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Rational Misbehavior? Evaluating an Integrated Dual-Process Model of Criminal Decision Making

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Abstract
Objectives Test the hypothesis that dispositional self-control and morality relate to criminal decision making via different mental processing modes, a 'hot' affective mode and a 'cool' cognitive one.
Methods Structural equation modeling in two studies under separate samples of undergraduate students using scenarios describing two different types of crime, illegal downloading and insurance fraud. Both self-control and morality are operationalized through the HEXACO model of personality (Lee and Ashton in Multivariate Behav Res 39(2):329–358, 2004).
Results In Study 1, negative state affect, i.e., feelings of fear and worry evoked by a criminal prospect, and perceived risk of sanction were found to mediate the relations between both dispositions and criminal choice. In Study 2, processing mode was manipulated by having participants rely on either their thinking or on their feelings prior to deciding on whether or not to make a criminal choice. Activating a cognitive mode strengthened the relation between perceived risk and criminal choice, whereas activating an affective mode strengthened the relation between negative affect and criminal choice.
Conclusion In conjunction, these results extend research that links stable individual dispositions to proximal states that operate in the moment of decision making. The results also add to dispositional perspectives of crime by using a structure of personality that incorporates both self-control and morality. Contributions to the proximal, state, perspectives reside in the use of a new hot/cool perspective of criminal decision making that extends rational choice frameworks.

Keywords Delinquency · Deterrence · Negative affect · Dual-process · Rational choice

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Introduction

According to Nagin and Paternoster (1994, p. 581), criminological theorizing has progressed along two distinct and largely segregated tracks. One track has focused on the distal level, examining relatively stable characteristics that make people conducive to offending, while the other has looked at proximal factors that operate more closely to the moment of decision making. Their separation has meant that each track offers a view on offending that is somewhat restricted by default. For example, while it is evident that there are important individual differences in people's propensity to engage in crime, differential predisposition to criminal activity does not explain why two individuals with similar dispositions do not offend equally (Jacobs and Wright 1999: 150). Conversely, proximal accounts of crime that focus on the event itself, fall silent when it comes to explaining the growing number of individual dispositions found to be predictive of offending (Nagin and Pogarsky 2001).

In recent years, however, several studies have attempted to bridge the divide between these two strands of research to arrive at a more comprehensive framework of criminal behavior (e.g., Laub and Sampson 1993; Nagin and Paternoster 1993, 1994; Nagin and Pogarsky 2003; Piquero and Tibbetts 1996; Van Gelder and De Vries 2012). In this article we intend to contribute to these emerging integrative perspectives by using insights from personality psychology and dual-process theories of information processing common in the cognitive sciences. We extend proximal, 'state', perspectives on crime by also examining the role of negative feelings in the decision process. We add to distal, 'trait' perspectives by examining not only crime's most commonly researched individual-level correlate, self-control, but by also looking at the role of morality. Specifically, we examine the psychological pathways through which these two dispositions operate on criminal choice, specifying both direct and indirect, via perceived risk of sanction and negative affect, relations.

The State Perspective: From Rational Choice to Dual Processes

Traditionally, decision making perspectives in criminology, such as deterrence theory, rational choice models, and situational crime perspectives, posit a reasoning actor who balances costs against benefits in order to arrive at a decision regarding whether or not to engage in crime (e.g., Apel and Nagin 2011; Becker 1968; Clarke and Felson 2004; Cohen and Felson 1979; Clarke 1997; Cornish and Clarke 1986; Nagin 1998; Nagin and Pogarsky 2001; Piquero et al. 2005; Stafford and Warr 1993; Zimring and Hawkins 1973). The behavioral model underlying each of these perspectives is premised on the idea that people will offend when they perceive the potential benefits of their offending, e.g., material gain, status, sexual gratification, to exceed the potential costs, e.g., punishment, regret, shame, but will refrain from doing so when costs outweigh gains.

These perspectives typically envision the decision process as largely cognitive, i.e., thinking- based, in nature; feelings are expected to play little or no role in crime causation. However, in recent years criminologists have started to also examine emotions in choice models of offending. This has, broadly speaking, played out in two different ways.

Emotions in Criminological Theory and Research

One way regards the incorporation in decision models of 'moral' emotions such as the regret or shame that are anticipated after a criminal decision is made (e.g., Bachman et al. 1992; Nagin and Paternoster 1993; Piquero and Tibbetts 1996; Grasmick and Bursik 1990; Grasmick et al.

1993a; Wikström and Treiber 2007; see also Braithwaite 1989). The expectation of such *future* negative feelings is assumed to operate as an informal deterrent to crime. For example, Grasmick and Bursik (1990), when examining tax cheating, drunk driving and petty theft, found that threats of shame influenced the utility of these offenses and the likelihood that they will occur. Because these emotions are only expected to be felt after a decision has been made, instead of at the time of decision, the decision-making process remains modeled as the implicitly cognitive task of predicting future costs and benefits and weighing them in terms of their expected utility (Loewenstein et al. 2001). Consequently, these emotions can straightforwardly be incorporated in standard cognitive decision making models as anticipated costs or benefits.

The other way in which crime research has addressed the role of feelings regards affect that is actually experienced at the time of decision, e.g., emotions such anger and fear and drive states such as sexual arousal. This type of affect regards the *immediate* visceral reactions to a situation (Loewenstein et al. 2001). To illustrate how this differs from *anticipated* emotions such as shame and regret, consider the difference between the following two appraisals of a criminal prospect; "The idea of apprehension scares me" versus "If I do this now, I will regret it later". The first appraisal is a direct and unmediated emotional reaction to the prospect, whereas the second reflects a reasoned assessment encompassing a prediction of feelings to be experienced at some point in the future.

One relevant type of immediate affect that has been related to crime in research is anger (e.g., Agnew 1992; Broidy 2001; Exum 2002; Carmichael and Piquero 2004; Mazerolle et al. 2003; Tedeschi and Felson 1994; see also: Bouffard et al. 2000). For example, Carmichael and Piquero (2004), using a hypothetical vignette design, examined how perceived costs and benefits and emotional arousal combine to influence the decision to engage in assaultive violence and found that thoughts of future consequences disappear under high emotional arousal. Specifically, among those who reported high—angry—emotional arousal, neither formal nor informal sanctions significantly inhibited assaultive violence.

Another area in which immediate affect has been related to crime is sexual arousal. Loewenstein et al. (1997), also using a vignette design, found that sexually aroused participants were more likely to imagine that they would behave in a sexually forcefully manner on a date than did non-aroused participants (see also Ariely and Loewenstein 2006; Bouffard 2002). The effect of arousal was not mediated by a wide range of cost and benefit variables, even though these variables were also significantly related to intentions of sexually forceful behaviors.

These findings reveal a limitation of strictly cognitive models of offending as they show that certain feeling states exert an influence on behavior independent of how costs and benefits are processed. Because both cognitions regarding costs and benefits and feelings are predictive of criminal choice, we think it is important to model them simultaneously in decision frameworks. In the words of Nagin (2007: 262): "Understanding the interaction between cognition and emotion is critical to understanding crime and how to prevent it".

One way to do so, which has become common currency in the cognitive sciences, is through so-called dual process models. According to these models there are two partially independent modes in which information is processed in the human brain. This means that when we engage in activities such as taking risks, problem solving, making attributions or deciding on a course of action, two qualitatively different modes of mental processing are operative that drive our behavior (Van Gelder in press). In other words, human behavior instead of being the result of mere habit, motivation, emotion or calculation, is assumed to be guided by more than one underlying process (Strack and Deutsch 2004).

One mode is based more on deliberate, effortful and analytical processing, while the other mode is based more on intuitive, automatic and fast processing (e.g., Chaiken and Trope

1999; Kahneman 2003; Metcalfe and Mischel 1999; Sloman 1996; Slovic et al. 2004; Van Gelder et al. 2009). A recent review documents how these so-called dual-process models can account for a large variety of judgment and decision making phenomena (Weber and Johnson 2009). The question we address in this article is to what extent a dual-process approach can also explain criminal decisions drawing from the recently proposed hot/cool framework of criminal decision making suggested by Van Gelder (in press).

A Hot/Cool Perspective of Criminal Decision Making

The hot/cool framework distinguishes a 'cool', largely cognitive, mode of information processing from a 'hot' affective mode. The cool mode is responsible for processing probabilistic information, weighing costs and benefits in terms of their utility, and making projections about the long-term consequences of decisions. The cool mode therefore operates largely in accordance with the basic assumptions underlying cognitive perspectives such as rational choice and deterrence theories. The hot mode, in contrast, evaluates information in a more intuitive way, is affective in nature, and is largely unresponsive to outcomes and probabilities (Van Gelder in press). While the cool mode is under conscious control, the hot mode operates automatically and is largely non-volitional.

Like other dual-process models, the hot/cool perspective assumes behavior to be the result of an interaction between the two modes (Kahneman 2003; Sloman 1996; Slovic et al. 2004). That is, both modes influence decision making behavior to varying degrees, depending on factors such as individual differences, situational characteristics and the nature of the decision outcomes (Mukherjee 2010). In other words, people are assumed to rely both on cognitive cost-benefit analyses and their feelings when making choices. Situational variables may trigger parallel responses from both modes, such as when the sight of food activates the affective state of hunger and the cognition "What shall I cook for dinner tonight?" (Loewenstein and O'Donoghue 2004). However, the modes may also cue a different behavioral response. This may, for example, happen in a situation in which the hedonic properties of immediate and long-term consequences of a prospect are negatively correlated. In these cases the cool mode and the hot mode may trigger opposite responses (e.g., what I *think* is the best option, is not be the option I *feel* like) (Van Gelder in press).

According to Van Gelder (in press), the hot/cool perspective on criminal decision making extends rational choice-based perspectives in a number of ways. To revert back to the distinction between different types of emotions discussed earlier, it, for one thing, shows why anticipated emotions such as regret and shame can be incorporated in rational choice models, but emotions such as anger and fear cannot. The former type of emotions, as predictions of future emotional states, are essentially costs that are incorporated in the cognitive calculus and therefore belong to the domain of the cool mode. At the time of decision, they regard thoughts about feelings rather than actually experienced feelings. Emotions that are experienced at the time of decision, such as the anger felt towards a perceived wrongdoer, the sexual arousal triggered by an object of desire, or the fear of a potential sanction, all implicate the hot mode. These emotional states are difficult to plausibly model as costs or benefits. This is perhaps best evidenced by the fact that many affective processes occur below the level of awareness and are by definition not subject to conscious experience and hence evaluation (LeDoux 1996).

The difference in time-orientation between the two modes is another feature of the hot/cool framework through which it extends cognitive and rational choice-based perspectives of criminal decision making. Because the analytical cool mode can mentally represent future events, it allows for the evaluation of the hypothetical consequences of different alternative

courses of action of a decision (Van Gelder in press). As it can consider both short-term and long-term payoffs, it enables individuals to make informed tradeoffs between immediate and delayed outcomes of a decision. In contrast, the hot system is triggered by external stimuli, operates in the here-and-now, and is relatively long-term goal independent. It lacks the capacity to evaluate the hypothetical consequences of behavior, such as the legal or social sanctions that may follow a crime (Van Gelder in press). When a behavioral response is generated by the hot system, it may therefore appear reckless and irrational.

In other words, the hot/cool perspective can explain the finding that people committing crime engage in activities that have modest immediate benefits but potentially large, long-term costs. Because the hot mode operates in the here and now and is under stimulus control, it is insensitive to delayed costs (Van Gelder in press; Metcalfe and Mischel 1999). Hence if the cool mode is not able to override the (criminal) response generated by the hot mode, criminal and potentially self-defeating behavior can be the result. This failure to make informed tradeoffs between immediate benefits and long-term costs is also highlighted in self-control theory.

The Trait Perspective: Self-Control and Morality

Self-Control

According to Gottfredson and Hirschi (1990), individuals who engage in crime tend to place little weight on the, generally long-term and potentially serious, consequences of their criminal actions and to overvalue the, mostly immediate and modest, benefits (see also: Hirschi and Gottfredson 2001; Wilson and Herrnstein 1985). The self-control perspective is compatible with cognitive decision perspectives in that it assumes the choice for crime to result from cost-benefit considerations, the difference being that the latter is a state perspective explaining *crime*, whereas self-control theory is a trait perspective explaining *criminality* (Gottfredson and Hirschi 1990).

Recent research has examined the indirect effects of self-control on offending via perceived costs of offending (Intravia et al. 2012; Jones et al. in press; Van Gelder and De Vries 2012). Van Gelder and De Vries (2012), for example, found that the effect of self-control was mediated by a multiplicative term of perceived sanction probability and perceived sanction severity, while also continuing to exert a direct effect on offending. In line with this research, we hypothesize the self-control-crime relationship to be partially mediated by the perceived risk of sanction.

However, we think that self-control also operates on crime in another indirect way, i.e., through negative feelings that operate as a constraint on delinquent behavior. Because individuals low in self-control find criminal acts exciting and thrilling and enjoy taking risks (Gottfredson and Hirschi 1990), we assume these individuals to experience less feelings of fear when considering a criminal prospect and hence to be more likely to engage in delinquent behavior also for this reason. Indeed, fearfulness has been shown in research to be an important predictor of sensation seeking behavior (De Vries et al. 2009a). Furthermore, the minimal tolerance for frustration and insensitivity to the suffering of others associated with low self-control are also likely to reduce feelings of fear and worry when contemplating an offense. In short, we hypothesize individuals that have low self-control to experience less negative emotions associated with various kinds of offenses compared to individuals with high self-control, and therefore to operate on criminal decision making through this pathway as well.

Beyond its indirect effects, several of self-control's subcomponents, e.g., impulsivity, risk seeking and self-centeredness, also suggest a direct relation with criminal choice. The impulsivity component, for example, is manifested in the tendency not to engage in deliberation prior to acting but to act on impulse instead (Lynam and Miller 2004). The need for thrill and the tendency to be sensation seeking that characterizes individuals low in self-control also links it directly to the tendency to take (criminal) risks. Furthermore, the self-centeredness and urge for immediate gratification that typifies individuals low in self-control is also reflective of time-stable habitual responses to engage in crime (Gottfredson and Hirschi 1990). Hence, we also hypothesize a direct relationship between self-control and criminal choice.

Morality

Another group of correlates of criminal behavior relates to the moral component of human cognition and emotion. Various studies employing rational choice and deterrence frameworks have found moral emotions such as anticipated regret or shame, and moral beliefs to be negatively related to offending (Bachman et al. 1992; Grasmick and Bursik 1990; Kroneberg et al. 2010; Nagin and Paternoster 1993, 1994; Paternoster and Simpson 1996; Piquero and Tibbetts 1996; Schoepfer and Piquero 2006; Williams and Hawkins 1986). For example, when investigating intentions to commit white-collar crime, Paternoster and Simpson (1996) found that when respondents' moral inhibitions were weak, threats of sanction had greater effects but when moral inhibitions were high, considerations of costs and benefits were unimportant (see also Bachman et al. 1992). Furthermore, various scholars (e.g., Elster 1989; Etzioni 1990; Hart 1961/1994; Tyler 1990; Wikström 2004, 2006) have noted that rules may be followed out of a moral conviction to obey them, largely irrespective of associated benefits and also in the absence of potential sanctions upon violation of the rule.

The approach we take in this article resembles this latter perspective in the sense that we examine an enduring individual disposition to think, feel, and behave according to a set of implicit and explicit moral guidelines. As a proxy of morality, we use the Honesty-Humility personality trait, which is incorporated in the recent six-factor HEXACO personality structure (Lee and Ashton 2004). Honesty-Humility refers to individual differences in the proactive willingness to use others for personal gains, which includes self-enhancing and immoral behaviors such as greed and immodesty and active violations of social norms through insincerity and unfairness (Lee and Ashton 2004).

Van Gelder and De Vries (2012) argued that individuals low in Honesty-Humility are more likely to violate rules because they have lower moral standards, but also because they care more about their own well-being than about the well-being of others who may be affected by their behavior. Honesty-Humility has been found predictive of a number of behavioural criteria related to crime, such as psychopathy, Machiavellianism, egoism, immorality, pretentiousness, unethical decision making, employee integrity (Ashton and Lee 2005; De Vries et al. 2009b; De Vries and Van Kampen 2010; Lee and Ashton 2004), and also to criminal choice (Van Gelder and De Vries 2012).

We hypothesize Honesty-Humility to be directly related to individuals' tendency to make criminal choices. That is, individuals high in Honesty-Humility are committed to following rules out of conviction and their moral perspective on what is right and what is not, whereas those low in Honesty-Humility lack such commitment. We also hypothesize Honesty-Humility to be indirectly related to criminal choice by impacting both the perception of risk and the negative feelings evoked by the situation. To start out with the

former, due to the value they place on obtaining material gain, wealth and status, we assume individuals low in Honesty-Humility to be more geared towards what they may get out of a situation and hence be more focused on the potential benefits of a criminal prospect to the detriment of considering its potential costs. Indeed, Weller and Tikir (2011) found Honesty-Humility to be positively related to perceived risk and negatively to perceived benefits in the domain of ethical decision making. Results from a study by Ashton et al., showed that Honesty-Humility is strongly correlated with status-driven risk taking, i.e., risk taking undertaken solely as means to an end, and being motivated entirely by the prospect of gains in money, power or prestige as opposed to the intrinsic value of adventure or sensory experience derived from the behavior (Ashton et al. 2010: 734). We also think that the inherent sense of fairness of individuals high in Honesty-Humility means that they have a tendency to believe that sanctions are more likely to follow upon violations of rules than people low in Honesty-Humility.

We assume Honesty-Humility to be associated with negative affect because the strong sense of self-importance of individuals low in Honesty-Humility and their motivation for personal gain feeds feelings of greed and entices them to break and bend rules to get what they want, while subduing the negative affect that may be evoked by the consideration of a criminal prospect. Additionally, and similar to self-control, people high in Honesty-Humility are more prone to experience negative emotions associated with various kinds of criminal activities, as a consequence of which they are also less likely to commit them (Van Gelder and De Vries 2012).

The Present Research

In two studies, using a vignette design, we examine the effects of the traits Honesty-Humility and self-control on criminal choice. We hypothesize that these traits are both directly and indirectly, via the state variables perceived risk of sanction and negative affect, related. Study 2 additionally examines the hypothesis that perceived risk and negative affect operate via different mental processing paths; a 'cool' cognitive mode and a 'hot' affective mode as suggested by the hot/cool perspective of criminal decision making. In other words, Study 2 examines to what extent processing mode moderates the relations between perceived risk and negative affect on the one hand, and criminal choice on the other.

Method

Participants and Procedure

A total of 577 undergraduate psychology and educational science students from a university in the Netherlands were approached by email to participate in a short scientific study about dilemmas. Of all students that were approached, 153 (26.5 %) (69.9 % female, $M_{age} = 20.4$, age range: 17–34 years) agreed to participate.[1] Clicking on a link in the

[1] We checked whether our sample differed significantly from the total student sample and found no significant differences between the two groups, except for emotionality ($m_{sample} = 3.28$ (sd = .55) vs $m_{total} = 3.40$ (sd = .55), $t(575) = 2.54$, $p = .01$). Furthermore, psychology students tend to score relatively high on emotionality; the scores on emotionality of the subsample was more in line with the (lower) mean scores derived from a norm group from the wider population.

invitation email took them directly to an online survey website where they completed the study. In exchange for their participation, they were entered in a raffle in which they could win €50,-. Personality data of the participants had been gathered earlier as part of a course requirement.

Materials

Honesty-Humility

Both Honesty-Humility and self-control were measured through the Dutch 100-item version of HEXACO personality inventory revised (De Vries et al. 2009c; Lee and Ashton 2004). With several modifications (see Lee and Ashton 2004), the HEXACO model incorporates the same five main personality dimensions as the well-known Big Five and Five-Factor models (Goldberg 1990; Costa and McCrae 1992), i.e., emotionality, extraversion, agreeableness, conscientiousness, and openness to experience but also contains the additional trait Honesty-Humility (Ashton et al. 2004; Ashton and Lee 2008; De Vries et al. 2008).[2]

Each of the six main HEXACO dimensions consists of four facets (i.e., lower-order factors). For example, the Honesty-Humility dimension is composed of the facets Sincerity, Fairness, Greed Avoidance and Modesty.[3] Each facet is in turn measured by four items on 1–5 (completely disagree-completely agree) scales. One interstitial facet represents Altruism. All items are available from the public domain website www.hexaco.org.

Previous studies using principal component analysis (PCA) on the 24 facets revealed a clear six-factor structure with eigenvalues >1, a clear break after the sixth factor, and highest loading of the facets on their intended factors (De Vries et al. 2008, 2009c; Lee and Ashton 2004). Internal consistency alpha reliabilities ranged from .79 (extraversion) to .83 (conscientiousness, openness to experience). Scale descriptives are presented in Table 1.

HEXACO Self-Control

Self-control is not represented as one of the main dimensions of the HEXACO personality structure. However, Van Gelder and De Vries (2012) showed that self-control can be conceived of as an interstitial construct, i.e., pertaining to blends of various factors, in the six-dimensional HEXACO personality space. We followed the procedure used by Van Gelder and De Vries (2012) to construct a scale measure based on the Self-Control scale

[2] Emotionality and Agreeableness are rotational variants of the Neuroticism and Agreeableness dimensions of the Big Five model (see: Lee and Ashton 2004).

[3] The four items of the fairness facet of the Honesty-Humility dimension, which is also represented in the HEXACO self-control scale (see below), showed predictor-criterion overlap (e.g., "I would never accept a bribe, even if it were very large"), which raises questions regarding the tautological nature of this facet. While we think this kind of overlap is best avoided, for several reasons we decided to retain the items in both the Honesty-Humility and HEXACO self-control scales. Most importantly, excluding the four items would eliminate the entire facet from the analyses, which may lead to erroneous conclusions regarding the direct and indirect effects of both personality variables on criminal choice. Furthermore, it should be noted that the items are attitudinal, not behavioral in nature and the measurement of personality was independent from the measurement of the mediator and outcome variables which reduces the peril of tautology. Note too that excluding them led to weaker effects, but both Honesty-Humility and HEXACO Self-Control remained significant predictors of criminal choice. Future research is advised, however, to use the 200-item version of the HEXACO personality inventory which includes additional Fairness items that do not show this overlap.

Table 1 Correlations of the HEXACO-PI-R, HEXACO self-Control, perceived risk, negative state affect and criminal choice for study 1 (below the diagonal) and for study 2 (above the diagonal) and descriptives

	1	2	3	4	5	6	7	8	9	10	11
1. Condition[†]		.06	.08	−.02	.08	.06	−.02	.03	−.02	−.07	.12
2. Honesty-humility		–	.16	−.15	.20*	.18*	.20*	.68**	.20*	.18*	−.23*
3. Emotionality		.18*	–	−.21*	−.19*	.20*	−.04	.32**	.30**	.35**	−.25*
4. Extraversion		−.02	−.13	–	.13	−.13	.09	−.09	−.22*	−.19*	.22*
5. Agreeableness		.28**	−.14	.04	–	.03	.08	.44**	−.05	−.15	.18*
6. Conscientiousness		.19*	.11	.06	.02	–	−.03	.60**	.21*	.09	−.21*
7. Openness to experience		−.01	−.14	.03	.17*	.12	–	.10	.08	−.04	−.02
8. HEXACO Self-control		.66**	.24**	.10	.44**	.61**	.06	–	.29**	.19*	−.28**
9. Perceived risk		.19*	.07	.12	.07	.14	.11	.23**	–	.48**	−.58**
10. Negative state affect		.25**	.23**	.01	.10	.23**	−.00	.32**	.68**	–	−.55**
11. Criminal choice		−.38**	−.17*	−.10	−.02	−.16*	−.04	−.32**	−.57**	−.60**	–
Study 1											
Mean		3.38	3.28	3.57	2.99	3.35	3.29	3.28	13.43	3.89	.01
Sd		.56	.54	.46	.50	.55	.60	.32	7.55	1.33	3.16
Study 2											
Mean		3.38	3.14	3.54	2.99	3.38	3.12	3.28	14.34	3.99	.00
Sd		.50	.65	.52	.53	.58	.62	.33	7.86	1.11	2.96

$N = 153$

* $p < .05$, ** $p < .01$

[†] Conditions (only present in study 2) are 1=affect and 2=cognition

developed by Grasmick et al. (1993b), which in turn takes the six core elements of the self-control concept as described by Gottfredson and Hirschi (1990) as a point of departure.

To construct HEXACO Self-Control, Van Gelder and De Vries (2012) first selected those HEXACO facets that correlated most strongly with the Grasmick et al. Self-Control scale in a community sample representative of the Dutch adult population. Subsequently, they ran regressions using these facets with Grasmick et al. self-control as the dependent variable. Following this procedure, they arrived at the HEXACO self-control measure which is based on the regression weights expressed in the following formula: HEXACO self-control = [3*Prudence + 2*(Fairness + Modesty + Fearfulness + Flexibility) + (Social Self-esteem + Patience + Inquisitiveness + Diligence + Altruism)]/16. In the present study, the HEXACO Self-Control scale had a Guttman Split-Half reliability of .80.

Scenarios

Two scenarios were used to measure the mediating and outcome variables. The scenarios were preceded by a short introduction stating that the participant would read about two dilemmas and asked to answer the questions following each of them. Both scenarios described illegal behavior that can be classified as common, minor crime, i.e., illegal downloading and insurance fraud. The illegal downloading scenario read as follows:

> Imagine the following: You need a particular computer program for a statistics course that you are taking. The program costs about €100,-. You think you will not be using it anymore after finishing the course, and therefore hesitate about buying the program. A fellow student has explained to you where you can easily, though illegally, download the program. Imagine that there is a new government policy to clamp down on illegal downloading. According to this policy, internet providers have to track down illegally downloaded software through random checks and report it to the authorities. This has already led to the prosecution of a significant number of individual users.

Both scenarios were followed by a set of items measuring anticipated sanction probability anticipated sanction severity, negative affect, and the outcome variable, criminal choice. For each of these constructs, we aggregated the responses to both scenarios in order to reduce error variance.[4]

Probability and Severity

Anticipated sanction probability and severity were each measured by two items per scenario, using 7-point Likert scales, e.g., 'How likely is it that you will be caught in case you download the program?' (very unlikely-very likely) and 'How severe do you consider the possible consequences of getting caught to be?' (not at all serious-very serious). For each scenario, two separate perceived (sanction) risk scales were constructed following the procedure suggested by Nagin and Paternoster (1993). The scales were constructed by

[4] To ensure comparability between the two scenarios, we examined the correlations between the same variables of both scenarios and between the correlations between the predictor and outcome variables for each scenario separately. Results indicate significant correlations between the same variables of each scenario (all $r's \geq .31$, $p < .001$) and highly similar correlations between the predictor and outcome variables of both scenarios.

multiplying the mean scores on one of the probability items with the mean scores on one of the severity items). The composite perceived risk scale for both scenarios together consisted of the mean scores of the four perceived risk scales (2 per scenario) each based on the probability × severity multiplication. Higher scores on the scale reflect higher perceived risk. The alpha reliability of the scale was .81.

Negative State Affect

Negative state affect was measured with five items per scenario using 7-point Likert scales. The items, preceded by the sentence: 'imagine you decide to [commit the offense]', were: 'Would this situation make you feel insecure?', 'Would you find the situation frightening?', 'Would you be worried?', 'Would you be nervous?', and 'Does the situation evoke negative feelings in general?' (not at all-very much). The alpha reliability of the negative affect scale consisting of 10 items (5 per scenario) was .92. Higher scores on the scale reflect higher experienced negative affect.

Criminal Choice

Following Van Gelder and De Vries (2012), three items per scenario measured criminal choice. The first item inquired about the likelihood that the respondent would choose the criminal option using a 7-point Likert scale, e.g., 'How likely is it that you would download the program?' (very unlikely–very likely). The second item measured the degree of certainty of the choice: 'How certain are you about this?' (not at all–completely). The third item was a percentage estimate of the likelihood of choosing the criminal option. The 7-point likelihood item was recoded to a scale that ranged from −3 to +3, and a criminal choice score was computed by multiplying the recoded likelihood item with the certainty item, so that the scores on this multiplicative scale could range from −21 to +21. Both this scale and the percentage estimate item were transformed into z-scores and subsequently summed into a composite criminal choice measure which had an alpha reliability of .80.

Results

We first computed the bivariate correlations between HEXACO personality, perceived risk negative state affect, and criminal choice (Table 1). Honesty-Humility, emotionality, conscientiousness, HEXACO self-control, perceived risk and negative state affect were significantly negatively correlated with criminal choice, which corresponds with findings reported in prior research (Miller and Lynam 2001; Van Gelder and De Vries 2012).

To be able to examine all the hypothesized—direct and indirect—effects of Honesty-Humility and HEXACO self-control on criminal choice in one single model, we employed structural equation modeling using AMOS 18 (Arbuckle 2009). Because the self-control dimension consists of facets from the HEXACO main dimensions, including the modesty and fairness facets from the Honesty-Humility dimension, this results in overlap that may distort the structural paths in the model if both Honesty-Humility and HEXACO self-control are included in the same structural model. We therefore constructed separate models for Honesty-Humility and HEXACO self-control.

In order to reduce the complexity of the structural equation models (SEMs) and to obtain more accurate estimates of the models' path coefficients, we created two parcels, each containing half of the items, as indicators of each latent variable instead of using

individual items as manifest indicators. There are several reasons why a 'parallel parcels' approach is to be preferred over using individual items as manifest variables or—in the case of the HEXACO personality scales—personality facets. For one thing, items are known to contain unique variance and spurious cross-loadings, which is parceled out when combining them. Parceling ensures more reliable indicators of a latent construct and a better approximation of normality in continuous distributed variables. When using single items, the complexity of a model increases manifold and raises the number of degrees of freedom relative to the sample N, which reduces model fit (Bentler and Chou 1987; Hagtvet and Nasser 2004). Second, due to their interstitial nature, the use of personality facets often leads to the occurrence of cross-loadings which also results in poorer model fit (Ashton et al. 2009).

For Honesty-Humility, self-control, perceived risk and negative state affect, we included half the items into one parcel, and the other half into another parcel. For the criminal choice variable, we entered the multiplicative items (see "Method" section) into one parcel and the other items in the other parcel. We allowed the error terms of the criminal choice variable to covary because the wording of two of the original items was very similar and because both items referred to the likelihood of making a criminal choice. Furthermore, to model the two-way relation between negative state affect and perceived risk, we allowed their errors (ζ's) to covary as well.

Model 1: Honesty-Humility, Negative State Affect, Perceived Risk, and Criminal Choice

The SEM containing the standardized structural coefficients linking the predictor variables with the outcome variable is displayed in Fig. 1. This model had a more than adequate fit

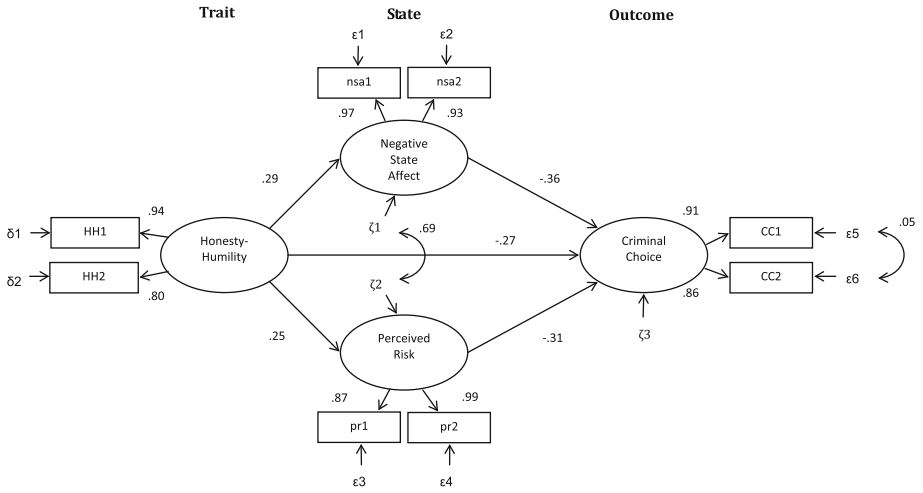

Fig. 1 Standardized structural paths between the latent variables in the structural equation model involving HEXACO honesty-humility, negative state affect, perceived risk, and criminal choice (Study 1). *Note*. The paths from the latent variables (*ellipses*) to the observed variables (*rectangles*) refer to standardized factor loadings. Error terms of the observed variables are indicated with δ (exogenous variables) and ε (endogenous variables) and the *arrows* pointing from the error terms to the observed variables and from the residuals (ζ's) indicate (random and unique) measurement error. *Double-headed arrows* refer to the covariance between residuals and between errors (ζ's and ε's)

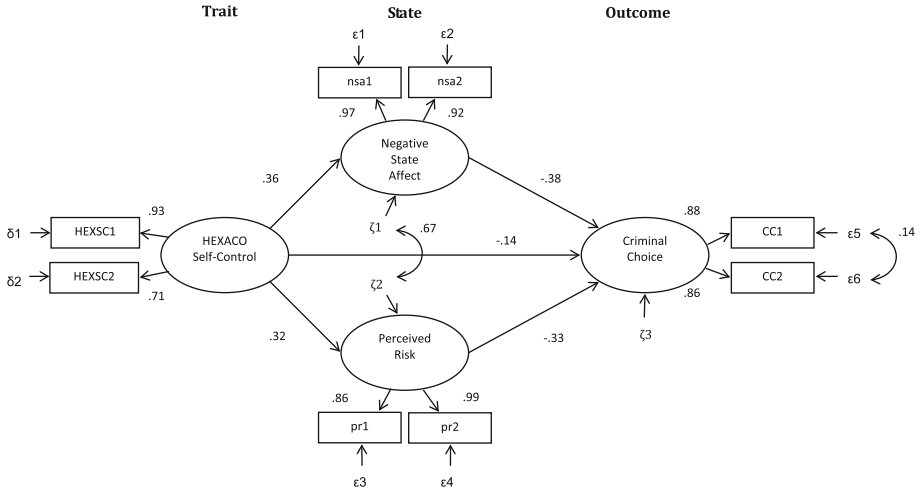

Fig. 2 Standardized structural paths between the latent variables in the structural equation model involving HEXACO self-control, negative state affect, perceived risk, and criminal choice (Study 1) *Note*. The paths from the latent variables (*ellipses*) to the observed variables (*rectangles*) refer to standardized factor loadings. Error terms of the observed variables are indicated with δ (exogenous variables) and ε (endogenous variables) and the *arrows* pointing from the error terms to the observed variables and from the residuals (ζ's) indicate (random and unique) measurement error. *Double-headed arrows* refer to the covariance between residuals and between errors (ζ's and ε's)

$\chi^2(df = 14) = 12.97$, $p = .53$; CFI = 1.00, TLI = 1.00, RMSEA = .00. Table 2 displays the standardized and unstandardized direct, indirect and total effects. As can be seen in Fig. 1, negative state affect and perceived risk were almost equally strongly related to criminal choice ($p < .01$). Furthermore, Honesty-Humility was significantly related to both mediator variables and also directly to criminal choice ($p < .01$).

To test our mediation hypotheses, i.e., to examine whether the *specific* indirect effects between Honesty-Humility and criminal choice were significant, we used the distribution of products approach (MacKinnon et al. 2002). This approach involves the conversion of the parameter estimates that comprise a mediation relation, e.g., from Honesty-Humility to perceived risk, and from perceived risk to criminal choice, into z-scores by dividing each unstandardized parameter estimate by its standard error and multiplying the resulting two z-scores ($z_\alpha z_\beta$) and using a critical value based on the distribution of the product of random variables to determine significance. In support of our hypothesis, we found that both state variables significantly mediated the relation between Honesty-Humility and criminal choice with $p < .01$ for negative state affect, and $p < .05$ for Perceived risk.

Model 2: HEXACO Self-Control, Negative State Affect, Perceived Risk, and Criminal Choice

The second SEM we tested included HEXACO self-control together with perceived risk, negative state affect and criminal choice. Standardized and unstandardized direct, indirect and total effects appear in Table 3. This model also showed a very good fit ($\chi^2(df = 14) = 11.04$, $p = .68$; CFI = 1.00, GFI = .98, TLI = 1.00, RMSEA = .00). As can be seen in Fig. 2, the standardized structural coefficients linking HEXACO self-control to negative state affect and perceived risk were both significant ($p < .01$). The structural

Table 2 Unstandardized and standardized path coefficients for Model in Fig. 1

	Unstandardized coefficients and S.E.	Standardized coefficients
Measurement model estimates		
Honesty-humility—HH1[†]	1.18 (.19)**	.94
Honesty-humility—HH2	1.00**	.80
Negative state affect—nsa1	1.00**	.97
Negative state affect—nsa2	.90 (.05)**	.93
Perceived risk—pr1	.82 (.05)**	.87
Perceived risk—pr2	1.00**	.99
Criminal choice—CC1	1.00**	.91
Criminal choice—CC2	.97 (.08)**	.86
Structural model (direct effects)		
Honesty-humility → negative state affect	.81 (.24)**	.29
Honesty-humility → perceived risk	8.41 (2.85)**	.25
Honesty-humility → criminal choice	−.84 (.22)**	−.27
Negative state affect → criminal choice	−.40 (.11)**	−.36
Perceived risk → criminal choice	−.03 (.00)**	−.31
Negative state affect → perceived risk	13.73 (2.05)**	.69
Structural model (indirect effects)		
Honesty-humility → criminal choice	−.57 (.24)*	−.18
Structural model (total effect)		
Honesty-humility → criminal choice	−1.41 (.31)**	−.45

$\chi^2(df = 14) = 12.97$, $p = .53$; CFI = 1.00, GFI = .98, TLI = 1.00, RMSEA = .00; $N = 153$

[†] See Fig. 1 for a graphical explanation of the variables

path from HEXACO self-control to criminal choice was marginally significant ($p = .07$). Finally, the standardized structural coefficients linking negative state affect to criminal choice and from perceived risk to criminal choice were both significant ($p < .01$).

We again used the distribution of products approach (MacKinnon et al. 2002) to test whether the specific indirect effects between HEXACO self-control and criminal choice were significant. The results support our hypothesis, as both state variables significantly mediated the relation between HEXACO self-control and criminal choice ($p < .01$).

Study 2

The previous study showed that people rely on both thinking and feeling when making decisions, even in situations that are unlikely to trigger strong emotions, such as illegal downloading and insurance fraud. However, this study did not include any manipulations of processing mode, and consequently, it is yet unclear whether perceived risk and negative affect pertain to two different modes of information processing as we hypothesized. In Study 2 we presented participants with the same scenarios as in Study 1, but prior to presenting them they performed a task intended to activate either a cool cognitive or a hot affective processing mode.

Table 3 Unstandardized and standardized path coefficients for Model in Fig. 2

	Unstandardized coefficients and S.E.	Standardized coefficients
Measurement model estimates		
Self-control—HEXSC1†	1.46 (.31)**	.93
Self-control—HEXSC2	1.00**	.71
Negative state affect—nsa1	1.00**	.97
Negative state affect—nsa2	.89 (.05)**	.92
Perceived risk—pr1	.81 (.05)**	.86
Perceived risk—pr2	1.00**	.97
Criminal choice—CC1	1.00**	.88
Criminal choice—CC2	1.00 (.08)**	.86
Structural model (direct effects)		
Self-control → negative state affect	2.04 (.50)**	.36
Self-control → perceived risk	21.47 (5.81)**	.32
Self-control → criminal choice	−.86 (.47)	−.14
Negative state affect → criminal choice	−.41 (.11)**	−.38
Perceived risk → criminal choice	−.03 (.01)**	−.33
Negative state affect → perceived risk	12.79 (1.99)**	.67
Structural model (indirect effects)		
Self-control → criminal choice	−1.48 (.57)**	−.25
Structural model (total effect)		
Self-control → criminal choice	−2.33 (.63)**	−.39

$\chi^2(df = 14) = 11.04$, $p = .68$; CFI = 1.00, GFI = .98, TLI = 1.00, RMSEA = .00; $N = 153$

† See Fig. 2 for a graphical explanation of the variables

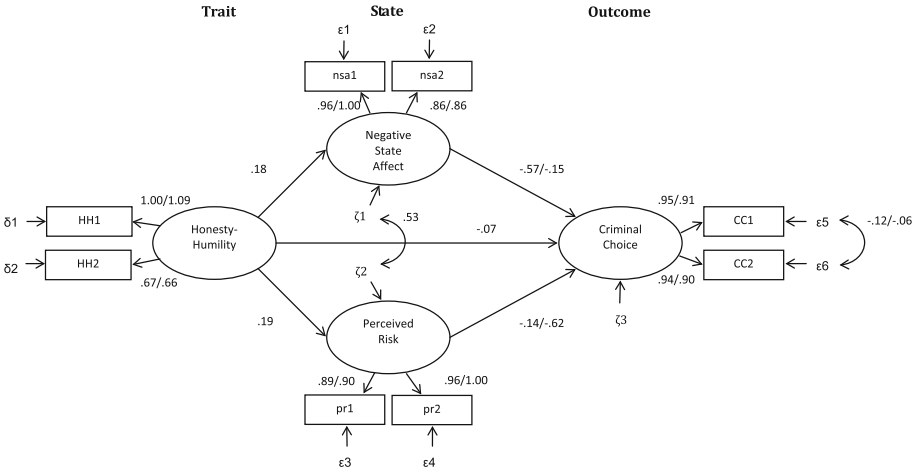

Fig. 3 Structural paths between the latent variables in the structural residuals model involving honesty-humility, negative state affect, perceived risk, and criminal choice (Study 2) *Note*. factor loadings and structural paths linking negative state affect and perceived risk to criminal choice are for the affect/cognition condition respectively (see text for explanation)

Method

Participants and Procedure

A total of 129 undergraduate psychology students (59.7 % female, $M_{age} = 20.4$, age range: 17–38 years) participated in this study in exchange for either course credit or monetary compensation. Participants were recruited on campus to participate in a study on Dilemma's. participants were seated in separate cubicles in the research lab of a large Netherlands university where they filled out the materials for this study, which were included in a larger unrelated data collection. Participants were randomly assigned to either the experimental condition ($n = 66$) or the control condition ($n = 62$). One participant had not followed the instructions of the scrambled sentences task and was ommitted from the analyses.

Materials

Priming Task

To activate processing mode, we relied on extant social psychological literature on priming (e.g., Frankish and Evans 2009; Bargh et al. 1996; Innes-Ker and Niedenthal 2002; Srull and Wyer 1979). Priming temporarily increases the activation level of a processing mode which results in short-term effects on behavior (Chaiken and Trope 1999; Metcalfe and Mischel 1999; Van Gelder et al. 2009; Frankish and Evans 2009). The mode that is targeted is expected to subsequently affect judgments and choices that follow the prime (Higgins et al. 1977).

In this study, processing mode was primed by presenting participants strings of five words in random order (Srull and Wyer 1979). Each string had to be unscrambled to create a grammatically correct sentence using all five words. Two different versions of this unscrambling task were created. In the affect version, intended to stimulate hot processing, each string of five words contained one word related to affect, e.g., mood, sensation, feeling, emotions. One of the strings in this version was 'talks, her, mood, about, she', which is to be unscrambled as "she talks about her mood". In the cognition version, intended to stimulate cool processing, participants were presented the same strings, however, the affect-related words were substituted for cognition-related words, e.g., thinking, rational, logic, calculation. For example, the unscrambled sentence in the above example read in the cognition condition: "she talks about her logic". In total, participants were presented 28 sentences to unscramble, 21 of which containing either cognition or affect-related target words and seven of which intended as fillers containing no words related to either cognition or affect, (e.g., "bakery to went she the"). The complete task appears in "Appendix". All statements were neutral in the sense that they contained no value references (e.g., good, bad, excellent), specific emotions, or emotionally valenced words (e.g., happy, sad, fearful).

Personality

Equal to the previous study, we used the 100-item Dutch revised version of the HEXACO personality inventory to measure Honesty-Humility and HEXACO Self-Control. The alpha reliability of the Honesty-Humility dimension was .77. HEXACO Self-Control had a

Guttman Split-Half reliability of .85. Means and standard deviations for both scales were highly similar to the previous study with 3.38(.56) for Honesty-Humility and 3.28(.33) for HEXACO Self-Control (see Table 1 for the remaining variables).

Negative State Affect, Perceived Risk and Criminal Choice

The mediating variables and the outcome variable were also measured and constructed identically to the previous study. Alpha reliabilities were slightly lower than the values in Study 1, but adequate with .86 for negative state affect, .76 for perceived risk, and .73 for criminal choice. Means and standard deviations were also similar to the previous study with 3.99(1.11) for negative state affect, 14.34(7.86) for perceived risk, and .00(2.96) for criminal choice.

Results

Equal to the results of Study 1, Honesty-Humility, HEXACO self-control, perceived risk and negative state affect were significantly correlated with criminal choice (see Table 1). In order to exclude the possibility that one of the manipulations would have a differential impact on the mean levels of the mediator and/or outcome variables, and not just influence the pathways between the variables as we intended, we checked whether the mean scores on the mediator variables and the outcome variable differed for the two experimental conditions. The results of t tests revealed no significant differences in mean scores on any of the variables. From this we conclude that any possible differences between the conditions on the mediator and outcome variables cannot be attributed to differences in the intensity of the manipulation.

Mediation Effects

Prior to examining the effect of our manipulation, we first tested for mediation effects of perceived risk and negative state affect for the complete sample to replicate the findings of Study 1. That is, we tested the core models comparable to those reported in Study 1, using the same analysis strategy and restrictions.

The (unconstrained) Model for Honesty-Humility showed adequate fit $\chi^2(df = 16) = 31.65$, $p = .01$; CFI = .98, TLI = .96, RMSEA = .09. The (unconstrained) Model for HEXACO self-control showed slightly better fit $\chi^2(df = 16) = 21.19$, $p = .17$; CFI = .99, TLI = .99, RMSEA = .05.[5] Different from the results obtained in Study 1, the direct paths from both Honesty-Humility to Criminal Choice and from self-control to criminal choice were not significant in this sample ($p > .05$), implying only indirect, i.e., mediated, effects of both dispositions on criminal choice.

Moderator Effects

In order to test for differences in the relative strength of the relations between negative state affect and criminal choice and perceived risk and criminal choice for the two experimental conditions, we again modeled two separate SEM's. Analyses for both the

[5] The ML estimation for this model gave rise to one Heywood case (i.e., negative error variance) which was dealt with by setting its variance to zero as suggested by Dillon et al. (1987).

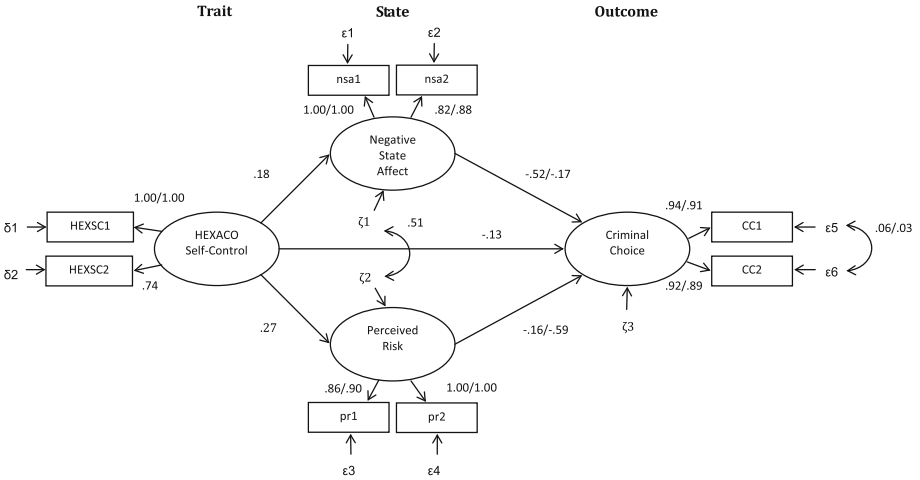

Fig. 4 Structural paths between the latent variables in the structural residuals model involving HEXACO self-control, negative state affect, perceived risk, and criminal choice (Study 2). *Note*. Factor loadings and structural paths linking negative state affect and perceived risk to criminal choice are for the affect/cognition condition respectively (see text for explanation)

Honesty-Humility model and the HEXACO self-control model are presented in two steps. In the first step, we compared the fit of different models (constrained vs unconstrained) using multi-group modeling. In the second step, we examined the strength of the structural paths between negative state affect and criminal choice and between perceived risk and criminal choice for both conditions. Standardized coefficients appear in Fig. 3 (Honesty-Humility model) and Fig. 4 (HEXACO Self-Control Model). For space considerations, unstandardized coefficients are not reported.

In the first step, we considered eight different models. In some of these models, we freed up the structural paths linking the latent endogenous variables negative state affect and perceived risk to the outcome variable criminal choice to examine whether these models showed better model fit than models in which these paths were constrained to be equal across the experimental conditions.

Model 1: Honesty-Humility, Negative State Affect, Perceived Risk, and Criminal Choice

We compared the following SEM models (Table 4): (1) a model in which none of the variables were related to each other (the independent model), (2) a model in which the hypothesized relations between the variables were allowed to vary between the two experimental conditions (the unconstrained model), (3) a model in which the measurement weights were fixed to be equal across the conditions, but the rest of the parameters were free [the measurement weights model (3a)], a model in which we allowed the structural paths between negative state affect and criminal choice and the structural paths between perceived risk and criminal choice in the hot processing condition to be different from the structural paths in the cool processing condition (structural weights model 3b). Models 3c (structural variance model) and 3d (structural residuals model) were equal to model 3b but now with an additional structural variance (3c) or a structural variance plus structural residuals (3d) fixed to be equal across the conditions. Model 3e (constrained model) was

Table 4 Comparison of fit indices of different models in study 2 for structural equation model with honesty-humility

	χ^2	df	p	TLI	RMSEA	90 % CI	p close	PCFI
1. Independent	793.20	56	.00	.00	.32	.30–.34	.00	.00
2. Unconstrained	57.51	32	.00	.94	.08	.05–.11	.08	.55
3. Constrained								
a. Measurement weights (λ's)	65.85	36	.00	.94	.08	.05–.11	.05	.62
b. 3a + structural weights + 2 β's free (see text)	71.15	39	.00	.94	.08	.05–.11	.05	.67
c. 3b + structural variance (Φ)	73.97	40	.00	.94	.08	.05–.11	.04	.68
d. 3c + structural residuals (Ψ)	**78.59**	**44**	**.00**	**.94**	**.08**	**.05–.11**	**.05**	**.75**
e. 3d + 2 β's constrained	85.67	46	.00	.93	.08	.06–.11	.03	.78
f. 3e + measurement residuals (Θ_δ)	102.83	53	.00	.93	.08	.06–.11	.01	.88

The structural residuals model (bold line in Table) is selected as the 'best' model (see text for explanation) and is represented in Fig. 3

equal to model 3d, but now the two parameters which were freed up across the two conditions in models 3b, 3c, and 3d were fixed to be equal. In the last model [measurement residuals model (3f)], all parameters were constrained to be equal across conditions.[6]

We compared the eight models using a significance test of the increase in χ^2 when additional parameters were fixed. A significant increase in χ^2 indicates that constrained (nested) models are significantly worse. Applied to the nested models in Table 4, we found that model 3a was not significantly worse than model 2 ($\Delta\chi^2(df = 4) = 8.34$, $p = .08$), that model 3b was not significantly worse than model 3a ($\Delta\chi^2(df = 3) = 5.30$, $p = .15$), that model 3c was not significantly worse than model 3b ($\Delta\chi^2(df = 1) = 2.82$, $p = .09$), that model 3d was not significantly worse than model 3c ($\Delta\chi^2(df = 4) = 4.62$, $p = .33$), but that model 3e was significantly worse than model 3d ($\Delta\chi^2(df = 2) = 7.09$, $p = .03$). On grounds of parsimony combined with the other fit indices (see Table 4), the structural residuals model (model 3d) appears to be the 'best' model. This model is shown in Fig. 3. Note that a better fit of a model in which the two relevant paths were freed up, i.e., allowed to differ, compared to a model where they are constrained is in line with our expectations.

We take the structural residuals model as the basis for comparing the relative strength of the standardized structural paths from negative state affect to criminal choice and from perceived risk to criminal choice for both experimental conditions and test our hypotheses. Recall that we expected that the structural path from negative state affect to criminal choice to be stronger in the hot processing condition compared to the cool processing condition, whereas the path from perceived risk was expected to be stronger in the cool processing condition relative to the hot processing condition.

As we expected, the standardized path linking negative state affect to criminal choice was significant in the hot processing condition ($\beta = -.57$, $p < .001$), but not in the cool processing condition ($\beta = -.15$, $p = .20$). Conversely, the standardized path linking perceived risk to criminal choice was significant in the cool processing condition ($\beta = -.62$, $p < .001$), but not in the hot processing condition ($\beta = -.14$, $p = .24$). In order to test whether the differences between the standardized paths between conditions were

[6] One Heywood case was dealt with by setting its variance to zero.

Table 5 Comparison of fit indices of different models in study 2 for structural equation model with HEXACO self-control

	χ^2	df	p	TLI	RMSEA	90 % CI	p close	PCFI
1. Independent	793.97	56	.00	.00	.32	.30–.34	.00	.00
2. Unconstrained	52.51	34	.02	.96	.07	.03–1.00	.21	.59
3. Constrained								
a. Measurement weights (λ's)	53.62	38	.05	.97	.06	.01–.09	.35	.66
b. 3a + structural weights + 2 β's free (see text)	54.31	41	.08	.98	.05	.00–.08	.46	.75
c. 3b + structural variance (Φ)	55.13	42	.08	.98	.05	.00–.08	.48	.74
d. 3c + structural residuals (Ψ)	**57.13**	**46**	**.13**	**.98**	**.04**	**.00–.08**	**.59**	**.81**
e. 3d + 2 β's constrained	64.69	48	.05	.97	.05	.00–.08	.43	.84
f. 3e + measurement residuals (Θ_δ)	78.59	53	.01	.96	.06	.03–.09	.24	.91

The structural residuals model (bold line in Table) is selected as the 'best' model (see text for explanation) and is represented in Fig. 4

indeed significant we employed the method to test for the equality of regression coefficients discussed by Paternoster et al. (1998). As hypothesized, the effect of negative state affect was significantly stronger in the hot processing condition compared to the cool processing condition, $z = -2.36$, $p < .01$. Conversely, the effect of perceived risk on criminal choice was, as expected, significantly greater in the cool processing condition compared to the hot processing condition, $z = 3.40$, $p < .01$.

Model 2: HEXACO Self-Control, Negative State Affect, Perceived Risk, and Criminal Choice

For the HEXACO self-control model, we followed a similar two-step analysis strategy.[7] We again compared eight different structural models and used the same indices to examine and compare model fit (Table 5). We found that model 3a was not significantly worse than model 2 ($\Delta\chi^2(df = 4) = 1.12$, $p = .89$), that model 3b was not significantly worse than model 3a ($\Delta\chi^2(df = 3) = .69$, $p = .88$), that model 3c was not significantly worse than model 3b ($\Delta\chi^2(df = 1) = .81$, $p = .37$), that model 3d was not significantly worse than model 3c ($\Delta\chi^2(df = 4) = 2.00$, $p = .74$), but that model 3e was significantly worse than model 3d ($\Delta\chi^2(df = 2) = 9.57$, $p = .02$). Equal to the Honesty-Humility model, on grounds of parsimony in combination with the fit indices reported in Table 5, we conclude that the structural residuals model (model 3d) is the 'best' model. The graphic for this model is presented in Fig. 4.

Consequently, we take this model as the basis for comparing the relative strength of the standardized structural paths from negative state affect to criminal choice and from perceived risk to criminal choice for both experimental conditions and test our hypotheses. The standardized path linking negative state affect to criminal choice was significant in the hot processing condition ($\beta = -.52$, $p < .001$), but not in the cool processing condition ($\beta = -.17$, $p = .15$). Conversely, the standardized path linking perceived risk to criminal choice was significant in the cool processing condition ($\beta = -.59$, $p < .001$) but not in the

[7] In the ML estimation for this model, three Heywood cases were dealt with by fixing their variances to zero.

hot processing condition ($\beta = -.16$, $p = .18$). We again used the procedure described by Paternoster et al. (1998) to test whether the differences between the standardized paths between conditions were indeed significant. As hypothesized, the effect of negative state affect was significantly stronger in the hot processing condition compared to the cool processing condition, $z = -1.92$, $p = .05$. Conversely, the effect of perceived risk on criminal choice was significantly greater in the cool processing condition compared to the Hot processing condition, $z = 2.70$, $p < .01$. These results by and large overlap with the results of the Honesty-Humility model. We conclude that our hypotheses are supported.

General Discussion

In Study 1, we examined how dispositional self-control and morality, operationalized through the Honesty-Humility trait, relate to criminal choice. It was shown that these relations are both direct and indirect, via the state variables negative affect and perceived risk. In Study 2, we replicated these findings and additionally provided evidence for the existence of two independent modes of information processing that influence criminal choices: a 'cool' cognitive mode and a 'hot' affective one.

These findings extend what we know from previous research in different ways. First, they add to our knowledge of the psychological mechanisms underlying the relations between individual dispositions and crime. As such they integrate the proximal with the distal level and provide a more encompassing picture of the criminal decision making process. Second, besides considering cognitive factors, such as the costs of crime, we also addressed the role of feelings as predictors of criminal choice, showing that they are equally predictive as perceptions of sanction risk. Third, we provided empirical evidence for the hot/cool perspective of criminal decision making by showing that there are two different modes, instead of one, in which criminal prospects are processed. Fourthly, morality, similar to self-control, was shown to operate through both processing modes as we found the Honesty-Humility-crime relation to be mediated both by negative affect and perceived risk. Finally, it was shown that the strength of Honesty-Humility as a predictor of criminal choice is comparable to that of self-control.

Our self-control measure, which is based on the broad notion of self-control put forth by Gottfredson and Hirschi (1990), and our measure of morality were highly correlated. While this can be partially attributed to our particular operationalizations of both measures, note that the correlation between morality and self-control is not limited to our study (cf. Antonaccio and Tittle 2008; Svensson et al. 2010). Furthermore, in conceptual terms there also appears to be overlap between both constructs. For example, both self-control and morality require the exercise of self-restraint. In addition, low scores on both constructs reflect self-centeredness, whereas high scores are indicative of selflessness. Hence, morality and self-control may be distinct, but not entirely independent constructs.

This makes our operationalization of morality, i.e., as a personality trait, also informative for crime research in another way. We think that the overlap between the constructs makes it unlikely that people scoring high on (dispositional) morality are low on self-control.[8] This combination, high morality and low self-control, would lead to a consistent failure to behave according to one's own moral guidelines. We do think that 'state morality', i.e., moral beliefs with respect to a particular offense, rather than dispositional morality can be mentally

[8] Please note that this is dependent on the measure of self-control used. This statement applies in particular to the measure based on the General Theory of Crime (Gottfredson and Hirschi 1990).

adjusted to be in line with one's behaviour as suggested by cognitive theories of dissonance and self-perception (Festinger 1957; Bem 1967) and criminological theories of neutralization (Sykes and Matza 1957). How morality precisely ebbs and flows across situations and circumstances is an interesting question for future research.

A theoretical perspective which also addresses both self-control and morality is Situational Action Theory (SAT) (Wikström 2004, 2006; Wikström and Treiber 2007). However, the resemblance between the perspective presented in this article and SAT is superficial only as our approach differs from SAT in a number of important ways. For one thing, in contrast to our view, SAT argues self-control is best perceived as a situational variable instead of as a stable trait (Wikström and Treiber 2007). Our operationalization of morality as a stable disposition also differs from the 'moral emotions and moral values' operationalization of SAT. Another important distinction between our perspective and SAT regards the kind of emotions examined, which in SAT regards *anticipated* emotions such as regret and guilt, but not *immediate* emotions such as fear and anxiety. Relatedly, SAT largely looks at these anticipated emotions as enduring tendencies to react in certain ways—e.g., the tendency to experience guilt after a rule is violated—but not the direct emotional reactions to a specific situation as was done in the present study.

When interpreting the results of the present study, a number of considerations should be kept in mind. One case in point is the fact that the research sample consisted of university undergraduates and not active offenders, which poses limits to the generalizability of the results. Nonetheless, we have reason to believe that the mechanisms at stake are general and extend across populations. Van Gelder and De Vries (2012) found similar mediation patterns in a community sample. Furthermore, results of research among squatters facing the risk of eviction in the city of Buenos Aires (Van Gelder 2009) were also highly similar to the results of the present studies. It was shown that both their perception of the risk of eviction and the negative affect triggered by their uncertain housing situation were predictive of the extent to which they were willing to invest in their dwellings, and hence take risks. While the response rate of Study 1 was relatively low, with the exception of the Emotionality dimension no differences were found in terms of scores on personality dimensions between our final sample and the original sample. As the findings of Study 1 and Study 2 were also highly similar, we think the validity of our findings is not compromised due to the response rate.

A second consideration that prompts caution with respect to the interpretation of the results regards the fact that this study used vignettes instead of real-life reactions to criminal situations. While vignettes are useful tools to capture individuals' behavioral intentions, they may not always accurately reflect actual decisions made in real-life situations (cf. Exum and Bouffard 2010). By using vignettes that were both relevant to and familiar for the target group we have attempted to maximize the correlation between reported intention and actual behavior (Ajzen 1991; Fishbein and Ajzen 1975). Additionally, vignettes carry the advantage over conventional self-report methods that they are detailed in terms of the description of the offense and its circumstances (Nagin and Paternoster 1994: 590). Given these points, we think that the reported behavioral intentions approximate decisions in the real-world.

Finally, we note that our manipulation did not actually intend to invoke emotions in participants but only the way information is processed. In case the hot mode is triggered through emotional arousal, we also expect differences in criminal choice, not just the strength of the paths operating on it. Note, however, that the fact that affective processing was a strong predictor of criminal choice even in a context in which emotions are unlikely to run high and for crimes that can be characterized as cool calculating offenses supports—

rather than undermines—our argument regarding the importance of affect as a predictor of criminal choice. To venture further into the studied relationships between affect, personality and crime, we recommend researchers to focus on situations that trigger (intense) emotions. This research could also examine the expected relationships for more serious offenses and among populations of active offenders and/or at-risk populations to address the limitations of the present studies.

Even though we see this research only as an initial step in testing the hot/cool perspective integrated with individual dispositions, we think it can contribute to the study of crime. Future research using the hot/cool perspective could shed new light on a series of fundamental issues that challenge crime research, such as why and when offender behavior deviates from what are rational courses of action, under what circumstances deterrence is likely to be most effective, and through which strategies and interventions recidivism can be more effectively prevented. Hopefully, the studies reported here will entice researchers to use the hot/cool perspective as a point of departure for addressing these issues.

Appendix

1. Just go with your **feeling/brain**
2. He is a[n] **emotional/rational** boy
3. He shared his deepest **feelings/thoughts**
4. She went to the bakery
5. You should really **experience/analyze** it
6. You must train your **intuition/brains**
7. She could really **sense/understand** it
8. The television brings the news
9. This does influence my **mood/thinking**
10. It is all about **emotions/knowledge**
11. She talks about her **mood/logic**
12. They sat at the table
13. He is a **sensitive/sensible** person
14. She made an **affective/analytical** impression
15. I had a certain **sensation/insight**
16. I took out the trash
17. My **gut-feeling/calculation** says it's correct
18. He spoke from his **heart/conviction**
19. I could **experience/understand** it myself
20. Discussing the matter once again
21. According to his own **experience/reasoning**
22. Our choice was very **impulsive/reasoned**
23. He listened to the **sentiment/analysis**
24. They did the dishes later
25. It keeps engaging our **emotions/minds**
26. I **sensed/realized** it very quickly
27. They shared a certain **temper/understanding**
28. He wrote in his agenda

Note. In bold are the words related to **emotion/cognition** respectively. Note that the original sentences were phrased in Dutch. An attempt was made to translate literally into

English while preserving the original meaning of the sentences as much as possible. Translation may have caused some changes in meaning and syntax.

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