

# Restoration Process of the Need for Autonomy: The Early Alarm Stage

Rémi Radel

Joseph Fourier University and University of Ottawa

Luc G. Pelletier

University of Ottawa

Philippe Sarrazin

Joseph Fourier University

Marina Milyavskaya

McGill University

Autonomy is described by self-determination theory as a basic psychological need, essential for individuals' well-being. While basic needs are generally thought to induce a restorative response when thwarted, evidence for such a process is lacking for autonomy. To date, most evidence indicates that autonomy deprivation leads to disaffection of this need in favor of other motives. A temporal model based on the general adaptation syndrome was adapted to reconcile this seeming contradiction. Specifically, it is hypothesized that an early alarm response aimed at restoring the satisfaction of the need for autonomy should precede the later relinquishment and compensation of this need that would result from a prolonged deprivation. Three studies provide support for this model by showing the existence of the immediate autonomy restorative response. Using a controlling situation to manipulate autonomy deprivation, the authors demonstrate in Experiments 1 and 2 that a controlling context leads to enhanced accessibility and an approach bias for autonomy-related stimuli. Experiment 3 indicates that the urge to restore autonomy can also affect personal judgment, leading individuals to make more independent judgments, exercising a nonreactive form of autonomy. Integration of this model within self-determination theory is discussed.

*Keywords:* autonomy, basic needs, impulse, self-determination theory

Throughout the history of psychology, many theorists have emphasized the importance of autonomy in human functioning. The humanistic model of Rogers (1961), the lifespan model of ego identity (Erikson, 1963) and Loevinger's stage model of ego development (Loevinger, 1976), among others, all consider autonomy as a necessity for a person's healthy functioning. However, it was not until the inception of self-determination theory (SDT; Deci & Ryan, 1985, 2002) that the concept of autonomy received the widespread attention it enjoys today. Deci and Ryan (2000) defined autonomy as a basic psychological need representing the individual propensity toward self-governance and coherence in an organism's behavioral aims. These authors suggested that the experience of autonomy is associated with a positive feeling of being the author and agent of the behavior, resulting in sensations of freedom. Indeed, hundreds of studies that examined the relative autonomy of motivational states have shown the importance of autonomy in adaptive functioning (see Deci & Ryan, 2002; Ryan & Deci, 2006). Numerous studies have also demonstrated that satisfaction of the need for autonomy has a crucial impact on individuals' well-being (e.g., Reis, Sheldon, Roscoe, & Ryan, 2000), while a lack of autonomy satisfaction has been linked to ill-being and

various psychopathologies (Ryan, Deci, Grolnick, & La Guardia, 2006; Ryan, 2005).

Given the strong relation between experiencing autonomy and optimal functioning, the nature of social events influencing individuals' sense of autonomy has been extensively investigated. An autonomy supportive climate is one that promotes and nurtures autonomy, whereas a controlling climate undermines and threatens it. Social environments providing choice, rationale, and empathy have been typically found to be supportive of autonomy (Deci & Ryan, 1987). Conversely, rewards (Deci, Koestner, & Ryan, 1999), deadlines (e.g., Amabile, DeJong, & Lepper, 1976), surveillance (e.g., Enzle & Anderson, 1993; Lepper & Greene, 1975), and orders and directives (e.g., Reeve & Jang, 2006) have all been found to be controlling. In many different contexts such as education (e.g., Flink, Boggiano, & Barrett, 1990; see Reeve, 2002, for a review), work (Gagné & Deci, 2005), or sport (Pelletier, Fortier, Vallerand, & Brière, 2001; see Hagger & Chatzisarantis, 2007, for a review), it has been widely demonstrated that individuals exposed to controlling contexts lose their autonomous motivation. For example, Lepper and Greene (1975) showed that engaging in an initially interesting game with the presence of surveillance and tangible rewards led participants to lose volition and initiative for this task. In other words, it seems that exposure to controlling events leads individuals to lose their relative senses of autonomy. However, if experiencing autonomy is so crucial for individuals, does it make sense to believe that, once it has been thwarted, people would accept this passively and would not try to restore it? Given that a commonly recognized criteria for something to be classified as a need is that it "elicit[s] goal-oriented behavior to satisfy it" (Baumeister & Leary, 1995, p. 498), one may presume that when the need for autonomy is not met, people

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Rémi Radel, Laboratoire Sport et Environnement Social, Joseph Fourier University, Grenoble, France, and School of Psychology, University of Ottawa, Ottawa, Ontario, Canada; Luc G. Pelletier, School of Psychology, University of Ottawa; Philippe Sarrazin, Laboratoire Sport et Environnement Social, Joseph Fourier University; Marina Milyavskaya, Department of Psychology, McGill University, Montréal, Ontario, Canada.

Correspondence concerning this article should be addressed to Rémi Radel, Laboratoire LAMHESS, University of Nice, 261 route de Grenoble, 06205 Nice cédex 3, France. E-mail: remi.radel@gmail.com

would attempt to regain a sense of autonomy. The present article investigates the existence of such a process.

### The Need Restoration Process

Several classical theories of motivation suggest that behaviors are performed in order to fulfill individuals' needs (Maslow, 1943; McDougall, 1908; Murray, 1938). For instance, Hull (1943) described the way with which needs direct behavior by proposing the homeostatic principle. According to this principle, need deprivation gives rise to a motive or drive state that pushes the organism into action. This principle was presumed to function through negative feedback mechanisms acting to reduce the difference between a preferred internal state and the organism's current state. As a result, behavior was understood as an attempt to regain the state of balance of the needs.

Drive theories recently re-emerged with the renewal of interest in the unconscious influences of human behavior. Specifically, in describing the *reflective impulsive model* (RIM) devoted to specifying the conscious and the unconscious determinants of social behaviors, Strack and Deutsch (2004) postulated the existence of a restorative process of basic needs. According to the RIM, responses engendered by need restoration are generated by the impulsive system. As such, these responses would be driven by cognitive processes occurring outside the individuals' awareness and control. More specifically, it is assumed that the deprivation of basic needs enhances the accessibility of behavioral schemata that were previously found to successfully end the state of deficiency. Several empirical results have provided support for their model. For example, Aarts, Dijksterhuis, and De Vries (2001) showed that individuals who were made thirsty had an enhanced accessibility and, therefore, a perceptual readiness for thirst-related stimuli. Similarly, Seibt, Hafner, and Deutsch (2007) demonstrated that the state level of the need for food not only influences the accessibility of behavioral schemata related to eating but also the incentive qualities of food-related stimuli. Although Strack and Deutsch (2004) hypothesized that the model was applicable to all basic needs, studies based on the RIM have thus far only been limited to the physiological needs.

Recently, Sheldon and Gunz (2009) conducted an investigation in order to show that the psychological needs postulated by SDT (autonomy, competence, and relatedness) could also generate a restorative motive when unmet. In two studies, they used questionnaires to assess need satisfaction as well as motivation to experience each of the needs. They found that need satisfaction for each of the needs was negatively correlated with the desire to experience that particular need, such that participants who were, for example, low on autonomy were more likely to say that they desired experiences that increased autonomy (but not relatedness or competence). This held true both when assessed at one time point and in a 6-week longitudinal study, showing that changes in need satisfaction affect the extent to which compensatory experiences are desired. These results are in accordance with previous studies on the need to belong (DeWall, Baumeister, & Vohs, 2009; Lakin & Chartrand, 2003; Maner, De Wall, Baumeister, & Schaller, 2007; Williams, Cheung, & Choi, 2000), and the need for control (Pittman & D'Agostino, 1989; Pittman & Pittman, 1980; Whitson & Galinsky, 2008). In a third experimental study, participants underwent a manipulation designed to undermine one of the

needs (using provision of false feedback on participants' personality based on their responses to a personality test) and again reported their motivation to experience autonomy, competence, and relatedness. While threats to competence and relatedness resulted in a greater desire for each of these experiences, this was not the case for autonomy. The authors believed that this was due to an ineffective manipulation (Sheldon & Gunz, 2009), although it can also mean a difficulty in consciously reporting on a motive that operates implicitly (Strack & Deutsch, 2004). Since these studies only relied on conscious, self-reported variables, conclusive evidence cannot be drawn regarding the existence of an autonomy restoration process.

In sum, the existence of restorative motives for thwarted needs seems well established in the motivational literature. However, reliable evidence for this restoration motive is lacking for the need for autonomy. One potential reason for this oversight is the SDT conceptualization of needs, which, as we will later show, promotes a focus on the longer term consequences of need deprivation.

### The Need Compensation Process

In their seminal article describing the function of the three basic psychological needs recognized by SDT (i.e., autonomy, competence, and relatedness), Deci and Ryan (2000, p. 230) state that "behavior does not have to be aimed at need satisfaction per se." SDT does not conceive of needs as drives orienting individuals' resources but as motivations specifying essential nutrients that are needed for optimal functioning. In line with this definition of needs, SDT studies have mainly focused on the identification of the environmental features that threaten or fulfill the satisfaction of these needs and their affective and motivational consequences. Additionally, research on SDT has also shown that the extent to which individuals strive to satisfy their needs could be affected by the process of compensatory motives (see Deci & Ryan, 2000, 2002). Specifically, it is assumed that when individuals face a social environment that does not provide them with reliable satisfactions of their basic needs, they progressively relinquish further pursuit of the deprived need in favor of need substitutes. This process is assumed to serve an accommodative function, as compensatory motives might provide collateral satisfaction even though they do not provide true satisfaction of the threatened need. Compensatory motives are typically presumed to depict extrinsic aspirations such as materialism or popularity (Deci & Ryan, 2000). In one study providing support for this compensatory process, Kasser, Ryan, Zax, and Sameroff (1995) showed that teenagers whose mothers were less nurturing valued more financial success than teenagers whose mothers were more nurturing. More recently, Moller, Deci, and Elliott (2010) elaborated on this model, showing that an accommodation to need deprivation can develop over time, leading to the devaluation of the thwarted need. Specifically, they showed that the less relatedness individuals experience in their life, the less they enjoy additional experiences of relatedness.

A study by Williams, Cox, Hedberg, and Deci (2000) provided a good illustration of this form of need regulation with autonomy, showing that adolescents who perceived their parental climate as controlling (and thereby had their need for autonomy thwarted) had significantly stronger relative extrinsic life goals than those who perceived their climate as autonomy supportive. In other studies examining the influence of law schools with a controlling

instructional climate, Sheldon and Krieger (2004, 2007) found that students progressively relinquished autonomy during the course of their studies and valued more external aspects of their ensuing job.

In sum, the approach of needs postulated by SDT suggests that when a basic psychological need is not satisfied, people eventually relinquish the need and replace it with a substitute or compensatory motive. At first glance, this evidence seems to negate the existence of an autonomy restoration process. However, research on other basic psychological needs has shown that while the same compensation process appears with relatedness, a restoration process is also evident (e.g., Maner et al., 2007; Williams et al., 2000). This opens the possibility that autonomy could similarly be subject to multiple forms of regulation. In particular, we propose that a temporal model can account for the co-existence of both the processes of restoration and compensation.

### A Temporal Need–Threat Model

One way to conceptualize the distinction between a need compensation process and a need restoration process is to consider need deprivation or need thwarting as a stressful event as discussed in Selye's *general adaptation syndrome* (GAS) model (1946), which describes an individual's reaction to a pervasive stressor as occurring in three stages. The first stage, called *alarm reaction*, corresponds to the immediate reaction of the organism to the stressor in which many resources are allocated to fight against the stressor. It makes sense to believe that this stage could correspond to an autonomy restoration process. In the second stage, called the *resistance stage*, the organism continues to allocate resources to fight against the stressor and must adapt its functioning to live with this preoccupation. The final stage, called the *exhaustion stage*, appears after long and continued exposure to the stressor. Once at this stage, the individual's resources are empty, and thus he or she can no longer resist. In the case of continued need deprivation, we think that individuals would relinquish the thwarted need, that they would lose motivation for the activity, and that they would develop need substitutes. It seems reasonable to assume that the compensatory process described in SDT occurs at this stage.

More recently Williams (2009) proposed a temporal need–threat model to explain individuals' reactions to ostracism and the thwarting of the need to belong. In the description of his model, Williams reviews the research that shows that once individuals have detected a need–threat, they first engage in a reflective stage where they become oversensitive to cues that may cause further rejection or cues that could lead to the restoration of belongingness. Several studies have provided converging evidence that following a threat to the need to belong (ostracism or rejection), individuals behave in ways that help to reestablish belongingness by showing improvements on memory for social information (Gardner, Pickett, & Brewer, 2000), by becoming more sensitive to nonverbal social cues (Pickett, Gardner, & Knowles, 2004), by showing selective attention to signs of acceptance (DeWall, Maner, & Rouby, 2009), or by nonconsciously trying to fit in or to be liked by mimicking another person's mannerisms and behaviors (Lakin, Chartrand, & Arkin, 2008). If individuals are not successful at restoring their need to belong or if the individuals are ostracized for long periods of time, in the following stage, they may compensate by becoming more aggressive (Twenge, Baumeister, Tice, & Stucke, 2001) and less altruistic towards

others (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007), or they may lose their capacity to self-regulate, show signs of detachment and alienation (Baumeister, DeWall, Ciarocco, & Twenge, 2005). At the end, their attempts to feel included may turn to passivity, and it may lead a sense of worthlessness (Williams, 2009).

In sum, a temporal model can fully explain why a restoration and a compensation process co-exist. If all stages of the temporal model have been well established for the need to belong, the evidence of the first alarm reaction is sparse for the need for autonomy. While never examined directly, some studies outside the SDT framework do provide preliminary support for the existence of this process.

### Support for an Autonomy Restorative Processes

One recent study on procedural justice (van Prooijen, 2009) provided interesting results that suggest a form of an autonomy restoration motive. The aim of van Prooijen's (2009) study was to examine individuals' reactions to procedure set by authorities. He hypothesized that individuals' reactions depend on the fairness of the procedure and on the extent to which individuals experienced freedom of choice. More specifically, he expected that people attend to the fairness of decision-making procedures more strongly when they experience a deprivation of autonomy than when their autonomy need is fulfilled. Of particular relevance to the present research, in Study 2, van Prooijen manipulated first whether participants had a choice of which task to do and then in a following task whether they were able to voice their opinions on the compensation (number of lottery tickets) they would receive from the experimenter. Procedural justice was operationalized as participants' perception of whether the experimenter was fair, just, appropriate, correct, and respectful. Results showed that participants who were not given a choice of which task to do (thwarted autonomy condition) were more affected by the fairness of the procedure (whether they were able to voice their opinions) than those having an opportunity to choose. Given that the manipulation of giving participants a voice versus no voice could in itself be considered as an autonomy cue, his results suggest that people are more sensitive to such cues when their sense of autonomy is undermined.

In another line of research more directly linked to motivation, a motive to restore threatened freedom has been well described and repeatedly demonstrated by psychological reactance theory (Brehm, 1966; Brehm & Brehm, 1981). Specifically, this theory proposes that people believe they have behavioral freedoms and react strongly when any of these freedoms are threatened or eliminated in such a way as to regain the lost freedom. To give a typical example, students receiving dogmatic messages of alcohol prevention typically have more intention to drink alcohol and find alcohol more desirable (Bensley & Wu, 1991). Although psychological reactance seems to parallel the autonomy restorative motive as it refers to the appearance of a motivation to restore a threatened freedom, the two concepts clearly differ in several ways. Unlike a need restoration motive, psychological reactance is stated in a specific rather than in a general sense. Instead of proposing that individuals act under the influence of a general need, the reactance theory supposes that the motivation created by the process of reactance only implies one specific freedom. For

example, it is stated that the freedom threatened by alcohol prevention messages (e.g., to drink alcohol) only elicits desire for the corresponding behavior (e.g., drinking) and not for other behaviors that could also lead an individual to regain the frustrated need. Brehm and Brehm (1981) raised the possibility that an extended mechanism may exist, which would be based on a broader formulation in which a reduction in control over one aspect of one's life would lead that individual to seek more control over any other aspect. Nevertheless, even such an extended phenomenon of reactance would still be distinct from the autonomy restoration motive, because it is likely that the two restoration processes deal with different kinds of freedoms. According to Koestner and Losier's (1996) distinction, reactance reflects a reactive form of autonomy, which corresponds to seeking freedom by acting independently from others. For example, if students intend to drink more because they were told not to, they are not exerting true, or reflective, autonomy. In one sense, they are deceiving themselves about their desires because they have been pressured and so they are defiant but not free. In contrast, the autonomy restoration motive should represent reflective autonomy, which is in concordance with a person's true values.

### The Present Research

While many traditional theories of motivation suppose that needs should elicit a restorative motive when thwarted, this has not been reliably shown for the need for autonomy. In fact, most of the studies emanating from the main theory on the need for autonomy go in the opposite direction, as SDT predicts a disaffection of autonomy in controlling contexts. This leads one to wonder whether the processes involved in regulating the need for autonomy behave in a different way from the other needs. Even though it seems unlikely that individuals would relinquish a basic need like the need for autonomy without trying to restore it first, it could be conceivable that one need functions differently from the others because each need constitutes a different motivational system with distinct neurological and chemical systems (Kenrick, Griskevicius, Neuberg, & Schaller, 2010; Schultheiss & Wirth, 2008). Nevertheless, it could also be the case that no studies have looked in the right place or at the right moment to detect the motive to restore autonomy. Specifically, while studies have shown that prolonged exposition to a controlling context leads to disaffection of autonomy in favor of other motives, it is possible that a different reaction occurs as an immediate consequence of autonomy deprivation. In agreement with the GAS model (Selye, 1946) that states that with time people eventually give up on fighting a source of stress, a strong defensive reaction should first occur immediately following a threat to a basic need.

Moreover, if SDT researchers who have looked at the immediate reactions to a controlling context have only documented a loss of autonomous motivation, it may be because they were only interested in the motivation for the context in which the threat occurred and that no attention was given to other responses. For example, when interested in the effect of a controlling instructional climate, researchers typically have assessed only the study participants' self-determined motivation for the task (e.g., Deci & Ryan, 2000). This limited focus could have precluded detection of the autonomy restorative response, as it is more likely that people will try to regain their autonomy in other contexts in which the environment

allows for need fulfillment. Measuring other variables (e.g., cognitive and perceptual indicators of the sensitivity for autonomy; autonomous motivation in another contexts or situations) could help determine whether individuals strive for their autonomy outside the immediate domain in which their sense of autonomy was thwarted.

Therefore, in the present research, we assessed individual responses to a temporary threat to autonomy using a different set of measures (compared with typical SDT studies) in order to determine the existence of an autonomy restoration process. On the basis of the RIM model, the first two experiments focused on early-stage cognitive processes such as perception and accessibility, as this model assumes that the motive to restore need fulfillment should be driven by such noncontrolled variables. As shown by DeWall et al.'s (2009) results on social reconnection, early-stage cognitive processes are particularly appropriate for the detection of the motive to restore the satisfaction of a psychological need. Therefore, our first experiment examined the effect of a controlling instructional climate on the accessibility of autonomy-related stimuli. Experiment 2 extended this by investigating whether the enhanced accessibility caused by the controlling context facilitates the approach toward autonomy-related stimuli or the avoidance of further autonomy-depriving stimuli. The third experiment was designed to test whether downstream processes such as personal judgment could also be affected by the motive to restore autonomy. In this experiment, we manipulated autonomy deprivation using a standard procedure of providing fake personality feedback, which ensures a careful test of the content of the manipulation. Autonomy restoration was operationalized as the extent to which participants were able to express their true opinions rather than conform to others' views on a picture-rating task. To rule out potential similarities between autonomy restoration and reactance, this experiment also examined whether autonomy deprivation leads to reactive or reflective autonomy.

### Experiment 1: Controlling Environment and Perceptual Readiness for Autonomy

The aim of this study was to examine the effect of a controlling context on the accessibility of autonomy-related constructs. The accessibility of constructs in memory can have a central role in the process of need restoration. When a mental representation is accessible, this representation is more likely to be used by individuals, thereby guiding their behaviors, intentions, and perceptions. Someone who wishes to replenish a thwarted need should, in the first place, determine where the stimuli liable to satisfy this need are located. As Bruner (1957) indicated, this perceptual readiness is precisely the function of enhanced accessibility. This rationale has been supported by several previous works on physiological basic needs (e.g., Aarts et al., 2001; Lavy & van den Hout, 1993). For example, Aarts and his colleagues (2001) showed that participants who were led to be thirsty, in turn had a perceptual readiness for stimuli related to the satisfaction of their deprived need (e.g., glass, bottle). In their study, perceptual readiness was assessed through the accessibility of thirst-related stimuli in a lexical decision task where participants had to indicate as fast as possible whether a string of letters was a word or a nonword, with some words related to the construct of interest (e.g., bottle).

In the present study, we assessed accessibility for autonomy-related stimuli using a similar lexical decision task. In this task, faster lexical decisions on words that are semantic associates of a construct represent a greater accessibility of the construct (Neely, 1991). Thus, some of the words of this task depicted autonomy-related stimuli. The response times for these words were compared with the response times for neutral words. This task was performed immediately after the experimental manipulation in which the participants were exposed either to a controlling or to a more neutral instructional climate to practice a game. Specifically, the instructional climate of the game was made controlling through a manipulation of surveillance (e.g., Enzle & Anderson, 1993), deadlines (Amabile et al., 1976), and orders and directives (e.g., Reeve & Jang, 2006). Since these have all previously been shown to threaten autonomy, we hypothesized that the participants facing this controlling climate would experience a deprivation of autonomy and consequently have a greater accessibility for autonomy-related words in the subsequent lexical decision task than the participants exposed to the more neutral instructional climate.

## Method

**Participants and design.** Participants were 52 French Canadian undergraduate students (34 women and 18 men) who received course credit for taking part. None of them had ever practiced the game in which the manipulation occurred. The design consisted of two between-subjects conditions: *controlling* versus *neutral*.

**Procedure.** Participants were individually invited to come into the laboratory for an experiment ostensibly conducted to examine cognitive consequences of playing video games. An experimenter explained that the participants would play a video game and then complete a computer task assessing their cognitive performance. The video game was a computer version of Tangram, a puzzle in which players have to use a limited set of geometric forms in order to construct a specific picture. The aim and the rules of this game were carefully explained to the participants.

In the *controlling* condition, the experimenter told participants that they had to strictly respect the directives played over the loudspeakers throughout the duration of the game. According to Deci and Ryan's (1987) definition of a controlling climate, the audio instructions included (a) frequent deadlines to finish the figures (e.g., "You have 1 min to complete this figure"), (b) solutions disclosure (e.g., "Use the big square to complete the top of the figure"), and (c) orders and commands (e.g., "Stop working on this figure now, and go immediately to Figure Number 3"). Before leaving the participants alone in the room, the experimenter also indicated that he would watch them via the one-way mirror located behind them in order to check whether they really followed the directives.

In the *neutral* condition, the one-way mirror was covered by a curtain. The experimenter told participants that an audio band was played in order to provide organizational indications. The level of perceived competence was controlled across the two conditions by including in the audio recording the same temporal indications as given in the controlling condition, but these were introduced with statements that had no mandatory component (e.g., "This figure normally requires 1 min"). The rest of the speech was only a description of the interface and of the figures. The same amount of speech and the same speaker's voice were used in both conditions.

The experimenter re-entered the room after 9 min and indicated the end of the first task. He launched the lexical decision task and left the room. All the instructions for the task were delivered by the computer. Participants were told that letter strings would be displayed on the monitor and asked to press as fast as possible the *C* key if the string was a real word or to press the *N* key if the string was a nonword. The string of uppercase letters remained on the screen until the participant pressed one of the two keys. A feedback indicating the response time in milliseconds was provided for 3 s, and then the next trial appeared. The first four trials constituted a training period during which no data were collected. Two autonomy-unrelated words and two nonwords were alternatively displayed during this period. Then, 48 trials followed, including 24 correct words and 24 nonwords presented in a random order. The nonwords were made from existing neutral words by altering one letter (e.g., *sylladle*). Among the 24 correct words, 16 were unrelated to autonomy, and eight were related to autonomy. The neutral words and the autonomy words were of similar length ( $M = 7.13$  letters) and had similar frequency of use. The autonomy-unrelated words designated various objects (e.g., *armchair*, *hammer*) and neutral verbs (e.g., *deodorize*, *whisper*). Words related to autonomy were obtained by a selection process. Six psychology researchers familiar with the autonomy construct (as defined by SDT) selected and rank-ordered the top five of 20 words that best represented this construct. Most of these words came from previous studies that used single words to depict the autonomy construct (e.g., Lévesque & Pelletier, 2003; Radel, Sarrazin, Legrain, & Gobancé, 2009). Every time a word was ranked in the top five list of a researcher, a proportionally inverse number of points was assigned to this word (e.g., ranked first = 5 points). Then, the sum was calculated to determine the overall ranking of the words. A summary of this pretest can be seen in the Appendix. The first eight words of this list were used in our task.

After the lexical decision task, participants were placed in a free-choice paradigm (Deci, 1971) to test their motivation for the Tangram puzzle. The experimenter came back following the lexical decision task and told participants that they next had to complete a questionnaire about their perceptions of the study. The experimenter then said that he realized that he no longer had any printed questionnaires and would have to go make extra copies. In order to assess whether participants would voluntarily return to the game, the experimenter then left the participants alone in a room where they had the option of playing Tangram or reading some magazines. Two minutes later, the experimenter came back and gave the participants a questionnaire to assess their perceptions of their competence and of the climate during the game. Perceived competence was rated by four items ("I felt very competent in this game"; "I felt able to meet the challenge of performing well in this task"; "I was able to master this task"; "I was good at doing this task";  $\alpha = .84$ ). The climate measure included four items assessing the extent to which the participants had perceived the environment as controlling ("I found the audio instructions very controlling"; "I did not feel free to do the task on my own"; "I felt pressured by the all the instructions"; "The task was very constraining to do";  $\alpha = .74$ ). All the items of the questionnaire were rated on a 7-point scale (1 = *not at all true*; 7 = *very true*). Upon completion of the questionnaire, the participants were debriefed and thanked.

## Results

An analysis of the mean ratings of perceived competence revealed no difference between the two conditions,  $t(50) = 1.04$ , *ns*. Therefore, the manipulation did not affect the extent to which the participants felt competent while playing the game. Conversely, a significant effect was found for the perception of the climate. Specifically, participants in the controlling condition ( $M = 4.9$ ,  $SD = 1.15$ ) perceived the climate as more controlling than participants in the neutral condition ( $M = 4.1$ ,  $SD = 1.12$ ),  $t(50) = 3.43$ ,  $p < .01$ . A logistic regression analysis indicated that fewer participants continued with the game during the free-choice period in the controlling condition ( $N = 5$ ) than in the neutral condition ( $N = 15$ ),  $\chi^2(1, 51) = 9.49$ ,  $p < .01$ . According to Deci and Ryan (1985), this suggests that the controlling context undermined participants' intrinsic motivation for the activity by reducing their feeling of autonomy. Taken together, these results indicate that the manipulation was effective in thwarting individuals' autonomy without affecting their competence.

We next investigated the effect of the manipulation on the accessibility of autonomy-related stimuli. As suggested in the literature (e.g., Förster, Liberman, & Higgins, 2005), we first removed responses that were incorrect (when participants pressed  $N$  for correct words; 1.5% of the responses), too fast (i.e.,  $< 100$  ms; 0.6% of the responses), and too long (i.e., 3 standard deviations above the mean; 0.5% of the responses) in order to clean data from accidental and unattended responses. Table 1 displays the means and standard deviations of the mean response latencies for neutral and autonomy words in each condition. In order to control for individual differences in response latency, we tested the difference between the average response time for neutral words and the average response time for autonomy-related words. Results indicated that the difference was significantly higher for participants of the controlling condition ( $M = 53$  ms,  $SD = 115$  ms) than for participants of the neutral condition ( $M = -16$  ms,  $SD = 112$  ms),  $t(50) = 1.99$ ,  $p < .05$ ,  $d = 0.33$ . Given that a greater difference between the response time for neutral words and the response time for autonomy words indicates a greater accessibility for autonomy, we can conclude that participants who were exposed to a controlling environment had an enhanced accessibility for autonomy words.

## Discussion

These results provide initial support for our hypothesis. Relative to a neutral instructional climate, a controlling climate thwarting

the need for autonomy but not the need for competence led to an enhanced accessibility for autonomy-related words. Thus, it seems that the experience of autonomy deprivation created a motivational state guiding participants' perception. Since perceptual readiness can play an important role in the restoration of autonomy, this first experiment provides support for the existence of an autonomy restoration process.

In addition, like other research on the influence of a controlling climate on motivation (e.g., Reeve & Jang, 2006), we observed that the participants exposed to such a controlling climate persisted less with the activity during the free-choice period when they had the opportunity to play on their own. This shows that people prefer avoiding further contact with a controlling activity, even when the activity itself no longer threatens autonomy. Even though the participants no longer had to follow controlling instructions, the task was played in the same context, and participants likely associated this context with control. As such, participants certainly expected to be controlled, and consequently they did not seek to restore their autonomy in this task. This result highlights the similarity between the restoration of the satisfaction of the need for autonomy and the need to belong as Maner et al. (2007) indicated that social reconnection does not appear with the perpetrator of the exclusion.

## Experiment 2: Implicit Approach Tendency toward Autonomy

Our aim in this second experiment was to replicate and to extend the results of Experiment 1 by controlling for any alternative interpretations of the results. In the first experiment, we demonstrated that an experience of autonomy deprivation led to a perceptual readiness of autonomy-related stimuli. However, one could argue that this perceptual readiness may occur for the purpose of avoiding any stimuli related to autonomy rather than approaching autonomy stimuli. To rule out this possibility, we assessed participants' approach-avoidance behaviors for autonomy-related stimuli using the manikin task (De Houwer, Crombez, Baeyens, & Hermans, 2001). In a comparison of the different measures of approach-avoidance behaviors, Krieglmeier and Deutsch (2010) showed that the manikin task was the most sensitive and the most reliable measure of this kind. This task was inserted in the procedure in lieu of the lexical decision task from Experiment 1. It consisted of pressing a key to move a human-like figure on the screen toward or away from a word on the screen. Similarly to the instructions given by Krieglmeier, Deutsch, De Houwer, and De Raedt (2010) in their second study, we asked participants to respond to the grammatical nature of each target word in order to limit conscious processing of valence. More specifically, participants had to distinguish whether the word was a noun. Responding instructions changed between participants. While half of the participants were asked to move the manikin toward the word if it was a noun and to move the manikin away from the word if it was not a noun, the reverse was asked of the other half of participants. As in all the other studies in which used this task has been used, the strength of the approach-avoidance bias was calculated by comparing the mean response time for compatible and incompatible trials. Compatibility refers to the match between the valence of the word and the change in distance resulting from participants' move of the manikin (increase vs. decrease of the distance between

Table 1  
Mean Latencies (in Milliseconds) in the Lexical Task Assessing Accessibility for Autonomy-Related Constructs (Experiment 1)

Construct	Condition			
	Autonomy deprivation		Neutral	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Autonomy-related words	782	211	857	243
Neutral words	835	258	841	301

the target word and the manikin). Typically, participants are faster to move the manikin toward positive words and away from negative words (compatible trials) than to move it toward negative words and away from positive words (incompatible trials; e.g., Krieglmeier & Deutsch, 2010).

Our task provided two dependent measures as two distinct categories of words were used. A first list consisted of autonomy-thwarting and autonomy-supporting words. A second list comprised positive and negative words unrelated to autonomy. We included this list in order to rule out the possibility that the autonomy-thwarting manipulation could induce a positivity bias rather than an autonomy bias. Since the autonomy-related words used in Experiment 1 are rather positive (see the Appendix), an alternative interpretation of our results could be that autonomy-deprived individuals would not seek to restore autonomy but to restore positive affect, which could also have been frustrated by the controlling context. In contrast to this alternative interpretation, we predicted that the bias induced by the autonomy deprivation manipulation would be specific to autonomy-related cues. As such, we did not expect any differences between participants in the controlling and the neutral conditions in their response pattern to the positive/negative words. Concerning the words related to autonomy, we expected that the approach-avoidance bias for these cues would be more pronounced for participants in the controlling condition than for participants in the neutral condition.

## Method

**Participants and design.** Fifty-six French undergraduate students (22 women, 34 men) participated in exchange for course credits. The design was a 2 (autonomy deprivation: controlling context vs. neutral context)  $\times$  2 (response mapping: noun-approach, non-noun avoidance vs. vice versa)  $\times$  2 (compatibility: compatible vs. incompatible) factorial-mixed design with the first two factors manipulated between participants.

**Materials.** A first list of words consisted of 10 positive and 10 negative words unrelated to autonomy. The second list included 10 words related to autonomy support and 10 words related to autonomy frustration. The words related to autonomy support were chosen from the list established in the pretest of Experiment 1. Another pretest (using the same approach) was conducted to generate words associated with autonomy thwarting, with the 10 top-ranked words used in this task. In both lists, half of the words were nouns. Scores of the valence of all words were obtained in another pretest ( $N = 26$ ), in which participants rated the extent to which each of the words was positive or negative using a 7-point Likert scale ranging from 1 (*very negative*) to 7 (*very positive*). While the words related to autonomy satisfaction were rated as rather positive ( $M = 5.43$ ), they were considered as less positive than the positive words unrelated to autonomy ( $M = 5.82$ ). Similarly, even if the words related to autonomy thwarting were seen as rather negative ( $M = 3.05$ ), they were considered as less negative than the negative words unrelated to autonomy ( $M = 1.68$ ). All words of these two lists and their scores in the different pretests can be seen in the Appendix. Besides these two lists of words, five neutral nouns and five neutral non-noun words were used for the practice session.

**Procedure.** Most of the procedure was the same as in Experiment 1 with the exception that the lexical decision task was

replaced by the manikin task. It should also be noted that we did not perform the free-choice paradigm in this experiment.

Each trial of the manikin task started with a cross in the middle of the screen. At this moment, participants had to press the 5 key of the numerical keyboard and keep it pressed until they began to move the manikin with other keys (discussed later). Triggered by the key press, the manikin appeared either in the upper or in the lower part of the screen. It was displayed equally often in the top and in the bottom of the screen. The manikin was a 3-cm-high schematic picture of a human figure displayed in black. After 750 ms, a word appeared in the center of the screen. Participants were asked to imagine being the manikin and to move toward the word when it was a noun or away from it when it was not a noun, or vice versa, depending on the condition. Participants were asked to give responses as fast and as accurately as possible by pressing three times on the 8 key to move the manikin upward or on the 2 key to move it downward. All keys had to be pressed with the middle finger of the right hand. Each key press moved the manikin in the chosen direction. If an incorrect response was made, an error feedback appeared on the screen. Five hundred ms after the third key press, the screen was cleared for 1,000 ms before the beginning of the following trial. The time between the onset of the word and the first key press served as the dependent variable.

After reading all the written instructions on the screen, participants started the 10-trial practice session. Then, participants completed 80 test trials test in random order (each word appeared twice). Upon completion, participants called the experimenter who gave them the same questionnaire as in Experiment 1, which assessed their perceptions of their competence ( $\alpha = .84$ ) and of the climate during the game ( $\alpha = .77$ ). Then, participants were debriefed and thanked.

## Results

Preliminary analyses showed no significant difference in perceived competence for the game between the two conditions,  $t(54) = 1.57$ , *ns*. However, participants in the controlling condition perceived the instructional climate of the game as more controlling ( $M = 5.1$ ,  $SD = 1.29$ ) than participants of the neutral condition ( $M = 4.1$ ,  $SD = 1.18$ ),  $t(54) = 3.34$ ,  $p < .01$ .

Before analyzing data from the manikin task, we excluded incorrect responses (7.1%) as well as responses below 150 ms and above 1,500 ms (2.7%), as recommended by Krieglmeier and Deutsch (2010). All descriptive statistics can be seen in Table 2.

We first conducted an analysis of trials including the positive/negative words. Latencies of correct responses were subjected to a 2 (compatibility)  $\times$  2 (autonomy deprivation) mixed Generalized Linear Model (GLM). This analysis provided a main effect of compatibility,  $F(1, 54) = 4.03$ ,  $p < .05$ ,  $\eta^2 = .069$ , but no effect of autonomy deprivation,  $F(1, 54) < 1$ ,  $p = ns$ . The interaction between these two factors was also not significant  $F(1, 54) < 1$ ,  $p = ns$ . In sum, participants reacted more quickly to compatible trials (i.e., toward positive words and away from negative words) than to incompatible trials (i.e., toward negative words and away from positive words), independently of the condition.

Then, we performed the same analysis for responses to trials including the words related to autonomy support and autonomy thwarting. This analysis yielded a significant effect of compatibility: on the whole, responses to the compatible trials (i.e., toward

Table 2  
*Mean Latencies (in Milliseconds) in the Manikin Task Reflecting Approach–Avoidance Behaviors to Affective and Autonomy-Related Words (Experiment 2)*

Variable	Condition			
	Autonomy deprivation		Neutral	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Positive vs. negative words				
Compatible trials	827	126	819	123
Incompatible trials	851	103	847	119
Autonomy supportive vs. thwarting words				
Compatible trials	808	118	835	112
Incompatible trials	854	101	843	106

autonomy-supportive words; away from autonomy-thwarting words) were faster than responses to the incompatible trials (i.e., toward autonomy-thwarting words; away from autonomy-supportive words),  $F(1, 54) = 8.33$ ,  $p < .01$ ,  $\eta^2 = .134$ . The autonomy deprivation manipulation had no main effect  $F(1, 54) < 1$ ,  $p = ns$ , but its interaction with compatibility was significant,  $F(1, 54) = 4.41$ ,  $p < .05$ ,  $\eta^2 = .076$ . Simple comparisons indicated that the compatibility effect occurred only in the autonomy deprivation condition,  $t(27) = -2.57$ ,  $p < .05$ , and not in the neutral condition,  $t(27) = -1.64$ ,  $p = .12$  (see Figure 1).<sup>1</sup>

## Discussion

In accordance with our hypothesis, we showed that all participants had an easier time responding to positive words with approach behaviors and to negative words with avoidant behaviors than the reverse and that the strength of this bias did not differ between autonomy-deprived and non-autonomy-deprived participants. This suggests that autonomy deprivation does not lead to a positivity bias. However, as we expected, autonomy deprivation led to a bias for autonomy-related words. Specifically, our results showed that only autonomy-deprived participants were significantly faster to respond to compatible autonomy stimuli than to incompatible autonomy stimuli. Since words related to autonomy satisfaction are rather positive and words related to autonomy

deprivation are rather negative, a compatibility effect could have also been observed for participants in the neutral condition. Nevertheless, those words were certainly not positive and negative enough, respectively, to make this effect significant.

In other words, this result suggests that autonomy deprivation leads individuals to have an implicit tendency to approach stimuli related to autonomy support and to avoid autonomy-thwarting stimuli. First, this provides support for our proposition that the greater accessibility of autonomy-related stimuli in the autonomy-thwarting condition in Experiment 1 is a motivational process devoted to facilitating the approach of autonomy-related elements. Second, this provides strong support for the autonomy restoration process because approaching potential sources of autonomy and avoiding potential autonomy threats are both highly likely to aid an individual in regaining autonomy.

## Experiment 3: Impact of Autonomy Restoration on Judgment

In Experiment 3, we changed the manipulation of autonomy deprivation in order to examine the robustness of the effect. Similarly to Sheldon and Gunz (2009), we adapted the manipulation that Twenge et al. (2001) used to threaten the need to belong (also used by DeWall et al., 2009, or Maner et al., 2007) for the autonomy need. This manipulation consisted of providing participants with bogus feedback about their personality following the completion of a personality test. In the present experiment, the bogus feedback informed participants that they tended to lack autonomy in their life and that they would be similarly be controlled in their future. We expected that this manipulation would have the same effects as a controlling environment (Studies 1 and 2), so that participants receiving the autonomy-threatening feedback would want to replenish their autonomy.

In this study, we also aimed to extend the findings of the two first experiments by examining whether the autonomy restoration

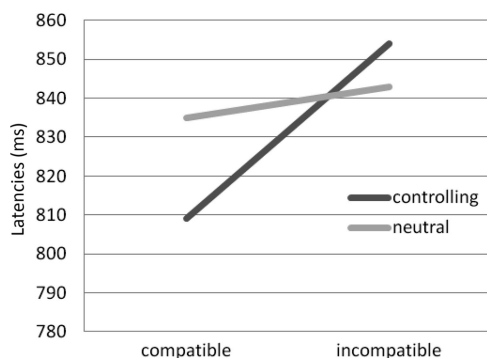


Figure 1. Latencies (in milliseconds) for correct responses to autonomy related words in the manikin task as a function of autonomy deprivation and compatibility (Experiment 2).

<sup>1</sup> Preliminary analyses including the counterbalancing factor of the mapping responses to the grammatical nature of the word (moving toward nouns and away from nonnouns vs. vice versa) were carried out. The main effect of this factor and its interactions with the other two factors were not significant with positive/negative words and with autonomy supportive/autonomy thwarting words as well, all  $F_s < 1.5$ ,  $p_s = ns$ .



motive could affect not only early automatic cognitive processes but also more elaborated controlled processes such as personal opinions. Opinions or judgments result from a weighting between personal values and convictions on one hand and social influences on the other hand. Depending on the side toward which the balance tips, one can either express an autonomous opinion or conform to social pressure. It is also possible to experience autonomy when following a social influence insofar as the influence is self-endorsed and corresponds to personal standards. As elaborated by Deci and Ryan (2002), "one can quite autonomously enact values and behaviors that others have requested or forwarded, provided that one congruently endorses them. On the other hand, one can of course rely on others for directions or opinions in such a way that autonomy is not experienced, as it is the case with mere compliance or conformity" (p. 8). In other words, when individuals go along with the group regardless of their own preferences and judgments, this represents a mechanistic form of conformity, which is strongly opposed to autonomy. As such, we presumed that participants for whom the need for autonomy is thwarted would be more likely to resist to this form of conformity in an attempt to experience autonomy.

The protocol we used to test this was similar to the one used by Arndt, Schimmel, Greenberg, and Pyszczynski (2002) and consisted of participants being asked to rate a series of paintings after having seen ratings given to the painting by alleged previous participants. We also added a modification to the original protocol in order to clarify the nature of the expected autonomy restoration response. As described in the introduction, we expected that the autonomy restoration process would differ from a generalized form of reactance. If that is true, one could expect the motivational response to be driven by a reflective form of autonomy (judgment is based on personal standards) rather than a reactive form of autonomy (judgment is made in opposition to any social influences), as the latter is closely related to reactance (Koestner & Losier, 1996). This distinction between reflective and reactive autonomy has been well illustrated by Koestner and his colleagues (1999) who showed that reactive autonomy was always negatively associated with following experts' advice, whereas reflective autonomy was positively associated with following expert advice when this advice was relevant. To test this premise, we manipulated others' ratings to reflect or oppose the objective quality of the paintings. If the autonomy restoration represents a form of reactance, then the ratings of the participants whose autonomy is threatened should differ from previous participants' alleged ratings independently of their objective accuracy. Conversely, if participants' ratings represent a reflective form of autonomy, they should differ from the others' alleged ratings only when these ratings do not reflect the objective value of the painting. As we expected autonomy restoration to be reflective rather than reactive, we hypothesized that participants in the autonomy-threatening condition would rate allegedly disliked but objectively superior paintings higher and the allegedly liked but objectively inferior paintings lower than participants in the neutral condition. Additionally, we did not expect participants in the autonomy-threat condition to differ from those in the neutral condition in their ratings of paintings with a corresponding objective value and others' alleged rating.

## Method

**Participants.** Forty-six English-speaking Canadian undergraduates (27 women, 19 men) participated in this study for course credit. The experiment was a 2 (objective quality of the paintings: high vs. low)  $\times$  2 (ratings of the previous participants: high vs. low)  $\times$  2 (autonomy deprivation vs. neutral) mixed-factorial design, with the last factor manipulated between participants.

**Procedure.** Participants were told that the aim of the study was to investigate the determinants of artistic preferences, specifically, testing the hypothesis that some personality traits should determine artistic taste. In line with that cover story, we asked participants to complete a personality questionnaire and then rate a set of paintings. The experimenter launched the computer program administering the personality questionnaire and left the participant alone. The questionnaire was the short revised version of the Eysenck personality questionnaire containing 22 items (Francis, Brown, & Philipchalk, 1992). Once they completed the questionnaire, all participants were informed by the computer program that they would receive feedback on each of the three subscales of the questionnaire. In accordance with Twenge et al. (2001)'s procedure, this feedback was based on participants' actual responses in order to increase the credibility of the manipulation. While no other feedback was given to the neutral group, participants in the autonomy deprivation group received additional feedback, which ostensibly reflected participants' global personality based on the combination of all their entries. The following statement appeared:

You are the type of person who needs to be directed and who does not really like to make decisions. You are typically oriented toward social environments that are rather controlling. You will find yourself in a job that does not demand initiative, where your commitments are minimal and where your work is well structured. Even if it's not totally true at your age, you will also have a tendency to be controlled in your social relationships.

This feedback was displayed during 1 min on the screen and then disappeared. The experimenter came back and launched the program on the computer displaying the paintings. Twelve abstract paintings were shown. Half of them came from a prestigious art gallery and were created by talented professional painters. The other half of the paintings came from an association aiming to introduce abstract art painting to the elderly, and so they were made by recreational painters. Pilot testing with 23 participants who did not know the origin of paintings confirmed that the pictures created by professional painters were more appreciated than the ones done by recreational painters. Using a 9-point scale (1 = *I do not like it at all* to 9 = *I love it*), participants of the pilot study rated the "professional paintings" much higher ( $M = 7.17$ ,  $SD = 1.23$ ) than the "amateur paintings" ( $M = 3.83$ ,  $SD = 1.32$ ),  $t(21) = 12.17$ ,  $p < .001$ .

Participants were provided with a notebook in which to indicate their ratings and were instructed to rate each painting on a separate page. On each page, the ostensible ratings of each painting by 15 other students could be seen. These bogus ratings represented a score on a 9-point scale, indicating how much the previous participants liked the painting. A number along the scale was circled using different inks and writing styles in order to enhance the perception that the ratings were authentic. The distribution of

ratings was different for each of the paintings. However, it was arranged so that for six of the paintings, the average likability rating was 7, and for the other six paintings the average likability rating was 3. In other words, half of the paintings were rated favorably, and the other half of the paintings were rated unfavorably by the alleged other students. A few scores deviating from the others were included to reduce participants' possible suspicion about the ratings. Among the six favorably rated paintings, three of them came from the art gallery and three of them came from the association. In the same way, an equal number of the six unfavorably rated paintings came from the art gallery and from the association. After viewing each painting for 20 s, participants had to circle a number corresponding to their liking for that painting. Their rating was made in a new row just below the ratings of the other students.

Upon completion of this task, the experimenter gave a short questionnaire to the participants including three items (rated on a 7-point scale from 1 = *not at all true* to 7 = *very true*) probing how much they had believed to the personality feedback ("Do you think that the feedback about your results was appropriate?"; "Do you believe in the feedback given on your type of personality?"; "Do you think that this feedback is consistent with your personality?";  $\alpha = .78$ ).

## Results

Analyses of self-reports indicated that participants generally thought that the personality feedback was true as their ratings were significantly greater than the scale's midpoint ( $M = 5.21$ ,  $SD = 1.52$ ,  $t(45) = 4.91$ ,  $p < .01$ ). In addition, there were no differences between the two experimental groups on this variable,  $t(44) < 1$ ,  $ns$ .

A repeated-measure GLM performed on participants' ratings of the paintings yielded no main effect of condition,  $F(1, 44) < 1$ ,  $p = ns$ , a strong significant main effect of the objective value of the paintings,  $F(1, 44) = 139.58$ ,  $p < .001$ ,  $\eta^2 = .760$ , and a strong significant main effect of the others' ratings  $F(1, 44) = 80.09$ ,  $p < .001$ ,  $\eta^2 = .645$ , showing that participants preferred the higher quality paintings and the paintings rated highly by others. The interaction between the objective value of the paintings and others' ratings was marginally significant,  $F(1, 44) = 3.88$ ,  $p < .06$ ,  $\eta^2 = .081$ . The interaction between the objective value and the condition was significant,  $F(1, 44) = 5.56$ ,  $p < .05$ ,  $\eta^2 = .112$ . Ratings of participants in the neutral condition and ratings of those in the autonomy deprivation condition were both significantly affected by the objective value of the paintings,  $t(22) = 6.73$ ,  $p < .001$  and  $t(22) = 9.95$ ,  $p < .001$ , respectively. As can be seen in Figure 2, autonomy-deprived participants were more sensitive to the objective value of the paintings than their counterparts. The interaction between the preexisting ratings of other participants and the between-subjects factor was significant,  $F(1, 44) = 9.99$ ,  $p < .01$ ,  $\eta^2 = .185$ . Ratings of participants in the neutral condition and ratings of those in the autonomy deprivation condition were both significantly affected by the preexisting ratings of other participants,  $t(22) = 8.05$ ,  $p < .001$  and  $t(22) = 4.39$ ,  $p < .001$ , respectively. Nevertheless, as illustrated by Figure 2, the participants in the neutral condition were more affected by the preexisting ratings than the participants in the autonomy deprivation condition. The three levels interaction was not significant  $F(1, 44) < 1$ ,  $p = ns$ .

Planned comparisons were performed to test our specific set of hypotheses. As expected, autonomy-deprived participants rated alleg-

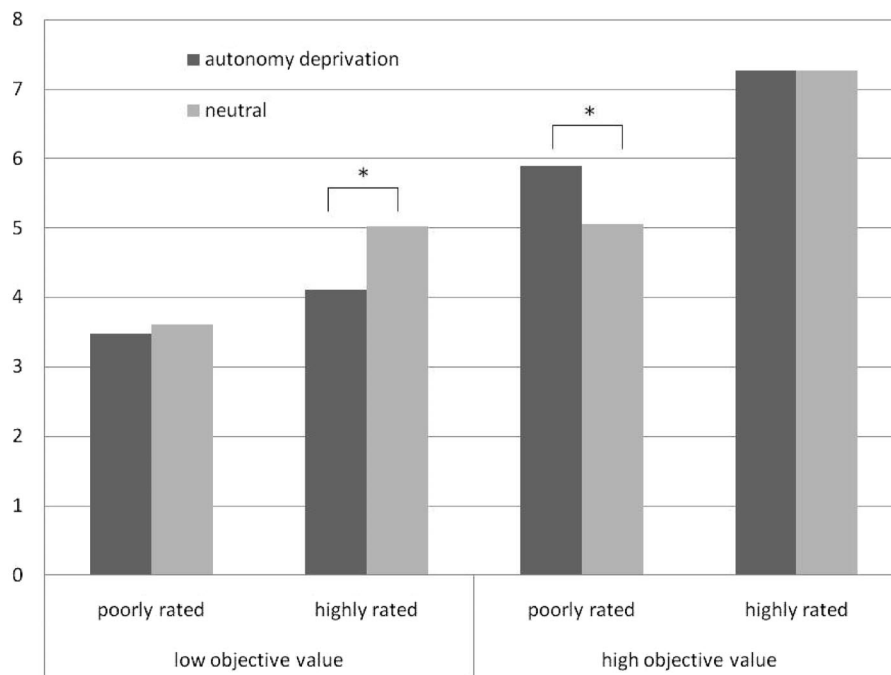


Figure 2. Means of paintings ratings as a function of the objective value of the paintings and preexisting ratings of the other participants (Experiment 3). Asterisks indicate significant difference at  $p < .05$ .

edly disliked but objectively superior paintings higher ( $M = 5.89$ ,  $SD = .97$ ) than participants in the neutral condition ( $M = 5.05$ ,  $SD = 1.18$ ),  $t(44) = 2.64$ ,  $p < .01$ . Similarly, paintings with low objective value and high preexisting ratings were rated less highly by participants in the autonomy deprivation condition ( $M = 4.11$ ,  $SD = 1.01$ ) than by those in the neutral condition ( $M = 5.03$ ,  $SD = .92$ ),  $t(44) = -3.24$ ,  $p < .01$ . As expected, no differences were found when the objective value was consistent with the preexisting alleged ratings of other participants,  $t_s(44) < 1$ ,  $p_s = ns$ .

## Discussion

In sum, these findings indicate that facing an autonomy threat can modify opinions and judgments that individuals report. As ratings of autonomy-deprived participants reflected to a greater extent the objective quality of the paintings (and thus were more likely to have been a reflection of their liking) rather than merely conforming to the ratings of others, this shows that the autonomy threat made them more motivated to regain autonomy by reasserting their beliefs. In sum, these results provide further evidence that exposure to an autonomy threat elicits a motive to regain autonomy. Nevertheless, it is interesting to see that autonomy-deprived participants distanced their judgment from others only when others' judgments were aberrant. Given that autonomy-deprived participants did not reject others' judgments when these were in accordance with the objective value of the rated item, the motive did not represent a reactive form of autonomy (rejecting any social influences). Since the judgment seemed to be made in coherence with personal standards, this would suggest that the autonomy restoration motive represents a reflective form of autonomy.

## General Discussion

Although SDT-based research has consistently showed that autonomy-depriving contexts lead to a loss of autonomous motivation (e.g., Flink et al., 1990) or to a relinquishment of autonomy (e.g., Williams et al., 2000), recent findings suggest that autonomy deprivation could lead to a motivation to restore autonomy (Sheldon & Gunz, 2009; van Prooijen, 2009). The aim of our research was to provide a systematic test of the existence of such an autonomy restoration motive. Across three studies, we provided converging evidence for the existence of an autonomy restoration motive. More specifically, the first two studies demonstrated that experiencing a thwarting of the need for autonomy leads to cognitive changes predisposing individuals to regain autonomy. Study 1 showed that experiencing autonomy deprivation raised the accessibility level of autonomy-related stimuli. As Bruner (1957) indicated, this allows individuals to easily locate where the potential sources of autonomy satisfaction are in the environment as well as preparing individuals to act by activating the behavioral schemata that are related to the satisfaction of autonomy (Strack & Deutsch, 2004).

Study 2 provided additional evidence of an autonomy restoration motive by showing that autonomy deprivation elicited an automatic tendency to approach cues related to autonomy satisfaction and avoid cues related to further autonomy thwarting. This finding thereby specifies the direction of the enhanced accessibility by showing that the perceptual readiness is devoted to direct individuals toward the elements that can potentially provide a source of satisfaction of autonomy in order to help them regain an optimal state level.

In sum, taking these two studies together, we can conclude that a set of cognitive adaptations occurs when one's need for autonomy is thwarted and that this cognitive mindset appears to be formed for the purpose of predisposing individuals to regain their sense of autonomy. This suggests that the organism allocates a part of its resources to restoring autonomy and that the need for autonomy is protected by a defensive mechanism that is similar to the one observed for other basic needs, such as the physiological needs (e.g., Aarts et al., 2001), the need to belong (e.g., DeWall et al., 2009; Maner et al., 2007), and the need for control (e.g., Pittman & D'Agostino, 1989).

On top of the cognitive changes elicited by the autonomy restoration process, we also examined whether judgment could be influenced by the restoration motive. In Study 3, we found evidence that judgment was affected by autonomy deprivation. This suggests that, in addition to early-stage cognitive processes, the autonomy restoration motive can affect downstream processes that are subject to conscious control.

It should be noted that the autonomy restoration motive was observed with two different manipulations. The manipulation in Studies 1 and 2, in which a controlling context was used to thwart participants' autonomy, has strong ecological validity insofar as controlling contexts are pervasive in daily life. For example, it has been shown that controlling contexts that thwart feelings of autonomy are the norm rather than the exception in important activities such as school (see Reeve, 2002 for review), work (e.g., Gagné & Deci, 2005) and sport (e.g., Pelletier et al., 2001). The manipulation used in Study 3 was a standardized process relying on allocation of fake personality feedback (see Maner et al., 2007; Twenge et al., 2001) to frustrate participants' autonomy. This manipulation ensures good internal validity as the content of the information was written and thereby tailored specifically to map onto the conceptual definition of autonomy.

Nevertheless, we have to acknowledge that some features of our experiments could prevent the generalization of our findings. Since all studies were conducted in the lab, it is hard to say whether the autonomy restorative response would occur in the same way in real life settings. Although the manipulation used in Experiments 1 and 2 included several controlling aspects, frustrations of needs in real-life settings (e.g., interacting with a controlling manager or a controlling teacher) are often more intense and are often associated with frustration of competence. In addition, many events could come to moderate the execution of the autonomy restoration process in the real world. If we can expect that early cognitive processes, which mostly rely on automatic processes, would be systematically engaged, the occurrence of downstream processes could more likely be inhibited. For example, in a more realistic situation of conformity in which individuals give their judgment in the presence of others, the threat of potential rejection could potentially inhibit resistance to conformity that should occur to restore autonomy. Field studies should be conducted to answer these questions.

In spite of these limitations, the present set of studies provides strong evidence to support the existence of an autonomy restoration process. It also yields a rudimentary description of the features of this process. First, it appears that in accordance with RIM, this restorative motive has an automatic component mobilizing non-controlled cognitive processes akin to the impulsive system. Nevertheless, this does not necessarily mean that this process is un-

conscious. Our results do not allow us to be conclusive on this point because we did not assess participants' awareness of this motivation and because autonomy deprivation was consciously manipulated in all of our studies. However, as suggested by the absence of effect on the conscious desire to experience autonomy reported in Sheldon and Gunz's (2009) study, it is likely that people are mostly unaware of this motivation. Even if the process can influence downstream processes such as judgment (as illustrated by Experiment 3), it seems unlikely that people have knowledge about the motivational underpinnings of their judgment (Nisbett & Wilson, 1977). Awareness could nevertheless be critical in the initiation of the process as it is possible that the autonomy threat must be consciously detected to initiate the restoration process. This last point can be illustrated by Mussweiler and Neumann's (2000) priming study in which participants were either primed with self-generated or external primes. While the former does not represent an autonomy threat, the latter may be considered as such. Their results showed that while individuals always assimilated self-generated primes, they corrected for the influence of externally provided primes but only when those primes were consciously detected.

Another interesting feature of the restoration process is its apparent similarity with psychological reactance. Since results from Study 3 showed that an autonomy threat leads to a reflective rather than a reactive form of autonomy, this means that the two phenomena are actually different as reactance is associated with reactive and not reflective autonomy (Koestner et al., 1996). In addition, if reactance were a part of an extended process functioning via a generalized motive, it seems that this motive would not be the need for autonomy. Brehm (1993) indeed referred to the need for control instead of the need for autonomy to designate the necessity to have and conserve freedoms. Even if control and autonomy are often confused, the two needs have two distinct definitions (see Skinner, 1996) and thus cannot be assimilated.

We think that the present findings have important theoretical implications for SDT. At a first glance, the existence of this process can seem discordant with many SDT findings. As we mentioned in the introduction, SDT research on autonomy regulation has demonstrated an opposite mechanism in which the deprivation of the need for autonomy leads to relinquishment of this need in favor of compensatory (extrinsic) motives (see Deci & Ryan, 2000). Although this compensation process does not seem to match with the restoration process, we think that both processes can be harmoniously integrated by adopting a temporal perspective. More specifically, we believe that both mechanisms exist, but each one represents a reaction to autonomy deprivation at a different point in time. While the autonomy restoration process would be the immediate reaction to the autonomy deprivation, the compensatory process would only occur in case of prolonged autonomy deprivation when autonomy restoration has consistently been unsuccessful. As suggested in the introduction, if we compared autonomy deprivation to a stressful event, its consequences could be interpreted using the general adaptation syndrome model of Selye's (1946) description of an individual's reaction to a pervasive stressor. According to the model, an alarm reaction (i.e., the autonomy restoration process) immediately follows the threat exposure. If all efforts to regain autonomy are unsuccessful and individuals remain exposed to the threat, they can eventually reach the exhaustion stage, in which they can no longer resist. While

Selye (1946) indicated that this stage can lead to death with a physiological stressor, we think that, in the case of psychological stress, individuals would rather relinquish the thwarted need. Indeed, it seems reasonable to assume that the compensatory process described in SDT occurs at this stage. In order to maintain a source of satisfaction, some other activities may become valued, resulting in the pursuit of compensatory motives (i.e., extrinsic goals). Nevertheless, as Deci and Ryan (2000) indicated, this state would be accompanied by many psychopathological problems. It would be very interesting for further research to provide a careful test of the entire temporal sequence by identifying people's reactions at each of the three stages of autonomy deprivation.

Another important implication of our results is that the autonomy restoration process could lead people to do things more autonomously immediately following the experience of an autonomy-depriving event. Yet, SDT research on the effects of controlling contexts (e.g., Deci & Ryan, 1987) has extensively shown that autonomy deprivation tends to undermine autonomous motivation. Once again, we think that these two claims may not necessarily contradict each other. When autonomy is assessed in the same activity in which the deprivation is experienced, the common SDT effect, namely, a reduction of autonomous motivation in the activity, will be seen. This is exactly what we observed in Study 1 when participants were less likely to practice the game in the free-choice period after their autonomy was threatened in this game. By focusing on autonomy in another activity or context, we would be able to see more autonomously oriented behavior following the autonomy threat. Indeed, it makes sense that individuals who experience autonomy deprivation in a task would not attempt to directly restore their autonomy by further engaging in this task but would rather direct their energy toward the next task. This assumption falls in line with the hypothesis made by Valleraud (2000) on the existence of a compensatory process that would lead individuals to focus on activities other than the one in which the need was thwarted. We think that this process of compensation in another activity can have a very important significance for motivational research as it suggests an intriguing possibility. Although controlling contexts usually have a negative impact on individuals' motivation in leading to a loss of autonomous motivation for the activity, they may also have a positive effect in leading to more autonomous motivation in another activity. More studies are needed to provide additional evidence for this process.

A further interesting direction for future studies would be to examine the immediate consequences of autonomy satisfaction. As our hypothesis is based on a homeostasis principle, it is possible that individuals not only value autonomy following deprivation, but they could also devalue experiencing autonomy following autonomy satisfaction. The results from Sheldon and Gunz (2009) who found a negative correlation between need satisfaction of autonomy, competence, and relatedness and the desire to experience each of these needs provide preliminary support for this possibility. It should also be noted that such a process of need satiation has been demonstrated for relatedness (DeWall et al., 2008).

In conclusion, the autonomy restoration process demonstrated in this article can help to solve apparent contradictions in SDT (e.g., autonomy as a basic need and autonomy relinquishment) and help to assemble disconnected theoretical parts of the theory (e.g., compensatory motives, loss of self-determination) via a meaningful model based on the temporal model of stress reaction. This perspective,

consistent with SDT's emphasis on individuals as active agents, suggests that individuals possess internal resources that may play an important role in the maintenance of their well-being even when contexts interfere with the satisfaction of basic needs.

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## Appendix

## Summary of the Pretests on the Words Used in Experiments 1 and 2

Original words	English translation	Autonomy score <sup>a</sup>	Valence score <sup>b</sup>
Words related to autonomy satisfaction			
<i>liberté</i> <sup>c,d</sup>	freedom	16	6.31
<i>libre</i> <sup>c,d</sup>	free	15	6.08
<i>autonomie</i> <sup>c,d</sup>	autonomy	13	5.62
<i>choix</i> <sup>c,d</sup>	choice	9	5.15
<i>authentique</i> <sup>c,d</sup>	authentic	8	5.46
<i>volonté</i> <sup>c,d</sup>	will	6	5.46
<i>libéré</i> <sup>c,d</sup>	liberated	4	5.15
<i>sincère</i> <sup>c,d</sup>	genuine	4	5.69
<i>alternative</i> <sup>d</sup>	alternative	3	4.38
<i>véritable</i> <sup>d</sup>	true	2	5
<i>intérêt</i>	interest	2	—
<i>option</i>	option	2	—
<i>franchise</i>	sincerity	2	—
<i>amusement</i>	enjoyment	1	—
<i>bénévole</i>	volunteer	1	—
<i>déagagé</i>	unburdened	1	—
<i>possibilité</i>	possibility	1	—
<i>affranchi</i>	relieved	0	—
<i>autorisé</i>	permitted	0	—
<i>dispense</i>	dispensation	0	—
<i>épanoui</i>	beaming	0	—
<i>exemption</i>	exemption	0	—
<i>intéressé</i>	interested	0	—
<i>naturel</i>	natural	0	—
Words related to autonomy thwarting			
<i>corvée</i> <sup>c,d</sup>	duty	10	2.07
<i>obligation</i> <sup>c,d</sup>	obligation	10	2.54
<i>contraint</i> <sup>c,d</sup>	constrained	8	2.08
<i>obligé</i> <sup>c,d</sup>	obliged	8	2.92
<i>restreint</i> <sup>c,d</sup>	restricted	7	2.69
<i>forcé</i> <sup>c,d</sup>	forced	7	2.15
<i>autorité</i> <sup>c,d</sup>	authority	6	3.15
<i>commande</i> <sup>c,d</sup>	command	6	3.69
<i>contrôlé</i> <sup>d</sup>	controlled	6	3.69
<i>surveillance</i> <sup>d</sup>	surveillance	3	3.04
<i>exigence</i>	requirement	3	—
<i>impératif</i>	imperative	3	—
<i>imposé</i>	imposed	3	—
<i>pression</i>	pressure	3	—
<i>dictature</i>	dictatorship	3	—
<i>règlement</i>	rules	2	—
<i>discipline</i>	discipline	1	—
<i>opprimé</i>	oppressed	1	—
<i>assujetti</i>	subjected	0	—
<i>astreinte</i>	constraint	0	—
<i>captivité</i>	captivity	0	—
<i>prison</i>	jail	0	—
<i>servitude</i>	servitude	0	—
<i>tâche</i>	labor	0	—
Positive words			
<i>amour</i> <sup>d</sup>	love	—	6.15
<i>joyeux</i> <sup>d</sup>	joyous	—	6.15
<i>heureux</i> <sup>d</sup>	happy	—	6.54
<i>soleil</i> <sup>d</sup>	sun	—	5.85
<i>triomphé</i> <sup>d</sup>	triumphed	—	6.15
<i>satisfait</i> <sup>d</sup>	satisfied	—	6.03
<i>câliner</i> <sup>d</sup>	to cuddle	—	5.54

(Appendix continues)

## Appendix (continued)

Original words	English translation	Autonomy score <sup>a</sup>	Valence score <sup>b</sup>
<i>plage</i> <sup>d</sup>	beach	—	4.85
<i>bonheur</i> <sup>d</sup>	happiness	—	6.15
<i>chaton</i> <sup>d</sup>	kitten	—	4.76
Negative words			
<i>vomir</i> <sup>d</sup>	vomit	—	1.54
<i>déchet</i> <sup>d</sup>	waste	—	1.92
<i>tabassé</i> <sup>d</sup>	beaten	—	1.31
<i>brûlure</i> <sup>d</sup>	wound	—	1.96
<i>mort</i> <sup>d</sup>	dead	—	1.96
<i>puanteur</i> <sup>d</sup>	stench	—	1.54
<i>dégoutant</i> <sup>d</sup>	disgusting	—	1.92
<i>mourrant</i> <sup>d</sup>	dying	—	1.54
<i>irradié</i> <sup>d</sup>	irradiated	—	1.61
<i>assassinat</i> <sup>d</sup>	murder	—	1.46

<sup>a</sup> The autonomy score depicts the sum of the points each word had in the pretest devoted to selecting the words that best represent autonomy satisfaction and in the pretest devoted to selecting the words that best represent autonomy thwarting. The higher this score is the more the word depicts the construct of interest. <sup>b</sup> The valence score represents the mean rating of each word in the pretest devoted to assessing the valence of the words used in Experiment 2. This score can vary from 1 (very negative) to 7 (very positive). <sup>c</sup> Words used in Experiment 1. <sup>d</sup> Words used in Experiment 2.

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### Call for Nominations

The Publications and Communications (P&C) Board of the American Psychological Association has opened nominations for the editorships of **Journal of Experimental Psychology: Learning, Memory, and Cognition**; **Professional Psychology: Research and Practice**; **Psychology and Aging**; **Psychology, Public Policy, and Law**; and **School Psychology Quarterly** for the years 2013–2018. Randi C. Martin, PhD, Michael C. Roberts, PhD, Ronald Roesch, PhD, and Randy W. Kamphaus, PhD, respectively, are the incumbent editors.

Candidates should be members of APA and should be available to start receiving manuscripts in early 2012 to prepare for issues published in 2013. Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominations are also encouraged.

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- **Psychology and Aging**, Leah Light, PhD
- **Psychology, Public Policy, and Law**, Peter Ornstein, PhD, and Brad Hesse, PhD
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Candidates should be nominated by accessing APA's EditorQuest site on the Web. Using your Web browser, go to <http://editorquest.apa.org>. On the Home menu on the left, find "Guests." Next, click on the link "Submit a Nomination," enter your nominee's information, and click "Submit."

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Deadline for accepting nominations is January 10, 2011, when reviews will begin.