

The impact of precommitment on risk-taking while gambling: A preliminary study

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Background and aims: Precommitment refers to the ability to prospectively restrict the access to temptations. This study examined whether risk-taking during gambling is decreased when an individual has the opportunity to precommit to his forthcoming bet. *Methods:* Sixty individuals participated in a gambling task that consisted of direct choice (simply chose one monetary option among four available ones, ranging from low-risk to high-risk options) or precommitment trials (before choosing an amount, participants had the opportunity to make a binding choice that made high-risk options unavailable). *Results:* We found that participants utilized the precommitment option, such that risk-taking was decreased on precommitment trials compared to direct choices. Within the precommitment trials, there was no significant difference in risk-taking following decisions to restrict versus non-restrict. *Discussion:* These findings suggest that the opportunity to precommit may be sufficient to reduce the attractiveness of risk. *Conclusions:* Present results might be exploited to create interventions aiming at enhancing one's ability to anticipate self-control failures while gambling.

Keywords: gambling, risk-taking, precommitment, self-control, punishment sensitivity

INTRODUCTION

Not all risk-taking is created equal: some risks are taken under a clear and rational frame of mind, while others are made in a less planful fashion (Helfinstein et al., 2014). A major issue with spontaneous risk-taking is that it is taken in the “heat of the moment”, without more “cooler” elaborated cognitive control, which may, in turn, hamper one's ability to pursue risk appropriately (Cohen & Lieberman, 2010; Knoch et al., 2006). Put differently, inducing cautiousness before deciding might enhance cognitive control, and in turn, would reduce the level of risk-taking. For instance, monetary risk-taking is diminished when imposing a delay before the next bet, as compared to a situation in which participants could bet directly (Newman, Patterson, & Kosson, 1987; Thompson & Corr, 2013, 2014). Others studies have shown that monetary risk-taking is lowered in a gambling context in which participants were required to stop their motor response (i.e., choosing a bet option), as compared to a condition without stop signals (Stevens et al., 2015; Verbruggen, Adams, & Chambers, 2012).

Another possible alternative for diminishing impulsive risk-taking would be to allow people to *precommit* to their forthcoming choice. Precommitment refers to the ability to anticipate self-control failures and prospectively restrict the access to temptations (Fujita, 2011; Kalenscher & Pennartz, 2008; Kurth-Nelson & Redish, 2010, 2012). Findings from several studies highlighted that precommitment is an efficient strategy to resist short-term temptations in order to

achieve long-term goals (Ariely & Wertenbroch, 2002; Ashraf, Karlan, & Yin, 2006; Giné, Karlan, & Zinman, 2010; Schwartz et al., 2014; Wertenbroch, 1998). These studies have shown that precommitment could help people to restrict themselves from (e.g.) smoking (Giné et al., 2010) or eating unhealthy food (Schwartz et al., 2014). For instance, individuals who agreed to pledge that they would increase their purchases of healthy food (at some risk of financial loss if the goal was not reached) subsequently showed an increase in healthy grocery items purchased, as compared with individuals who declined the commitment (Schwartz et al., 2014). This restriction process was framed on a single precommitment decision phase (e.g., to choose or not to precommit to a grocery-shopping program; Schwartz et al., 2014), separated from hours, days or even weeks from the actual temptation. Hence, while those studies highlighted that precommitment could reduce the incidence of self-control failure on several types of behaviors, this research only covers a certain type of situations where precommitment could impact decision-making. More specifically, studies are needed in order to examine the impact of pre-commitment processes that allow people to restrict themselves when choices are made repeatedly within the “heat of the moment”, that is, on a trial-per-trial basis in

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which an individual has the opportunity to precommit his/her forthcoming decision, such as during monetary risk-taking in gambling.

The trial-per-trial impact of precommitment was recently studied within an experiential delay-discounting task (Crockett et al., 2013), where the opportunity to make a binding choice was more effective at promoting selection of the larger-later option than a ‘willpower’ condition that was required sustained inhibitory control. These findings led us to hypothesize that precommitment could also impact sequential decision-making that involves probabilistic rewards, that is, gambling. Precommitment strategies are already provided within casino-settings to individuals who want to limit their level of monetary expense prior to gambling (Nower & Blaszczynski, 2010). For instance, gamblers can deposit predetermined amounts of money on “smart cards” or can also gamble on slot machines that enforce pre-set limits of money expense, after which the machine deactivates (Ladouceur, Blaszczynski, & Lalande, 2012; Nower & Blaszczynski, 2010). Nevertheless, the recent expansion of the gambling computer technology has facilitated and diversified the access to situations involving high monetary risk-taking (e.g., online poker, sport betting; Khazaal et al., 2013; Petry & Weinstock, 2007). Indeed, recent advances in online sport betting not only allow to place bets on several ongoing live sport competitions but also to bet on specific events occurring during the game. Hence, one major issue with the online gambling environment is that it may increase the development of abnormal monetary risk-taking by affording much faster response times as the usual constraints of casino settings (e.g., time delay to get to the casino, various delays imposed by the actions of other gamblers, presence of a dealer). In this context, it is important to examine whether precommitment could help one to restrict himself when the temptation is closer in time and occur repeatedly over a certain period of time.

The action of “gambling” in the present study consisted of choosing one of four monetary amounts. Participants were informed that the higher the amount, the less probable a win and than a loss corresponded to half of the amount they gambled with. Thus, selecting higher amounts constituted a more risky bet, whereas selecting lower amounts constituted a safer bet (but without having explicit information on win/loss probability). Risk-taking in our task consisted of preferring relatively higher amounts that carried a higher probability of losing (and in the case of the riskiest options, a negative expected value) over lower amounts that carried a lower probability of losing (Boyer, 2006; Verbruggen et al., 2012). This is the same behavior that

problem gamblers engage in, for example, sport betting. In this context, self-control refers here as the ability to sacrifice the opportunity to experience high monetary reward in favor of lower but less risky rewards, that is, acting consistently with one’s more abstract distal motivation (e.g., to win money at the end of the experiment; Boyer et al., 2006; Fujita, 2011). Self-control failure, on the other hand, entails sacrificing one’s distal concerns of long-term monetary gains in favor of the possibility of enjoying higher but less probable reward (e.g., risk-seeking choice), that is, acting in a manner consistent with one’s concrete, proximal incentive (Dill & Holton, 2014; Fujita, 2011). Hence, each trial of our gambling paradigm triggers a self-control conflict because the participant’s distal and proximal motivations pressed for opposing actions. Using this gambling paradigm, we expected that participants would take less risk (i.e., enhanced self-control) when they have the opportunity to precommit to their forthcoming bet, that is, to make a binding choice that turns high-risk bet unavailable for choice, as compared with situations in which participants can gamble directly.

Finally, an exploratory aim of this study was to examine whether the association between sensitivity to reward, sensitivity to punishment and risk-taking could be modulated by the type of trials (precommitment or direct choice). Indeed, some studies highlighted that sensitivity to reward and to punishment is predictive of monetary risk-taking (Franken & Muris, 2005; Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2006; Kim & Lee, 2011; Studer & Clark, 2011; Suhr & Tsanadis, 2007). More specifically, in risky choice situations, high sensitivity to punishment should promote avoidance of potential losses and thereby lead to risk-averse behavior. In contrast, sensitivity to reward might lead to risk-seeking behavior. In this study, we examined whether precommitment could have a “protective” effect on the impact of sensitivity to punishment and reward on monetary risk-taking. Hence, we expected that risk-taking will negatively correlate with sensitivity to punishment, and positively correlate with sensitivity to reward for the direct choice trials, but not for the precommitment trials.

METHODS

Participants

Sixty undergraduate students from the University of Southern California (USC), College of Letters, Art, and Sciences participated in this study (see Table 1 for participants’ characteristics).

Table 1. Demographical data and scores on the BIS/BAS (reward sensitivity) and the SOGS in the Precommitment First (PF), the Direct Choice First (DCF) and the Intermittent Precommitment (IP) conditions

	PF	DCF	IP	Test statistics
<i>n</i>	20	20	20	
Male/Female	10/10	10/10	10/10	
Age	20.83(2.28)	20.40(1.64)	21.20(2.54)	$F(59) = 0.62, p = .54$
BIS	15.00(3.41)	13.10(3.67)	14.45(2.18)	$F(59) = 1.91, p = .16$
BAS reward sensitivity	8.30(2.20)	7.60(2.09)	7.55(2.24)	$F(59) = 0.743, p = .48$
SOGS	0.50(0.88)	0.90(1.02)	0.75(1.06)	$F(59) = 0.082, p = .44$

Gambling task

Stimuli were presented on a 19-inch LCD monitor against a black background. The task was run using E-Prime 2.0 Professional. The current procedure was based on a previous study by Crockett et al. (2013), and it consisted of two types of trials: direct choice and precommitment trials. During the direct choice trials (see Figure 1a), participants simply chose one monetary gamble from four available options by pressing the “f”, “g”, “h” or “j” key on the keyboard. During the precommitment trials (see Figure 1b), participants had, first, to decide whether to restrict their forthcoming choice. If participants chose to precommit, the two riskier options were made unavailable (i.e., crossed-out, see Figure 1b). If participants chose not to commit, they faced a choice situation in which the four amounts were available. For the half of the trials, the situation depicting the two crossed-out options was displayed on the left of the screen, and the situation with the four available options was displayed on the right of the screen, with these positions reversed for the other half of the trials. Participants chose the situation they wanted to face with left- and right-button presses via the keys “1” and “2” of the keyboard, respectively. Across each trial, the four choice options were randomly chosen among

the following amounts (depicted in €; expected value, EV, were based on Verbruggen et al., 2012): 100 [$p_{win} = .90$; EV = 85], 200 [$p_{win} = .80$; EV = 140], 400 [$p_{win} = .70$; EV = 220], 600 [$p_{win} = .50$; EV = 150], 700 [$p_{win} = .40$; EV = 70], 900 [$p_{win} = .30$; EV = -450], 1000 [$p_{win} = .20$; EV = -2000]. A loss corresponded to the half of the amount selected (e.g., corresponding loss for the €100 amount corresponded to €-50). The amounts were aligned in a random order to prevent choices from being driven by spatial-attention or response-bias effects (which might occur, for example, if higher amounts were consistently presented on the right of the screen).

In total, there were 50 direct choice trials and 50 precommitment trials. There was no decision-time limit. Each trial was separated by a fixation cross (1000 ms). The succession between direct choice trials and precommitment trials differed across three between-subjects conditions: “Direct Choice First” (DCF), “Precommitment First” (PF), and “Intermittent Precommitment” (IP). In the DCF condition, 50 direct choice trials were followed by 50 precommitment trials. In the PF condition, 50 precommitment trials were followed by 50 direct choice trials. The IP condition consisted of a random succession of direct choice trials

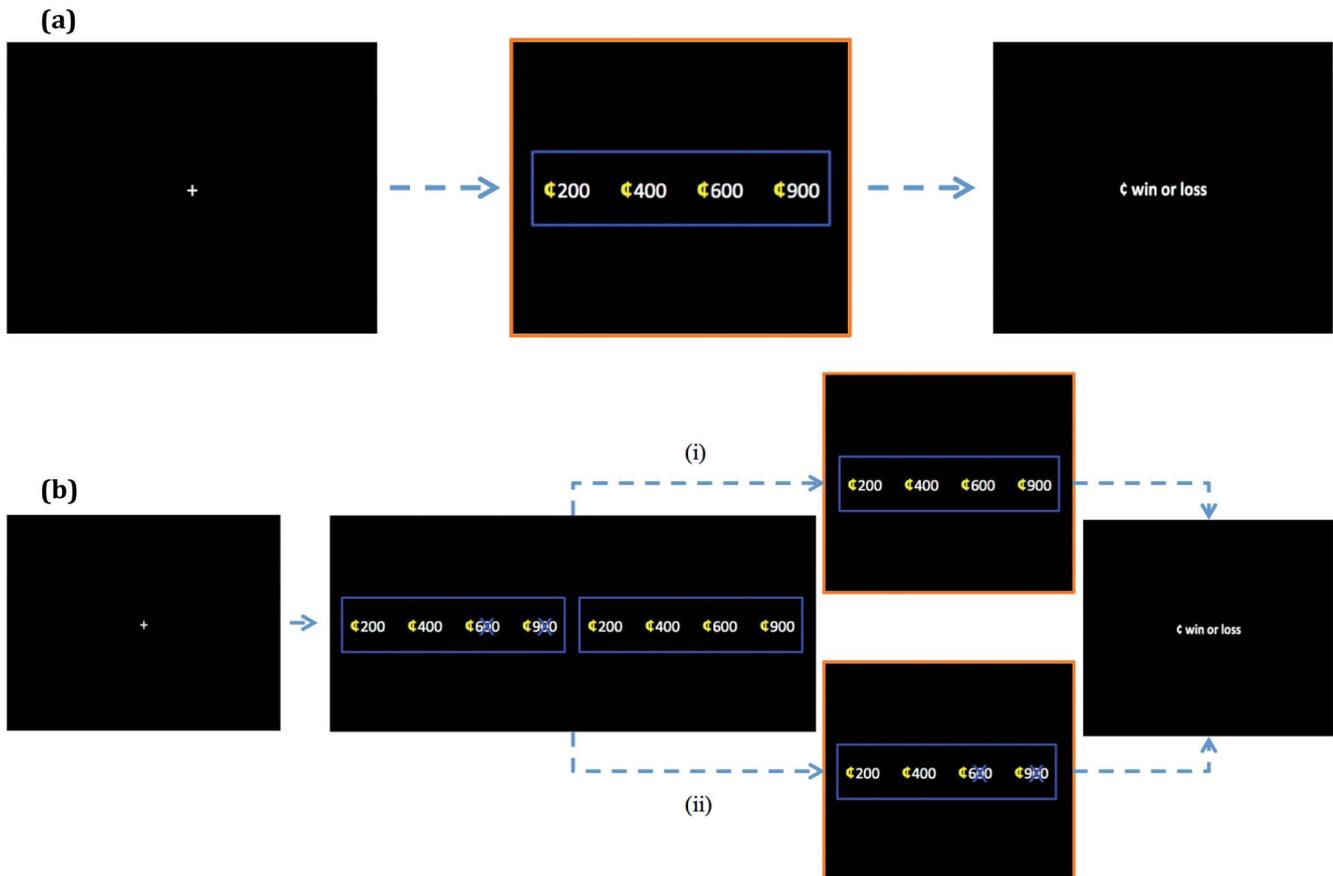


Figure 1. (a) An example of direct choice trial. After seeing a fixation cross (1000 ms), participants simply chose between four options associated with different monetary amounts and received a feedback (2000 ms), either a win or a loss. A loss corresponds to the half of the amount selected. (b) An example of precommitment trial. After seeing a fixation cross (1000 ms), participants have to decide whether to face (i) a choice situation in which the four-choice options are available or either (ii) a situation in which the two riskier options are made unavailable (crossed-out options). After choosing the situation they want to face, they choose an amount and then receive a feedback (2000 ms), either a win or a loss

Table 2. Risk-taking under precommitment and direct choice trials in each trial-order between-groups conditions (Direct Choice First, Precommitment First, Intermittent Precommitment)

Conditions	Direct choice						Precommitment					
	25 first trials		25 last trials		50 trials		25 first trials		25 last trials		50 trials	
	M	sd	M	sd	M	sd	M	sd	M	sd	M	sd
Direct Choice First	1473	528	1428	515	1451	521	1474	748	1180	609	1325	678
Precommitment First	1218	696	1071	768	1146	732	1195	649	931	538	1061	593
Intermittent Precommitment	1290	776	1339	706	1313	741	983	647	1059	676	1064	662

M = mean; sd = standard deviation.

($n = 50$) and precommitment trials ($n = 50$). This between-groups condition was implemented to our design in order to control for the possibility that the impact of trial types (precommitment vs. direct choice) on risk-taking interacts with a specific dynamic of trials order presentation. Participants were divided equally between the DCF ($n = 20$), the PF ($n = 20$) and the IP conditions ($n = 20$) and were paired on gender across each condition (see Table 1). The number of participants to include was set *a priori* based on previous studies examining the effect of situational factors on monetary risk-taking (Thompson & Corr, 2013, 2014; Verbruggen et al., 2012). New participants were tested until that number was reached.

For each participant, index of risk-taking was first calculated on a trial-by-trial basis which corresponded to the value of the amount selected multiplied by the range of risk-taking [range = 1, 2, 3 or 4; when 1 corresponded to the smallest amount, which had the highest probability of winning (the safest bet) and 4 to the highest amount, which had the lowest probability of winning (the riskiest bet)]. These indices (range = 100–4000) were then averaged separately for the 50 direct choice trials and the 50 precommitment trials. Higher scores indicate higher risk-taking.

Reward and punishment sensitivity

The BIS/BAS self-report scale was administered (Carver & White, 1994). This scale measures affective responses to impending rewards (BAS) or punishments (BIS) and contains 20 items with a four-point Likert scale ranging from “strongly agree” to “strongly disagree”. The BAS items are divided into three subcategories: BAS drive, BAS reward sensitivity, and BAS fun seeking. The BIS subscale has no subcategories and measures only punishment sensitivity. The BIS subscale (seven items) and the BAS reward sensitivity subscale (five items) were used in this study because our primary research goal was to measure the influence of reward and punishment sensitivity on monetary risk-taking. Adequate reliability for the BIS punishment sensitivity subscale (Cronbach’s $\alpha = 0.74$) and for the BAS reward sensitivity subscale (Cronbach’s $\alpha = 0.70$) was established in this study.

Problem gambling severity

We used the 20-item South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) to evaluate the participants’ gambling-related behavior and problems. The SOGS is a

widely used screening instrument for problem gambling and shows good reliability and validity in the community and clinical samples (Lesieur & Blume, 1987). A total SOGS score of 5 or higher is typically used to classify probable pathological gambling (with scores between 1 and 4 indicating some problems with gambling; Lesieur & Blume, 1987).

Procedure

After having signed an IRB-approved informed consent form, all participants ($N = 60$) received the same task instructions and were ignorant about the logic of trials succession order. They were informed that the probability of winning decreased as the amount increased and that a loss corresponded to the half of the amount selected. Each participant received a fixed remuneration of \$5, and another \$5 to gamble with. The two \$5 bills were placed next to the experimenter’s computer so that the participant could see it. Subjects were informed that, at the end of the experiment, their total amount will be added (if $> \text{€}0$) or subtracted (if $< \text{€}0$) from their \$5 gambling balance. At the end of each trial (i.e., after choosing an amount), participants were told how much they had won or lost (2000 ms), but they received no information about their current balance during the task. The experiment started with a short practice phase that consisted of two direct choice trials and two precommitment trials. Directly after the task completion, participants were given the total amount won or lost during the task. They were then asked to fill out the BIS/BAS scale and the SOGS.

Ethics

The study procedures were carried out in accordance with the Declaration of Helsinki. Each participant gave informed consent to the experimental procedure, which was approved by the USC Institutional Review Board. Participants received \$5 fixed remuneration, plus money won during the gambling task.

RESULTS

Participant characteristics

Participants from the DCF, the PF and the IP conditions were similar in age, sensitivity to reward (scores on the BAS reward sensitivity subscale from the BIS/BAS) and sensitivity to punishment (scores on the BIS scale from the

BIS/BAS). On the SOGS, no participant reported a score ≥ 4 (which corresponds to probable pathological gambling). Moreover, only 4 participants reported gambling once or more a week (playing cards for money or betting on the lottery). These results are depicted in Table 1. We observed no significant correlation between BIS/BAS (reward sensitivity subscale), SOGS, and age (all $p > .061$).

Risk-taking under precommitment vs. direct choice

Mixed-model ANOVA was used with the type of trials (direct choice vs. precommitment) and times (25 first trials vs. 25 last trials) as a within-subjects factor; trials succession conditions (DCF vs. PF vs. IP) as a between-subjects factor; and scores of risk-taking as a dependent measure (see Table 2 for descriptive statistics). These analyses revealed a main effect of the type of trials, $F(1,59) = 6.89, p = .011, \eta^2 = .11$, indicating that risk-taking was lower during the precommitment trials than during the direct choice trials (see Figure 2). We also observed a main effect of Time, $F(1,59) = 4.09, p = .048, \eta^2 = .07$, indicating that risk-taking was lower in the last 25 trials for both precommitment and direct choice trials. There was no main effect of the trials' succession conditions and no interaction effect between the type of trials, time and the trials' succession conditions (all $p > .25$).

We observed no significant correlation between risk-taking (for both 25 first and 25 last trials of the direct choice and precommitment conditions) and individual variables (BIS/BAS, SOGS, and age; all $p > .22$). Independent sample *t*-tests revealed that gender had no significant effect on risk-taking (all $p > .14$).

Complementary analyses: Risk-taking within precommitment trials

Additional analyses were undertaken within precommitment trials ($n = 50$) in order to examine the average of risk-taking

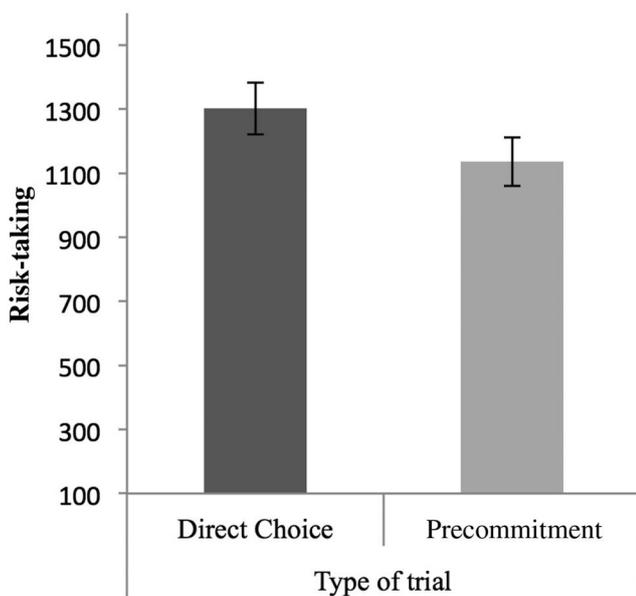


Figure 2. Average score of risk-taking (range = 100–4000) for the Direct Choice and the Precommitment trials

Table 3. Risk-taking under precommitment trials, when choosing to face the crossed-out situation (with the two riskier options unavailable for choosing) and under the non-crossed-out situation (with the four amounts available for choosing), separately for the Direct Choice First, Precommitment First, and Intermittent Precommitment conditions

	Crossed-out		Non-crossed-out	
	M	sd	M	sd
Direct Choice First	1358	302	1438	354
Precommitment First	1336	252	1380	209
Intermittent Precommitment	1492	402	1535	419

M = mean; sd = standard deviation.

when choosing under the crossed-out situation versus under the situation in which the four amounts were available. ANOVA was undertaken with the type of situation faced during the precommitment trials (choice with four options vs. choices with the two less risky options) as a within-subjects factor; trials succession conditions (DCF vs. PF vs. IP) as a between-subjects factor; and scores of risk-taking as a dependent measure (see Table 3 for descriptive statistics). These analyses revealed no significant main effect of the type of situations faced ($p = .12$), the trial order conditions ($p = .33$), and no interaction effect between the type of situations and the trial order conditions ($p = .63$). On precommitment trials, participants opted to restrict their options on 54.2% of trials (mean 27.1 of the 50 precommitment trials).

Association between sensitivity to reward/punishment and risk-taking

Pearson correlation analyses have been undertaken separately for the DCF, the PF, and the IP conditions, for both the precommitment trials and the direct choice trials. Results showed that sensitivity for punishment (scores on the BIS subscale of the BIS/BAS) was negatively correlated with risk-taking during the direct choice trials in the DCF condition ($n = 20; r = -.53, p = .015$) but not in the PF condition ($n = 20; r = .28, p = .22$), neither in the IP condition ($n = 20; r = -.043, p = .86$). No significant correlation was observed with self-reported scores of sensitivity to punishment and risk-taking during the precommitment trials. No significant correlation was observed with self-reported scores of sensitivity to reward (scores on the BAS reward sensitivity subscale of the BIS/BAS).

DISCUSSION

In the present study, monetary risk-taking was reduced when participants had the opportunity to precommit to their forthcoming gamble, that is, to make a binding choice that turned high-risk option unavailable for choice compared to a direct choice where this option was not presented. Importantly, within precommitment trials, participants were not less risky after restricting compared to when electing to face the four options.

This finding suggests that risk-taking was not moderated by precommitment *per se* (i.e., deciding to face the

“crossed-out” situations), but rather by enforcing a “pre-commitment-oriented” break before deciding. Hence, pre-commitment could impact self-control at a deliberative stage (i.e., when the agent forms a judgment as to what action is best; [Dill & Holton, 2014](#); [Vohs et al., 2008](#)), and in turn enhance one’s ability to exert self-control in choosing (i.e., a volitional stage of self-control) and executing (i.e., an implemental stage of self-control) an action (for a detailed description of these three stages of self-control, see [Dill & Holton, 2014](#)). This assumption is in line with recent brain-imaging findings ([Crockett et al., 2013](#)), which highlighted higher brain activation within the lateral frontopolar cortex (a brain region notably involved in prospective valuation and counterfactual thinking; [Burgess, Dumontheil, & Gilbert, 2007](#); [Tsujiimoto, Genovesio, & Wise, 2011](#)) while people had to decide whether to precommit or not their forthcoming choice toward a larger-later reward rather than a smaller-sooner reward. Hence, this pre-choice “pre-commitment-oriented” period may have triggered prospective (“look-ahead”) reflective processes allowing to compute and to compare expected values attached to specific alternatives or courses of action. Nevertheless, the observed decrease of risk-taking under precommitment trials could be also explained by alternative and/or complementary mechanisms. For instance, crossing out the two higher bet options during the first phase of each precommitment trial (i.e., deciding whether to commit a forthcoming choice; see also [Figure 1](#)) might have lowered the perceptual motivational value of those bets. Moreover, in the present design, the bet options were not shown an equal amount of time under direct choice and precommitment trials. Hence, diminished risk-taking under precommitment trials might also be due to the enhanced bet choice delay. Indeed, recent studies showed that monetary risk-taking is diminished when imposing a delay before the next bet, as compared to a situation in which participants could bet directly ([Newman et al., 1987](#); [Thompson & Corr, 2013, 2014](#)). Thus, in this context, precommitment trials might have maximized the opportunity for a “cooling off” period, allowing one to decide in a more rational – less emotionally oriented – way ([Ladouceur et al., 2012](#); [Nower & Blaszczynski, 2010](#)). Future studies are needed to address these issues in order to gain more insight on alternative mechanisms that could further explain diminished risk-taking under precommitment.

We also observed that the degree of risk-taking decreased throughout the task, and independently of trial types. This finding is consistent with previous studies on risk-taking ([Stevens et al., 2015](#); [Verbruggen et al., 2012](#)) and suggests that participants learned to be more cautious in their choices after having experienced several wins and losses. The effect of time also indicates that precommitment had an effect on risk-taking at both the earlier and latter phases of the gambling task (i.e., when the participant had more insight on the value associated with each option). In other words, this finding suggests that precommitment might impact on both decision-making under ambiguity (i.e., situations with missing information on the reward/loss probability) and decision-making under risk (which offers full information on reward and loss associated with a choice option). Nevertheless, additional studies are needed to specifically address this question (e.g., by comparing a condition in which exact

probabilities are revealed and a condition with missing information on reward/loss probability).

Sensitivity to punishment was negatively associated with risk-taking only for the direct choice trials of the “Direct Choice First” (DCF) condition. Thus, low sensitivity to punishment led to higher monetary risk-taking during an initial phase of non-restricted gambling (i.e., the 50 direct choice trials of the DCF condition), but not during gambling characterized by intermittent phase of precommitment (i.e., the Intermittent Precommitment condition), or when the phase of non-restricted gambling occurred after a phase of gambling with precommitment (i.e., the Precommitment First condition). In addition, there was no association between sensitivity to punishment and risk-taking during the precommitment trials, which suggests that punishment sensitivity may have no impact on risk-taking when people are given the opportunity to precommit their forthcoming choice. This finding also confirms the construct validity of our gambling task.

A main limitation of the present study is that it does not include any measure of the emotional responses triggered by the action of gambling throughout the task (e.g., using online psychophysiological or functional imaging measures). In other words, we do not know if the observed impact of precommitment on risk-taking is either hampered or enhanced by the participants’ emotional involvement while gambling. Moreover, we did not control for the impact of previous decision outcome (loss vs. rewards) on the participants’ subsequent decision. Indeed, decision-making involving independent events is often biased by prior outcomes. For instance, individuals are often more risk-seeking after losing than after winning a gamble (e.g., [Xue, Lu, Levin, & Bechara, 2011](#)), a pattern which is often referred to as the “gambler’s fallacy” ([Laplace, 1820](#)). Hence, future studies are needed in order to specifically examine whether previous choice outcomes modulate the impact of precommitment on monetary risk-taking. One option would be to use a controlled task that allows manipulating both prior outcomes and subsequent trials (e.g., precommitment trial vs. direct choice trial involving the same bet options; for an example of a task design, see [Xue, Lu, Levin, & Bechara, 2010](#) and [Xue et al., 2011](#)).

While these findings remain preliminary, it has some potential clinical relevance. First, the induction of precommitment-oriented thinking could be an effective strategy to ration access to “vices” during online gambling, such as sport betting. This contemporary and increasingly popular form of gambling affords fast sequential betting (e.g., to bet on different games occurring simultaneously; to bet on forthcoming events of an ongoing game) using one or multiple online betting platforms. In this context, one could benefit from sequential inductions of precommitment-oriented strategy to ration access to “vices”. This calls for research on precommitment using more ecological designs. Second, present findings suggest that precommitment might diminish the impact of sensitivity to punishment on monetary risk-taking. Hence, it could be that precommitment diminishes risk-taking in individuals with low level of punishment sensitivity, such as pathological gamblers and casino gamblers in particular ([Goudriaan, Oosterlaan, de Beurs, & van den Brink, 2005](#); [van Holst, van den Brink,](#)

Veltman, & Goudriaan, 2010). Nevertheless, it remains to examine whether the observed effect of precommitment on monetary risk-taking generalizes to a sample of gamblers, which has both extreme ends of the spectrum of gambling disorder well represented. For instance, with regard to proactive motor response inhibition, recent evidence showed that occasionally stopping a response decreases monetary risk-taking in low-problem gamblers but not in high-problem gamblers (Stevens et al., 2015). Thus, future studies are needed to examine whether precommitment has an impact on monetary risk-taking during more ecological gambling situations and in participants who are used to behave in such context (i.e., frequent/problem gamblers). Another interesting question to examine is whether precommitment could help one at stopping his/her gambling session. One option would be to use a paradigm in which the gambler has some levels of agency on the decision to continue or stop his/her gambling session (e.g., to have the opportunity to precommit the number of trials to play). Ultimately, this line of research might result in the development of new strategies that would enhance gamblers' capacity to control their gambling, rather than cease it, which is relevant to gamblers generally.

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