Self-regulation predicts risk-taking through people’s time horizon

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In the context of decision-making research, people’s regulatory orientation mode (i.e., assessment and locomotion modes) has been included among the most prominent individual difference variables, which may potentially account for choice behaviour. Thus, the main objective of our experiment was to investigate the relations between habitual use of regulatory mode and risk-taking through people’s time horizon. Risk-taking was appraised using a behavioural measure (i.e., BART) 1 month following evaluation of habitual use of regulatory mode. The findings revealed a significant negative association between the assessment mode and risk-taking through individual differences in time horizon.

Keywords: Balloon Analogue Risk Task; Individual differences; Regulatory mode; Risk-taking; Time horizon.

A recent review suggests that the extent to which people behave in a risky manner depends, among other things, on the type of self-regulation a person typically uses (Lauriola, Panno, Levin, & Lejuez, in press). In this article, we focus on the distinction between two modes of self-regulation, which are posited to motivate human behaviour (Higgins, Kruglanski, & Pierro, 2003; Kruglanski et al., 2000). While the so-called assessment mode “constitutes the comparative aspect of self-regulation concerned with critically evaluating entities or states, such as goals or means, in relation to alternatives in order to judge relative quality,” the locomotion mode “constitutes the aspect of self-regulation concerned with movement from state to state and with committing the psychological resources that will initiate and maintain goal-related movement in a straightforward and direct manner” (Kruglanski et al., 2000, p. 794).

In the context of decision-making, regulatory mode has been included among the person factors, which may account for choice behaviour (Appelt, Milch, Handgraaf, & Weber, 2011); but surprisingly, there is no empirical evidence of its relation with risk-taking. Higgins et al.’s (2003) work pointed out that people with a strong assessment tendency critically evaluate options and relate future actions to critical standards in order to make the most appropriate decision. Such evaluative criticism leads assessors to engage in mental time travelling as they compare current states to future outcomes to protect their interests in the long run (Pierro et al., 2008, p. 327). Accordingly, one may think that comparing current and future states might also lead assessors to take less risk in the present to avoid potential bad outcomes in the future (see Kruglanski et al., 2000, for more details). This idea has been supported by a recent study, which adopted a delay discounting paradigm (choosing between larger-later rewards vs. smaller-sooner rewards) to demonstrate that when assessment overrides locomotion, people make more far-sighted choices, whereas when locomotion overrides assessment, people make more short-sighted choices (Mannetti et al., 2009). Higgins et al. (2003) also pointed out that individuals with a strong locomotion tendency are motivated to quickly engage in activities, perceiving them as ends in themselves rather than means. Accordingly, they are presumed to live for the sake of the moment with less regard for future consequences of their actions. Thus, although the locomotion mode constitutes...
an aspect of self-regulation concerned with movement from state to state, it does not necessarily involve a movement towards the future in the long run (Kruglanski et al., 2000). Therefore, another idea which motivated this study is showing whether locomotion mode is related to risk-taking—although in a direction opposite to that for assessment—through people’s mental time travel. These expectations are also based on a recent study showing that while locomotion was negatively related to greater counterfactual thinking and regret, each of which has been associated to decreased risk-taking in the literature, assessment was positively related to these two variables (Pierro et al., 2008).

Taken together, all these findings reinforce the view that regulatory mode is related to people’s mental time horizon as well as to decision-making. People’s time horizon has been defined as how far into the future people think about things (Bluedorn, 2002). The association of time horizon with risky decision-making is not only essential to theoretical models of risky decision-making, such as the Risk Homeostasis Theory (Wilde, 1982), but it has also been empirically documented in a number of studies in which one’s orientation towards the future leads to decreased risk-taking in different domains (see Teuscher & Mitchell, 2011, for a review). Notably, a recent study, which adopted a probability discounting paradigm (choosing between smaller-certain rewards versus larger-less likely rewards; see Green & Myerson, 2004, for a review), showed that the greater the present hedonistic time perspective the greater the risk-taking (Baumann & Odum, 2012). Teuscher and Mitchell’s (2011) review also pointed out that studies investigating the relationship between people’s future orientation and risk-taking are consistent with the idea that individuals with a wider time horizon are less apt to take risk. However, accounts for the association have not been offered. Thus, our goal is to investigate whether people’s time horizon can mediate the expected association between regulatory mode and risk-taking. In particular, for the assessment mode, we expect a negative association with risk-taking and a positive association with time horizon. For the locomotion mode, we expect a positive association with risk-taking and a negative association with time horizon.

MEASURES

Participants

One hundred nineteen undergraduate students at the University of Rome “Sapienza” (Mage = 21, SD = 3.48; 68% women) received course credit plus a variable payment in the form of a prepaid mobile phone card, the amount of which was determined by the outcome of the decision task. Both course credit and payment were given at the end of the study (see below).

Measures

Regulatory mode questionnaire

Empirical evidence showed that locomotion and assessment tendencies are essentially uncorrelated with each other, that each contributes to self-regulatory success, and that each relates to a distinct task orientation and motivational emphasis (Kruglanski et al., 2000). We measured participants’ habitual use of regulatory mode with the Regulatory Mode Questionnaire (RMQ; Kruglanski et al., 2000), which consists of 24 items using 6-point scales (strongly disagree—strongly agree). Sample items include “I often compare myself with other people” (i.e., assessment mode) and “When I finish one project, I often wait awhile before getting started on a new one” (i.e., locomotion mode, reverse scored). The internal consistencies in our own sample were .74 for assessment and .78 for locomotion. All analyses use these continuous measures where higher scores indicate greater assessment and locomotion modes.

Temporal depth index

Different measures of temporal focus are available in the literature (see Shipp, Edwards, & Lambert, 2009). We used the Bluedorn’s (2002) Temporal Depth Index (TDI) as it represents the best tradeoff between reliability and ease of use in a laboratory setting. More specifically, the TDI measures the temporal distance between the future and the present with three items only: “When I think about short-term future, I usually refer to things faraway”, “When I think about middle-term future, I usually refer to things faraway”, “When I think about long-term future, I usually refer to things faraway” (Bluedorn, 2002). The rating scale presented 15 time response classes (e.g., 1 day, 1 month, 1 year and 11 years), ranging from 1 = 1 day to 15 = more than 25 years (see Bluedorn, 2002, for more details). A composite score (Cronbach’s α = .87) was computed such that a higher score indicated a wider time horizon.

Balloon Analogue Risk Task

The Balloon Analogue Risk Task (BART) (Lejuez et al., 2002) is a 30-trial computer-based measure of risk-taking. In each trial, a small simulated balloon is presented and the participants can inflate it by pressing a pump button, thereby earning $.05 placed in a temporary bank. The balloon can explode anytime after each pump, and if this happens all the money accumulated in the temporary bank is lost. Thus, each pump confers greater potential reward, but also greater risk. Participants can decide anytime to transfer the money from the temporary bank to the permanent bank, thus ending the trial. Relevant to our interests, participants can engage in mental time...
travel on each trial, as any decision (i.e., collecting the money or continuing to inflate the balloon) has an effect on the total amount earned at the end of the task (see Schonberg, Fox, & Poldrack, 2010, for more details). The average number of pumps on unexploded balloons was the dependent variable, with higher score indicating greater risk-taking (Lejuez et al., 2002).

**Procedure**

Participants were tested on two separate sessions—spaced 4 weeks apart—each of which was presented as an independent study. During the first session, the participants filled out the RMQ (Kruglanski et al., 2000). During the second session, they performed the BART according to the standard procedure, and filled out the TDI (Bluedorn, 2002).

**RESULTS**

The .05 level of significance was adopted throughout all analyses. To investigate the relations among habitual use of regulatory mode, time horizon and risk-taking, we computed correlation coefficients (see Table 1). As predicted, the assessment mode was positively correlated with time horizon as well as negatively related to risk-taking. In addition, time horizon was negatively related to risk-taking. All these correlations were in the moderate range. At variance with our prediction, the locomotion subscale was not significantly related to either risk-taking or time horizon.

To further understand the mechanisms underlying relationships among assessment mode of self-regulation, time horizon and risk-taking, we used the INDIRECT procedure for SPSS (see Preacher & Hayes, 2008, for more details) to test our mediation hypothesis. As shown in Figure 1, the mediation model was estimated to derive the total, direct and indirect effects of assessment mode on risk-taking through time horizon. We estimated the indirect effect of assessment mode on risk-taking, quantified as the product of the OLS regression coefficient estimating time horizon from assessment mode (i.e., path $a$ in Figure 1), and the OLS regression coefficient estimating risk-taking from time horizon, controlling for assessment mode (i.e., path $b$ in Figure 1). A bias-corrected bootstrap-confidence interval (CI) for the product of these paths that does not include zero provides evidence of a significant indirect effect (Preacher & Hayes, 2008). Using the INDIRECT procedure with 5000 bootstrap samples revealed a significant negative indirect effect of assessment mode on risk-taking through time horizon (point estimate $= -0.10$, 95% percentile CI $= -0.27$ to $-0.02$).

**DISCUSSION**

This study shows that habitual use of the assessment mode of self-regulation predicts risk-taking through people’s time horizon. Unexpectedly, our results also showed that the locomotion tendency was neither related to greater risk nor to people’s time horizon. This suggests that locomotors approached the BART task as they take life, by playing the game for its own sake rather than setting a strategic plan based on future goals. Thus, the hypothesized mediation effect is likely for assessors only.

![Figure 1](image-url)
In comparison to earlier studies (Mannetti et al., 2009; see Teuscher & Mitchell, 2011, for a recent review), our work first expands our knowledge by detecting people’s time horizon as a mediator of the relationship between habitual use of assessment and risk-taking. This conclusion is consistent with the claim that assessors critically evaluate options and relate future actions to critical standards. By virtue of this evaluative criticism they are less apt to take risk in the present to avoid potential bad outcomes in the future (see also Pierro et al., 2008).

Interestingly, two features make this study well-grounded. First, we assessed risk-taking using the BART, which represents a compromise between inferring risk-taking tendencies from observed choices in a controlled environment and assessing one’s personal involvement in real-life risky situations, in which an immediate pleasure or a short-term reward may lead to negative outcomes in the long run (e.g., unprotected sex; see Lejuez et al., 2002, for more details). Second, to more conservatively test the predictive power of the regulatory mode on risk-taking we assessed these tendencies 4 weeks before assessing risk-taking.

However, we should acknowledge some limitations to our study. First, Kruglanski et al. (2000) showed that people’s regulatory mode is also related to their extraversion and neuroticism. It was beyond the scope of this study to investigate these personality dispositions, but we cannot rule out that they may moderate our results. Second, as our evidence on the relationship between habitual use of regulatory mode and risk-taking is based on a college sample, further studies need to be carried out among different population samples. For instance, Shalev and Sulikowski (2009) suggested that poor self-regulation may play a specific role in a range of impulsive- and compulsive-related disorders. Therefore, it might be interesting to shed light on mechanisms linking individuals’ regulatory mode to risk-taking in specific populations, such as pathological gamblers. Third, the BART has been considered a good proxy of real-world risk behaviours as it involves sequential choices where the willingness to get an immediate reward (i.e., pressing the pump button) may lead to negative outcomes in the future (i.e., a decreased total earning at the end of the task). However, future studies should shed light on how assessment mode would affect a current risky choice, which in turn may lead to negative outcomes some years later. To address this issue, paradigms which combine delay with probability discounting may be adopted (see Green & Myerson, 2004, for a review).

To further understand risk-taking processes Schonberg et al. (2010, p. 6) suggested adopting a risk task that “allows for decomposition and analysis in terms of cognitive and economic primitives” (e.g., magnitude of gains and losses, probabilities). Future studies should investigate mechanisms underlying the relationship between regulatory mode and risk-taking using a risk task that assesses the decision maker’s gain, loss and probability sensitivity, such as the Columbia Card Task (Figner, Mackinlay, Wilkening, & Weber, 2009; Panno, Lauriola, & Figner, 2013) or the Cups Task (Levin, Weller, Pederson, & Harshman, 2007).

The present findings could have important applied implications. For instance, the assessment mode may be situationally induced in some contexts, for example in financial advertising about retirement investments, to make people’s choices more far-sighted. With respect to time horizon, future studies are needed to investigate whether situationally inducing a wider time horizon may lead to decreased risk-taking. Such a finding would have substantial implications, for example, regarding psychological interventions that focus on adolescents’ risk behaviours.

To conclude, our results promise a novel insight into the connections between personality psychology and decision science because they increase our knowledge about regulatory mode theory (Kruglanski et al., 2000) as well as research lines that rely on decision-making processes (Appelt et al., 2011).


