., depression, anxiety, helplessness, and psychological distress). The authors explained that a mismatch between DC and PC leads to a poorer psychological adjustment because high DC people may suffer when faced with chronic incontrollable situations. Actually, their past experiences of control or their unrealistic optimism could be challenged. In contrast, low DC people perceiving too much control over their environment can feel bad when not motivated to control it. They are placed in a situation in which they could be effective despite of their desire not to influence events that may occur. So, both those cases of inadequacy between individuals' DC and PC may cause a state of dissonance that leads to poor psychological adjustment.

However, a similar study conducted by Brouillard et al. (1999) in a sample of 120 first-year undergraduate students of psychology has shown contradictory results. The authors tried to confirm the results of Garant and Alain (1995) by studying the conjoint effects of the DC and the PC on psychological well-being, life satisfaction and happiness. If they also concluded that a large gap between levels of DC and PC leads to a poorer psychological adjustment, they added that the direction of this difference was to be taken into account. Particularly, when DC was lower than PC, students reported a better quality of relationships, a higher sense of life, self-acceptance, more life satisfaction and positive affect than when DC was higher than PC. In the same way, Tetrault and Alain (1999) confirmed that the direction of the mismatch was important to predict depression. In their study lower depression was observed among students with a low DC and a high PC ($M_{depression} = 2.80$) than among students with a high DC and a low PC ($M_{depression} = 3.14$). The authors added that students' scores of depression in the mismatching conditions did not significantly differ from those in the worse matching condition (Low DC/Low PC = 3.13). The best scores of psychological adjustment ($M_{depression} = 2.53$) were reported by high DC/high PC students. In other words and contrary to the results of Garant and Alain (1995), not only the two matching conditions had opposite effects on adjustment (so, matching in itself is not a guaranty of adjustment) but the two mismatching conditions did not lead to worse psychological adjustment compared to the matching 'low DC/low PC'' (Evans et al., 1993).

Finally, Brouillard et al. (1999) showed similar results using variables that were more related to SDT, namely: the needs for relatedness, autonomy and competence (assessed with the Psychological Well-Being Scale, Ryff 1989).

Results showed that these three psychological needs were respectively correlated to PC ($r = .56$; $r = .49$; $r = .54$) and DC ($r = .35$; $r = .58$; $r = .44$). Results also indicated that the interaction between DC and PC did not explain the satisfaction of student's need for relatedness or competence, but significantly explained the satisfaction of student's need for autonomy (2 % of the variance).

Because it assesses constructs that are intrinsically linked to SDT, the Brouillard et al.'s study (1999) seems to be particularly relevant. As already mentioned, the authors have shown, in line with Evans et al. (1993) and Tetrault and Alain (1999), that the effects of the two matching conditions were very different from each other (Low DC/Low PC leading to weak psychological adjustment, High DC/High PC leading to the opposite). Moreover, the effects of the mismatching conditions did not lead to a worse psychological adjustment than the Low DC/Low PC condition. Finally, DC and the PC can also impact the satisfaction of the basic psychological needs on which autonomous motivation is based.

The present research

Starting from the idea that students' reactions to perceived control depends on their motive to control the environment (Wortman and Brehm 1975), the first aim of this research is to observe the conjoint effects of DC (Burger 1992; Burger and Cooper 1979) and PC (Brouillard et al. 1999; Garant and Alain 1995; Tetrault and Alain 1999) on autonomous motivation (Deci and Ryan 2012), depression and anxiety (Bradley 1994; Bruchon-Schweitzer 2002). These effects were observed in an educational context among two samples of undergraduate students in economy and psychology. While past studies were run using an inter-individual approach of DC and PC, we propose here to use an intra-individual approach. Indeed, before testing for the distinct and conjoint effects of DC and PC, one had to check whether the four supposed cells do exist in a sample as hypothesized by Evans et al.'s theoretical framework (1993). Study 1 investigated the existence of those groups and tested the effect of those profiles on Autonomous motivation (Brouillard et al. 1999). Study 2 aimed to replicate the existence of those profiles and also explored their impact on (1) autonomous motivation (Deci and Ryan 2012), and (2) depression and anxiety (Brouillard et al. 1999; Garant and Alain 1995; Tetrault and Alain 1999).

An alternative statistical procedure which focuses on the similarity between participants and which permits to detect naturally occurring groups of people according to their relative position on specific variables (cluster analyses; Henry et al. 2005) is proposed to test the existence of the suspected profiles among participants. This way of doing permits then to treat clusters as an independent variable and to test their effect on the dependent variables under study, here autonomous motivation and adjustment. Cluster analyses does not allow to identify the unique contribution of each variable (here DC and PC taken as continuous independent variables) on dependent variables (as for their interaction). However it seems not to be so problematic insofar as our independent variables do not have cut-offs levels predicting their positive or negative impact on autonomous motivation and psychological adjustment. Also, this person-oriented approach is interesting because it also provides opportunities for researchers to determine the number of participants characterized by distinct "control" profiles while correlation or regression analyses do not (Ratelle et al. 2007). Moreover, cluster analyses are a relevant confirmatory approach when based on theoretical arguments brought by exploratory procedures such as multiple regression (Gore 2000, p. 301). Because previous studies used multiple hierarchical regressions (Brouillard et al. 1999; Garant and Alain 1995; Tetrault and Alain 1999), cluster analyses could be complementary and bring more insights from a qualitative point of view (Henry et al. 2005). Finally, cluster analyses are regularly used in the SDT literature (Altintas and Guerrien 2012; Archambault et al. 2010; Gillet et al. 2010, 2012; Ratelle et al. 2007; Stephan et al. 2010; Wolfradt et al. 2003).

In line with Evans et al. (1993) theoretical framework, it was hypothesized in Study 1 that 4 distinct clusters will emerge from the analysis (hypothesis 1). The first cluster should gather students with a high DC and a low PC (cluster 1; High DC/Low PC), the second students with a low DC and a high PC (cluster 2; Low DC/High PC), the third students with a low DC and a low PC (cluster 3; Low DC/Low PC), and finally, the fourth cluster students with a high DC and a high PC (High DC/High PC, cluster 4). Moreover, it was hypothesized that the lowest levels of autonomous motivation would be observed in the Low DC/Low PC cluster (Burger 1992; Evans et al. 1993; Thompson 2009), inversely to the High DC/High PC cluster because PC benefits essentially to individuals who want control (Thompson and Spacapan 1991; Thompson and Schlehofer 2008; hypothesis 2). Students in the High DC/Low PC and those in the Low DC/High PC will report moderate levels of autonomous motivation, lying in between the two matching clusters (cluster 3, Low DC/Low PC and cluster 4, High DC/High PC) because psychological outcomes are not optimal if control (DC or PC) is missing (Evans et al. 1993; hypothesis 3). Finally, students in the Low DC/High PC profile will report higher scores on autonomous motivation than students of cluster 1 (High DC/Low PC) as suggested by the results of Brouillard et al. (1999), and those of Tétrault and Alain (1999; hypothesis 4).

Study 2, aimed to replicate results of Study 1 as for the existence of the aforementioned clusters and their effect on autonomous motivation, but added two correlated dependent variables often used in studies focusing on the conjoint effects of DC and PC: depression and anxiety (Brouillard et al. 1999; Garant and Alain 1995; Tetrault and Alain 1999). Thus, in line with Evans et al. (1993) theoretical framework and the study of Tetrault and Alain (1999), it was hypothesized that depression (hypothesis 5) and anxiety (hypothesis 6) would be higher in the Low DC/Low PC cluster, and lower in the High DC/High PC cluster. Students belonging to the mismatching clusters will show scores of depression (hypothesis 7) and anxiety (hypothesis 8) lying in between of those in the matching clusters (High DC/High PC and Low DC/Low PC). Finally depression (hypothesis 9) and anxiety (hypothesis 10) will be higher among students in the High DC/Low PC cluster than those in the Low DC/High PC cluster.

Study 1

Method

Participants and procedure

The study included 98 French students in their third year of economy at the University of Reims, with 49 males and 49 females (*M* age was 21.5; SD = 1.64). Students were recruited during a regular lesson after a month of courses. Questionnaires were presented as being part of the course requirements and as illustrating a part of the lesson on motivation.

Measures

Desire for control DC was assessed with the DCS (Burger and Cooper 1979) translated into French by Alain (1989). Results from past studies (Amoura et al. 2013; Garant and Alain 1995; Legrain et al. 2011) provided good support for the psychometric properties of the French version. Originally, the scale contains 20 statements that refer to the individuals' motive for control in various domains (e.g., "I enjoy making my own decisions"; $\alpha = 0.60$). Because of the low internal consistency of the scale among our sample, we excluded reversed items in order to reach a satisfactory alpha (0.70). Participants were asked to indicate the extent to which each statement described them on a 7-point Likert scale ranging from 1 *(this sentence does not describe me)* to 7 *(this sentence greatly describes me).*

Perception of control Perception of control was assessed with the French version of Spheres of Control Questionnaire (Garant and Alain 1992). This scale contains 30 statements that refer to the perceived control three spheres of life: personal control (self-efficacy and locus of control), interpersonal control and sociopolitical control. Internal consistency of the scale was satisfactory ($\alpha = 0.75$). All items are measured on a 7-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). The Spheres of Control Questionnaire has been found reliable and valid (for a review, see Paulhus and Van Selst 1990; Garant and Alain 1995; Brouillard et al. 1999; Tetrault and Alain 1999).

Academic motivation Students' motivation was assessed with the French version of the Academic Motivation Scale for College (Vallerand et al. 1989). This questionnaire contains 28 items that assess intrinsic motivation, three forms of extrinsic motivation, and amotivation. Internal consistency of the different subscales was satisfactory (between 0.61 and 0.86). All items are assessed on a 7-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). The seven subscales were combined into a Relative Autonomy Index (Grolnick and Ryan 1987; Ryan and Connell 1989). High positive scores on this index reflect high levels of self-determined motivation, whereas low scores reflect low levels of self-determined motivation. This scale has been found to be reliable and valid (Brault-Labbé and Dubé 2010; Vallerand et al. 1993).

Results

Descriptive statistics and preliminary analyses

Data were first of all checked for extremes and outliers, none were found. Means and correlations between variables are presented in Table 1. Results showed that all variables were significantly correlated each other.

Main analyses

To explore the existence of specific profiles of participants according to their levels of DC and PC, we ran a

Table 1 Study 1: means, standard deviations and correlations between the different variables

	Means	SD	1	2
1. Desire for control	4.90	0.50	–	
2. Perception of control	2.78	0.60	0.37***	–
3. Autonomous motivation (RAI)	4.74	4.20	0.21*	0.40***

* $p < .05$; ** $p < .01$; *** $p < .001$

hierarchical cluster analysis with the Ward's method on the z scores of the two variables (DC and PC). Given that the correlation between DC and PC was 0.37, multicollinearity was not an issue for subsequent analyses (tolerance = 0.86; >0.20). Examination of the dendogram and agglomeration schedules suggested that a four-cluster solution was the most suitable. Results from a k-means cluster analysis confirmed the consistency of the four-cluster (Hair et al. 1998). The homogeneity within each cluster (i.e., the H coefficient) for the four-cluster solution was satisfactory with H values ranging from 0.75 to 0.90 (Tryon and Bailey 1970). The Bayesian Index Criterion (Schwarz 1978) confirmed this choice as the lower value was observed for the four-cluster solution (see Table 2). Participants of cluster 1 (n = 26) were high on DC and low on PC; they were identified as High DC/Low PC cluster. Participants of cluster 2 (n = 34) were low on DC and high on PC; they were identified as the Low DC/High PC cluster. Participants of cluster 3 (n = 30) were low on both measures; they were identified as the Low cluster. Finally, participants of cluster 4 (n = 8) were high on both scores; they were identified as the High cluster.

Table 3 shows means and standard deviation on DC, PC and autonomous motivation, for all clusters. First of all, a one-way MANOVA was conducted using profile groups as the independent variable and the two types of perceptions as the dependent variables. Results showed significant differences between the four groups, $F(6,186) = 58.45$, $p < .001$, $\eta^2 = 0.65$. Follow-up univariate analyses indicated significant ($p < .001$) group differences on the two perception variables. Concerning on DC, Fisher LSD post hoc tests showed that the means of each cluster differed from each other at $p < .001$, except the High DC/Low PC cluster which did not differ from the High cluster. All cluster also differed from each other on PC except for the Low cluster which not differ from the High DC/Low PC cluster.

Finally, an ANOVA, planned comparison and Fisher LSD post hoc tests were conducted to determine the effect of clusters on the autonomous motivation. Results showed a significant effect of clusters on autonomous motivation calculated with the RAI, $F(3, 94) = 3.19$, $p < .03$, $\eta^2 = 0.09$. Because we hypothesized a linear ordering effect, we ran a polynomial linear contrast, which was significant ($F(1, 94) = 5.48$, $p < .02$). Post hoc tests showed that the means of the Low DC/High PC and the Low clusters were significantly different ($p < .01$) as well as the Low and the High clusters ($p < .05$). Students in the Low DC/High PC cluster tended to be more motivated ($p = .07$) than students in the High DC/Low PC cluster.

In other words, students with a low DC and PC were (1) significantly less motivated than students with a low DC and a high PC and (2) significantly less motivated than students with a high DC and a high PC.

Table 2 Study 1: Bayesian information criterions (BIC) according to the different number of clusters

Number of classes	Bayesian information criterion (BIC)	BIC modification	Proportion of BIC modifications	Proportion of measures of distance
1	153,194			
2	129,554	−23,641	1,000	2,113
3	128,025	−1,528	.065	1,035
4	127,166	−.859	.036	2,277
5	137,073	9,907	−.419	1,318
6	149,017	11,944	−.505	1,025
7	161,118	12,101	−.512	1,097
8	173,773	12,655	−.535	1,561
9	188,471	14,699	−.622	1,311
10	204,034	15,563	−.658	1,218
11	220,094	16,060	−.679	1,125
12	236,407	16,313	−.690	1,093
13	252,893	16,486	−.697	1,129
14	269,590	16,697	−.706	1,025
15	286,328	16,738	−.708	1,417

Discussion

The purpose of study 1 was to confirm the existence of the four profiles predicted by Evans et al. (1993) and to explore their effects of autonomous motivation. Our results showed that the theoretical framework was relevant (hypothesis 1); 4 distinct clusters emerged depicting the 4 possible combinations of DC and PC's levels. Higher motivation was observed in the High cluster and lower motivation in the Low cluster (hypothesis 2); mismatching clusters (High DC/Low PC and Low DC/High PC) laid in between the High and Low profiles because of the lack of either desire or perception of control (hypothesis 3). Finally, autonomous motivation was higher among students in the Low DC/High PC cluster compared to students in the High DC/Low PC cluster, but the results just tended to be significant (hypothesis 4).

Our results were consistent with former studies that investigated the conjoint effects of desire and perception of control on self-determination (Brouillard et al. 1999). More precisely, a high DC and a high PC configuration leads to an internal PLOC, in the sense that the more students desire and perceive control the more they feel themselves at the basis of their behaviors during their studies (and conversely for students with a low DC and a low PC). In other words, when a match between the DC and the PC occurs, motivation depends on the type of matching profile, which can

Table 3 Study 1: descriptive statistics for the four-cluster solution

	Cluster 1 low		Cluster 2 high DC/low PC		Cluster 3 low DC/high PC		Cluster 4 high		F	p	η^2
	M	SD	M	SD	M	SD	M	SD			
Desire for control	-1.08^a	0.64	0.84^b	0.59	0.11^c	0.60	0.82^b	0.76	50.38	.000	0.62
Perception of control	-0.65^a	0.63	-0.65^a	0.61	0.61^b	0.44	1.98^c	0.41	74.22	.000	0.70
Autonomous motivation	3.31^a	3.65	4.11^b	4.77	6.08^b	3.16	6.53^c	6.22	3.19	.03	0.09

Means that do not share subscripts differ by $p < .05$ according to Fisher LSD post hoc tests

be high or low, the former being associated to autonomous motivation contrarily to the later. When a mismatch occurs, autonomous motivation differs in function of the direction of the relation between DC and PC. When DC is lower than PC, a more internal PLOC occurs. We may imagine that the fact to feel at the origin of the behavior and effective, despite of the desire for control, leads to a somewhat internal PLOC because of the satisfaction of the needs for autonomy and competence. Conversely, when DC is higher than PC, a more external PLOC occurs. We also can imagine that the configuration in which a student perceives low control (in other word, to feel an external LOC and low SE) and strongly desires to affect events in the environment does not allow for his satisfaction of the needs for autonomy and competence. In this case, the "why" of the behavior is more related to external sources (external PLOC).

Study 2

The previous study showed that the Evans et al. (1993) control approach was relevant to predict autonomous motivation. Study 2 proposes to focus on autonomous motivation and adds two other dependent variables as used in previous studies concerning the conjoint effect of the desire and the perception of control, namely depression and anxiety.

Method

Participants and procedure

Participants were 218 French students in their first year of psychology studies at the same University (48 males and 170 females). The mean age was 19.22 years (SD = 1. 73). Two times of measures were organized, the first one during the first lesson (in which DC, PC and autonomous motivation were assessed) and the second one a month later (during which depression and anxiety were measured). Questionnaires were presented as being part of course requirements and illustrating a part of the courses on social psychology. The choice to assess separately DC, PC and autonomous motivation before assessing psychological adjustment (depression and anxiety), has been made in order to allow students to immerse themselves in their new academic environment and have affective measures linked as far as possible to the educational context (Burger 1984).

Measures

Desire for control DC was assessed with the DCS (Burger and Cooper 1979) translated into French by (Alain 1989) as in Study 1. Internal consistency of the scale, still without reversed items was good ($\alpha = 0.70$).

Perception of control Perception of control was assessed with the French version of Spheres of Control Questionnaire (Garant and Alain 1992) as in Study 1. The internal consistency was also good ($\alpha = 0.71$).

Academic motivation Students' motivation was assessed with the French version of the Academic Motivation Scale for College (Vallerand et al. 1989) as in Study 1. Internal consistency of the different subscales was satisfactory (between 0.61 and 0.83). Again, the RAI has been calculated.

The well-being questionnaire Students' anxiety and depression was assessed with two subscales of the French version of the well-being questionnaire (Bruchon-Schweitzer 2002). The depression subscale was composed of six items and anxiety subscale was composed of six items, all measured on a 4-point Likert scale ranging from 1 (*Never, very rarely*) to 4 (*Frequently, all the time*). Internal consistency of depression ($\alpha = 0.61$) and anxiety ($\alpha = 0.74$) were satisfactory. This scale has been found reliable and valid (Berjot and Girault-Lidvan 2009; Bruchon-Schweitzer 2002).

Results

Descriptive statistics and preliminary analyses

Data were first of all checked for extremes and outliers, none were found. Means and correlations between

variables are presented in Table 4. Attrition analyses were run in order to test for the differences in characteristics between participants at Time 1 and Time 2. Results revealed that participants did not differ on all variables. Results showed that DC, PC and autonomous motivation were significantly correlated with each other, that PC was negatively correlated to depression, and that depression was positively correlated to anxiety.

Main analyses

A hierarchical cluster analysis, similar to the one used in Study 1, was run. Given the correlation between DC and PC ($r = -.47$), multicollinearity was not an issue (tolerance = 0.78; > 0.20). Again, a four-cluster solution was the most suitable and the Bayesian Index Criterion (see Table 5) confirmed the relevance of the four-cluster solution suggested by the examination of dendograms and agglomeration schedules. The homogeneity within each cluster (i.e., the *H* coefficient) for the four-cluster solution was satisfactory with *H* values ranging from 0.75 and 0.90 (Tryon and Bailey 1970).

Participants of cluster 1 (n = 59) were low on DC and high on PC; they were identified as the Low DC/High PC cluster. Participants of cluster 2 (n = 47) had low scores on both measures and was identified as the Low cluster. Participants of cluster 3 (n = 58) had a high score on DC and a low score on PC; it was identified as the High DC/Low PC cluster. Finally, participants of cluster 4 (n = 54) had high scores on both measures and was identified as the High cluster.

Table 6 presents the means and standard deviations of DC, PC, autonomous motivation, depression and anxiety according to clusters. A one-way MANOVA was conducted using profile groups as the independent variable and DC and PC as the dependent variables. Results showed significant differences between the four groups, $F(6, 426) = 138.46$, $p < .001$, $\eta^2 = 0.66$. Follow-up univariate analyses also indicated significant ($p < .001$) group differences. Fisher LSD post hoc tests showed that the means of each cluster differed from each other at least at $p < .01$ for DC and PC.

Finally, a one way MANOVA was conducted to determine the effect of clusters on autonomous motivation, depression and anxiety. Results showed a significant effect (wilks Lambda = 0.79, $F(9, 318) = 3.53$, $p < .001$, $\eta^2 = 0.09$). So, univariate analyses were run for each of our dependent variables. First, results showed a significant effect of clusters on motivation ($F(3, 214) = 12.67$, $p < .001$). Moreover, polynomial linear contrast analysis showed that this effect was linear ($F(1, 214) = 36.12$, $p < .001$). Post hoc tests revealed that participants in the Low cluster were less motivated than participants in the High DC/Low PC cluster ($p < .01$), who were less motivated than those in the Low DC/High PC cluster ($p < .01$). However, participants of the Low DC/High PC cluster were as motivated as those in the High cluster.

The effect of clusters tended to be significant on depression ($F(3, 133) = 2.53$, $p = .06$, $\eta^2 = 0.05$). Moreover, polynomial linear contrast analysis showed that this effect was linear ($F(1, 133) = 6.19$, $p < .01$). Fisher LSD post hoc tests revealed that students in the Low cluster were more depressed compared to students in the High cluster ($p < .05$). Students in the mismatching clusters (High DC/Low PC and Low DC/High PC) did not differ from each other's ($p = .23$). However, students in the Low cluster were more depressed than students in the Low DC/High PC cluster ($p < .05$). No significant results were found for anxiety ($F(3, 133) = 0.77$, $p = .51$, $\eta^2 = 0.02$).

Discussion

Study 2 aimed to replicate results of Study 1 on the existence of the 4 clusters and their conjoint effects on autonomous motivation, and to confirm results of past studies on the effect DC and PC on two adjustment variables often used in similar studies, namely depression and anxiety (Brouillard et al. 1999; Garant and Alain 1995; Tetrault and Alain 1999).

Table 4 Study 2: means, standard deviations and correlations between the different variables for study 2 at time 1 and time 2

	Means	SD	1	2	3	4
1. Desire for control[a]	4.90	0.68	–			
2. Perception of control[a]	2.86	0.58	0.47***	–		
3. Autonomous motivation[a] (RAI)	7.08	2.75	0.29***	0.34***	–	
4. Depression[b]	1.98	0.41	−0.07	−0.33***	−0.15	–
5. Anxiety[b]	1.97	0.61	0.01	−0.15	0.05	0.47***

[a] n = 218

[b] n = 137

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 5 Study 2: Bayesian information criterions (BIC) according to the different number of clusters for Study 2

Number of classes	Bayesian information criterion (BIC)	BIC modification	Proportion of BIC modifications	Proportion of measures of distance
1	322,749			
2	252,294	−70,455	1,000	1,779
3	222,116	−30,178	.428	1,470
4	208,472	−13,644	.194	1,888
5	211,378	2,906	−.041	1,094
6	215,881	4,503	−.064	1,893
7	228,419	12,538	−.178	1,405
8	243,551	15,132	−.215	1,075
9	259,129	15,578	−.221	1,000
10	274,709	15,580	−.221	1,007
11	290,328	15,619	−.222	1,047
12	306,214	15,887	−.225	1,244
13	323,210	16,995	−.241	1,299
14	341,251	18,041	−.256	1,264
15	360,023	18,771	−.266	1,159

Table 6 Study 1: descriptive statistics for the four-cluster solution

	Cluster 1 low		Cluster 2 high DC/low PC		Cluster 3 low DC/high PC		Cluster 4 high		F	p	η^2
	M	SD	M	SD	M	SD	M	SD			
Desire for Control	-1.20^{a}	0.59	0.34^{b}	0.39	-0.44^{c}	0.49	1.17^{d}	0.55	206.90	.000	0.74
Perception of control	-0.99^{a}	0.62	-0.63^{b}	0.60	0.49^{c}	0.45	0.99^{d}	0.73	123.30	.000	0.63
Autonomous motivation	5.36^{a}	2.70	6.68^{b}	2.27	7.85^{c}	2.56	8.18^{c}	2.70	12.67	.000	0.15
Depression	2.14^{a}	0.40	1.99^{abc}	0.37	1.87^{b}	0.30	1.93^{bc}	0.48	2.53	.06	0.05
Anxiety	2.02	0.68	2.03	0.57	1.81	0.65	1.98	0.55	0.77	.511	0.02

Means that do not share subscripts differ by $p < .05$ according to Fisher LSD post hoc tests

The results of this study confirmed the existence of the four profiles predicted by Evans et al. (1993; hypotheses 1). Moreover, results showed that higher autonomous motivation was observed among students with a high DC and high PC cluster, and lower motivation among students with low scores on both measures confirming hypothesis 2. Mismatching clusters (Low DC/High PC and High DC/Low PC) were found to be lying in between the High and Low clusters, thus confirming hypothesis 3. Autonomous motivation was significantly higher among students belonging to the Low DC/High PC cluster than among students belonging to the High DC/Low PC cluster, confirming hypotheses 4.

As for depression, results confirmed that students in the Low cluster would be less depressed than in those the High cluster (hypothesis 5). However, contrary to what was found for autonomous motivation, the Low DC/High PC cluster did not differ from the High cluster, infirming hypothesis 7. Thus, students belonging to the Low DC/High PC cluster were as little depressed as those in the High cluster. Finally, the two mismatching clusters did not differ from each other infirming hypothesis 9. As for anxiety, results showed no effects of cluster infirming all hypotheses related to this measure (hypothesis 6, 8 and 10).

So, in line with Study 1, Evans et al. (1993) framework which predicted psychological outcomes in function of DC and PC levels seems to be a relevant design to predict autonomous motivation toward studies. However, unexpectedly, students in the Low DC/High PC cluster were as little depressed as students in the High DC/High PC cluster. It is well known in the literature on depression that the attributional style is important to understand depression. Seligman et al. (1979) have shown that depressed individuals attribute bad outcomes to internal, stable and global causes. However, Burger (1984) specified that Low DC people with an internal LOC[2] are less depressed because of their weak motivation to control what happens in their lives, while they believe they have control over it. Indeed, depressed people often declare that what happens to them is beyond their control (Beck 1972; Seligman 1975; Rotter

[2] Our PC measure assesses to some extent the LOC (the more individual perceives control in the personal sphere, the more their attributional style is internal).

1966) and that "whatever I do to be happier, things can only get worse". So we may imagine that participants who are less motivated to control events in their life (Low DC) while still perceiving control (High PC) were more able to accept what happened to them, surely because they attributed what happened to them in an internal way. Thus these participants seemed to be less prone to depression than Low DC/Low PC participants, as confirmed by our results.

No significant results were found for anxiety. If anxiety and depression are generally strongly linked, they often share common symptoms and result from similar circumstances, they are nevertheless distinct constructs. Anxiety suggests arousal and a reaction to threat by attempts to cope with the threat. Depression on the other hand suggests more a lack of arousal and a withdrawal as described by Seligman's studies (Clark and Watson 1991). So control, especially the lack of it, is at the heart of depression while not so much of anxiety.

General discussion

The general aim of these studies was to understand the consequences of a match or a mismatch between DC and PC, on autonomous motivation and psychological adjustment. More particularly, they aimed to (1) to confirm Evans et al. (1993) theoretical framework about the existence of four distinct profiles of participants according to their levels of DC and PC (which can be both high or low), and (2) to observe the effect of these profiles on autonomous motivation, depression and anxiety. Results confirmed the relevance of Evans et al. (1993) theoretical framework through the 2 studies. Also, these studies showed that, from an intra-individual perspective, the dynamic between DC and PC is relevant to predict autonomous motivation. Finally, psychological adjustment tends to be generally better for students with a High DC/High PC profile, and a Low DC/High PC profile.

Through our studies, we have seen moreover that a linear conception of the relation between DC and PC fitted well to our data, contradicting Garant and Alain's results (1995) of a quadratic conception of DC and PC in the prediction of psychological adjustment. The worst profile was that of a match between low DC and low PC. Students of that profile were the least autonomously motivated and the more depressed, which is coherent with the idea that this configuration of low control equates to learned helplessness. The next profile was that of the mismatch between DC and PC in which DC was higher than PC. In this configuration, students' desire to master the environment was not satisfied insofar as they did not make a link between their behavior and the reinforcements available in their academic context. Perceiving control over one's environment seems however always beneficial whatever the level of DC even if having a high DC seems to help autonomous motivation. But the reverse is not true. Indeed, if DC seems quite good in promoting autonomous motivation, it is at the condition that PC is as high or higher. The same reasoning seems to fit for depression.

One possible reason that conjoint effects of DC and PC have such an impact on autonomous motivation and depression could be the changes they cause in the PLOC. Indeed, the more students desire and perceive control, the more internal is their PLOC. As a consequence, the more they feel themselves at the origin of their behavior, the more they feel autonomously motivated. In addition, the more students desire and perceive control, the less they attribute what happens to them as being out of their control and so the less they feel depressed (Deci and Ryan 1985; Seligman et al. 1979).

Some limitations of our studies have nevertheless to be mentioned. First, despite of the fact that no studies have considered the effects of DC and PC on autonomous motivation assessed with the RAI, we used a correlational design. Thus, we have to remain cautious in our conclusions and encourage experimental studies. For instance, an experimental design based on participants' levels of DC and PC could be interesting to predict autonomous motivation and psychological adjustment. Second, if the RAI (Grolnick and Ryan 1987; Otis and Pelletier 2005) has the advantages to reveal a global level of autonomous motivation, it doesn't say anything of the effect on the different behavioral regulations of the Self-Determination Continuum (Deci and Ryan 1985; Ryan and Deci 2000). Third, cluster analyses are particularly context sensitive. This is why we may have found only 8 participants in the High DC/High PC cluster of Study 1 (the same cluster of Study 2 contained 54 participants). DC and PC distributions were a normally distributed in both samples and no outliers were found. However, while ranges of scores on the DC scale were similar in the two samples (5.42 in the first sample composed of economic students, 5.14 in the second composed of psychology students), it was not the case for the PC scale. The range in the first sample was a lot lower ($Range = 2.91$; $M = 2.78$) than that in the second ($Range = 5.77$; $M = 2.86$). So we believe that the High DC/High PC cluster that contained only 8 participants in Study 1 could be due to the level of PC of economic students, which range is particularly low. Economy students evolve in a more competitive context compared to psychology students, especially because economy students are placed in competition with students from Business or Management Schools. Moreover, the climate could be also more controlling, insofar as (a) students could be more individualistic and less prone to help each other and

(b) teachers interpersonal style could be more controlling (Reeve 2009, p. 163). We could imagine that such a competitive context impairs students PC whose maximum scores on the PC scale were lower (Minimum = −2.85; Maximum = 2.85) than that of psychology students (Minimum = −2.19; Maximum = 3.21), explaining the low number of these students in the High profile of Study 1. The fourth limitation we can make concerns the measures of adjustment. If the scales that were used to assess depression and anxiety (Bradley 1994; Bruchon-Schweitzer 2002) have the advantage to be short and valid, replication of our study with other scales should be done, insofar as these variables have been measured in many different ways. Finally, because the mediating role of the satisfaction of basic psychological needs has not been considered when considering autonomous motivation, remedying this lack can be interesting, especially as the DC has been found related to these needs (Amoura et al. 2013; Brouillard et al. 1999).

In the SDT literature, the concept of control is usually addressed through the effect of social factors on autonomous motivation such as the interpersonal style of teachers (Soenens et al. 2012), peer interaction (Legrain et al. 2011) or rewards (Deci et al. 1999; Joussemet et al. 2004), but fewer researches considered control variables. Further research could for example consider for the dynamic between the interpersonal style of the supervisor (as being autonomy-supportive and/or controlling) and individuals levels of DC and PC to better understand autonomous motivation. This approach combining some individual variables and social factors could open toward a more transactional conception of autonomous motivation and its outcomes. In such a design, the question of perceived control would be addressed in a different but complementary way.

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