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RUNNING HEAD: Indirect Measurement of Risk Propensity Self-concept

Using the Implicit Association Test to Assess Risk Propensity Self-concept: Analysis of the Predictive Validity of Risk-taking Behavior in a Natural Setting

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Abstract

The present work analyzes the predictive validity of measures provided by several available self-report and indirect measurement instruments to assess risk propensity (RP), and proposes a new instrument using the Implicit Association Test: The IAT of Risk Propensity *Self-Concept* (IAT-RP*SC*). Study 1 analyzed the relationship between IAT-RP*SC* scores and several RP self-report measures. Participants' risk-taking behavior in a natural setting was also assessed, analyzing the predictive validity of the IAT-RP*SC* scores compared to the self-report measures. Study 2 analyzed the predictive validity of risk-taking behavior as provided by the IAT-RP*SC* scores in comparison with other indirect measures. Results of these studies showed that the IAT-RP*SC* scores exhibited good reliability, and were positively correlated to several self-report and indirect measures, providing evidence for convergent validity. Most importantly, the IAT-RP*SC* scores predicted risk-taking behavior in a natural setting with real consequences above and beyond all other self-report and indirect measures analyzed.

Keywords: risk propensity, personality self-concept, implicit association test, validity.

It is widely assumed that individuals differ in their risk-taking behavior (Kogan & Wallach, 1964; Rubio, Hernández, Zaldívar, Márquez, & Santacreu, 2010). Whether these differences are attributed to a specific personality trait or driven by situational factors and influenced by attitudes towards risk remains controversial (Appelt, Milch, Handgraaf & Weber, 2011). At the basis of this controversy lies the fact that risk-taking behavior is a complex phenomenon that is likely multidetermined. Risk-taking behavior should be understood as a function of the characteristics of the decision maker (e.g., risk propensity) and the decision domain (e.g., eliciting deliberate or automatic behaviors), as well as the interaction between both (Figner & Weber, 2011).

Regardless of the theoretical assumptions, the different perspectives have stimulated the development of several measurement procedures to assess risk propensity (RP) and risk attitude.[i] Traditionally, RP has been assessed by self-report instruments (Harrison, Young, Butow, Salked, & Solomon, 2005). These measurement instruments generally assess how often people engage or how likely people would engage in various risky behaviors (e.g., the Nicholson, Soane, Fenton-O'Creevy, & Willman's, 2005, RPS; the Weber, Blais, & Betz's, 2002, DOSPERT) or, alternatively, the preference of a specific course of action among several alternatives, each having different probabilities and pay-offs (e.g., the Kogan & Wallach's, 1964, CDQ).

Although most of these self-report measures have an acceptable level of reliability and validity, many authors have highlighted the limitations these instruments present (e.g., Robie, Born, & Schmit, 2001; Rubio, Hernández, Revuelta, & Santacreu, 2011; Schwarz, 1999). Firstly, authors highlight the susceptibility of self-reports to response distortions due to voluntary biases, such as social desirability. For instance, several studies have demonstrated the effects of social desirability on the reliability and validity of self-reported risk-taking behaviors,

such as sexual (Catania, Gibson, Chitwood, & Coates, 1990) or reckless behaviors (Brown, 1999). On the other hand, research in psychology has shown the existence of implicit processes leading many psychologists to propose that significant parts of individuals' knowledge might be inaccessible to introspection and awareness (Nisbett & Wilson, 1977; Seger, 1994). Thus, several authors have recently suggested dual-process models to acknowledge that people can process information about themselves and their environment not only explicitly, controllably, or reflectively, but also implicitly, automatically, or impulsively (Smith & DeCoster, 2000; Strack & Deutsch, 2004; Wilson, Lindsley, & Schooler, 2000).

For the reasons noted above, interest in *indirect* measurement has increased considerably in recent years in order to complement the information provided by self-report measurements (see Gawronski & Payne, 2010). Thus, researchers have developed a multitude of indirect measurement procedures for different constructs, such as attitudes, stereotypes, self-esteem, or self-concept (see Petty, Fazio, & Briñol, 2009), as well as for RP (e.g., Dislich, Zinkernagel, Ortner, & Schmitt, 2010). At the same time, other instruments that are not based on individuals' self-report have also been developed in order to overcome the limitations of self-report measures, such as the objective performance tests (e.g., the Balloon Analogue Risk Task, BART, Lejuez et al., 2002; the Choice Task, Mishra & Lalumière, 2011; The GDT, Brand et al., 2005; the Risk Propensity Task , PTR, Aguado, Rubio, & Lucia, 2011; the Roulette Test, RT, Rubio et al., 2010). Nevertheless, the problems of predicting risk-taking behavior in natural settings (Weber el al., 2002), as well as the lack of consistency found among different types of measurement instrument (e.g., Lejuez, Aklin, Zvolensky, & Pedulla, 2003) deserve further research and the development of new measurement procedures. The present work analyzes the predictive validity of measures provided by several available self-report and indirect measurement instruments to assess RP, and proposes a new measurement procedure

using the Implicit Association Test: The IAT of Risk Propensity *Self-Concept* (IAT-RP*SC*).

IAT MEASURES AND RISK PROPENSITY RESEARCH

The IAT was proposed to assess strengths of associations between concepts by observing response latencies in computer-administered categorization tasks (Greenwald, McGhee, & Schwartz, 1998). Although IAT measures have received several criticisms (e.g., Fiedler, Messner, & Bluemke, 2006; see De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009, for a review), research has provided substantial evidence concerning their good psychometric properties (see Greenwald, Poehlman, Uhlmann, & Banaji, 2009; Lane, Banaji, Nosek, & Greenwald, 2007; for reviews). Thus, IAT measures have typically shown good internal consistency and an acceptable temporal stability (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005; Lane et al., 2007).

Regarding the predictive validity of IAT measures, Greenwald et al. (2009) have recently found an average $r = .27$ for prediction of behavioral, judgment, and physiological measures by IAT scores, although predictive validity can vary largely as a function of many different variables (Perugini, Richetin, & Zogmaister, 2010). Furthermore, Perugini and colleagues (2010) have proposed that there are different patterns of predictive validity, and different theoretical models have been used to explain those different predictive patterns, such as *unitary* (e.g., Fazio, 2007) or *dual* construct models (e.g., Strack & Deutsch, 2004; Wilson et al., 2000). Specifically, the latter models propose dual (implicit and explicit) representations for the same concept (e.g., risk).

A very relevant property of the IAT is its supposed reliance on associative processes that can operate automatically (Ranganath, Smith, & Nosek, 2008). At the same time, prior research has shown that IAT measures are less susceptible to faking than self-report measures (Greenwald et al., 2009). These findings are of particular interest for RP assessment in which

the perceived consequences of reporting risk-taking behavior can be susceptible to social desirability concerns, and would affect the veracity of self-report measures (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005). Moreover, even when individuals want to reveal her/his risk propensity or risk attitude, they can be unaware of, and thus, unable to report it explicitly. Assuming that no one consciously seeks for negative results of his/her actions, individual differences in risk-taking behavior should be based either on risk-takers believing that the situation faced involves lower potential losses or lower probability of such losses than it actually involves, or they being worse accurate in loss identification of their actions (Yates & Stone, 1992). It is important to note that such individual variability is plausibly based not simply on reflective (or deliberate), but also on impulsive (or automatic) processes involved in risk-taking behaviors (Weber & Johnson, 2009). As IAT measures are posited to reveal automatic responses which are more resistant to self-presentation artifacts and independent of introspective access to the association strengths being measured (Greenwald et al., 2002; Greenwald, Nosek, & Banaji, 2003), they can be very useful for RP research.

PREVIOUS ATTEMPTS FOR A MEASUREMENT OF RISK PROPENSITY USING IAT

Despite the fact that most indirect measurement research in the last decade relates to the study of IAT, and although many authors have suggested the need to develop measurement procedures of RP that are not based on self-report to overcome their limitations (Hunt, Hopko, Bare, Lejuez, & Robinson, 2005; Rubio et al., 2010), to our knowledge, very little research has been developed using IAT to assess RP or risk attitude. Specifically, on the one hand, Ronay & Kim (2006) proposed two different versions of the Implicit Risk Task (IRT, Global and Unique), which provide indirect measures of respondents' appraisals of risk by assessing the strength of automatic associations of the attributes '*Gain'* versus '*Loss'* with the category '*Risk'*. Both IRTs were designed as a Single Category IAT (SC-IAT, Karpinski & Steinman,

2006), in which the category of '*Risk*' did not have a contrast category, thus defining the measure as an evaluation of risk alone and not as a comparative or relative measure of risk, as opposed to '*Security*' or another such antithetical representation. The two versions of the IRT (i.e., Global and Unique) are different only because the IRT-Unique was personalized, replacing the words to represent a global construct of risk with self-selected words representing risk behaviors unique to each participant. Results showed a significant correlation between the IRT-Unique and a parallel semantic differential scale (SDS). However, it did not correlate with either the Sensation Seeking Scale Form V (*SSS-V*, Zuckerman Eysenck, & Eysenck, 1978) or the behavioral criterion used (i.e., the BART, Lejuez et al, 2002). In contrast, the IAT-Global did not correlate with either a parallel SDS or the SSS-V, but did correlate with the BART, showing that the IRT-Global scores had a slight but significant incremental validity above and beyond the variance of the behavioral criterion explained by the self-report measures (i.e., the SSS-V and the parallel SDS).

On the other hand, in a more recent study, Dislich and colleagues (2010) analyzed the convergence between several direct, indirect, and objective risk-taking measures in gambling. These authors developed a SC-IAT similar to Ronay & Kim's IRTs (2006), which assessed associations of the attributes '*Gain'* versus '*Loss'* with the category '*Gambling'*. Most relevant to the present work, Dislich and colleagues (2010) also developed an IAT to indirectly assess the self-concept of being a risk-prone person. In their IAT-RP, they used the categories '*Me'* versus '*Other'*, and '*Risky'* versus '*Secure'*. Interestingly, Dislich et al. (2010) found their SC-IAT correlated with what was considered an impulsive objective performance test (OPT, i.e., the BART, Lejuez et al., 2002), whilst direct measures (e.g., DOSPERT) correlated with a reflective OPT (i.e., the GDT, Brand et al., 2005). Thus, these authors proposed that their results be interpreted as evidence that controlled behavior depends to a larger extent on explicit

traits, whereas automatic behavior is influenced more strongly by implicit dispositions, consistent with dual-construct theories (e.g., Wilson et al., 2000; see also Smith & DeCoster, 2000; for a review).

Nevertheless, even though several available indirect measures have shown significant predictive validity with respect to an objective performance-based test assessing RP (i.e., the BART), neither Ronay & Kim (2006) nor Dislich and colleagues (2010) explored whether those IAT measures can predict risk-taking behavior in a natural setting with real consequences. More specifically, prior research did not use any behavioral criteria in which people would gain or lose real money according to their risk-taking behavior; only the BART was used to simulate those risk-taking situations. Hence, the main aim of the present work is to analyze the unexplored validity of several available self-report and indirect measures to predict a specific behavior: A *spontaneous* risk-taking behavior in a *natural* setting with *real* consequences.

OVERVIEW OF THE PRESENT STUDIES AND HYPOTHESES

The present work proposes an improved measurement procedure for an indirect assessment of RP from a personality self-concept perspective: The IAT-RP*SC*. Based on prior research (e.g., Dislich et al., 2010), the IAT was adapted to measure RP by assessing associations of the *Self* ('*Me*' versus '*Not-Me*') with '*Risk*' versus '*Security*' categories. We propose IAT-RP*SC* has differences and advantages over existing measurement instruments based on IATs for several reasons. Firstly, the IAT-RP*SC* differs from Ronay & Kim's IRTs (2006) and Dislich and colleagues' SC-IAT (2010) because the IAT-RP*SC* is not a risk attitude measurement procedure. The IRTs and the SC-IAT arguably provide more attitudinal measures because they include 'Gain' vs. 'Loss' as attribute categories, and these categories may be interpreted as evaluative categories with a clear valence (positive vs. negative). In contrast, and according to what Schnabel, Asendorpf, & Greenwald (2008) point out, the IAT-RP*SC* categories ('Me' vs.

'Not-Me') relate to associative representations of self-concept. Thus, the IAT-RP*SC* should be considered as a personality self-concept measurement instrument (see also Greenwald et al., 2002; Schnabel & Asendorpf, 2010). Moreover, the IAT-RP*SC* also differs from Ronay & Kim's IRTs (2006) because the IAT-RP*SC* includes a comparative or relative measure of 'risk' in relation to 'security' (instead of a global evaluation of 'Risk' concept alone), in line with most prior IAT research and with the very tradition of the study of the meaning of language (Osgood, Succi, & Tannenbaum, 1957).

Furthermore, the IAT-RP*SC* also differs from the more similar indirect measurement procedure (IAT-RP) proposed by Dislich et al. (2010). In this case, although some authors have endorsed the use of the categories *Self/Me* versus *Other/s* when IAT was used for assessing self-related associations (e.g., Egloff & Schmukle, 2002), other authors proposed the use of the categories *Me* versus *Not-Me* mainly because, as indicated by Karpinski's (2004) research, the use of the category '*Other/s'* without further specification implicitly connotes negative valence, which can affect the IAT. Across two studies, Karpinski (2004) showed that the nature of the mental representation of the self, as assessed by an IAT of self-esteem, varied as a function of the mental representation of the '*Other'* category, calling into question the use of the term '*Other/s'* as a category and its interpretation as a measure of self-esteem or any self-related associations. In contrast, Pinter and Greenwald (2005) found that the valence of nonspecific '*Other'* may be approximately neutral. Thus, as Pinter and Greenwald (2005, p. 74) point out, the nonspecific '*Other'* category is only one of several choices for representing the concept of '*Other'* in self-esteem IATs or any self-related associations assessed by IAT. In fact, the choice of the appropriate category to contrast with self should be guided by the research question being addressed.

Regarding the present work, we took into account what Olson and Fazio (2004) highlight.

That is, IAT measures may be contaminated by what they refer to as *extrapersonal associations*, such as information that does not contribute to a self evaluation though it is available in memory. To reduce the influence of these extrapersonal associations on IAT measures, Olson and Fazio (2004) proposed a personalized IAT, to include, for example, '*I like*' vs. '*I don't like*' as category labels, instead of '*Pleasant*' vs. '*Unpleasant*'. Although our IAT-RP*SC* is not exactly a personalized IAT as recommended by Olson and Fazio (2004), we believe that using 'Not-Me' instead of 'Other' as categories should decrease the influence of normative information related to risk-taking behaviors (i.e., extrapersonal associations culturally shared about risk-taking behaviors but not necessarily reflecting an individual RP). In conclusion, based on prior literature, the use of '*Me*' vs. '*Not-Me*' may be considered more appropriate and may emphasize the IAT-RP*SC* as a personality self-concept measurement instrument. In fact, many prior studies have used *Me* vs. *Not-Me* obtaining good results (e.g., Díaz, Horcajo, & Blanco, 2009; Jordan et a., 2003).

Therefore, the present work aimed, firstly, to improve some procedural aspects of previous works with IAT in RP research, proposing specifically a new RP measurement procedure using IAT: the IAT-RP*SC*. Secondly, and most importantly, the present work analyzed the validity of prior available self-report and IAT measures in predicting a risky behavior in a natural setting with real consequences, extending previous literature on the predictive validity of RP measures. Thus, two studies were carried out. Study 1 analyzed the relationships between the IAT-RP*SC* scores and several RP self-report measures, examining the predictive validity of the IAT-RP*SC* scores compared to self-report measures. In Study 2, we analyzed the predictive validity of the IAT-RP*SC* scores in comparison with measures provided by other available indirect measurement procedures. Three hypotheses are tested:

1) As prior research has shown, IAT measures have predicted automatic or spontaneous behaviors better than self-report measures in several domains (e.g., shy behavior in realistic social situations, Asendorpf, Banse, & Mücke, 2002). Thus, we expect the IAT-RP*SC* scores will predict spontaneous risk-taking behavior above and beyond self-report measures in a natural setting with real consequences in which individuals have to choose quickly and in a less controlled or deliberate way.

2) We expect the IAT-RP*SC* scores will predict spontaneous risk-taking behavior above and beyond other indirect measures provided by an available risk attitude IAT (i.e., Dislich et al.' SC-IAT) because this attitudinal IAT has been developed using categories more external to individuals, such as 'Gain' or 'Loss' in relation with 'Gambling', and including more normative information about this concept (Olson & Fazio, 2004), instead of categories relating to associative representations of self-concept, such as 'Me' or 'Not-Me' and its associations with 'Risk'. As prior works have highlighted, self-concept is a higher order organizing schema that fundamentally determines the specific attitudes and behaviors that individuals show in a given situation (see Leary & Tangney, 2003, for a review). In fact, even though self-concept can also show changes in response to subtle influences, the salient information related to self-concept will be brought to bear in any specific context (e.g., Cantor, Markus, Niedenthal, & Nurius, 1986; Markus & Kunda, 1986) and will influence how individuals interpret situations, the choices they make, whether and how they initiate actions, and their pursuit of specific goals (Kawakami et al., 2012, p. 562).

3) We expect the IAT-RP*SC* scores will predict the spontaneous risk-taking behavior above and beyond the existing RP self-concept IAT (i.e., Dislich et al.' IAT-RP) because the IAT-RP*SC* has been designed in relation to associative representations of self-concept by using 'Me' vs. 'Not-me' categories (instead of including the 'Other/s' category), and as noted previously, it

should decrease the potential negative valence of the nonspecific 'Other/s' category (Karpinski, 2004) and the influence of normative information related to risk-taking behaviors (Olson & Fazio, 2004).

Study 1: Relationship between IAT-RP*SC* Scores, Self-report Measures and Risk-taking Behavior

The main aim of Study 1 was to assess the convergent validity of the IAT-RP*SC* scores with other self-report measures, as well as the validity in predicting risk-taking behavior in a natural setting with real consequences.

Method

Participants. Sixty-nine psychology students at the Universidad Autónoma de Madrid (Spain) voluntarily participated in partial fulfillment of course requirements (57 women and 12 men). Participants' mean age was 21.9 years (SD = 1.99), with ages ranging between 20 and 30 years. Participants were offered a 16€ voucher exchangeable at the university bookshop.

Measurement Instruments and Procedure.

IAT-RPSC. Using the same procedure recommended for the development of previous IATs (Greenwald et al., 1998), the IAT-RP*SC* was developed using words as stimuli. The IAT-RP*SC* included two categories with respect to self ('*Me*' and '*Not-Me*'), and two other categories with respect to attributes, which were non-evaluative categories ('*Risk*' and '*Security*'). Although our main target categories were 'Risk' versus 'Security', as noted before and following Greenwald et al. (2002, p. 9), it would make more sense to understand our IAT assessing RP as a *self-attribute association* in which the attribute is not evaluative ('Risk' vs. 'Security') and can be interpreted as an aspect of *self-concept* (see also, e.g., Schnabel et al., 2008).

The selected words and categories were used with the standard IAT available from *Inquisit* (version 3.0) and recommended by Greenwald and colleagues (Greenwald et al., 2003), which

consisted of seven blocks or sets of stimuli.[ii] In the first combined block, participants had to classify with the same key the words related to 'Me' or 'Risk' categories. In the second combined block, participants had to classify with the same key the words related to 'Me' or 'Security' categories. Each combined block included 40 trials. The order of block assignment was kept constant for each participant. The IAT was scored according to the revised scoring algorithm described by Greenwald et al. (2003), which produces a *D* score including error latencies in analyses without penalty. The IAT-RP*SC* measures were computed such that the larger *D* score indicated the relative stronger association between 'Risk' and 'Me' (*or* 'Security' and 'Not-Me') compared to 'Risk' and 'Not-Me' (*or* 'Security' and 'Me').

Previously, we explored the reliability of the IAT-RP*SC* scores using a sample of two hundred and seventy participants (174 women and 96 men, mean age = 21.13 years, SD = 3.28, with ages ranging between 17 to 45) by (a) analyzing split-half reliability of the participants' scores and (b) analyzing test-retest reliability across a 3-week period. To assess the internal consistency of the IAT-RP*SC* scores, we created a split-half reliability index by correlating the *D* scores derived from Blocks 3 and 6 with the *D* scores from Blocks 4 and 7. This index was based on a Spearman-Brown corrected split-half correlation. The correlation was $r = .74$ ($n = 270$) at Time 1, and $r = .73$ ($n = 270$) at Time 2 (three weeks later). Moreover, we analyzed test-retest reliability across this 3-week period by correlating the *D* scores from the Time 1 assessment with those of the Time 2 assessment. This correlation was $r = .55$ ($n = 270$, $p < .001$). Results showed that the IAT-RP*SC* scores exhibited good internal consistency on the split-half method, and acceptable test-retest reliability. Thus, in Study 1, the IAT-RP*SC* scores were analyzed in the prediction of risk taking behavior, compared to self-report measures.

In all cases, the IAT-RP*SC* scores were computed such that a larger *D* score indicated a relative stronger association between 'Risk' and 'Me' (*or* 'Security' and 'Not-Me') compared to

'Risk' and 'Not-Me' (*or* 'Security' and 'Me'). In this first study, participants' mean *D* score was -.13 (SD = .76), ranging between -1.14 and 1.27.

The Domain Specific Risk Attitude Scale (*DOSPERT*, Weber, et al, 2002). The DOSPERT consists of a 30-item scale that evaluates (a) behavioral intentions to engage in risk-taking behaviors in five different risk domains (social –S–, recreational –R–, financial –F–, health/safety –H/S–, and ethical –E–) using a 7-point rating scale ranging from 1 ("extremely unlikely") to 7 ("extremely likely"); and (b) the respondents' gut level appraisal of how risky each behavior is on a 7-point scale, ranging from 1 ("not at all") to 7 ("extremely risky"). The DOSPERT was adapted to Spanish using the back-translation method (in the present study, the scores of this Spanish version showed good reliability with a Cronbach's α of S = .79; R = .83; F =.79; H/S = .66; E = .62 and Total scale = .79 for behavioral intentions, and S = .74; R = .82; F =.87; H/S = .78; E = .70 and Total scale = .88 for risk perception).

The Risk Propensity Scale (*RPS*, Nicholson, et al., 2005). The RPS is a 12-item scale, asking respondents the following: "We are interested in everyday risk-taking. Please could you tell us if any of the following have ever applied to you, *now* or in your adult *past*?" For each of 6 items there were two response scales, one for "now" and one for "past". Each was scaled 1-5: "never", "rarely", "often", "quite often", and "very often". A Spanish translation of the scale was used for this research (Spanish version scores showed a Cronbach's α of .56 for the "Present" scale, .55 for "Past" scale, and .74 for the total scale).

The Sensation Seeking Scale Form V (*SSS-V*, Zuckerman et al., 1978; Spanish adaptation: Pérez & Torrubia, 1986) consists of a "yes"/"no" 40-item scale including Thrill and Adventure Seeking (TAS), Experience Seeking (ES), Disinhibition (DIS), and Boredom Susceptibility (BS) sub-scales. The SSS-V provides a score for each subscale as well as a total score (current

research Cronbach's α = .85, .57, .63, .60, and .79 for TAS, ES, DIS, BS and Total scale, respectively).

The Risk Propensity Semantic Differential Scale (RP-SDS). The RP-SDS was designed *ad-hoc* for the present study and included a 7-point SDS using the Risk terms included in the IAT-RP*SC* and their antonyms. Each participant was asked to respond on the SDS about his/her self ('Me'). Participants' responses were scored and averaged to create a composite index so that higher values represented higher RP (Cronbach' α = .92).

The risk-taking behavior. We designed this behavioral measurement specifically for this study. We decided to use this particular risk-taking behavior measurement because our interest was to assess the predictive validity of the IAT-RP*SC* measures in as natural a setting as possible, that is, with real consequences. Thus, the behavioral measurement consisted of choosing between collecting the 16€ voucher for participating, or betting on double or quits, or different subsequent bets. If the participant accepted the double or quits bet, he/she chose heads or tails and the experimenter tossed a coin. According to the result, the participant would receive 32€ or nothing. If the participant instead declined to play, a new proposal was made. This time he/she could bet to receive 28€ should they win and 4€ should they lose. If he/she accepted the bet, the coin was tossed. Otherwise, a new offer was given: 24€ in the event of winning/8€ on losing. If he/she refused to bet, a last offer was presented: 20€ on winning/12€ on losing. The values range from 0 (no bet accepted) to 4 (the first, riskiest bet is accepted) . Eight participants declined to participate in the risk-taking behavior task and were not included in analyses. Frequencies showed thirty-three participants on value 0, eleven participants on value 1, zero participants on value 2, six participants on value 3, and eleven participants on value 4.

All participants were tested in a computer laboratory. Participants were informed that all data would be confidential and anonymous, and all agreed to participate in the experiment providing their signed informed consent. After assigning them a personal identification number, they performed the IAT-RP*SC* and, afterwards, the self-report measurement instruments, without any time limit, in the following order: DOSPERT, RPS, SSS-V, and RP-SDS. Once they completed this phase, they were individually conducted to a different room in which one experimenter completed the voucher with the participant's name and offered him/her the opportunity to play double or quits, and so on. If he/she refused all the alternatives, he/she collected the 16€ voucher and was thanked for their participation. Otherwise, the coin was tossed and a new voucher completed according to the result.

Results

The IAT-RP*SC* scores' internal consistency (split-half reliability index computed as described) was $r = .93$. Likewise, convergent validity was demonstrated by positive significant correlations between the IAT-RP*SC* scores and behavioral intentions to engage in risky behaviors in the DOSPERT's health/safety domain ($r = .25$, $p = .03$), the SSS-V's DIS subscale ($r = .25$, $p = .03$), and the RP-SDS ($r = .33$, $p = .01$) scores (see Table 1)

Please insert Table 1

Most importantly, participants' IAT-RP*SC* scores were related to risky behavior showing a positive and significant correlation with the risk-taking behavior ratings ($r = .30$, $p = .02$). In fact, the IAT-RP*SC* scores were the unique measures which significantly correlated with the behavioral criterion (see Table 1). Moreover, a multiple regression analysis was conducted in order to test the predictive validity of the IAT-RP*SC* compared to self-report measures. In this analysis, the risk-taking behavior ratings were regressed on the self-report (specifically, total indexes from DOSPERT behavioral intentions and risk perception, RPS, SSS-V, and RP-SDS)

and IAT-RP*SC* scores (stepwise method). Results showed only a significant effect of the IAT-RP*SC* scores on risk-taking behavior ratings, $\beta = .295$, F (1,45) = 4.274, $p = .044$, which accounted for8.7% of variance for the behavioral criterion. No other self-report measure had a significant effect on the risk-taking behavior when included in the regression model (see Table 3). Finally, the two-way interactions between the IAT-RP*SC* scores and the self-report measures were non-significant for behavioral ratings when included in the regression analysis.

Discussion

The results from Study 1 showed very good internal consistency of the IAT-RP*SC* scores, especially considering that the internal consistency of measures based on response latency is generally somewhat lower than for those based on self-reports (see Lane et al., 2007).[iii] Furthermore, the correlations between the IAT-RP*SC* scores and some RP self-report measures allow us to propose the IAT-RP*SC* as a valid measurement instrument. In contrast with these correlational results, prior research conducted by Dislich et al. (2010) did not find a significant relation between their IATs scores and the self-report measures (e.g., DOSPERT) included in their study (*r*s ranged from .01 to .09). Similarly, the IRTs measures from Ronay and Kim (2006) were not significantly related to SSS-V ($r = .07$ for IRT-Global, and $r = -.05$ for IRT-Unique) or SDS ($r = .11$ for IRT-Global), except for the IRT-Unique scores which were related to a parallel SDS ($r = 28$, $p < .01$). Therefore, the IAT-RP*SC* scores showed better convergent validity than has been found in prior research on RP using IAT. In sum, the moderate positive correlations between the IAT-RP*SC* scores and some self-report measures outperformed the results from Dislich and colleagues (2010) or Ronay and Kim (2006), and were in line with results from most previous IAT research showing evidence for convergent validity, although it was also consistent with the hypothesis that indirect and direct measures could refer to related

but distinct constructs (Nosek & Smyth, 2007).

Finally, the most relevant result was that the IAT-RP*SC* predicted spontaneous risk-taking behavior in a natural setting with real consequences. In our first study, the IAT-RP*SC* scores showed a correlation of .30 with the risk-taking behavior ratings, consistent with prior findings averaging *r* of .27 for prediction of behavioral, judgment, and physiological measures (Greenwald et al., 2009). Most importantly, a multiple regression analysis showed that the IAT-RP*SC* scores predicted risky behavior above and beyond all other self-report measures included in this study.

In sum, the IAT-RP*SC* seems to be a suitable measurement instrument of RP appraising relatively stable individual differences in automatic associations between self and risk, and these individual differences, furthermore, contribute significantly to the prediction of risk-taking behavior in a natural setting. One question to resolve is whether the IAT-RP*SC* scores will predict relevant behavior above and beyond other available indirect measurement instruments.

Study 2: Relationship between the IAT-RP*SC* Scores, other Indirect Measures and Risk-taking Behavior

The main aim of Study 2 was to assess the predictive validity of the IAT-RP*SC* scores in comparison to other indirect measures assessing RP in order to test whether our measurement instrument outperforms those currently existing. Thus, in addition to the IAT-RP*SC*, other indirect measurement instruments and a behavioral risk-taking criterion were included in this study. Paying attention to the fact that Ronay and Kim's (2006) IRTs are very similar to the SC-IAT from Dislich and colleagues (2010), we selected the IAT-RP and the SC-IAT proposed by the latter authors.

Method

Participants. Forty psychology students at the Universidad Autónoma de Madrid (Spain) voluntarily participated in partial fulfillment of course requirements. Participants were offered a 16€ voucher exchangeable at the university bookshop. One participant with an IAT error rate greater than 20% was excluded from analyses. Therefore, thirty-nine participants were finally included in analyses (34 women and 5 men). Participants' mean age was 21.6 years (SD = 1.58), with ages ranging between 20 and 27 years.

Measurement Instruments and Procedure.

IAT-RPSC. We used the IAT-RP*SC* as included in the first study, and *D* scores were computed in the same way. In this second study, participants' mean *D* score was -.57 (SD = .31), ranging between -1.44 and .05.

IAT-RP (Dislich et al., 2010). The IAT to assess RP developed by Dislich and colleagues (2010) included two target categories ('Me' and 'Other'), and two (attribute) non-evaluative categories ('Risky' and 'Secure'). The words used for each category were adapted to Spanish from original words used by Dislich and colleagues.[iv] Participants had to respond with the same key to 'Me' or 'Secure' categories in the first combined block. In the second combined block, participants had to respond with the same key to 'Me' or 'Risky' categories. The order of block assignment was kept constant for each participant. In this case, consistent with Dislich et al. (2010), the IAT-RP scores were computed such that a larger *D* score indicated a relative stronger association between 'Secure' and 'Me' (or 'Risk' and 'Not-Me') compared to 'Secure' and 'Not-Me' (or 'Risk' and 'Me'). Thus, a negative correlation between the IAT-RP*SC* and IAT-RP scores was expected. In the IAT-RP, participants' mean *D* score was .68 (SD = .27), ranging between .05 and 1.23.

SC-IAT (Dislich et al., 2010). As indicated by Dislich and colleagues (2010, p. 22), the SC-IAT included only the single target category 'Gambling', and the attribute categories were

'Loss' vs. 'Gain'. All procedural aspects of this SC-IAT followed Karpinski and Steinman's (2006) recommendations. A larger *D* score indicated a stronger association between 'Gambling' and 'Gain' rather than 'Gambling' and 'Loss' (see Dislich et al., 2010). Participants' mean *D* score was .08 (SD = .34), ranging between -.59 and .80.

Risk-taking behavior. We used the same behavioral criterion developed for Study 1, which consisted of choosing between collecting the 16€ voucher for participating, or betting on double or quits, or subsequent bets. All participants agreed to participate in the risk-taking behavior task, and score frequencies showed thirteen participants on value 0, twelve participants on value 1, six participants on value 2, four participants on value 3, and four participants on value 4.

The procedure was as in the first study. In this case, the order of presentation of these three indirect measurement instruments was counterbalanced between participants. Once they completed this phase, as in Study 1, they were individually conducted to a different room in which the behavioral assessment was carried out.

Results

The IAT-RP*SC* scores' internal consistency (split-half reliability index computed as described in Study 1) was $r = .69$. The IAT-RP scores' split-half correlation was $r = .50$. Finally, the split-half correlation of the SC-IAT was $r = .58$.

Regarding convergent and predictive validity, all indices were computed such that the higher the score, the higher the RP, with the exception of the IAT-RP scores, as noted before. The order of presentation of IAT measurement instruments produced no significant differences on scores. For this reason, that variable was not included in the correlation and regression analyses. As expected, the IAT-RP*SC* scores showed a significant and negative correlation with the scores of the most similar IAT (the IAT-RP, $r = -.57$, $p < .001$). Most importantly, the IAT-RP*SC* scores were correlated with the behavioral ratings ($r = .39$, $p = .01$). Likewise, the IAT-

RP scores were correlated with the behavioral ratings (r = -.31, p = .05), but we do not find this to be the case for the SC-IAT (see Table 2).

Please insert Table 2

A multiple regression analysis was also conducted in order to test the predictive validity of the IAT-RP*SC* scores in comparison with the other indirect measures. In this analysis, the risk-taking behavior ratings were regressed on all indirect measures (stepwise method). Results showed only a significant effect of the IAT-RP*SC* scores on the behavioral ratings, β = .387, F (1,36) = 6.333, p = .016, which accounted for the 15% of variance for the behavioral criterion. No other indirect measures had a significant effect on the risk-taking behavior ratings when included in the regression model (see Table 3). However, as both IAT-RP*SC* and IAT-RP measures were correlated with risk-taking behavior ratings, to examine the IAT-RP*SC* scores' incremental predictive power above and beyond that provided by the IAT-RP scores, a hierarchical regression analysis was also performed. Step one of the hierarchical regression included the IAT-RP scores, which accounted for 5.9% of variance in the behavioral measures, F (1,36) = 2.24, p = .14. Inclusion of the IAT-RP*SC* scores on Step 2 resulted in an R^2 change of .091, accounting for 15% of variance, F (2,35) = 3.09, p = .05, indicating the validity of the IAT-RP*SC* scores was incremental to that explained by the IAT-RP scores.

Please insert Table 3

Discussion

The results indicate that the IAT-RP*SC* scores show an internal consistency higher than the other indirect measures included in this study. Furthermore, the correlations between the IAT-RP*SC* and the IAT-RP scores allow us to present the IAT-RP*SC* as a valid measurement instrument showing convergent validity not only with the self-report measures, but also with

other indirect measures such as the IAT-RP developed by Dislich et al. (2010). Most importantly, although the IAT-RP*SC* and IAT-RP measures were related to risk-taking behavior ratings, a multiple regression analysis showed the superiority of IAT-RP*SC* scores predicting risk-taking behavior above and beyond all other indirect measures.

General Discussion

The present work analyzed the predictive validity of several self-report and indirect measures for RP assessment, and proposed a new measurement instrument using the Implicit Association Test (IAT): the IAT-RP*SC*. Across two studies, the IAT-RP*SC* scores showed good internal consistency, as well as significant moderate relationships with other direct (Study 1) and indirect (Study 2) measures of RP. These results are in line with earlier IAT research showing the relationship between indirect and self-report measures of attitude, stereotype and self-esteem being consistent and weakly positive, although also quite variable in magnitude between studies (e.g., Bosson, Swann, & Pennebaker, 2000). More recent research has shown similar findings, though IAT and self-report measures can be strongly related in some cases (Greenwald et al., 2003; Hofmann et al., 2005; Nosek, 2005). In a meta-analysis of IAT and self-report measure correlations, Hofmann et al. (2005) reported an average *r* of .24 in a total of 126 studies from 53 different content domains. Likewise, Nosek (2005) analyzed 57 different content domains reporting an average correlation of .37. Therefore, prior evidence suggests that direct and indirect measures are positively related. Consistent with this prior evidence, the IAT-RP*SC* scores were significantly positively correlated with several self-report measures included in Study 1 (*r*s ranged from .25 to .33).

In accordance with our first hypothesis, the IAT-RP*SC* scores predicted spontaneous risk-taking behavior in a natural setting with real consequences above and beyond self-report measures. Previous literature has shown evidence for the predictive validity of IAT measures in

a wide variety of research domains and, in some cases, IAT measures predicted variation in behavior that was not accounted for by direct self-reports (see Friese, Hofmann, & Schmitt, 2009; Greenwald et al., 2009; Perugini et al., 2010; for reviews). For example, Greenwald and colleagues (2009) compared the predictive validity of IAT measures with that of parallel self-report measures. As noted before, this review found an average *r* of .27 for prediction of behavioral, judgment, and physiological measures by IAT measures, although predictive validity can largely vary as a function of many different variables (see, e.g., Perugini et al., 2010). Likewise, parallel self-report measures were also effectively predictive, averaging an *r* of .36, but with much greater effect size variability. Furthermore, IAT measures showed predictive validity that was independent of corresponding self-report measures (Greenwald et al., 2009). Related to this, in the present work, the IAT-RP*SC* scores significantly predicted risk-taking behavior ratings included in Studies 1 and 2 (βs ranged from .29 to .38), while self-report measures did not.

The predictive validity issue when direct and indirect measures are involved deserves a more detailed discussion. As Perugini and colleagues (2010) have proposed, there are different patterns of predictive validity in such cases. Although we do not intend to be exhaustive, there are several predictive patterns which have received important support from prior research (see Perugini et al., 2010; for a complete description). For example, according to a *simple association pattern*, a single indirect measure predicts a single behavior. In addition, a *moderation pattern* occurs when the simple association pattern is qualified by conditions under which predictive validity is enhanced or reduced. In contrast, according to an *additive pattern*, an indirect measure explains a unique portion of variance of a behavioral criterion in addition to what is predicted by a self-report measure. Moreover, an *interactive or multiplicative pattern*

can also be proposed. That is, indirect and self-report measures can interact synergistically to predict a particular behavioral criterion. Furthermore, a *double dissociation pattern* consists of indirect measures predicting spontaneous behavior, and self-report measures predicting deliberate behavior and not vice versa. Finally, different theoretical models have been proposed to explain those different predictive patterns. They can be classified into *unitary* (e.g., Fazio, 2007), or *dual* (e.g., Strack & Deutsch, 2004; Wilson et al., 2000) construct models.

Thus, in line with the different patterns of predictive validity suggested by prior theoretical and empirical works, our results could support a *simple association pattern* in which only the IAT-RP*SC* scores predicted a single risk-taking behavior. However, these results could also be interpreted as evidence of a *moderation pattern* in which only the IAT-RP*SC* scores predicted risky behavior because we included a single risk-taking behavior in a specific condition (i.e., spontaneous behavior in a natural setting with real consequences), but they could not predict risky behavior in different conditions. In the same regard, an explanation is also possible based on a *double dissociation pattern* in which the IAT-RP*SC* scores predict more spontaneous behavior, whereas self-report measures predict more deliberate behavior (not assessed in the present work) and not vice versa, according to Dislich and colleagues' findings (2010). In contrast, an *additive pattern* in which the IAT-RP*SC* scores explain a unique portion of variance of our behavioral criterion in addition to what is predicted by a self-report measure is harder to assume based on the results provided by Study 1 given that the self-report measures did not significantly predict risk-taking behavior. Finally, an explanation in terms of an *interactive or multiplicative pattern* can be ruled out given the results found in Study 1 because the IAT-RP*SC* did not interact with self-report measures in the prediction of risk-taking behavior.

Therefore, the next question to clarify must be under what *conditions* the IAT-RP*SC* scores predict risk-taking behavior; that is to say, what *type* of behavior, or *when* those indirect

measures would predict it. According to prior literature, indirect measures could predict different types of behavior compared to self-report measures. For example, Asendorpf and colleagues (2002) found that an indirectly measured self-concept of personality (shyness) significantly predicted spontaneous shy behavior in realistic social situations. Moreover, indirect measures uniquely predicted spontaneous (but not controlled) shy behavior, whereas self-report measures uniquely predicted controlled (but not spontaneous) shy behavior. Most relevant to the present research, Dislich and colleagues (2010) found that indirect measures of RP were better predictors of objective personality test (OPT) scores assessing impulsive behavior, compared to direct measures of RP. In contrast, when the OPT assessed reflective behavior, direct measures of RP were better predictors compared to indirect measures.

The present study assessed spontaneous risk-taking behavior producing real consequences in a natural setting. As any other behavior in a natural setting, such risk-taking behavior would probably be multidetermined. Nevertheless, the main elements of this situation individuals had to face were: a) choosing quickly between doubles or quits (and so on) and, b) not being told about this beforehand. Thus, we could speculatively hypothesize that it mainly shows more impulsive or automatic aspects of RP in accordance with proposals from dual models of risk-taking behavior (Weber & Johnson, 2009) and prior research analyzing the prediction of IAT measures over spontaneous behavior (e.g., Asendorpf et al., 2002).

Furthermore, according to De Houwer and colleagues (De Houwer, 2006; De Houwer et al., 2009; Moors & De Houwer, 2006), “a process can be called automatic in the sense that it can operate even when participants do not have particular goals, a substantial amount of cognitive resources, a substantial amount of time, or awareness (of the instigating stimulus, the process itself, or the outcome of the process)” (De Houwer et al., 2009, p. 350). Thus, the risk-taking behavior assessed in the present work can be assumed to be automatic in the sense that

participants did not have a substantial amount of time to think carefully about the consequences of her/his decision making. Likewise, the IAT-RP*SC* measures can be assumed to be automatic in the same sense of automaticity. Therefore, in the present work, we assumed the automaticity of these measures as consistent with most previous IAT research which also has shown that IAT measures are often more difficult to control and fake than are traditional self-report measures (Greenwald et al., 2009). In conclusion, at least in this sense, IAT measures, and particularly the IAT-RP*SC* scores, can be described as less controllable, and thus more automatic than many self-report measures (De Houwer et al., 2009).

Alternatively, we think that the RP self-report measures analyzed in the present work could relate to a more reflective dimension. That is, through their biographical experiences, individuals consolidate a reflective and conscious representation of themselves, and the way people describe themselves can rest on the basis of the coherence of one's own reflective and conscious statements (Cervone & Shoda, 1999). In this sense, when someone is directly asked about her/his preferences or dispositions, we hypothesize that a person describes her/himself on the basis of that coherence, and her/his responses would coherently show one's own deliberate cognitions and behaviors. Thus, when facing a situation in which reflective cognitive resources are available, as is the case when completing a self-report assessment or making deliberate risk-taking behavior decisions, the individual can use such reflective representations to guide her/his information processing and behavior. However, in this case, biases produced by response factors such as self-presentation concerns, or limitations associated with an inaccurate self-awareness, as well as additional implicit processes operating, might affect self-report measures. In contrast, when facing a situation in which time is limited and controlled processing is not allowed, such as in an IAT assessment or making spontaneous risk-taking behavior decisions, the individual behaves in a more automatic way, and thus she/he should show less self-

presentation biases in her/his responses and behaviors, as well as less dependency on accurate self-awareness. Whether the difference is only in the respective degrees of controllability of the processes on which direct and indirect measures are based (e.g., Fazio, 2007), or whether the difference is produced by a dual-representation of constructs such as RP or risk attitude (e.g., Wilson et al., 2000), remain under discussion. In accordance with Perugini and colleagues (2010, p. 261), both theoretical models are able to accommodate empirical results from the different predictive patterns noted previously. The most critical result would have been evidence for double dissociation, but it is always possible to reinterpret the evidence for dissociation as indicative of different processes underlying the measures themselves rather than reflecting different forms of knowledge representation per se (see Greenwald & Nosek, 2009; Olson & Fazio, 2009).

In sum, as noted by Perugini and colleagues (2010), the critical question relates to the meaning attributed to the differences between self-report (or direct) and IAT (or indirect) measures. More specifically, this relates to whether these differences provide information about the same underlying constructs, whilst the underlying processes of these constructs are expressed differently in response to self-report versus indirect measures, as suggested by Fazio's MODE model (e.g., Fazio, 2007; Olson & Fazio, 2009); or whether people hold different forms of knowledge for the same concept (e.g., risk self-concept), either as separate representations (e.g., Strack & Deutsch, 2004; Wilson, et al., 2000) or as a result of separate processes (e.g., Gawronski & Bodenhausen, 2006). Analyzing this controversy exceeds the aims of the present work and, as noted by Perugini and colleagues (2010), probably requires empirical research on construct formation and functioning.

In accordance with the second hypothesis of the present research, our results showed an IAT assessing self-concept predicted the behavioral criterion above and beyond a presumably

more attitudinal IAT (Dislich et al.' SC-IAT). These results are consistent with those works which establish self-concept as a higher order organizing schema that fundamentally determines the specific attitudes and behaviors that individuals show in a given situation (see Leary & Tangney, 2003, for a review), the IAT-RP*SC* being a better instrument to assess and provide self-concept measures to predict spontaneous risk-taking behavior in a natural setting. Moreover, as noted previously, the use of IAT categories such as "Gain" versus "Loss" may include more normative information about the 'Gambling' (or 'Risk') concept (Olson & Fazio, 2004), calling into question even the interpretation of its scores as attitudinal measures. This is of particular interest when referring to risk-preference assessment and the prediction of risk-taking behavior. In fact, there is controversy regarding whether risk-taking behavior is the result of a consistent and stable way of behaving when faced with a choice involving risk elements or driven by situational factors and influenced by attitudes towards risk (Appelt et al., 2011), although there is robust evidence for the consistency of risk preferences (Levin, Hart, Weller, & Harshman, 2007). Regardless of theoretical assumptions, several procedural aspects of existing risk attitude IATs could also explain the superiority of the IAT-RP*SC* scores found in the present work. Future research should analyze and improve risk attitude IATs developed to date, for example, using more typical attitudinal IAT categories, such as 'Positive' (or 'I like') versus 'Negative' (or 'I don't like') as attribute categories, and 'Risk' versus 'Security' as target categories (see Greenwald et al., 2002; Olson & Fazio, 2004).

Concerning the third hypothesis of the present work, our results showed that, even though scores from both RP self-concept instruments (IAT-RP and IAT-RP*SC*) significantly correlated with the behavioral criterion, only the IAT-RP*SC* scores significantly predicted risk-taking behavior in the stepwise regression analysis. Moreover, when a hierarchical regression analysis was carried out, the predictive validity of the IAT-RP*SC* scores was incremental to that

explained by Dislich et al.'s (2010) IAT-RP scores on risk-taking behavior. Thus, it seems the categories 'Me' vs. 'Not-Me' instead of 'Me' vs. 'Others' may decrease the potential negative valence of the nonspecific 'Other/s', as Karpinski (2004) posed, and would also reduce the influence of normative information related to risk-taking behaviors (Olson & Fazio, 2004), although these specific issues require further research. Thus, the results obtained allow the consideration of the IAT-RP*SC* as an improved measurement procedure for assessing RP self-concept compared to prior available IATs.

In conclusion, we propose the assessment of RP should take into account both self-report and indirect measures in order to gain a better understanding of individual differences in RP, as well as to improve the prediction of individuals' risk-taking behavior. In accordance with this, our results correspond to those from Asendorpf et al. (2002) and Dislich et al. (2010), and are consistent with several predictive patterns noted in prior literature, but they do not provide conclusive support for either a dual-process model or a dual-representation model that account for the distinctions between implicit and explicit constructs (see, e.g., Greenwald & Nosek, 2009; Nosek & Smyth, 2007; Olson & Fazio, 2009; Perugini et al., 2010; for a discussion). In the present work, the IAT-RP*SC* scores showed superiority in predicting assumedly more (but not exclusively) automatic risk-taking behavior with real consequences, compared to self-report and other available indirect measures. Future research should analyze and distinguish the multiple (automatic or controlled) aspects that the IAT-RP*SC* tap into and its relations with different (automatic or controlled) risk-taking behaviors. Furthermore, future research should explore these questions in a relevant way for personality research, for example, analyzing individual difference variables as potential *moderators* for the relationship between indirect (versus direct) measures of RP and risk-taking behavior (see, e.g., Conner, Perugini, O'Gorman, Ayres, & Prestwich, 2007; Dislich et al., 2010; Friese et al., 2009).

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Table 1: Correlations between IAT-RP*SC,* self-report, and risk-taking behavior measures.

	IAT-RPSC	Dospert Behavioral Intention						Dospert Risk Perception						RPS	SSS-V					RP-SDS	RTB
		B-S	B-R	B-F	B-H/S	B-E	Tot	P-S	P-R	P-F	P-H/S	P-E	Tot		TAS	ES	DIS	BS	Tot		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	(.93)	-.09	.04	.12	**.25***	.01	.17	-.05	-.01	-.01	-.18	-.09	-.11	.19	.08	.01	**.25***	.08	.15	**.33***	**.30***
2		(.79)	.23	.06	.13	.02	.20	-.08	-.07	.16	.02	-.03	-.03	.26*	.24*	.22	.03	-.17	.18	.04	-.04
3			(.83)	.04	.22	.03	.64**	.18	-.53**	-.03	-.05	.01	-.17	.40**	.80**	.27*	.00	.20	.58**	.27*	-.08
4				(.79)	.04	.15	.50**	.06	-.04	-.54**	.01	-.15	-.22	.19	.11	.03	.06	-.16	.04	.03	-.06
5					(.66)	.70**	.73**	-.09	-.17	-.18	-.64**	-.35**	-.40**	.32**	.02	.29*	.40**	.23	.30*	.21	-.03
6						(.62)	.66**	-.06	-.17	-.20	-.55**	-.43**	-.37**	.11	-.13	.19	.39**	.29*	.21	.31*	-.08
7							(.79)	.07	-.41**	-.37**	-.43**	-.32**	-.44**	.45**	.44**	.34*	.30*	.21	.50**	.33*	-.11
8								(.74)	.27*	.15	.33**	.42**	.62**	.10	.24*	.27*	.05	.06	.25*	.03	-.24
9									(.82)	.24	.36**	.48**	.71**	-.17	-.35**	-.11	-.09	-.24	-.32**	-.29*	.05
10										(.87)	.25*	.38**	.61**	.02	.06	-.10	.03	-.11	-.02	-.02	.09
11											(.78)	.67**	.70**	-.24*	.05	-.22	-.25*	-.14	-.16	-.12	.00
12												(.70)	.81**	-.12	.13	-.15	-.29*	-.13	-.12	-.20	.11
13													(.88)	-.14	-.02	-.06	-.12	-.14	-.11	-.20	-.01
14														(.74)	.40**	.26*	.30*	-.01	.42**	.30*	-.09
15															(.85)	.37**	.06	.09	.71**	.11	.07
16																(.57)	.43**	.14	.71**	.06	-.08
17																	(.63)	.37**	.64**	.11	-.03
18																		(.60)	.54**	.07	-.04
19																			(.79)	.14	-.10
20																				(.92)	.04

1.- IAT-RPSC: 2.- DOSPERT B-S: Behavioral Intention (Social); 3.- DOSPERT B-R: Behavioral Intention (Recreational); 4.- DOSPERT B-F: Behavioral Intention (Financial); 5.- DOSPERT B-H/S: Behavioral Intention (Health/Safety); 6.- DOSPERT B-E: Behavioral Intention (Ethical); 7. DOSPERT B-Tot: Behavioral Intention (total scale)- 8.- DOSPERT P-S: Risk Perception (Social); 9.- DOSPERT P-R: Risk Perception (Recreational); 10.- DOSPERT P-F: Risk Perception (Financial); 11.- DOSPERT P-H/S: Risk Perception (Health/Safety); 12.- DOSPERT P-E: Risk Perception (Ethical); 13.- DOSPERT P-Tot: Risk Perception (Total scale); 14.- RPS: Risk Propensity Scale; 15.- SSS-V TAS: Thrill and Adventure Seeking; 16.- SSS-V ES: Experience Seeking; 17.- SSS-V DIS: Disinhibition; 18.- SSS-V BS: Boredom Susceptibility; 19.- SSS-V Tot: Total scale; 20.- RP-SDS: Risk Propensity Semantic Differential Scale; 21.- RTB: Risk Taking Behavior.

* $p < .05$; ** $p < .01$; Split-half correlation (IAT-RPSC measures) and Cronbach's alpha of self-report measures in main diagonal between brackets; in bold the correlation between IAT-RPSC and other measures.

Table 2: Correlations between IAT-RP*SC*, IAT-RP, SC-IAT, and the risk-taking behavior measures.

	1. IAT-RPSC	2. IAT-RP	3. SC-IAT	4. Risk Taking Behavior
1.	(.69)	-.57**	-.02	.39*
2.		(.50)	-.16	-.31
3.			(.58)	.10

* $p < .05$; ** $p < .01$; Split-half correlation of measures in main diagonal between brackets.

Table 3: Regression Weights and *p* Values for Measures in Studies 1 and 2.

	DV: Risk-taking behavior Study 2		DV: Risk-taking behavior Study 3	
Variables	*β*	*p*	*β*	*p*
Dospert BI	-.086	.557		
Dospert RP	-.130	.368		
RPS	-.121	.414		
SSS-V	-.115	.431		
RP-SDS	-.031	.839		
IAT-RP*SC*	.295	.044	.387	.016
IAT-RP			-.032	.869
SC-IAT			.052	.741

Dospert BI: Dospert Behavioral Intentions (total scale); Dospert RP: Dospert Risk Perception (total scale); RPS: Risk Propensity Scale; SSS-V: Sensation Seeking Scale Form V (total scale), RP-SDS: Risk Propensity Semantic Differential Scale; IAT-RP*SC*: Implicit Association Test of Risk Propensity Self-Concept; IAT-RP: Implicit Association Test of Risk Propensity; SC-IAT: Single Category Implicit Association Test.

FOOTNOTES

[i] According to De Houwer and colleagues (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009), the term measure/s can be used to refer to a procedure or to an outcome of a procedure. To avoid confusion, we clarify that in the present work the term *measure/s* (or *score/s*) is used to refer only to a measurement outcome, and we use the term *measurement procedure* (or instrument) to refer to a procedure used to generate a measurement outcome.

[ii] Regarding the IAT-RP*SC* stimuli, six words per category were selected. The words representing 'Me' and 'Not-Me' categories were adapted from previous research on IAT in Spanish (Briñol, Horcajo, Becerra, Falces, & Sierra, 2003; Horcajo, Briñol, & Petty, 2010). To select the stimuli from the 'Risk' and 'Security' categories we used the following procedure: First, six expert researchers in the study of risk propensity individually elaborated a list of 20 words associated with the category 'Risk' and another list of 20 words associated with the category 'Security'. In order to reach a single common list, the six researchers met and drew up, through discussion and consensus, a final list of 24 items for each category. Then, a pilot study including 50 psychology students was carried out in order to empirically test the association with the bipolar dimension. Afterwards, experts analyzed the strength of association, as well as the connotation, and six words per category were selected. The words were used in Spanish, and its frequency of use (i.e., familiarity) in this language was previously checked in order to ensure no differences were found between words pertaining to 'Risk' or 'Security' categories. Thus, the 'Me' category was represented by, for instance, the words *I* or *mine*, and the 'Not-Me' category was represented by, for instance, the words *others* or *theirs*. Moreover, the 'Risk' category was represented by, for instance, the words *risky* or *to bet*, and the 'Security' category was represented by, for instance, the words *safe* or *home*.

[iii] Split-half reliability of the IAT-RP*SC* scores (.93) was above average for coefficients of equivalence (.79, computed as Cronbach's alpha and split-half reliability) for those reported in Hofmann et al.'s (2005) meta-analysis, and higher than other available IATs to assess RP, such as for instance, the IRT-Global from Ronay and Kim (2006, Cronbach's $\alpha = .73$) or the IAT-RP and SC-IAT from Dislich and colleagues (2010, $\alpha = .88$, $\alpha = .79$, respectively), and similar to the most reliable IRT-Unique from Ronay and Kim (2006, $\alpha = .95$). Moreover, the IAT-RP*SC* scores also showed an acceptable test-retest reliability (.55) in our pilot study, it being higher than the mean of .50 reported in prior literature for IAT measures (Lane et al., 2007). This result is very similar to the one reported for a self-esteem IAT (ranging from .52 to .69, e.g., Krause, Back, Egloff, & Schmukle, 2011), or other self-related IATs (e.g., .57 for the IAT-anxiety, Egloff & Schmukle, 2002). Finally, internal consistency indices were average when compared to reliability coefficients obtained by self-report measures related to RP (see Harrison et al., 2005, for a review of RP measurement instruments used in health settings), although it is more difficult to compare test-retest reliability due to the lack of this type of study in RP research. For example, score stability on the Adolescent Risk-Taking Questionnaire (ARQ, Gullone, Moore, Moss & Boyd, 2000) showed two of eight subscales under .50 and the rest below .60.

[iv] We thank Friederike Dislich and Manfred Schmitt for providing us with the stimuli used in their IAT-RP and SC-IAT.