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ABSTRACT

The Need for Cognitive Closure (NCC, Kruglanski & Webster, 1996) is a motivational force describing a general tendency to form clear judgments and to reach firm decisions. Since individuals high in NCC have an intolerance of uncertainty and ambiguity, as well as a preference for predictability, we hypothesized that they would show more risk aversion and reduced propensity to choose delayed rewards compared to individuals low in NCC. In Study 1, we showed that individuals high in NCC perceived specific activities as riskier, and therefore, showed lower willingness to engage in those activities than individuals high in NCC. In Study 2, high NCC individuals, compared to low NCC individuals made less risky choices in the cold version of the Columbia Card Task (CCT) – a task considered to involve deliberate decision making processes. In Study 3, we found the same relationship between the NCC and risk taking in a task involving more affective decision-making processes - the Balloon Analogue Risk Task (BART). We also employed a delay discounting task to assess the impact of NCC on inter-temporal choices. In line with our expectations, individuals high in the NCC opted for smaller but certain, or temporally more proximal, options.

1. Need for Cognitive Closure decreases risk taking and motivates discounting of delayed rewards

The present work relates an epistemic motivation highly important to, and prominent in, the field of judgment and decision making — the Need for Cognitive Closure (NCC, Kruglanski, 1989, 2004) — to risk taking and inter-temporal choices. Although the influence of the NCC construct on numerous decision making phenomena has been shown (e.g. Kruglanski, 2004; Roets, Kruglanski, Kossowska, Pierro, & Hong, 2015), it had not yet been thoroughly studied in the realm of risky behaviors. The present paper focusses on inter-individual variability in risky and inter-temporal choices, providing evidence that NCC can contribute to explain such variability.

2. Individual differences in risk taking

Most recently, Josef et al. (2016) demonstrated stability of participants' responses over time, as well as the consistency across several risk related tasks, thereby providing evidence for the existence of a stable personal disposition that underlies risky decision-making and decision-making under ambiguity (see also Highhouse, Nye, Zhang, & Rada, 2016; Lauriola, Levin, & Hart, 2007; Mishra & Lalumière, 2011; Soane & Chmiel, 2005). However, only few studies examined the role of individual difference variables in risk taking (e.g., Dahlbäck, 1990). The variables studied so far in relation to various forms of risky behavior are differences in self-control, impulsivity, sensation seeking (for an overview see Mishra, 2014; Lauriola, Panno, Levin, & Lejuez, 2014), as well as classic differences on the Big Five personality dimensions (Nicholson, Soane, Fenton-O'Creevy, & Willman, 2005).

Lauriola and Levin (2001) investigated the relationship between the higher-level Big Five personality dimensions and risk taking, while differentiating between gain and loss perspectives. Overall, in line with prospect theory (Kahneman & Tversky, 1979), personality factors have been shown to be more important in predicting risk taking in order to achieve gains compared to avoiding losses. In particular, Emotional Stability (Neuroticism) and Openness to Experience predicted risk taking in the domain of achieving gains (Lauriola & Levin, 2001).

Going beyond explanations based on classic personality traits, motivational characteristic may afford new insights into risk taking propensity across individuals and situations. For instance, Zou and Scholer (2016) suggest that individuals' regulatory focus (promotion vs. prevention) may be an important predictor of risk taking stability as well

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as variability. Regulatory focus refers to individuals' goal to achieve positive outcomes (promotion-oriented goals) or to avoid negative outcomes (prevention-oriented goals, Higgins, 1997). Risk behavior could be perceived instrumental to both of these goals depending on whether the possibility for gains versus loses is emphasized. Thus, risk behavior will be perceived as more instrumental and enacted to achieve one's promotion-related goals if gains are emphasized (Zou, Scholer, & Higgins, 2014). By contrast, risk behavior will be perceived as more instrumental and enacted toward prevention-orientation goals when negative consequences or potential losses are emphasized. This may be the case because in situations involving loss, risky options offer the possibility of maintaining or returning to the status quo which is the primary motivation of prevention-focused individuals (Scholer, Zou, Fujita, Stroessner, & Higgins, 2010).

These findings exemplify that risk taking depends on the extent to which a behavior serves an individuals' motivation in a given situation. The notion that motivational necessities determine willingness to take risks is captured in our theorizing on Need for Cognitive Closure and decision-making under uncertainty.

3. Need for Cognitive Closure and decision-making under uncertainty

Need for Cognitive Closure (NCC, Kruglanski, 1989, 2004) has been defined as the "desire for a firm answer to a question and an aversion toward ambiguity" (Kruglanksi & Webster, 1996, p. 264). It refers to the motivation to obtain stable, firm knowledge in order to avoid uncertainty. Individuals differ in their dispositional NCC, and these differences can be assessed using the NCC scale (Webster & Kruglanski, 1994). Generally, individuals with a strong need for closure tend to "seize" on information which allows them to make a judgment on a given topic and then "freeze" on that judgment, while individuals low in NCC tend to consider more options before reaching a decision, feel more comfortable keeping their options open and eschew binding or definite opinions. Accordingly, individuals high in NCC may seek less information before making a decision (Choi, Koo, Choi, & Auh, 2008; Houghton & Grewal, 2000), and they also report higher confidence afterward (Webster & Kruglanski, 1994).

Although numerous studies have shown that NCC is generally associated with limited information search, being high on NCC does not imply *cognitive laziness*. There are cases when high NCC individuals increase information processing and effort in order to attain closure. This may be the case when high NCC individuals lack an initial satisfactory knowledge base that can provide quick closure (see Roets et al., 2015 for a comprehensive review of NCC research). For instance, in a consumer choice paradigm, Houghton and Grewal (2000) found that high NCC resulted in a less extensive information search, but only when participants supposedly already had well-formed and accessible opinions on the product. In a related study, Vermeir, Van Kenhove, and Hendrickx (2002) asked participants to choose between brands of unfamiliar products so that reliance on prior knowledge was eliminated. They found that in these situations, high NCC individuals initially sought significantly more information. In other words, NCC is an important motivational tendency that could determine the amount of information processing to reach a conclusion and make a decision. The direction in which NCC pushes the information processing (low vs. high) depends to the extent to which the individual poses readily accessible information to obtain a clear-cut judgment or decision and therefore attain closure.

Despite being an important variable in judgment and decision-making (e.g., Kruglanski, 2004; Kruglanski & Webster, 1996; Roets et al., 2015), NCC has not yet been studied directly in the realm of risky decision-making. The present work fills that gap by assessing the impact of NCC on various risk related measures. We propose that, since individuals high in NCC want to avoid uncertainty (Berenbaum, Bredemeier, & Thompson, 2008) they will show lower willingness to take risks. Lower risk taking allows them to avoid the uncertainty of potential negative. On the other hand, we expect high NCC individuals' intolerance of ambiguity (Schlink & Walther, 2007; Webster & Kruglanski, 1994) to be related to lower willingness to accept the prolonged uncertainty implied by a delayed reward, and therefore greater discounting of delayed rewards. NCC as a predictor for lower risk taking and greater discounting reflects the notion that situational motivational necessities determine an individuals' willingness to take risks. Our hypotheses are underpinned by results of some previous studies that are indirectly interesting for the present issue.

For instance, Schlink and Walther (2007) found NCC to moderate the so-called Ellsberg (1961) paradox. This paradox involves a scenario with two urns containing red and black balls. The ratio of black to red balls in Urn 1 is unknown (high ambiguity), whereas Urn II contains exactly 50 red and 50 black balls (little ambiguity). Schlink and Walther (2007) found that high NCC individuals have a preference for the urn with little ambiguity, whereas individuals with a low NCC showed no preference for either of the urns.

Studying post decisional regret and counterfactual thinking, Mannetti, Pierro, and Kruglanski (2007) found that individuals high in NCC are more prone to counterfactual thinking and post-decisional regret after choosing a non-status-quo option than after choosing the status quo option. Since choosing a non-status-quo option can be conceived of as a risky choice compared to maintaining the status quo, those findings further underpin our hypothesis that individuals high in NCC would show less readiness to take risks.

In the consumer context, Kim (2013) showed that individuals low in NCC preferred a brand offering a delayed value promotion, whereas individuals high in NCC preferred a brand offering an immediate value promotion. Kim (2013) argued that immediate promotions would offer a closed deal and reward when purchased, whereas delayed promotions' deals can only be closed in the future. Hence, delayed promotions involve both risk and time and they are accordingly evaluated as involving uncertainty (Patak & Reynolds, 2007). Kim's (2013) findings are in line with Vermeir and Van Kenhove (2005), who showed that consumers high in NCC are more likely to make use of coupons. Since individuals high in NCC plan their shopping trips in advance, they collect more coupons beforehand. Collecting coupons in advance could be considered a means to avoid uncertainty, help predicting future outcomes, as well as to quickly reach decisions.

In sum, we propose that individuals low in NCC would show greater risk taking than individuals high in NCC. Further, we expect greater willingness to delay gratifications for individuals low in NCC, whereas individuals high in NCC would opt for smaller but certain or temporally more proximal options. In Study 1, we showed that individuals high in NCC perceive various situations as riskier, and therefore, show less willingness to engage in them. In Study 2, we tested the hypothesis that individuals' dispositional NCC would predict their willingness to take risk in the cold version of the Columbia Card Task (Figner & Weber, 2011). In Study 3, we tested the same hypothesis for the more affective Balloon Analogue Risk Task (Lejuez et al., 2002). Moreover, we employed a delay discounting task to show that NCC would be negatively related to individuals' readiness to delay gratifications.

4. Study 1

With Study 1, we wanted to establish that individuals high in NCC would perceive activities as riskier and therefore be less likely to engage in them. In order to test this hypothesis, we assessed risk perceptions of various risky activities as well as the likelihood to engage in those risky activities.

5. Method

5.1. Participants

A total of $N = 139$ participants (61% female, $M_{age} = 36.50$, $SD_{age} = 11.91$) took part in a study on 'attitudes, personality, and evaluation of

activities'. Participants were recruited via Mechanical Turk and provided with a link that took them to an online survey.

5.2. Procedure and measures

Participants were asked to fill in the questionnaires, which were presented in randomized order. After completion, participants answered some demographic questions. Lastly, they were debriefed and paid through their Amazon accounts.

5.2.1. Need for Cognitive Closure

We used 14 items to assess NCC (Pierro & Kruglanski, 2006). Participants indicated their agreement with statements like "When I need to solve a problem, I generally do not waste time in considering diverse points of view about it", or "In case of uncertainty, I prefer to make an immediate decision, whatever it may be" (1 = *Strongly disagree*, 6 = *Strongly agree*).

5.2.2. Risk measures

We used the Domain-Specific Risk-Taking (DOSPERT, Blais & Weber, 2006) scale to measure risk perceptions of 30 risky activities as well as risk taking (i.e., the likelihood to engage in those activities).

5.2.3. Risk perception

The risk-perception responses evaluate the participants' gut level assessment of how risky various activities/behaviors are (1 = *Not at all risky*, 7 = *Extremely risky*). The scale encompasses five domains: ethical, financial, health/safety, social, and recreational risks. For example, "Having an affair with a married man/woman" (*ethical*), "Investing 10% of your annual income in a new business venture" (*financial*), "Engaging in unprotected sex" (*health/safety*), "Disagreeing with an authority figure on a major issue" (*social*), and "Taking a weekend sky-diving class" (*recreational*).

5.2.4. Risk taking

The risk taking responses evaluate behavioral intentions – that is, the likelihood with which respondents would engage in the described risky activities/behaviors (1 = *Extremely unlikely*, 7 = *Extremely likely*).

6. Results and discussion

We combined items measuring NCC ($\alpha = 0.83$), risk perception ($\alpha = 0.91$), as well as risk taking ($\alpha = 0.88$) to form composite scores. As a prerequisite for calculating mediation analysis, we checked whether our measures covaried. We found significant correlations between NCC and risk perception ($r = 0.19$, $p = 0.023$) as well as between risk perception and risk taking ($r = -0.33$, $p < 0.001$). The correlation between NCC and risk taking, however, was not significant ($r = 0.10$, $p > 0.223$). We assumed an indirect effect of NCC on risk taking via risk perception. Therefore, we tested a mediation model (IV = NCC, mediator = risk perception, DV = risk taking).

First, we found that NCC was not associated with risk taking (B = 0.12, $t(136) = 1.22$, $p > 0.223$). However, NCC was positively related to risk perception (B = 0.21, $t(136) = 2.29$, $p = 0.023$), and risk perception was negatively associated with risk taking (B = −0.37, $t(136) = -4.54$, $p < 0.001$). Mediation analyses were performed using the bootstrapping method with bias-corrected confidence estimates (MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2004). The 95% confidence interval of the indirect effects was obtained with 5000 bootstrap resamples (Preacher & Hayes, 2008). Results confirmed the mediating role of risk perception in the relation between NCC and risk taking (B = −0.08; CI = −0.17 to −0.01). Results indicated that the effect of NCC on risk taking became significant (B = 0.19, $t(136) = 2.16$, $p = 0.033$) when controlling for risk perception (see Fig. 1). This finding is consistent with a suppression pattern (MacKinnon, Krull, & Lockwood, 2000).

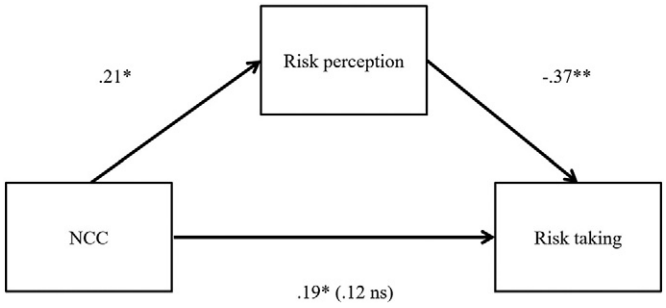

Fig. 1. Indirect effect of Need for Cognitive Closure (NCC) on risk taking through risk perception. *Note*: $^{*}p < 0.05$, $^{**}p < 0.001$.

In sum, although the direct path between NCC and risk taking was not significant, we could establish a mediation. Thus, we showed that NCC reduces risk taking via perceptions of risk. As expected, individuals high in NCC perceived the same specific activities as entailing more risk, which in turn led to decreases in behavioral intentions to engage in those activities. Such an indirect effect suppressed a positive association between NCC and risk taking, indicating that if closed minded individuals were not particularly concerned with perception of risk (as they are), they would even enter in some risky/high gaining activities. To clarify the effect of NCC on actual risk taking behavior, in our next study, we tested the hypothesis that individuals high in NCC would engage in less risk taking behavior.

7. Study 2

In Study 2, we tested the hypothesis that NCC would predict risk taking in a task that measures risk taking under predominantly deliberative conditions (i.e., cold version of the Columbia Card Task–cold CCT; Figner & Weber, 2011). In line with our theorizing, we predicted that individuals high in NCC would avoid taking risks.

8. Method

8.1. Participants

Fifty-one undergraduate students at XXX University participated in this study (65% women, $M_{age} = 21.31$ years, $SD_{age} = 2.55$).

8.2. Procedure and measures

After completing a questionnaire that assessed their NCC, participants individually played the cold CCT (explanations see below) on a desktop computer, according to the procedure described by Figner and Weber (2011).

8.2.1. Risk measure

To measure participants' risk taking, the cold CCT (Figner, Mackinlay, Wilkening, & Weber, 2009; Figner & Weber, 2011) was used. The cold CCT is a 24-trial computer-based measure showing 32 cards face down and a score of 0 points for each game round. Participants are asked to indicate how many cards they want to turn over for each round by clicking on one of 33 buttons (ranging from 0 to 32 cards to be turned over). Selecting a greater number of cards indicates greater potential reward, but also greater risk. The indicator of risk taking is the average number of cards chosen per trial. Higher scores indicate greater risk taking (see Figner et al., 2009; Figner & Weber, 2011, for more details).

Figner et al. (2009) designed the cold CCT in order to assess risk taking under predominantly deliberative conditions. Indeed, participants taking this task make decisions with the involvement of mainly "cold" cognitive processes, as the cold CCT does not give immediate feedback

about the outcomes of participants' decisions, but delays feedback until all decisions have been made (Figner & Weber, 2011). Other risk tasks (e.g., the BART (Lejuez et al., 2002), or the hot version of the CCT (Figner & Weber, 2011)) are supposed to trigger more emotional arousal, and thus, involve more affective decision making processes – e.g. because immediate feedback about the outcome is provided. A number of studies using skin conductance measurement, self-reports, and convergent validity with other measures established that the cold CCT triggers a decreased emotional arousal compared to the hot CCT or the BART (e.g., Buelow, 2015; Figner et al., 2009; Holper & Murphy, 2013; Panno, Donati, Chiesi, & Primi, 2015). In this regard, Figner and colleagues also showed that participants taking the cold version of the CCT reported to more strongly rely on "mathematical decision strategies" compared to the hot CCT (Figner & Weber, 2011; Figner et al., 2009).

8.2.2. Need for Cognitive Closure

Because this study was part of a larger survey that aims to investigate a wide range of attitudes and behavior related to decision making, we measured NCC with an abbreviated scale. Thus, we used five items of the measure presented in Study 1 to assess NCC (Pierro & Kruglanski, 2006). Ratings were made on 7-point Likert scales, with the endpoints (1 = *Strongly disagree*) and (7 = *Strongly agree*). A composite score of these items ($\alpha = 0.63$) indicated participants' dispositional NCC.

9. Results and discussion

In order to test the hypothesis about the relationship between NCC and risk taking, we regressed participants' risk taking on NCC scores. As predicted, we found that individuals with a high NCC showed decreased risk taking compared to individuals with low NCC ($\beta = -0.32$, $p = 0.020$; $R^2 = 0.10$; $B = -0.38$, 95% $CI = -0.69$ to -0.06). To further investigate whether this effect was affected by gender and age, we included these variables as covariates into a multiple regression model. The NCC effect on risk taking did not substantially change ($\beta = -0.33$, $p = 0.023$; $R^2 = 0.11$; $B = -0.38$, 95% $CI = -0.71$ to -0.05).

In sum, we showed differences in actual risk taking behavior for varying degrees of dispositional NCC. As expected, individuals with high NCC took less risks. The risk task used in Study 2, the cold CCT, involves more deliberate decision making processes. Therefore, we tested the same relationship with a task that is known to trigger more affective decision-making processes in the next study.

10. Study 3

In Study 3, we tested the hypothesis that individuals high in NCC would also show less risk taking in the Balloon Analogue Risk Task (BART; Lejuez et al., 2002), a task known to involve more emotional, hot decision making processes. Furthermore, we employed a delay discounting task to measure participants' impulsivity, in relation to readiness to delay gratifications. We tested the hypothesis that individuals high in NCC would opt for smaller but certain, or temporally more proximal, options.

11. Method

11.1. Participants

One hundred and thirteen students at XXX University participated on a voluntary basis in this study (65% female, $M_{age} = 23.45$, $SD_{age} = 2.92$).

11.2. Procedure and measures

Participants first filled in a questionnaire measuring their NCC (Pierro & Kruglanski, 2006). Subsequently, they completed the automatic BART and a delay discounting task. Participants were informed that they will not receive any rewards neither for the BART, nor for the delay discounting task. However, they were asked to make the decisions as though they were really given the rewards.

11.3. Risk measures

11.3.1. Automatic BART

The automatic BART is a 30-trial computer-based measure of risk taking propensity (Pleskac, Wallsten, Wang, & Lejuez, 2008). During the task, a balloon appears on the screen, an empty box, information about the current reward/loss magnitude of the balloon, the money earned on the last balloon, as well as the total money earned. At the beginning of a trial, participants typed in the number of pumps they wanted to use. Then, a balloon automatically expanded according to the numbers of pumps chosen (positive feedback), or it exploded (negative feedback). After the feedback (balloon explosion or money collected), a new balloon appeared on the screen. The total number of balloon pumps was 30. The maximum number of pumps was 128, the average explosion point was on pump 64. The number of pumps on success balloons was added to participants' points total while any point for an exploded balloon was lost and not added to the total. The average number of pumps across trials was used as dependent variable.

11.3.2. Delay discounting

Participants completed a delay discounting task on a laptop computer (Richards, Zhang, Mitchell, & de Wit, 1999). They had to take a hypothetical decision between different amounts of money after different delays or with different probabilities responding on about 110 questions. Question examples were: (a) Would you rather have $10 for sure in 30 days or $2 for sure at the end of the session, or (b) would you rather have $5 for sure at the end of the session or $10 with a 25% chance?

Our task versions used a computerized adjusting-amount procedure to measure discounting of delayed monetary reinforces. Responding to a series of trials, participants were asked to decide whether they preferred a smaller amount immediately available or $10 available after a delay (0, 2, 30, 180 and 365 days). Depending on the participants' decisions on the previous trials, the amount of money had an increment of $0.50 in the next trials, until an amount was reached that the participants chose equally often as the delayed reward ($10).

We calculated participants' indifference points and used the hyperbolic function model to describe their delay and probability discounting. In case of delay discounting, an indifference point is defined as the amount of immediate certain money the participant judged to be equivalent to the $10 reward, if he or she waited for an amount of time D. For example, if a participant is willing to accept $7 immediately instead of waiting 2 days for an award of $10, the indifference point of this participant for $D = 2$ is 7. Varying the delay D, we could calculate several indifference points for each participant in order to model their behavior. Similarly, in case of probability discounting, an indifference point is defined as the amount of certain money the participant is willing to accept immediately instead of 'betting' to win an award of $10 with a probability p. For example, if the participant accepts to take $7 immediately instead of betting with probability $p = 0.9$ for the $10 award, we say that the indifference point for $p = 0.9$ is 7. Within each session, we determined five indifference points for each discounting scenario varying the delay $D \in \{0,2,30,180,365\}$ days and the probability $p \in \{1.0.9.0.75.0.5.0.25\}$. We then used hyperbolic models to describe the indifference points as a function of delay and probability.

In case of delay discounting, the equation is the following: $V = A / ((1 + kD))$, where V is the indifference point, A is the amount of the reward, D is the delay to reward, and k is a free parameter. In case of probability discounting, it is common to express the probability discount as a function of the "odds-against" values instead of the probability of winning (Rachlin, Raineri, & Cross, 1991). To convert probabilities

in odds-against values the following formula is used: $O(p) = (1 / p) - 1$. Specifically, given the probabilities used in the experiments, the odds-against values are: 0.0.11.0.33.1.0.3. This way, the x-axis increases indefinitely from zero, like the delay, and the probability discounting can be modeled as a hyperbolic function (Rachlin et al., 1991). The hyperbolic equation in this case is the following: $V = A / ((1 + hO))$, where V is the indifference point, A is the amount of the reward, O is the "odds-against" function, and h is a free parameter. After the experiment, we used a non-linear curve-fitting program (Reed, Kaplan, & Brewer, 2012) to find the best values of k and h for each of the 113 participants such that the hyperboles better fitted their indifference points. The values of k and h indicate the steepness of the hyperbolic function and at the same time give us information about the participants. Greater values in k and h indicate greater impulsivity.

12. Results and discussion

To investigate our hypothesis of the relationship between NCC and risk taking, we regressed participants' target score in the BART. Target scores correspond to the average stated number of pumps for the balloons. As predicted, NCC was negatively related to risk taking in the BART ($\beta = -0.21$, $p < 0.03$). Thus, the higher the NCC, the lower the willingness to take risks. To investigate our hypothesis of the relationship between NCC and delay discounting, we regressed participants' k and h index. As predicted, we found that individuals high in NCC opted for smaller but certain, or temporally more proximal options compared to individuals low in NCC (k-value: $\beta = 0.28$, $p < 0.01$; h-value: $\beta = 0.23$, $p < 0.02$).

13. General discussion

We hypothesized that individuals high in NCC would be less willing to take risks. In Study 1, we found increased perceptions of risk for various activities in individuals high in NCC that lead to decreased willingness to engage in those activities. In Study 2, individuals high in NCC showed less risk taking in the cold version of the CCT. Likewise, we found that individuals high in NCC showed less risk taking in the BART (Study 3). Thus, we were able to show the hypothesized relationship between NCC and risk taking in a task involving more deliberate (cold CCT) as well as more emotional (BART) decision-making processes. Furthermore, we were able to confirm our hypothesis that individuals high in NCC would opt for smaller but certain, or temporally more proximal options in a delay discounting task (Study 3).

These findings contribute to the construction of a more complete and complex pattern of behavioral consequences of NCC, and relate to previous research, for instance in the domain of intergroup relations. NCC was found to be linked to outgroup derogation, e.g., lower acceptance of out-group members' beliefs and attitudes (Shah, Kruglanksi, & Thompson, 1998), fundamentalism (Brandt & Reyna, 2010), as well as prejudices and racism (e.g., Van Hiel, Pandelaere, & Duriez, 2004). However, the tendency of high NCC individuals to seize and freeze on stereotypes was found to depend on the ability to achieve closure (Kossowska, Dragon, & Bukowski, 2015). In this regard, Kossowska et al. (2015) showed that when NCC is accompanied by low ability to achieve closure, individuals indeed correct their initial tendency to rely on stereotypes. Therefore, like in our research, NCC is associated with behavior that is geared toward achieving the goal of closure, and hence, cannot be called more or less rational per se. Likewise, the willingness of high NCC individuals to take risks depends on the extent to which the given behavior allows them to attain and maintain closure. Risk aversion may be more likely when an individual can easily make a decision about the cost of negative consequences, or the potential benefits of taking the risks are not immediately clear. However, when the balanced is reversed, and the benefits of taking risks are clear or easy to establish and/or the potential costs are ambiguous or hard to discern, high NCC individuals may be more inclined to take risks.

In the present studies, we measured NCC as a stable motivational orientation. Therefore, our findings contribute to the literature on risk taking, establishing NCC as an important individual difference variable for the prediction of risky and inter-temporal choices. However, different features of everyday situations can induce levels of NCC, independently from personal stable orientation. For instance, time constraints (e.g., Kruglanski & Freund, 1983), noise (e.g., Kruglanski, Webster, & Klem, 1993) or fatigue (e.g., Webster, Richter, & Kruglanski, 1996) can increase an individual's NCC situationally. Likewise, an individual's NCC can be decreased, for instance, when erroneous judgments are perceived as costly (e.g., Kruglanski & Freund, 1983). Therefore, an interesting avenue for future research would be to manipulate NCC, which would allow establishing a causal link between NCC and risky as well as inter-temporal choices. Such an approach could also rule out the influence of a possible third variable being responsible for the relationship found.

Furthermore, those findings could bear important consequences for applied contexts, such as the workplace. Numerous conditions previously identified as increasing or decreasing NCC could potentially also lead to changes in risky and inter-temporal choices, e.g., working in noisy environments, or making important decisions under conditions of fatigue. As for the current findings, they could be used to unobtrusively improve personnel selection procedures for jobs involving risky decisions – dependent on whether the employer prefers the job candidate to be risk averse or not.

Our findings can also be interpreted as a preference for expectancy over value in individuals high in NCC. Less risk taking in the CCT and in the BART provides individuals with higher expectancy to obtain at least few points. However, the higher value option (i.e. obtaining more points) can only be achieved by taking more risk, and thus, trading value for expectancy. Consequently, individuals high in NCC demonstrate a preference for certain choices albeit being of less value. Likewise, in the delay discounting task, individuals high in NCC preferred smaller but certain rewards over larger but distant or uncertain rewards. One could argue that this preference for expectancy over value is due to a lack of interest for value of outcomes and gainings. The suppression pattern emerged in Study 1 clearly excluded this possibility by showing that when risk perception is controlled for, closed minded individuals are even inclined to engage in risky activities in order to gain something. However, importance of value is subdued by the greater emphasis placed on expectancy. This notion not only brings together the findings that individuals high in NCC show less risk taking and more impulsivity, but also sheds light on the underlying processes.

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