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The effects of regret on internalization of academic motivation: A longitudinal study

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ABSTRACT

We examined whether and how regret contributes to acquiring autonomous motivation with the aim of gaining a deeper understanding of the intrapersonal process of the internalization of academic motivation. We conducted a longitudinal survey to examine the longitudinal relationship between motivation and regret in academic situations. Results of a path analysis showed that regret about neglecting study, experienced immediately after an end-of-term examination, mediated the conversion of controlled (especially, introjected) motivation into autonomous (i.e., intrinsic and identified) motivation. In contrast, participants' regret about not having enjoyed themselves in the long term negatively predicted autonomous motivation in a subsequent examination. These results indicated that participants' regret about neglecting their studies contributed to internalization, but regret about not having enjoyed themselves interfered with this. We discussed new insights for both educational practices and psychological theories.

1. Introduction

It is well known that when motivation is autonomous and self-endorsed, rather than externally controlled or pressured, goal achievement is more likely (see Ryan & Deci, 2000, for a review). In academic situations, autonomous motivation can help students study harder and achieve better grades (Guay, Ratelle, & Chanal, 2008). Autonomous motivation is also effective in the achievement of other goals, including health regulation (Ng et al., 2012) and playing sports (Pelletier, Fortier, Vallerand & Breire, 2001). Thus, autonomous motivation is a successful means of achieving goals.

Self-determination theory (Ryan & Deci, 2000) posits that autonomous and controlled motivation lie on a continuum. The theory also suggests that controlled motivation can be converted into autonomous motivation by satisfying one's psychological needs (i.e., autonomy, competence, and relatedness); this is referred to as *internalization*. Previous research has revealed that intrinsic motivation can be enhanced through choice (Patall, Cooper, & Robinson, 2008) and autonomous support (Black & Deci, 2000; Grolnick & Ryan, 1989). However, few studies have focused on verifying the intrapersonal process of internalization; thus, there is a profound dissociation between internalization of motivation and other findings in cognitive psychology. Therefore, we address this issue by considering the intrapersonal process of self-control and reinforcement learning. More specifically, we examined whether and how regret contributes to acquiring autonomous motivation by focusing on the adoptive role of regret.

1.1. Does regret contribute to internalization?

Regret is a negative emotion caused by counterfactual comparison between the fact (what is) and the possible state (what might have been) (Roese & Olson, 1995). When people are aware that the consequences of choosing an option were worse than the consequences of a rejected option, they feel regret. Regret is a self-conscious emotion associated with the feeling of responsibility (Connolly & Ordo, 1997). Thus, when people feel regret, they blame themselves for failing to act differently.

Regret is known to have a profound impact on decision making. In regret theory, economists suggest that people anticipate the option that causes the least regret and choose the option that will maximize their pleasure (Bell, 1982; Loomes & Sugden, 1982). Many psychological researchers have verified the usefulness of the function of regret in decision making (see Zeelenberg & Pieters, 2007, for a review). Cognitive neuroscientists have revealed that regret is associated with activity in the orbitofrontal cortex and it can modulate the value of options (Coricelli, Dolan, & Sirigu, 2007). People place a high value on the option that will cause them to feel the least regret after their decision.

Recent research on self-control suggests that experience of self-conscious emotions can increase goal importance in subsequent situations wherein self-control is required for goal achievement (Hofmann & Fisher, 2012). Hofmann and colleagues conducted an experience-sampling survey and examined relationships between self-control failure/success, self-conscious emotions, and subsequent self-control.

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They revealed that the experience of guilt, a negative self-conscious emotion, in situations in which participants had failed to resist their own desires improved goal importance in subsequent occurrences of the same type of desire. This result is consistent with the theoretical explanation of the role of regret, in which negative emotions associated with poor choices modulate the value of options in subsequent decision making.

By having this function that benefits self-control, regret can contribute to the internalization of motivation. Self-determination theory suggested four types of extrinsic motivation; external, introjected, identified, and integrated (Ryan & Deci, 2000). External and introjected motivation types are typically assumed to be controlled, and identified, integrated, and intrinsic motivation types are assumed to be autonomous. Self-determination theory suggests that people increasingly internalize their motivation – moving from external to integrated motivation – as they grasp the importance of goal achievement. As noted above, regret can improve goal importance in subsequent situations requiring self-control. Therefore, it follows that regret would also contribute to internalization.

1.2. How does regret contribute to internalization?

As regret is known to have an effective role in experimental studies, we should consider exactly how regret could contribute to internalization in everyday situations. Participants in experimental studies often have only one goal; however, in everyday situations, people may have multiple goals at once. For instance, Fries, Schmid, Dietz, and Hofer (2005) revealed that only 11.4% of the students who participated in their study reported never having experienced motivational conflict in academic situations. Previous research also showed that goals or values concerning leisure interfere with academic goal achievement (Fries, Dietz, & Schmid, 2008; Hofer et al., 2007). Therefore, students are likely to regret not having enjoyed themselves and this regret can affect their motivational states, even though they have a specific academic goal.

In addition to this, regret can change dynamically, although the issue that caused the regret does not change. Gilovich, Medvec, and Kahneman (1998) proposed that regret has two aspects in terms of temporal dynamics: *hot regret* and *wistful regret*. In the short term, hot regret is evoked by strong emotional responses to facing alternative outcomes, and then fades quickly. Conversely, wistful regret occurs gradually when considering other possible outcomes in the long term. Accordingly, we considered regret about neglecting one's studies and not having enjoyed oneself in both the short and long terms.

We hypothesized that regret about neglecting one's studies in the short term would contribute to long-term consequences, such as internalization. Regret that contributes to decision making in experimental studies, is hot regret, which occurs soon after a choice has been made (i.e., in the short term; Coricelli et al., 2007). An experience sampling study also revealed that self-conscious emotion in the short term can improve goal importance regardless of time distance (Hofmann & Fisher, 2012). These results support the notion that regret in the short term may continue to affect distant situations. In addition, regret that concerns ongoing goals is more stable than the other types of regret (Summerville, 2011). Therefore, hot regret about goals to be achieved in the short term would be more beneficial for internalization relative to wistful regret in the long term.

Conversely, we hypothesized that regret about not having enjoyed oneself in the long term would interfere with internalization. Previous research demonstrated that the need for self-control biased decision making (Trope & Fishbach, 2000). Marketing research has shown that, when facing the need for self-control, regret about resisting temptation (e.g., enjoyment) was suppressed soon after participants made decisions, but then resurfaced a considerable amount of time after the decisions had been made (Kivetz & Keinan, 2006). Kivets and Keinan regarded this regret as wistful and insisted that it occurred because participants felt as though they were “missing out,” as the criteria against which they assessed themselves became liberated from the need for self-control. Therefore, regret about competitive goals (i.e., enjoyment), which might interfere with internalization, might be less dominant in hot regret (in the short term) but more dominant in wistful regret (in the long term).

1.3. Who feels more regret that contributes to internalization?

We discussed the effect of regret on motivation above and consider the opposite effect below. Internalization refers to the conversion from controlled motivation to autonomous motivation. Therefore, it is crucial to clarify whether and why regret can mediate the possible longitudinal relationship between controlled motivation and autonomous motivation.

As described above, regret is associated with a sense of responsibility. Connolly and Ordo (1997) assumed that regret is caused by both compatible outcomes and feelings of self-blame for having made a poor choice. Some research has shown that the strength of regret depends on the consistency of actual decisions and the orientation of the decision maker (Seta & Seta, 2013). For instance, individuals who have maintenance goals tend to regret action more than do individuals who have change goals, and the opposite is true for regret about inaction.

We hypothesized that controlled motivation would promote regret about failing to attain goals (i.e., regret about neglecting study). As described above, the need for goal achievement causes far-sighted bias. This bias is related to the feeling of *doing the right thing*, strengthens regret about failure to engage in goal-related behavior, and lessens regret about not having engaged in other enjoyable activities soon after decisions have been made (Kivetz & Keinan, 2006). Self-determination theory posits that controlled motivation reminds students that they *should do* something (Deci & Ryan, 1995). Therefore, if people with controlled motivation feel more responsible for attaining their goals, controlled motivation should enhance stronger regret concerning the ongoing goal in the short term. In conjunction with the enhancement of this regret, it follows that controlled motivation would suppress regret about competitive goals in the short term.

The enhancement of regret may be adaptive for people with controlled motivation with respect to repetitive goal achievement. Regret is also known to be a fundamental process in reinforcement learning, in which agents repeatedly experience similar decision-making situations and update the predicted value of options according to their experience in order to maximize future rewards. As previously discussed, regret is beneficial for modulating the value of options. In a lesion study, patients with orbitofrontal cortex lesions did not experience regret and could not learn to maximize future rewards (Camille et al., 2004).

One of the reasons that reinforcement learning may enable agents to maximize future rewards is that it can steer them towards less effortful goal achievement. At the beginning of the learning process, the agent encodes the association between the behavior and the potential consequences. As learning progresses, agents act somewhat automatically according to encoded reward history. The former is known as goal-directed action, and the latter is known as habitual action (Balleine & O'Doherty, 2010; Daw, Niv, & Dayan, 2005). Previous research has demonstrated that habitual actions require less effort in self-control (Goto & Kusumi, 2013). In sum, feeling regret at the beginning of reinforcement learning is an adaptive way of maximizing future rewards efficiently.

Autonomy is also related to the effort required for goal achievement. Muraven, Rosman, and Gagné (2007) revealed that participants who were rewarded according to their performance experienced less autonomy and performed worse following a cognitive control task relative to those who were rewarded regardless of their performance. Other studies have also demonstrated that participants with controlled motivation invest more effort in a task than do those with autonomous motivation (Moller, Deci, & Ryan, 2006; Muraven, 2008). These results suggest that people with controlled motivation may suffer from a high mental load