Rational misbehavior?

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AFFECT AND COGNITION AS PREDICTORS OF CRIMINAL CHOICE

VRIJE UNIVERSITEIT

RATIONAL MISBEHAVIOR?

AFFECT AND COGNITION AS PREDICTORS OF CRIMINAL CHOICE

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Aan mijn mentor JvdV

TABLE OF CONTENTS

1 GENERAL INTRODUCTION

Imagine the following: You are at the airport returning from a trip abroad. Part of the reason you went on the trip was because you were interested in buying some local artifacts. However, before leaving you did not check whether it was actually allowed to import them. As you proceed to get your luggage off the belt, you notice a billboard indicating that it is forbidden to bring cultural goods into your country without an export license from the country of departure. You did not get such a license, which means you are now faced with the choice of declaring the artifacts you bought and have them confiscated or taking your chances and not declaring them. By not declaring them you risk not only the confiscation of your new items but a hefty fine as well.

If you would find yourself in this situation, would you consider 'forgetting' to declare your new items? And do you think that your choice in this case would be guided more by rational-instrumental considerations or more by how you feel about the situation? Additionally, can your reliance on either thinking or feeling when deciding on whether or not to get declare the items be influenced? That is, could it be that on one moment you would rely more on how you think about the situation when making your decision, whereas at another moment you would rely more on how you actually feel about it? Furthermore, do you think that interpersonal differences play a role in the sense that people with different personalities would evaluate the risks involved differently? And, do the answers to these questions also have practical implications? In other words, can the 'so what?' question be answered confidently?

In conjunction, the individual responses to these questions will serve to answer the broader research question underlying this dissertation: Can a so-called 'dual-process' perspective that incorporates both thinking and feeling better explain and predict criminal decisions than the existing single-process perspectives that currently dominate criminal decision making research and theorizing?

In the remainder of this introduction, I will discuss the main concepts that are used in the dissertation as well as review theory and empirical research pertinent to the phenomena under study. As the central concepts and theoretical perspectives reappear in the different chapters, their discussion here will be limited in scope to avoid being redundant. Subsequently, I discuss the aims and hypotheses of the dissertation followed by a chapter overview. Below, I start the discussion of the main concepts by briefly touching upon the historical context of what is likely to be one of the most persistent dualisms in human history.

PASSION VERSUS REASON

The central distinction in this dissertation is that between feeling and thinking at they apply to decisions of a risky or criminal nature. This division is a classic one, early references to it date back more than two millennia, and one that has resurfaced time and again in different guises, such as emotion versus ratio, affect versus cognition, and passion versus reason. The ancient Greek philosophers, for instance, chronicled how people's short-sighted passions got them into trouble when obscuring reason and lead them to engage in behavior that ran counter to their best interest. For Descartes (1649/1989), passions too could contradict deliberation and, if intense enough, be self-defeating by overpowering the minds' countervailing efforts. In a similar vein, Adam Smith (1790) described human behavior as the outcome of a struggle between the 'passions', i.e. emotions and drives such as hunger and desire, and the 'impartial spectator', which he envisioned as an internal voice of reason able to moderate the passions. Hume (1739-40/1985) also referred to the dualism but reversed the primacy of reason over passion arguing that "reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them". More recently, Freud (1923/1962) expressed the inner tension as a conflict between an ego, which represents the rational and conscious self and obeys a reality principle, and a pleasure-seeking id.

However, as the 20th century wore on, the notion that feelings can be important drivers of behavior got somewhat lost to social scientists and psychologists who increasingly came to rely on strictly cognitive information processing models, thereby excluding from consideration the potential influence of affect on our choices and actions. Similarly, economists, and in their wake criminologists, reverted to rational choice and utility models to explain behavior, which were also restricted to that part of our mental operations which pertains to thinking, i.e. cognition (Haidt, 2006). This has led to a rather limited, and one-sided, view of decision processes under risk and uncertainty. As Loewenstein et al. (2001, p. 267) argue: "Many choice theorists are deliberately agnostic about the psychological processes underlying the patterns of choice that their models predict".

Recently, in line with some of the insights from the classical theorists alluded to earlier, social psychologists, behavioral economists and neuroscientists have come to realize that there may actually be two systems or modes of information processing in the human mind. Consequently, our behavior may be guided not by one but instead by two systems that function relatively independent from each other. One of these systems is under volitional control, largely cognitive in nature, and the seat of reasoning and conscious behavior. The other system is automatic, strongly related to affect and often

operating below the level of consciousness (Frankish & Evans, 2009). This view on cognition and affect, which is generally captured under the term 'dual-processing', can for example elucidate why the way we feel about something may differ from how we think about it, and explain the familiar ambivalent feeling of 'being in two minds' (Loewenstein & O'Donoghue, 2004). It will be argued throughout this dissertation that this view can also teach us much about how people make criminal choices.

TERMINOLOGY AND CONCEPTS

Affect and cognition

Before elaborating further on the dual-process view, a brief note on terminology is in order. As some concepts have been variously used over a period of centuries, it begs their characterization and delineation to avoid misunderstanding. In this dissertation, feelings, passions and emotions are captured under the term 'affect'. This general term refers to the subjective experience of feelings, which includes moods and emotions, and may extend to visceral drive states, such as pain, drug craving and sexual arousal (cf. Loewenstein, 1996). Moods and emotions are closely related, but nevertheless distinct, phenomena (Beedie, Terry & Lane, 2005). Moods are low-intensity, diffuse (i.e. unfocused), and relatively enduring affective states without a clear antecedent cause and therefore have little cognitive content (e.g. feeling good or feeling bad) (Forgas, 1995, p. 41). Emotions, on the other hand, are more intense, focused, short-lived and usually do have a definite cause (e.g., being angry at, or fearful of, something) (Forgas, 1995, p. 41; see also Schwarz & Clore, 2007).

The terms reason, ratio and cognition have been, and continue to be, used in different ways and for different purposes, but have in common that they refer to thinking states. In terms of risk and decision making, traditional approaches, such as the well-known rational choice paradigm in criminology and expected utility models in economics are based on these states and for that reason subsumed under the heading 'cognitive'. This term is preferred over the term 'rational', which lacks clarity regarding its meaning and often carries normative connotations (Hammond, 2007). Finally, it is important to note that when referring to rational choice in the subsequent chapters, unless otherwise indicated, we refer to descriptive models, not prescriptive or normative ones.[1]

[1] A fundamental distinction in decision theory is that between normative or prescriptive theories and descriptive theories. The former regard how people ought to make decisions, while the latter

Risk and criminal risk

Signing an armistice, leaving your house without an umbrella, squatting a property, cheating on your taxes or spouse, or going base jumping share (at least) one common feature and that is that they all incur a possibility of loss. In other words, each of these activities entails risk, which is generally conceived as consisting of two components: the likelihood of negative outcomes, or 'losses', and the severity of these outcomes (Yates & Stone, 1992). In criminology, this distinction generally plays out in the probability of sanction and its severity, which together with punishment celerity, i.e. the imminence of punishment, form the core of traditional deterrence models (cf. Beccaria, 1764/1963).

When referring to risk in this dissertation, we are not primarily interested in the perils of leaving one's house without an umbrella or signing armistices. Instead, we examine risks with presumably greater and more relevant consequences than the former, and with a more personal nature than the latter; societal risks are beyond its scope. Furthermore, although not exclusively, the main focus of this dissertation is on risks of a criminal nature. Nagin and Pogarsky (2001, p. 885) note that "in decision making parlance, the criminal opportunity presents a choice between a sure thing (restraint from the criminal act), and a gamble that arises because the contemplated conduct can produce a gain with some probability and a loss with complementary probability." In other words, a criminal decision is a kind of risky decision. Obviously, criminal decisions do constitute a particular kind of risk and hence findings from this behavioral risk domain cannot automatically be assumed to apply to other domains, and vice versa. I will return to this issue later in this introduction.

Research on decision making under risk and uncertainty

The study of risk and judgment and decision making research have long been strictly cognitive enterprises employing notions such as expected utility, maximization, and value functions as the principal instruments in the toolkit. The dominant behavioral model in these fields has been that of man as a maximizer who weighs costs against benefits in order to arrive at an optimal decision. Furthermore, most research in this tradition is experimental in nature. Typical experiments involve presenting participants monetary gambles in which they are required to choose between two or more options with different levels of probability and payoff.

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describe how people actually make choices. The so-called 'rational choice perspective' developed by Cornish and Clarke (1986; Clarke & Cornish, 1985) is an example of a descriptive model.

In the 1970s and 1980s, Daniel Kahneman and Amos Tversky demonstrated in a series of papers that judgment processes were of a different quality than that described by rational choice models. One of their main findings was that choice behavior is often prone to a set of heuristics and biases (cf. Kahneman, Slovic & Tversky, 1982) and that people generally satisficed, i.e. settled for a satisfactory solution, rather than maximized (see also Simon, 1957). However, these deviations from optimality were regarded as cognitive in nature; feelings continued to be viewed as epiphenomenal to the decision making process (Loewenstein et al., 2001).

The strictly cognitive and experimental take on risky decision making has been criticized on the grounds that it is too far removed from the real world risks that people face. The use of monetary gambles that serve as surrogates for complicated real-world situations often require large doses of conjecture or leaps of faith (Fischhoff, 1996). As Lopes (1987, p. 263) summarizes "after all the study and clever theorizing, we are left with a theory of risk taking that fails to mention risk". Furthermore, many researchers continued to view risk behavior in much the same way as any other type of behavior; at least planful and reasoned, if not always rational (Gerrard et al., 2007, p. 29). Only in the last two decades have decision researchers started to address the role of feelings in how people perceive and deal with risk in what I see as an attempt to bring the study of human decision making closer to how people actually make and take decisions in the real-world.

Of course, if risk-related feelings and cognitive evaluations had identical determinants as well as consequences for behavior, the application of a dual-process perspective to the study of (criminal) risk would be little more than an alternative description of the psychological processes underlying decision making, and feelings would not be required as an intervening construct (Loewenstein et al., 2001). In this case, a dissertation dedicated to the interplay of cognition and affect would amount to little more than an inane academic endeavor. However, as will be explained in detail in the next chapter, feelings and cognitions related to choice and risk do have different determinants and it is precisely for this reason that both need to be taken up in theoretical perspectives dealing with risk and, by analogy, criminal decision making.

THE DUAL-PROCESSING HYPOTHESIS

In a sense, the ancient dualism between reason and passion reemerged in social psychology, and related areas such as social cognition and behavioral economics, under the heading of dual-process models. These theories assume that the way we go about making judgments, engage in problem solving, acquire new skills, value items, or decide on a

certain course of action is influenced by different modes of mental processing. Some of these models go beyond information processing and behavior in a specific domain and argue for two mental faculties or systems that guide behavior in general (Deutsch & Strack, 2004). These all-encompassing models are known as dual-system models. However, 'dual-process theory' is often adopted as an umbrella term for both types of models and I will adhere to this practice.

As such, the dual-processing hypothesis does not refer to one specific theory or model, but instead denotes a set or class of theoretical models. The central assumption of all duality process models is that human behavior is guided by more than one underlying process (Gilbert, 1999). Or, as Evans and Frankish (2009, p. 1) phrase it: "These theories come in different forms, but all agree in positing two distinct processing mechanisms for a given task, which employ different procedures, and may yield different, and sometimes conflicting, results".

The next chapter discusses the dual-process hypothesis in detail, but it can at this point already be remarked that if the hypothesis is correct, traditional models of human decision making, whatever their precise nature, come up short almost by default as they only portray a one-sided view of decision processes.[2]

INTEGRATING TRAITS AND STATES

Beyond going from single-processing to dual-processing, this dissertation adds another extension to traditional models of criminal decision making by also looking at individual dispositions. One common division in both the psychological literature and in criminological research is that between proximal factors that operate in the moment of choice (e.g. costs and benefits) versus more distal individual dispositions related to criminal behavior (e.g. self-control, sensation-seeking). This distinction is known in the criminological literature as theories on *crime* versus theories on *criminality* (Gottfredson & Hirschi, 1990). In social psychological terms, proximal factors are labeled 'states', whereas individual dispositions are referred to as 'traits'.

[2] Note that research may regard how both modes influence the *quality* of decision making, i.e. making sound or flawed decisions, but this is not a central concern in this dissertation. Rather, I examine how *both* thinking and feeling are related to risky and criminal decision making, without making normative claims even though, arguably, making a criminal decision implies making a 'wrong' decision.

While there is ample evidence that both 'traits' and 'states' are important predictors of decision making, few studies have sought to examine them in conjunction. Hence, little is known about how traits and states are interrelated and how they operate on criminal choice in conjunction. Developing an integral perspective that includes both perspectives is relevant as it constitutes a more comprehensive view of criminal choice. Therefore, as a subsidiary goal, I will also examine personality traits as predictors of crime and the particular pathways, i.e. affective and cognitive, through which they operate.

To operationalize the trait perspective, the recently proposed HEXACO model of personality (Ashton et al., 2004; Ashton & Lee, 2008; De Vries, Ashton, & Lee, 2009) is used. This structural model of personality builds on the well-known Big Five and Five-Factor models, but contains an additional personality trait, Honesty-Humility, that is of particular relevance to crime research. Honesty-Humility refers to individual differences in the tendency to be interpersonally genuine, to be unwilling to take advantage of others, to avoid fraud and corruption, to be uninterested in status and wealth, and to be modest and unassuming (Lee & Ashton, 2004). In other words, an individual's score on the Honesty-Humility dimension is reflective of his/her dispositional morality, which is an under-researched yet fundamental correlate of criminal behaviour (Antonaccio & Tittle, 2008).

Indeed, due to the inclusion of the Honesty-Humility dimension, the HEXACO model has been shown to outperform five factor solutions on a number of important behavioral criteria related to rule violating behavior and delinquency such as psychopathy, Machiavellianism, egoism, immorality, pretentiousness, unethical decision making, and employee integrity (Ashton & Lee, 2005; De Vries, De Vries, De Hoogh, & Feij, 2009; de Vries & van Kampen, 2010; Lee & Ashton, 2004). The fact that the HEXACO model has not yet been applied to criminal behavior, makes it of particular interest for the current purposes.

AIMS AND SCOPE: DUAL-PROCESSING RISK & CRIME

The previous discussion on states reveals an interesting parallel between social psychology and the field of judgment and decision making. Both fields came to rely on strictly cognitive models to explain human behavior in the second half of the 20th century only to gradually come to the conclusion that a central explanatory element was missing in their analyses. Hence researchers in both fields have increasingly started to address the potential role of feelings as a predictor of behavior in their research.

In spite of these emerging insights in its sister disciplines, criminology has so far been successful in turning a blind eye to them and is still being dominated (either implicitly or

explicitly) by cognitive considerations. As De Haan and Loader (2002, p. 243) eloquently phrase it, many established modes of criminological thought proceed in ways that ignore entirely, or at best gesture towards, the impact of emotions on their subject matter. While attention in crime research has been devoted to the role of affect, it has not –in my opinion– received its fair share and most approaches to this end have remained confined to narrative and interpretative studies or have treated affect as an enduring individual disposition (Nagin, 2007). However, although it may generally be acknowledged that affect influences criminal acts such as (expressive) violence, vigilantism, and crimes of passion, all of which are widely associated with lapses in self-control, its influence is likely to stretch beyond these examples and to influence criminal decisions in more subtle and as yet little understood ways. Furthermore, both in criminal justice contexts and by public opinion, emotions are generally associated with extreme and/or relatively rare crimes such as crimes of passion (hence the name). Due to disproportionate media coverage of these kinds of crime their occurrence tends to be overestimated (Felson, 1994). However, as will be shown, affect plays an important role too in seemingly calculating and everyday offenses (e.g. insurance fraud, illegal downloading, tax evasion).

This dissertation proposes and tests a new way of approaching criminal decision making and addressing the role of affect. It draws from other academic fields of human decision making because, as Nagin (2007, p. 262) notes, "research on choice in problem domains that seemingly have little connection to crime provide the basis for making fundamental advances in our knowledge and understanding of crime." In turn, in social psychology and related disciplines, increasing attention is being devoted to the role of affect in different domains, but *criminal* decision making has mostly fallen outside the scope of this research. Perhaps because researchers in these areas feel that this behavioral criterion falls outside their field of expertise or because they think the matter should be addressed by criminologists. Whatever the reason, this implies that insights from research on criminal choice such as that written up in this dissertation may also prove valuable to social psychology and judgment and decision making research.

Drawing from psychology to shed new light on a topic that is (also) pertinent to crime research and delinquent behavior is not new to criminology. Nor is conceiving of criminal decision making as a particular kind of risky decision making. In 1985, Clarke and Cornish noted that a "considerable body of recent psychological research on information processing and decision making has passed largely unnoticed by criminologists". This led them to draw out a cognitive framework of criminal decision making based on this research, the so-called rational choice perspective. Since its publication 25 years ago, the psychological research on information processing and decision-making alluded to by Clarke and Cornish has much progressed. Indeed, this literature seems to form a

systematic body of research that can contribute much to our understanding of delinquent behavior and criminal decision processes and also to provide a much needed update for the standard criminological decision making perspectives that currently dominate the field.

CHAPTER OVERVIEW

Below, I present an overview of the chapters, each of which represents an independent research article that has either been published, awaits publication, or is currently under review. This overview will briefly discuss each chapter in terms of type (theoretical versus empirical), goal, research approach and results. A schematic overview of the chapters appears in Table 1.1.

Chapter 2 is intended to set the theoretical stage for the remainder of the dissertation. The article on which it is based was written with the goal of introducing dual-process theory to criminology and it proposes a hot/cool perspective on criminal decision making based on this theory. It reviews the literature and prior research on dual processing and makes the case for applying the dual-process hypothesis to the study of criminal behavior, and is the first in criminology to do so. The goal of this chapter is demonstrating how the hot/cool framework extends rationalist accounts of human decision making that currently dominate criminological decision making research.

The hot/cool perspective elucidates how affect is likely to influence criminal decisions alongside cognitive considerations, such as the perceived costs and benefits of crime. It is furthermore shown how the hot/cool perspective offers a more realistic account of criminal decision making processes than existing models and approaches and also allows for the explanation of a variety of criminal behaviors that are difficult, if not impossible, to explain in terms of rational choice or expected utility, such as offenses committed in states of sexual arousal or intense rage, and which seem to be impervious to deterrence. This chapter also explains how the hot/cool perspective provides important input for practice, for example by explaining that a failure on the part of offenders to recognize the influence of affect on their (criminal) decisions is likely to lead to a subsequent failure to take measures to avoid certain situations conducive to offending or to deal with intense affective states in non-criminal ways.

Chapter 3 empirically tests the dual-process hypothesis in a non-criminal context. I thought it necessary to first examine risk in general prior to applying it to a specific risk domain such as criminal choice. The reason is that even though various researchers have argued for a dual-process view in the context of risky decision making (e.g. Slovic et al.,

2005), no study has actually tested it and hence empirical evidence for such a model was lacking.

In three different studies presented in this chapter it is shown how both cognition and affect are related to risky choice and belong to different domains of mental processing. In the first study, I use vignettes describing risky situations to test a model that includes both perceived risk, which is a cognitive measure, and negative affect, i.e. feelings of fear and worry evoked by the situation, as predictors of risky choice. The results indicate that both are significant predictors. These findings are replicated in Studies 2 and 3. However, in addition in Study 2, cognition and affect are made salient by adding cognitive information or affective information to the vignettes which leads to respective increases in the strength of perceived risk or negative affect as predictors of risky choice. In Study 3, using an experimental priming manipulation, I induce either a 'hot', affective, or 'cool', cognitive processing mode with participants prior to presenting them the vignettes. The results show that activating a cognitive processing mode strengthens the relation between perceived risk and risky choice, whereas inducing an affective processing mode strengthens the relation between negative affect and risky choice. Together these findings provide empirical support for a dual-process model of risky choice.

In Chapter 4, the cognition/affect distinction that underlies the hot/cool perspective is tested with respect to criminal choice in a representative sample of the Dutch population. However, besides the 'state' variables perceived risk and negative affect, this chapter also examines personality dimensions, 'traits', as predictors of criminal choice hypothesizing that the state variables mediate the relationship between personality and criminal choice. By examining the state factors of the hot/cool framework in conjunction with personality traits this chapter aims to arrive at a more comprehensive view of criminal decision making that incorporates both the distal and proximal levels. As hypothesized, we find both negative affect and perceived risk of sanction to be predictive of criminal choice, and both to mediate the relationship between personality and criminal choice.

In Chapter 5, I empirically test the hot/cool perspective of criminal decision making. Equal to Chapter 3, it is shown that the hot and cool processing modes can be independently activated using a priming task. Furthermore, this chapter replicates the findings of Chapter 4 by showing how perceived risk and negative affect mediate the relations between personality and criminal choice. The first study in this chapter examines the relations between personality traits and criminal choice with perceived risk and negative affect as mediating variables of this relation. In the second study, participants are made to rely more on either their thoughts or their feelings when deciding on whether or not to take illegal action using a priming task that is administered prior to the vignettes.

The results provide evidence for the mediating role of perceived risk and negative affect and support for the hot/cool perspective of criminal decision making.

Table 1.1 Chapter overview

Chapter	Topic	Approach
1	General introduction	
2	Introducing the dual-process hypothesis to the study of criminal decision making	Theoretical analysis
3	Testing a dual-process model of (non-criminal) risky choice	Three experimental studies
4	Testing perceived risk and negative affect as mediators of the personality-crime relation	One study among a representative community sample
5	Testing the integrative hot/cool perspective on criminal decision making	Two experimental studies
6	Discussion	

Chapter 6, finally, concludes the dissertation by discussing the findings in the light of their contributions to criminology, judgment and decision making research and social psychology. Strengths and limitations are discussed and potentially productive avenues for future research identified. The chapter concludes with practical implications and recommendations for policy makers.

CONCLUDING REMARKS

As each chapter was written as a separate article, the reader will find that there is some overlap in content. This carries the advantage that each of the different chapters is

comprehensible in isolation, without the necessity of reading preceding or subsequent chapters. The reader is therefore encouraged to read the chapters by interest instead of in their order of presentation.

Furthermore, as the articles were written at different points in time, and my ideas developed throughout the process of doing the research for this dissertation, this has led to some changes in terminology over the course of the chapters. For example, whereas Chapter 3 distinguishes an affective or affect-based mode of information processing from a cognitive processing mode, the other chapters denote these modes as 'hot' and 'cool' respectively. As these changes are minor in nature, I assume that they are self-explanatory and will therefore not elaborate further on them.

2 BEYOND RATIONAL CHOICE: THE HOT/COOL PERSPECTIVE OF CRIMINAL DECISION MAKING[3]

Abstract

This chapter proposes a general framework of criminal decision making that assumes both 'cool' cognition and 'hot' affect, i.e. feelings, to influence criminal choice. Drawing from judgment and decision making research and social psychology, the hot/cool perspective extends rational choice and deterrence theories by explaining how affect is likely to influence criminal decisions alongside cognitive considerations, such as the perceived costs and benefits of crime. It is shown how the hot/cool perspective offers a more realistic account of criminal decision making processes than existing decision models and approaches and also allows for the explanation of criminal behaviors that are difficult to explain in terms of rational choice.

[3] Based on Van Gelder (2012)

INTRODUCTION

Even though decision making models restricted to rational choice considerations have often been challenged as being limited and unrealistic in their portrayal of criminal decision processes (e.g. Akers & Sellers, 2009; De Haan & Vos, 2003), few satisfactory alternatives have so far been developed. References to the role of feelings are not uncommon in narrative and interpretative approaches (e.g. Athens, 2005, 1997; Katz, 1988; Wright & Decker, 1997, 1994), and in theories that conceive of affect as an enduring disposition (e.g. Agnew, 1992; Wikström, 2006), but rarely make it into choice models of offending. This chapter proposes an alternative account of criminal decision making based on dual-process theories in social psychology and related fields, such as behavioral economics and neuroscience. As will become clear, the proposed hot/cool perspective of criminal decision making does not argue against the idea of rationality, but offers a more complete explanation of criminal behavior by considering the influence of affect, i.e. feelings, *alongside* rational considerations, such as the perceived costs and benefits, and shows how they are related.

On rationality and rational choice

Over time, many different meanings have been bestowed upon the term 'rationality'. Hammond, writes that "rationality remains a concept whose interpretation is susceptible to personal preference, idiosyncratic explication, and popular misunderstanding, and, therefore, has produced countless varieties of meaning. As a result, at the beginning of the twenty-first century, there is no universal agreement on what it means to be rational" (2007, p. xiii). The meaning the term is generally given in criminological texts has its roots in decision theory and economics. In these disciplines it traditionally refers to individuals who maximize expected utility according to a prescribed set of mathematical axioms for balancing costs, benefits and preferences.

According to Akers and Sellers (2009, p. 27), deterrence researchers in criminology began to refer to economic rational choice theory to expand the deterrence doctrine beyond legal punishment. The basic idea underlying classical deterrence theory is that crime is a deliberate choice that people make from a range of behavioral options. In this way, people make those choices that they perceive to be in their best interests (Henry, Lanier & Lanier, 2006).

In a seminal paper, the economist Becker (1968) introduced economic rational choice theory to the study of crime and argued that crime, or better said, the choice to

offend, should be examined using the same principles of cost-benefit analysis people use when selecting legal behaviors. According to Becker (1986), beyond punishment, the monetary or psychic gain from offending and other variables representing the willingness to offend should also be included in the analysis.

However, even though traditional rational choice-based theories may remain faithful to the utilitarian notion that individuals tend to behave in ways that maximize benefits and minimize cost, it is often acknowledged that they do not engage in elaborate assessments of all the pros and cons of various alternative courses of action. Instead, people exhibit 'bounded rationality' and tend to opt for a solution that is satisfactory instead of optimal (Simon, 1957). In other words, for decisions to be rational, extensive computing is not required. The minimal condition is some form of rudimentary cognitive processing of pros and cons. This idea stands at the basis of the rational choice perspective that was developed by Cornish and Clarke (1986).

According to Cornish and Clarke (1986, p. 1) the starting point of their rational choice perspective "was an assumption that offenders seek to benefit themselves by their criminal behavior; that this involves the making of decisions and of choices, however rudimentary on occasion these processes might be; and that these processes exhibit a measure of rationality, albeit constrained by limits of time and ability and the availability of relevant information." Cornish and Clarke's rational choice perspective thus departs from the more traditional economic rational choice conceptions in that for decisions to be 'rational', utility maximization is not essential. Instead, it coincides with the view of Simon (1957) that the decision making behavior of individuals is characterized by bounded rationality (Cornish & Clarke, 2006).

While some rational choice notions assume decision making to be boundedly rational whereas others see it as unbounded, and while some assume rudimentary processing of pros and cons, whereas others may claim elaborate assessments, all notions of the concept in criminology agree that offending is a choice process in which individuals, when faced with several possible courses of action, will reason their way towards the option they believe is most beneficial to them at a given moment. Furthermore, all rational choice-based models used in criminology are essentially cognitive, i.e. thinking-based, choice models that pay little or no regard the role of feelings in criminal decisions.[4]

[4] Situational theories. such as situational crime prevention (Clarke, 1997) and routine activities theory (Cohen & Felson, 1979), are also perspectives premised on the notion of a reasoning offender who engages in a cost-benefit analysis when making his decision to engage in crime or not. In other words, these are also rational choice based approaches to crime.

The Role of Feelings in Criminal Decisions

In rational choice and deterrence models, feelings are seen as unrelated to the decision-making process. However, as Shover (1991, p. 103) argued: "Whereas the model criminal decision maker is never angry, desperate, or defiant, the moods of real-life decision makers can distort the criminal calculus severely and make offenders unconcerned about risk". Impulsive or 'spur of the moment' decisions that result in crime offer illustrative examples of how criminal decisions may actually be heavily infused with affect.

In a study on shoplifting, Cromwell, Parker and Mobley (2003) found that more than 20% of the interviewed offenders gave explanations that directly implicated their feelings (e.g. stress, thrill, impulsivity) as the primary motivation for their offending behavior. Many of the offenders who cited instrumental reasons (e.g. 'I didn't want to pay for the item') as their primary motivation, also reported secondary motivations that implicated their feelings. Similarly, De Haan and Vos (2003), write that impulsivity, release of tension and emotions were reported as equally important motivations by street robbers as getting the money (see also Shover, 1996). With respect to violent crime, references to the influence of emotions such as anger, shame, contempt, outrage and frustration in its onset and its continuation are abound in the literature (e.g. Athens, 2005, Collins, 2008; Tedeschi & Felson, 1994).

Besides stressing the role of feelings in criminal decisions, various studies also question the notion of a calculating offender, as assumed by rational choice-based accounts. Feeney (1986), for example, found that robbers frequently embarked upon their offenses seemingly without a plan and with an apparent lack of deliberation; over half of the robbers he interviewed said they did no planning at all, and over 60% said that before the robbery the idea of getting caught hadn't crossed their minds. Comparable findings are reported by Gill (2000), Shover and Honaker (1992), Tunnell (1990) and Wright and Decker (1997). Shover and Hochstetler (2002, p. 12) conclude that there is remarkable consistency in the results of studies: "Burglars, armed robbers and other street criminals are anything but the careful calculating actors sketched in classical criminological theory".

There is likely to be variation among different types of crime with respect to the extent to which feelings play a role. According to Shover and Hochstetler (2005), white-collar criminals operate more in conformity with the assumptions of rational choice theory than street offenders who operate in hedonistic contexts which cloud judgment and eschew rationality and long-range planning. In contrast, many white-collar workers live and work in worlds that promote and reward prudent behavior (Shover & Hochstetler, 2005). By implication, they should be more prone to commit their crimes after carefully weighing costs against benefits and, consequently, operate more in conformity with the assumptions of deterrence and rational choice. Yet, as Akers and Sellers (2009) note, this

remains an untested assumption because empirical evidence as to how strictly rational the decision process for white-collar criminals actually is, and to what extent it is more rational than for other offenders, is lacking. Furthermore, white-collar crimes may also implicate feelings such as fear, thrill and excitement (Bouffard, Exum & Paternoster, 2000).

Considering the above, it seems plausible that extending models of criminal decision making by incorporating affect is likely to increase their explanatory scope. As noted by Ward and Nee (2009, p. 173), affect is often treated as separate from cognition, but there are strong reasons to believe that the role of affect is central to and inextricable from decision-making processes and it makes sense that this development is taken on board when studying offending. The approach taken in this chapter differs from most previous crime research that has alluded to the role of feelings. Instead of examining emotion as a relatively enduring state or taking a narrative or interpretative approach, it draws form recent social psychological and judgment and decision-making research, risky decision making in particular, to study the actual choice process and the principles guiding it.[5]

Cognitive and Affective Appraisals of Risk

Differentiating between cognitive and affective responses to risk is important because feelings operate according to a different logic than cognitive risk estimates. People have, for example, been found to dread certain risks more than others that are more likely to occur and/or are more severe in nature (e.g. Slovic, 1987). In these cases, feelings about risk are influenced by considerations orthogonal to its probability and severity, such as the extent to which it is controllable. The classic example in this respect is that most people experience little fear driving a car, yet dread flying even though acknowledging the fact that driving is much more hazardous than flying (Loewenstein, Weber, Hsee & Welch, 2001).

As will be argued in more detail later in this chapter, the divergence of cognitive appraisals from emotional reactions can occur because the latter have determinants that differ from those that drive cognitive evaluations. Emotions respond differently to probabilities and outcomes, the two central input variables of rational choice and deterrence models, than cognitive evaluations of riskiness (see Loewenstein et al., 2001). As Frijda (1988, p. 355) notes "emotions know no probabilities. They do not weigh

[5] Nagin and Pogarsky (2001, p. 885) note that "in decision making parlance, the criminal opportunity presents a choice between a sure thing (restraint from the criminal act), and a gamble that arises because the contemplated conduct can produce a gain with some probability and a loss with complementary probability." In other words, a criminal decision is a kind of risky decision.

likelihoods. What they know, they know for sure." Emotions are, however, influenced by variables that play only a minor role in cognitive evaluations, such as the time interval between the decision and the realization of outcomes, and the degree to which a risk is known or controllable (Loewenstein et al., 2001).

Emotions, moods and visceral drive states

Besides distinguishing affect from cognition, it is also important to differentiate between different types of affect. Affect is a general term that refers to the experience of feelings, which encompasses moods and emotions, and may extend to visceral drive states, such as pain, drug craving and sexual arousal. Moods and emotions, even though closely related, are nevertheless distinct phenomena (see previous chapter).

Various experimental studies have documented the influence moods can have on unrelated judgments. Johnson and Tversky (1983), for example, showed that people who were induced to experience positive affect tended to make more optimistic risk estimates than people who were made to experience negative affect. Additionally, individuals in anxious moods are likely to evaluate risks as more threatening and severe in comparison to individuals who feel elated (Schwarz & Clore, 1988). Furthermore, individuals may use their mood as a source of information about their own state (Schwarz & Clore, 1983). It is therefore a plausible, yet untested, assumption that mood serves as an important cue for judgment related to certain offenses. Happy or elated moods may lead people to underestimate risks and engage in reckless activities, such as speeding or unwanted sexual overtures. Anxious moods do the reverse and prompt cautious behavior.

The potential effect of mood on crime also operates in a different way. According to Shover and Honaker (1992), crime provides an offender the opportunity to establish himself as a competent individual and (re)gain a sense of control over his life. Offenders may consequently try to alleviate a negative mood, such as feelings of frustration born out of failure at legitimate activities, through crime (Wright & Decker, 1994). The link between negative mood alleviation and risky behavior is supported by experimental research. Leith and Baumeister (1996) found that people's negative moods were related to lower self-control, which in turn led to riskier behavior. They explain this finding by arguing that "[p]eople who are upset seem merely to seek out the best possible outcome and grab for it, without being deterred by rational cost-benefit calculations or even by the prospect of possible unpleasant consequences" (Leith & Baumeister, 1996, p. 1264).

Different from moods, emotions have a definite antecedent cause and are associated with an evaluative judgment, or appraisal, of an event and its significance for our well-

being. Emotions, therefore, carry information about ourselves and the state of the world around us. An appraisal triggers certain specific tendencies to respond to the eliciting stimulus (Frijda, 2007, 1988; Smith & Ellsworth, 1985, 2003). Angry individuals, for example, are likely to assess a situation as more controllable and certain and, consequently, perceive it as less risky than fearful individuals do (see e.g. Lerner & Keltner, 2000, 2001; Smith & Ellsworth, 1985). Anger, consequently, can facilitate criminal action, while fear is likely to inhibit it. Furthermore, emotions can influence the quality and depth of information processing of decision outcomes and the prediction of consequences (e.g. Loewenstein & Lerner, 2003).

Because emotions are adaptive responses to the environment geared to help individuals respond to the challenges facing them (Frijda, 1986, 1988; Smith & Ellsworth, 1985; Ellsworth & Scherer, 2003), they can also assist in making the right choices rather than just interfering with sound decision making (Damasio, 1994). In a sense, emotions save cognitive processing by triggering time-tested responses to universal problems such as loss, threat or injustice (Loewenstein & Lerner, 2003, p. 628). Indeed, as Ward and Nee (2009, p. 174) note, research on the role of emotion on judgment suggests that it can have both positive and disruptive effects as a lack of emotional competence can also mean that individuals struggle to deal adaptively with their problems.

Anticipated versus immediate affect

Besides distinguishing moods from emotions it is essential to differentiate between the various ways in which affect can influence decision processes. One fundamental distinction is that between anticipated, i.e. post-decision, and immediate affect.[6] The former is a component of the anticipated consequences of a decision and refers to emotions expected to occur when outcomes are experienced, such as regret, disappointment or feelings of shame, rather than emotions experienced at the time of decision. Immediate affect, on the other hand, is experienced at the time of decision. It can arise from contemplating consequences, such as feelings of fear and dread when visualizing potential negative outcomes, so-called anticipatory emotions, or it can be the result of incidental influences unrelated to the decision itself, such as the mood of an individual at the moment of decision making. In the latter case we can speak of concurrent or incidental immediate affect.

[6] The distinction between anticipatory and immediate affect presented in this section is largely drawn from Loewenstein et al. (2001) and Loewenstein and Lerner (2003).

Various studies of decision making have shown that people are motivated to avoid feeling regret and disappointment and therefore opt for courses of action that minimize the likelihood of these emotions occurring (e.g. Bell, 1985; Mellers, Schwarz, Ho & Ritov, 1999). When affect is considered in rational choice and deterrence models, it concerns this type of post-decision emotions, (e.g. Bachman, Paternoster & Ward, 1992; Nagin & Paternoster, 1993; Piquero & Tibbetts, 1996). For example, when presented with an opportunity to steel, an individual might refrain from thievery thinking, "If I steel this now, I'll regret it later". The desire to avoid feeling regret functions as a deterrent to performing such action. A similar point applies to the "sneaky thrills" that are expected to result from minor property crime (see Katz, 1988), which also refers to anticipated consequences of conduct, and not emotions experienced at the moment of the decision itself (Bouffard, 2002).

Even though anticipated affect can be and has been incorporated in rational choice-based models, the decision process remains modeled as the implicitly cognitive task of predicting future emotions and weighing them in terms of the expected utility of the different possible courses of action (Loewenstein et al., 2001). In other words, as far as rational choice and deterrence models have addressed the role of emotions, they have done so to a limited extent because the influence of immediate affect has been disregarded.

Furthermore, note the fundamentally different nature of anticipated emotions that have been associated with offending compared to anticipatory emotions and moods likely to influence it. Regret, guilt and shame share a certain moral character (Frijda, 1986; Marshall, Marshall, Serran, & O'Brien, 2009; Tangney, Baumeister & Boone, 2004), that anticipatory emotions (e.g. fear, anger) lack. Additionally, they do not occur without a social context. Instead, they are self-conscious and directly involve (self-)reflection and evaluation (Tangney, 2003). Anticipatory emotions can have a social source, but this is not necessary. We can be angry at the policeman that gave us a fine, but also because our flight is delayed.

As mentioned earlier, immediate affect can regard emotions which arise from contemplating the consequences of a decision, i.e. be anticipatory in nature, or they can be incidental and therefore unrelated to the decision at hand, such as the mood of an individual, i.e. be concurrent. The distinction between anticipatory and concurrent affect may turn out relevant for criminologists because certain criminal actions cannot be realistically represented as one-off discrete choices between alternatives, but seem to be the outcome of a sequence of events in which offenders flow from one situation into the next. Wright and Decker (1994, p. 60), for example, note that "[c]rime often appears to happen almost automatically, the crime occurring with minimal calculation as part of a more general path of action". This implies that an offender's affective state at one moment

is likely to influence his/her actions in a subsequent one (see also Chapter 6). Note that rational choice-based accounts, which model crimes as individual cases of discrete choice, have trouble not only accommodating the influence of feelings triggered by a specific situation, but also feelings that are unrelated to the decision at hand.

MODELING COGNITION AND AFFECT: THE DUAL-PROCESS HYPOTHESIS

The idea that affective reactions can take place virtually independent of cognitive input, led Zajonc (1980, p. 151) to conclude that "affect and cognition are under the control of separate and partially independent systems that can influence each other in a variety of ways, and that both constitute independent sources of effects in information processing." The notion of two different and partially independent systems of information processing stands at the basis of dual-process and –system theories, which have become common currency in social psychology, social cognition in particular, and are also common in other fields that study human decision making, such as behavioral economics and neuroscience.

Dual-process theories revolve around the idea that when people engage in activities as diverse as making attributions, solving problems, evaluating risks, or deciding on a certain course of action, two qualitatively different modes of mental processing are simultaneously operative (e.g. Chaiken & Trope, 1999; Kahneman, 2003; Van Gelder, De Vries & Van der Pligt, 2009). Whereas dual-process models tend to describe two modes information processing in a specific domain, dual-system models posit two mental systems that guide behavior in general, each operating according to different principles (e.g. Metcalfe & Mischel, 1999; Sloman, 1996; Strack & Deutsch, 2004).

The various duality models that have been proposed differ somewhat in content and also in terms of terminology. Some pit a controlled (or rule-based) against an automatic (or associative) mode (e.g. Sloman, 1996; Smith & DeCoster, 2000), while others refer to the distinction as reflective versus impulsive (e.g. Strack & Deutsch, 2004). Still others make a more direct reference to the fact that one of the modes is essentially cognitive in character, whereas the other is affect-based (e.g. Chaiken & Trope, 1999; Epstein, 1994; Hsee & Rottenstreich, 2004; Loewenstein & O'Donoghue, 2004; Metcalfe & Mischel, 1999; Mukherjee, 2010; Van Gelder et al., 2009; Van Gelder & De Vries, 2012a). Metcalfe and Mischel (1999), for example, differentiate between an emotional 'hot' system, which is under stimulus control, and a cognitive 'cool' system, which is the seat of self-control.

In spite of differences between the various models, a significant number of them share a set of common assumptions (Smith & DeCoster, 2000). The most distinguishing

characteristic of all models is that behavior, instead of being the result of mere calculation, habit, drive or motivation, is guided by more than one underlying process (Strack & Deutsch, 2004).[7] Furthermore, one of the modes of processing –the hot, affective, impulsive or heuristic, mode– is fast, requires little or no cognitive effort, employs heuristic judgments, and has a low threshold for processing incoming information. The opposite holds for the other, cool, cognitive, rule-based, systematic- mode of processing, which is associated with effortful, systematic judgments and decisions based on extensive thinking.

While processing in the former mode is not necessarily conscious, it is in the latter which also allows for abstract and hypothetical reasoning (Evans, 2003). Additionally, while the cool, cognitive mode is controlled and volitional, influences from the hot, affective mode are automatic in nature and can be hard to suppress. Finally, both modes influence decision making behavior to varying degrees, depending not only on the nature of decision outcomes and the way a situation is framed but also on individual differences (Mukherjee, 2010). Van Gelder and De Vries (2012a), for example, found personality traits to relate differentially to the cognitive characteristics perceived sanction severity and probability and the negative affect that was evoked by the prospect.

The notion of two systems that guide information processing and behavior lends itself well for studying and describing criminal decision making and, as will become clear, allows for the explanation of crimes that are hard to accommodate by strictly cognitive perspectives. Below, we take the dual-process notion as the basis for developing a hot/cool perspective of criminal decision making drawing mainly from models that adhere to the cognitive/affective distinction which, it should be noted, does not necessarily map perfectly onto all the other dual-process models that have been suggested.

A HOT/COOL PERSPECTIVE OF CRIMINAL DECISION MAKING

The central explanatory element of the hot/cool perspective of criminal decision making regards the potential discrepancy between cognitive appraisals of a criminogenic situation and affective reactions to it, which is the result of two qualitatively distinct modes of

[7] Gilbert (1999) notes that because there are no tangible referents for the processes as specified in dual-process models, there is generally no proper way to count them and rule out the possibility that there may in fact be more than two processes. It is however clear to most psychologists that there is more than one (Gilbert, 1999). Deutsch and Strack (2006) add that the assumption that there are exactly two processes is not implied by duality theories. Systems are regularly interacting groups of processes that share the same computations. Accordingly, the two systems entail multiple processes.

mental processing that guide behavior. The cool, cognitive, mode is sensitive to considerations such as probabilities and extralegal costs such as anticipated guilt and social disapproval, and is therefore likely to respond to notions of sanction severity and certainty, as suggested by deterrence theorists. The cool mode is also responsible for weighing costs against benefits and making projections about the long-term consequences of decisions and, consequently, functions much in accordance with the logic assumed by rational choice models of offending.

The hot mode, however evaluates in a more intuitive way and responds to different situational characteristics, such as the temporal and spatial immediacy of decision outcomes, their controllability and the vividness with which they can be imagined, but remains largely unresponsive to probabilities and outcomes themselves. Loewenstein and O'Donoghue (2004), for example, note that as an uncertain averse event approaches in time, people's fear tends to increase even when the probability or severity remains constant. Rather than self-regulating like the cool mode, the hot mode's operation is triggered by external stimuli. It is under stimulus control and therefore largely non-volitional in nature. The fact that the hot mode is insensitive to the input variables of rational choice models explains why an individual's (criminal) behavior can deviate from or even directly contradict what would be a beneficial course of action in terms of perceived utility and long-term considerations.

Beyond rational choice

The idea of two separate modes of mental processing that guide behavior can elucidate a number of fundamental issues pertaining to criminal decision making that existing theories have not been able to satisfactorily address. For one thing, it shows why anticipated emotions such as regret and shame can be incorporated in rational choice models, but immediate affect, such as anger and fear or negative moods, cannot. As predictions about future emotional states, regret and shame are essentially costs that are incorporated in the cognitive calculus. In terms of the dual-process approach, the consideration of potential future regret, guilt and shame, like estimates of probability and severity, belong to the domain of the cool, cognitive, mode as they, at the time of decision, primarily regard thoughts *about* feelings rather than feelings themselves.

Direct visceral reactions to risk, such as anger, fear and sexual arousal, on the other hand, implicate the hot mode and are difficult, if not impossible, to plausibly model as costs or benefits; they are simply there. This is perhaps best evidenced by the many affective processes that occur below the level of our awareness and that are hence not

consciously experienced (LeDoux, 1996). In a similar vein, Loewenstein and O'Donoghue (2004) give the example that people can become fear conditioned to subliminal stimuli which, they argue, may actually be powerful precisely because the conscious, cool system is unaware of them and is therefore less likely to engage in efforts to override it. Additionally, even if an actor is aware of the influence of affect on his/her behavior, it may still only be partially subject to cognitive control. For instance, the cool system may be perfectly aware that it makes no sense to take out frustrations from work on one's spouse; but if the negative feelings generated at work carry over into the home, such cognitive awareness may make little difference (Loewenstein & Lerner 2003). In short, as these immediate emotions fall outside the explanatory scope of a cost-benefit analysis, however extensive this analysis may be, while exerting an influence on (criminal) behavior, a major limitation of strictly cognitive decision making models emerges.

Note again that the hot/cool perspective does not assume that rational, i.e. cognitive, considerations do not play a role in decisions to offend. Instead it argues that feelings play an important role in determining criminal choice behavior alongside these considerations and that it is important to consider both. The hot/cool perspective assumes behavior to (generally) be the result of both cognitive and affective processes, in which the latter can influence the former and vice versa. The cool mode influences the decisions of the hot mode by exerting restraint or self-control, whereas the hot mode influences the cool mode for example by alerting it that something needs our attention. Many environmental stimuli will activate both the hot and the cool mode and the resulting 'bilateral' influences are mutually reinforcing such as when the sight of food activates the affective state of hunger and the cognition "What shall I cook for dinner tonight?" (Loewenstein & O'Donoghue, 2004).

Most behavior therefore results from an interaction between the cool mode and the hot mode. Evidence for this interaction comes from neuroscience as neural pathways run both from the more primitive brain sections associated with hot affective processing, such as the limbic system and the amygdala, to the prefrontal cortex, which is responsible for cool deliberative processing, and vice versa (LeDoux, 1996, 2003). However, the hard-wiring of the brain allows for an emotional reaction without the participation of a cognitive appraisal, though not the other way around (LeDoux, 1996; Zajonc, 1998, 1980). This means that if the cool system is not activated, behavior is entirely driven by the hot system and affective motivations (LeDoux, 1996; Loewenstein & O'Donoghue, 2004; Zajonc, 1980). This explains that in situations that trigger strong affect, for instance situations giving rise to impulsive crimes of passion or road rage, offenders may not weigh the pros and cons of alternative courses of action at all.

Competition for Control

Due to their parallel operations, the two systems can compete for the control of overt responses. For example, when the hedonic properties of immediate and long-term consequences are negatively correlated, which is often the case with crime, the hot system will cue a different behavioral response than the cool system (Pham, 2007). The cool system may, for example, try to prevent the execution of a behavior that was impulsively activated by the hot system. In other words, this potential divergence in responses explains why we can think about something one way, e.g. "I really shouldn't do it because it is too risky", but feel about it differently, e.g. "I really want it, so I'll just take my chances". In addition, the fact that the hot mode is under stimulus control and therefore non-volitional in nature explains why offenders may report having little control over their criminal behavior (cf. Katz, 1988).

In short, if the cool system is unable to override the (antagonistic) response of the hot system, the latter dominates and impulsive behavior ensues. Therefore, if the triggered response of the hot system is intense enough, it leads to lapses in self-control, which has been found to be an important correlate of crime, and even its defining element according to some (e.g. Gottfredson & Hirschi, 1990). The assumption is that lapses in self-control occur when the hot system temporarily takes over which leads behavior to be determined by the immediate associations generated by stimuli and their hedonic properties, rather than the assessed valence and probability of future consequences. Note that this implies that individual differences in the ability to exert self-control are at least partially rooted in the strength of the cool and hot modes (see Van Gelder & De Vries, 2012a).

Time-Perspective

Another, related, insight of the hot/cool framework is the difference in time-orientation of the two systems, and their (in)ability to envisage future events. The cool mode can mentally represent future events and generate a time perspective, which allows for an understanding and evaluation of different alternative courses of action and developments over time. As the cool system can take into account both short-term and long-term payoffs, it enables individuals to resist immediate rewards and strive for more valuable future outcomes.

As was mentioned before, the hot system is stimulus-oriented and triggered by perceptual input. Its time horizon is restricted to the immediate present. The hot mode is, consequently, set in motion by external stimuli, tied to the here-and-now and relatively (long-term) goal independent. It lacks the capacity to represent the future and

consequently the ability to evaluate the hypothetical consequences of behavior, such as the legal or social sanctions that may follow a crime. When a behavioral response is generated by the hot system, it may therefore appear reckless and impulsive. This sheds light on the finding that people who commit crimes often engage in action that even though offering immediate rewards, simultaneously entail the risk of costs greatly exceeding the benefits (Hirschi, 2004). Because affective rules of valuation are geared to the here-and-now, it is not difficult to see how this can lead to impulsive and self-defeating behavior in domains where present and long-term hedonic consequences are negatively correlated.[8] Or, in the words of Bouffard et al. (2000), while the benefits of self-destructive conduct are generally immediate, its costs are more remote.

In sum, in situations where intense emotions are at stake, decision behavior is likely to violate the assumptions of rational choice and other strictly cognitive models of decision making in different ways. The inability of the cool system to correct a self-defeating response of the hot system explains the finding that people may act in ways that run counter to their best interest. The shortening of one's time horizon under the influence of emotional arousal in which short term benefits are weighed disproportionately in comparison to long-term considerations also contradicts rational choice theory, as the costs of the action may fully outweigh the (long-term) benefits and individuals fail to make informed trade-offs, or don't succeed to act on them.

To sum up, the hot/cool perspective can explain why an individual may be perfectly able to make informed trade-offs between immediate benefits and delayed costs of behavior in one, emotionally-neutral, situation, but fails to do so in a subsequent one that is affect-laden. Inconsistency in preferences over time, or even their reversal, leads to behavior that is seemingly 'irrational', but cognitive decision making models have to stop short of identifying the conditions that brought these inconsistencies about and why they occur, while they make perfect 'sense' from a hot/cool perspective.

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[8] It could be argued that the tendency to let short-term benefits prevail over long-term costs can be brought under the explanatory scope of strictly cognitive models through the notion of hyperbolic time discounting, i.e. the finding that people care more about the same time delay if it occurs earlier than if it occurs at a later time. In other words, the value of a later reward is discounted by a factor that increases with the length of the delay. That is, even though people normally choose options that give substantial weight to long-term costs and benefits, when making decisions with immediate consequences, they will tend to be place disproportionate weight on immediate costs and benefits. However, Loewenstein and Lerner (2003) note that hyperbolic discounting has significant limitations as an explanation for impulsivity for two reasons. First, it does not explain why people display impulsive behavior in certain situations (e.g. when they are hungry, sexually aroused, angry or frightened) but not in others. Thus, the hyperbolic discounting perspective has difficulty accounting for situation- and reward-specific variations in impulsivity. Second, hyperbolic discounting cannot explain why many situational features other than time, such as physical proximity and sensory contact with the desired object commonly lead to impulsive behavior (Loewenstein & Lerner, 2003, p. 625).

Intense Arousal and Influence of Affective Drive States

LeDoux (1996) notes that emotions can flood consciousness because the hardwiring of the brain is such that connections from the emotional systems to the cognitive systems are stronger than vice versa. Intense emotions may therefore overwhelm cognitive processing and deliberative decision making (Loewenstein & Lerner, 2003). This influence can be so pervasive that people can act against their self-interest even in full knowledge they are doing so (Loewenstein, 1996). This conflict between emotional impulse and reasoned cognition and the former overriding the behavioral response of the latter explains why individuals can become unruly and impulsive when experiencing strong emotions, which may result in criminal behavior. Expressive violence forms an apt illustration of this process. Baumeister and Heatherton (1996) note that violence typically results when someone becomes angry at a pressing stimulus. The anger, which implicates the hot mode, keeps attention confined to the immediate, provoking situation and so efforts to restrain violent impulses and consider the long-term, i.e. a corrective response by the cool mode, becomes difficult. Mischel, Cantor and Feldman (1996), for example, observe that physically abusive men typically are intensely invested in their intimate relationships. Following a violent outburst, it is common for them to beg their partner for forgiveness and, in extreme cases, go so far as to threaten with suicide in case the partner intends to leave them. In other words, these men's repetitive violent outbursts are clearly self-defeating (Mischel, Cantor and Feldman, 1996).

In a similar vein, Collins (2008) relates about crimes that follow prolonged periods of built up tension, such as police officers that severely beat up their victims after high-speed chases and atrocities of soldiers committed against civilians. These crimes are committed in an emotional rush that seems unstoppable and uncontrollable. After the outburst follows the realization that the behavior was excessive: "It is like an altered state of consciousness, from which the perpetrators often emerge at the end as if returning from an alien self" (Collins, 2008, p. 100).

Findings from research into the influence of intense affect on behavior also apply to visceral drive states such as drug craving (Loewenstein, 1996). A drug addict, for example, when relapsing into addiction knows that "taking the drug is the wrong course of action, but is unable to translate this belief into action" (Loewenstein, 1996, p. 272). Indeed, there is no dearth of evidence that many crimes, such as robberies, burglaries and other types of street crime, are drug-related, either committed under the influence of drugs and/or with the goal of obtaining drugs (e.g. Cromwell et al., 2003; Gill, 2000; Shover & Honaker, 1992; Wright & Decker, 1994, 1997).

Sexual arousal is another example of an affective state that exerts a strong influence on behavior and that may result in criminal behavior (Bouffard, 2002; Loewenstein, Nagin & Paternoster, 1997; Ariely & Loewenstein 2006). In an experimental study using a date rape scenario, Loewenstein et al. (1997) 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. The effect of arousal on predicted behavior was not mediated by a wide range of cost and benefit variables. Arousal, therefore, not only influenced the way costs and benefits were processed, but also exerted a direct effect on behavior. This finding is consistent with the assumption of the hot/cool perspective that affect and cognition pertain to separate paths of mental processing that influence behavior, and that feelings not only influence behavior indirectly, but can also exert a direct effect on behavior.

Failure to Acknowledge the Influence of Affect on Behavior: Implications for practice

An important characteristic of affect and other drive states is that people are often oblivious of their influence. More specifically, individuals in an emotionally neutral, or 'cold', state tend to systematically underestimate the effect intense affect, the 'hot' state, can have on their future behavior and preferences, and the influence it has had on their past behavior (Loewenstein, 1996). The inability of individuals to appreciate the motivational force of affect can lead them to overestimate their capacity to control temptation (Loewenstein, 2005; Nordgren, Van der Pligt & Van Harreveld, 2009). This finding has important implications for practice.

A failure to acknowledge the influence of affect on previous behavior and unrealistic optimism regarding one's ability to control impulses in future situations, may imply that convicted offenders fail to optimally utilize their possibilities to protect themselves against the temptations of crime and may return to situations that contributed to their initial offenses, even if they are committed to abstain from offending (Dhami et al., 2006). In other words, for crimes committed in states of intense arousal, not only is (anticipated) punishment less likely to achieve the desired deterrent effects, even offenders motivated to abstain from criminal behavior are likely to underestimate the influence their feelings have on their behavior. Therefore, they may fail to take the necessary measures to avoid certain situations or deal with intense affective states when these emerge. In a similar vein, for treatment to be successful, it may be crucial to strengthen the offender's awareness of the processes in the onset of negative affect (Day, 2009). Indeed, Howells and Day (2006)

have argued that successfully engaging in treatment requires (violent) offenders to experience and accurately label their emotional states (see also: Howells, Day & Wright, 2004).[9]

This implies that impulsive or hot (state) crimes may require a fundamentally different response from the criminal justice system to prevent offenders from reoffending, than cognitive, calculated offenses. For offenders motivated to abstain from future offending, it is more useful to create awareness of the influence of affect and people's inability to resist impulses, rather than placing faith in the unlikely assumption that in the future, after punishment, adequate cost-benefit calculations will be made in similar situations. If people are made aware of how their decisions are being influenced by their own affective state, they could (be trained to) compensate for such influences, which requires the cool mode to inhibit the response cued by the hot mode. Indeed cognitive behavioral interventions often promote emotional regulation skills through effortful overriding impulsive and automatic response tendencies (Mischel, 2004). Relatedly, anger management programs generally attempt to increase inhibitory processes and control angry responses (Davey, Day & Howells, 2005).

To take the example of anger, Davey et al. (2005) note that 'reappraisal' of an anger-inducing event is a cognitive strategy of re-construing it in less hostile terms such that the anger is not experienced. In this case the reinterpretation of the event will avoid triggering a strong response from the hot mode by changing the meaning of the eliciting event and hence the appraisal tendencies associated with anger. An alternative strategy is suppression of the anger (e.g. biting one's lip) to inhibit angry behavior (Davey et el., 2005). Here the idea is to directly suppress the response of the hot mode instead of attempting to avoid its activation. Both strategies are compatible with the hot/cool perspective laid out in this chapter. Whereas emotion regulation regards the inhibition of the hot mode, thinking in more logical and objective ways implies strengthening the cool mode. In sum, self-regulatory competencies and 'cooling' strategies can help enable crime-prone individuals to overcome diverse momentary 'hot' situational pressures and prevent impulsive responding (e.g., LeDoux, 1996; Loewenstein & O'Donoghue, 2004; Metcalfe & Mischel, 1999). In spite of the fact that many offender treatment programs are sensitive to the influence of emotions on offending behavior, others are still based on the assumption that offenders make essentially rational choices about their offending (Day, 2009, p. 119; Ward, 1999).

[9] Note that this points towards individuals differences in the strength of the hot and the cool mode in individuals.

DISCUSSION & CONCLUSION

Earlier work on emotions and offending has remained largely confined to narrative or interpretative approaches or has addressed affect as an enduring individual disposition. Studies relying on self-reports by offenders are highly informative for our understanding of crime but are unlikely to give full insight into the mechanisms of affect influencing choice as people are often not even aware of this influence, not to mention other problems associated with recall and self-report methods. Theories that address the role of affect as an enduring characteristic tell us a lot about stable differences in individual disposition but are not able shed light on the actual choice process. Previous studies have therefore been somewhat restricted in their ability to explain this behavior and give little insight into the psychological states of offenders.

This chapter introduced an alternative perspective that extends the dominant choice paradigms in criminology. By drawing from other fields of human decision making such as social psychology, behavioral economics and neuroscience, an alternative framework that is able to incorporate rational choice-based perspectives and addresses the role of emotions was developed. It was shown that this hot/cool perspective is able to explain delinquent behaviors that cannot be accommodated in terms of rational choices and provides a more realistic account of the criminal decision process.

The hot/cool approach illuminates why notions such as sanction severity and celerity often have little or no effect on crime rates and why the effect of punishment certainty is only modest (see Nagin, 1998). As was argued in this chapter, feelings about risk are largely insensitive to changes in probability and (severity of) outcomes or social costs, implying that deterrence is unlikely to be effective when transgressions are intimately associated with affect. In these cases, short-term considerations outweigh or obscure long-term consequences in the mind of the offender as the influence of affect ties his/her focus to the immediate present, and as such encourage making the (criminal) choice that yields immediate benefit. Even in cases in which individuals display a general motivation to abstain from offending, the only thing required to (re-)offend may be a 'weak moment' and rational considerations to be temporarily overridden by affects' desires.

Ironically, while absent in contemporary choice models of criminal decision making, the distinction between hot affect and cool cognition is not alien to our criminal justice systems and has had implications for the way crimes are punished. The classic distinction is that between premeditated and impulsive crime, which implies that hot-blooded crimes of passion resulting in death are viewed as fundamentally different from, and therefore deservant of less harsh punishment, than cold-blooded murder. For the criminal justice system to classify an intentional killing as voluntary manslaughter, instead of murder, what

is required is a reasonable provocation, that a reasonable person so provoked would not have cooled off in the time interval between the provocation and the delivery of the fatal blow, and that the defendant must not in fact have cooled off during that interval (LaFave & Scott, 1986, p. 654). The parallels with the hot/cool perspective are striking. The first condition refers to an external stimulus eliciting the behavior (recall the hot mode being non-volitional and under stimulus control), whereas the second and third conditions refer to the (in)ability of the cool system to inhibit the response cued by the hot system. In other words, the idea that emotional arousal can inhibit rational thinking and the ability to act willfully, has been intuitively grasped and accepted by our criminal justice systems.

The hot/cool perspective of criminal decision making implies a significant advance over rational choice and deterrence models as it offers a more complete and plausible explanation of criminal choice behavior and the psychological mechanisms at stake. It is able to explain many types of crime and how people actually go about making criminal choices without having to resort to rather artificial or farfetched constructions that force classification into a rational versus irrational dichotomy or continuum.

Nevertheless, the hot/cool perspective is still general in nature and requires empirical testing. Finding out how the two systems actually interact with respect to different situations, personality types, and kinds of crime is the next big empirical challenge for research in criminal decision making. While much work within social psychology, neuroscience and behavioral economics supports the dual-process idea for different domains of human behavior, it still requires testing in research on crime and delinquency. Criminal behavior cannot simply be equated with risky behavior in other domains if only because the former contains a strong moral dimension that the latter lacks and crimes vary in terms of the degree to which they implicate risk. Furthermore, the fact that criminal acts carry significant consequences for others, e.g. victims, implies they are related to individual differences in empathy, which is often not the case in other risk domains. It is interesting to remark here that empathy too has both a cognitive and an affective component, the former expressed in individuals' ability to recognize and understand the feelings of others and the latter in the ability to actually experience these feelings imaginatively. Future research should therefore focus on individual differences in the ability to which people are susceptible to be led by their feelings. This begs the question as to what extent volitional processes in the cool mode can actually be used to inhibit or channel impulses from a hot mode that seeks immediate satisfaction, and whether, and to what extent, people can be trained to compensate for influences of their hot mode. Hopefully, the hot/cool perspective can function as a point of departure for research that addresses these and other issues.

3 EVALUATING A DUAL-PROCESS MODEL OF RISK: AFFECT AND COGNITION AS DETERMINANTS OF RISKY CHOICE[10]

Abstract

In three studies we addressed the impact of perceived risk and negative affect on risky choice. In Study 1, we tested a model that included both perceived risk and negative affect as predictors of risky choice. Study 2 and Study 3 replicated these findings and examined the impact of affective versus cognitive processing modes. In all three studies both perceived risk and negative affect were shown to be significant predictors of risky choice. Furthermore, Study 2 and Study 3 showed that an affective processing mode strengthened the relation between negative affect and risky choice and that a cognitive processing mode strengthened the relation between perceived risk and risky choice. Together, these findings show support for the idea of a dual-process model of risky choice.

[10] Based on Van Gelder, De Vries & Van der Pligt (2009)

INTRODUCTION

When informing about a risk, how likely is the appeal to 'use one's head' to succeed when the evaluation of that risk appears to be more of a 'feeling thing'? Is information about the low probability of risks that trigger strong affective reactions (e.g. flying, terrorist attack) likely to have a comforting effect? Conversely, is it likely that probabilistic information is discomforting enough to persuade individuals not to engage in certain risky behaviour (i.e. drinking and driving, unprotected intercourse)? Or are appeals better directed at influencing feelings in these cases? In this chapter we address the effects of both cognition and affect as determinants of risky choice and examine how and to what extent 'cool' cognitive considerations of and 'hot' feeling-based reactions to risky choice can influence the *way* we process risk.

Standard decision theories have generally assumed people to decide on a certain course of action by making a mental calculation that incorporates the probability of the outcomes of a decision together with an evaluation of these outcomes. In the case of risky choice, people are supposed to combine the perceived severity of the outcomes of a choice with the perceived probability of their occurrence (e.g. Yates & Stone, 1992; Hendrickx, Vlek & Oppewal, 1989; Vlek & Stallen, 1981). Deviations from these normative approaches have traditionally been accommodated in terms of cognitive biases, errors or the use of heuristics (Kahneman & Tversky, 1982; Simon, 1957; Tversky & Kahneman, 1974). More recent literature has also started addressing the possible role of affect as a determinant of risky choice.

One example is research that focused on the role of anticipated emotions such as disappointment and regret arising from the counterfactual comparisons of potential decision outcomes (Bell, 1985; Loomes & Sugden, 1982; 1986; Mellers, Schwarz, Ho & Ritov, 1999). However, the regret perspective focuses on anticipated emotions that come into play only after a choice has been made, rather than emotions present at the time of the decision and "(…) the decision-making process in these theories is still modeled as the implicitly cognitive task of predicting the nature and strength of future emotions in response to possible decision outcomes and weighing them according to their likelihood of occurring" (Loewenstein, Weber, Hsee & Welch, 2001, p. 268).

Other research has addressed the direct influence of affect on how we evaluate risks. Johnson and Tversky (1983), for example, found that mood can influence individuals' risk judgments. People who were induced to feel positive affect made more optimistic risk estimates than people who were made to experience negative affect (Johnson & Tversky, 1983). Lerner and Keltner (2001) studied the influence of discrete emotions on risk perception and found fear and anger, both negatively valenced emotions, to have opposite

effects. Angry people expressed more optimistic risk estimates and risk-seeking choices than did fearful individuals.

Finucane, Alhakami, Slovic & Johnson (2000) provide evidence for an 'affect heuristic', which refers to the tendency to use an overall affective impression when making decisions. This, in their view, can be more efficient than weighing the different pros and cons of the situation because the reliance on affect helps to respond quickly and effectively in many decision situations, in particular when a judgment or decision is complex and mental resources are limited (Finucane et al., 2000; Slovic, Peters, Finucane & MacGregor, 2005). The notion that individuals often rely on their feelings when faced with a decision and that affective reactions come prior to decisions and judgments was earlier proposed by Zajonc, who argued that "feeling accompanies all cognitions" (1980, p. 154).

The possible interplay between cognition and affect has been prominent in dual-process theories of information processing (Chaiken & Trope, 1999; Epstein, 1994; Sloman, 1996), which revolve around the idea that when people make judgments and decisions or engage in problem solving, two qualitatively different modes of processing are operative. Some of these theories make the distinction between automatic versus more controlled modes of processing, whereas others argue for a more cognition-based versus a more affect-based processing mode (e.g. Chaiken & Trope, 1999; Epstein, 1994). Epstein (1994), for example, distinguishes an experiential system which is intimately associated with affect, "but not to the exclusion of all non-affective cognitions" (p. 713), from a rational system which is "relatively affect free" (p. 711).

Recent theorizing on risky decision making draws from dual-process theories by arguing that there are two different modes in which risks are evaluated, one based more on deliberate and analytical considerations (as supposed by cognitive decision making perspectives), the other based on intuitive, relatively fast, and affect-based reasoning (e.g. Kahneman, 2003; Kahneman & Frederick, 2002; Slovic, Peters, Finucane & MacGregor, 2005). In a recent paper, Slovic and collaborators termed these two ways in which risks are perceived and acted on as 'risk-as-analysis' and 'risk-as-feelings' respectively (Slovic, et al., 2005). The dual-process approaches to risky choice thus share the idea of two modes of processing that interact and that are continually active, but respond to different characteristics of a situation. The cognitive mode is supposed to be sensitive to risk considerations such as outcomes and probabilities, whereas the feeling-based mode responds to affective considerations, and is not responsive to probabilities (Slovic et al., 2005). The fact that the different processing modes respond to different characteristics of a situation also illuminates why affective reactions to risky situations and decisions can diverge from cognitive considerations: "People can experience powerful fears about things that they recognize as highly unlikely (such as airplane crashes) or not objectively terrible

(such as public speaking); in contrast, many experience little fear about hazards that are both more likely and probably more severe (such as car accidents)" (Loewenstein et al., 2001, p. 269).

The dual-process notion of risky choice is compatible with the 'risk-as-feelings' hypothesis by Loewenstein and collaborators, which also acknowledges the role of affect as well as probability and outcome valences in the decision making process, and argues that affect influences decision making amongst others through the interaction with cognition where the former influences the latter and vice versa (Loewenstein et al., 2001). One of the principal assumptions of the risk-as-feelings hypothesis is that "[t]he impact of cognitive evaluations on behaviour is mediated, at least in part, by affective responses (cognitive evaluation gives rise to feelings that in turn affect behaviour)" (p. 271).

In sum, studies have shown that both cognitive considerations and affective reactions can influence risk perception and risky choice. Furthermore, there is empirical support for the idea of two parallel modes of information processing in a variety of domains, including judgment and decision making. However, 1) the case for the dual-process approach applied to risky choice has been made, but not tested. Additionally, 2) little is known as to what extent people can be induced to rely more on either their feelings or their thoughts when faced with a risky choice. Both of these two issues form the objectives of the present chapter. We present a model that includes and simultaneously tests cognitive considerations and negative affect as predictors of risky choice and examine how the two are related by manipulating them separately.

In Study 1, we investigated the role of perceived risk and negative affect as predictors of risky choice using vignettes in which risky situations are described. We expected both perceived risk and negative affect to be significant predictors of risky choice.

STUDY 1

METHOD

Participants and procedure

Participants were 231 undergraduate students (68 males, 163 females) with a mean age of 22.5 years (*SD*=6.1 years) from the University of Amsterdam who participated for course credit. Participants were randomly presented one of two booklet versions, each containing two vignettes and two questionnaires. Within each booklet the order in which the vignettes were presented was counterbalanced. The booklets started with a short introduction in

which the participants were told they would read about two risky choice situations, and asked to answer the questions pertaining to the descriptions.

Materials

The vignettes contained a description of a personally relevant risky situation of about 8-10 lines (see Appendix). The topics of the vignettes ranged from riding in a car with a driver who has been drinking (Drink 'n Drive), flying with an airline that has been warned for the bad maintenance of their aircraft (Airplane), biking on slippery streets (Exams) and running the risk of being fined for not carrying an ID (Going Out). An attempt was made to design vignettes that were personally relevant for the participants and that varied both in terms of the nature of the risk and the severity of its consequences (e.g. getting a fine, suffering severe injuries). The 'Drink 'n Drive' scenario, for example, read:

> "*Imagine the following:* You are at a birthday party an hour's drive from your home. You agreed with a friend, with whom you are at the party, that he/she would drive you back home since you don't have a drivers licence. When the party is over, you notice that your friend is quite drunk. There is nobody at the party from your hometown who can give you a ride, and there is no public transport. You deliberately stayed sober because you have an important job interview in the morning".

Each vignette was followed by eight items measuring perceived risk, negative affect and the dependent variable, risky choice. In all cases bipolar 9-point scales were used. Two items measured perceived risk. One item pertained to risk probability: "How big are the chances of X happening (e.g. having an accident)?" *(very small - very big*). The other item concerned risk magnitude: "How serious are the possible consequences of X (e.g. getting into the car with your friend driving)?" (*not serious at all – very serious)*. The perceived risk score was obtained by multiplying these two items in correspondence with the formal definition of risk (Loewenstein, et al.,2001; Yates, 1992).

Four items measured negative affect: "Would you be worried in this situation?", "Does the situation make you feel uncertain?", "Does the situation evoke feelings of fear?" and "Does the situation evoke negative feelings in general?" *(not at all – very much)*. Cronbach's alpha for the different negative affect scales ranged from .83 to .92. The outcome variable, risky choice, was measured with two items.

Table 3.1 Descriptives of perceived risk, negative affect and risky choice (Study 1)

	Airplane	Exams	Drink 'n Drive	Going Out
Variables	M (SD)	M(SD)	M(SD)	M(SD)
1. Perceived risk	32.05 (19.13)	31.46 (17.36)	42.78(19.15)	39.28(19.28)
2. Negative affect	6.26 (1.98)	4.80 (1.74)	6.81(1.51)	5.37(1.56)
3. Risky choice	5.19 (17.06)	19.41 (14.14)	-9.39(18.29)	7.29(17.52)

Note: The labels "Airplane", "Exams", "Drink 'n Drive", and "Going Out" refer to the vignettes used. The possible range of the different scales is explained in the text.

The first item inquired about the likelihood that the participant would engage in the risky behaviour: "How likely is it that you would go for option/do X (e.g. get into the car with your friend driving)?" (*very unlikely – very likely*). The second item measured certainty: "How certain are you about this?" (*not at all - completely*). The likelihood item was recoded to a scale that ranged from -4 to +4 and the risky choice score was computed by multiplying the recoded likelihood item with the certainty item, so that the scores could range from -36 to +36.

Table 3.2 Correlations of perceived risk, negative affect and risky choice (Study 1)

	Airplane			Drink 'n Drive		
Variables	1	2	3	1	2	3
1. Perceived risk	--			--		
2. Negative affect	.66**	--		.66**	--	
3. Risky choice	-.50**	-.53**	--	-.51**	-.50**	--
	Exams			Going Out		
1. Perceived risk	--			--		
2. Negative affect	.59**	--		.56**	--	
3. Risky choice	-.51**	-.49**	--	-.45**	-.51**	--

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

RESULTS

In Table 3.1, the means and standard deviations of perceived risk, negative affect and the outcome variable risky choice for each of the four vignettes are displayed. In Table 3.2, the correlations between the predictor variables and the risky choice are shown. All of the correlations in each of the four vignettes are significant at $p<.01$.

To test for the relations between perceived risk and negative affect on the one hand and risky choice on the other, in all four vignettes at once we conducted multigroup structural equation modeling (SEM) using AMOS 7.0 (Arbuckle, 2006). We constructed three latent variables, of which negative affect was measured using four indicators, perceived risk was measured using one indicator based on the probability x magnitude multiplication, and risky choice likewise was measured using one indicator based on the likelihood x certainty multiplication (see method section). Because no reliability information was available for the two multiplicative indicators, we fixed the measurement weights linking perceived risk and risky choice to their respective indicators to be equal to one.

We compared 8 different SEM models (see Table 3.3): 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 (see Figure 3.1) were allowed to vary between the four vignettes (the unconstrained model), 3) a model in which the measurement weights were fixed to be equal across the four vignettes, but the rest of the parameters were free across the four vignettes (the measurement weights model (3a)), 4) a model in which both the measurement weights and the structural paths connecting the latent exogenous variables to the latent endogenous variable were fixed to be equal across the four vignettes (the structural weights model (3b)), 5) a model in which all previous weights and all structural variances and covariance were fixed to be equal across the four vignettes (the structural (co)variances model (3c)), 6) a model in which all previous weights and (co)variances and the structural residual ($\zeta 1$) were fixed to be equal across the four vignettes (the structural residuals model (3d)), and 7) a model in which all parameters (i.e., including the measurement residuals (δ and ε)) were fixed to be equal across the four vignettes (the measurement residuals model (3e)).

Figure 3.1 Standardized estimates in the structural residuals model of relations between perceived risk, negative affect, and risky choice in Study 1 (see text for explanation)

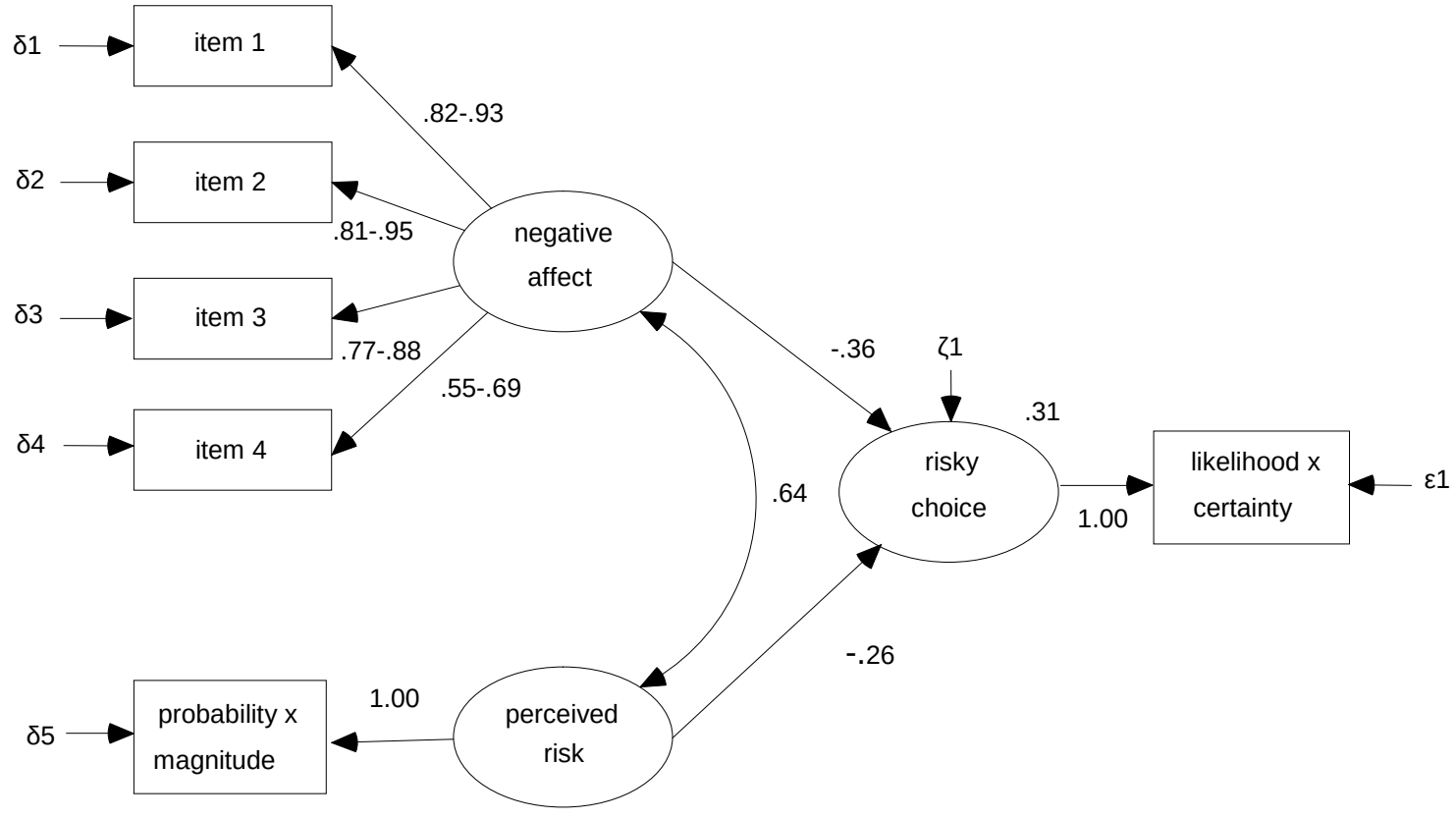


Table 3.3 Comparison of Fit Indices of different models in Study 1

	χ^2	df	*p*	TLI	RMSEA	90% CI	*p*-close	PCFI
1. Independent	1538.79	60	.00	.00	.232	.222-.242	.00	.00
2. Unconstrained	73.55	32	.00	.95	.053	.037-.069	.35	.52
3. Constrained								
a) Measurement weights (λ's)	84.45	41	.00	.96	.048	.033-.063	.57	.66
b) 3a + Structural weights (γ's)	92.73	47	.00	.96	.046	.032-.060	.66	.76
c) 3b + Structural (co)variances (Φ)	108.83	56	.00	.96	.045	.032-.058	.71	.90
d) 3c + Structural residuals (Ψ)	**117.67**	**59**	**.00**	**.96**	**.047**	**.034-.059**	**.66**	**.94**
e) 3d + Measurement residuals (Θ_δ)	209.14	71	.00	.92	.065	.055-.075	.01	1.07

In Table 3.3, the results of the analyses on the seven models are described. Based on the fit indices, we selected a model with a Tucker-Lewis Index (TLI) of .90 or above, a Root Mean Square Error of Approximation (RMSEA) of .05 or below, or if not possible, a *p*-close value of .01 or higher, and preferably a Parsimony Comparative Fit Index (PCFI) of .90 or above. Furthermore, we compared the different models described above using a significance test of the increase in χ^2 when additional parameters were fixed. A significant increase in χ^2 signifies that constrained (nested) models are significantly worse. Considering the parsimony of nested models, we used a somewhat conservative value of $p<.01$ for the significance test. Applied to the nested models in Table 3.3, we found that model 3a was not significantly worse than model 2 ($\Delta\chi^2_{(df=9)}=10.91$, $p=.28$), model 3b was not significantly worse than model 3a ($\Delta\chi^2_{(df=6)}=8.28$, $p=.22$), model 3c was not significantly worse than model 3b ($\Delta\chi^2_{(df=9)}=16.10$, $p=.07$), model 3d was not significantly worse at the $p<.01$ level than model 3c ($\Delta\chi^2_{(df=3)}=8.84$, $p=.03$), but model 3e was significantly worse than model 3d ($\Delta\chi^2_{(df=12)}=91.47$, $p<.01$).

On grounds of parsimony combined with the other fit indices, the structural residuals model (model 3d, see Table 3.3) appears to be the 'best' model. This model is shown in Figure 3.1. Because the measurement residuals were not equal across vignettes, the range (instead of the exact values) of the measurement weights (λ's) linking negative affect with its indicators are shown. However, differences in measurement residuals across groups do not affect the structural paths from the latent exogenous variables to the latent endogenous variable. The standardized structural coefficient linking negative affect and risky choice ($\gamma=-.36$) and the standardized structural coefficient linking perceived risk and risky choice ($\gamma=-.26$) were found to be significant at $p<.01$. Additionally, there was a significant relation between negative affect and perceived risk ($\varphi=.64$, $p<.01$).

CONCLUSION

Study 1 examined the influence of negative affect and perceived risk on risky choice in a straightforward manner. In all four vignettes, perceived risk and negative affect were found to be significantly negatively related to risky choice. However, Study 1 did not include any manipulations of cognitions or affect, and consequently, it is therefore yet unclear under what circumstances the effects of cognitions and affect can be strengthened or reduced. In Study 2, we aimed to replicate these findings and to provide further support for a distinction between affect and cognition by experimentally manipulating the salience of affective versus more cognitive information.

STUDY 2

According to Higgins (1996), activated knowledge affects our judgments when that knowledge is related to the stimulus information because it has become more accessible. When knowledge is activated, it increases the likelihood that this knowledge will be used in some way and therefore influences subsequent responses to stimuli (Higgins, 1996; Higgins, Rholes & Jones, 1977). An interesting question in this respect regards the extent to which it is possible to render cognition or affect more salient through the description of a risky situation and whether this could influence the evaluation of the situation reflecting the salience of either the affective or the cognitive component. Sunstein (2003), for instance, found that people were willing to pay more for the elimination of a certain risk (i.e. risk of cancer due to arsenic in drinking water) when having read a description of the risk that contained an added sentence with vivid terms, than people who just read the 'plain' description. This implies that the way in which risks are described can influence the judgment of risks. Furthermore, Hendrickx, Vlek & Oppewal (1989) found that people judged risks as more probable and were also less inclined to make risky choices when presented with information on *how* a future loss or accident might occur than when presented with information about the relative frequency of similar accidents in the past. The explanation for this effect according to Loewenstein et al. (2001) is that the vividness of the imagery evoked by the description of potential future losses, as opposed to 'cold' frequency estimates, is an important determinant of emotional reactions and is therefore likely to also trigger changes in risk perception and decisions.

In a recent study, Berndsen & Van der Pligt (2005) studied the impact of an affective focus versus a cognitive focus on risk perception and acceptance of meat consumption by presenting participants with risk descriptions in bogus newspaper articles phrased in either more affective or more cognitive terms. Based on the ideas put forward by Higgins et al. (1977), they expected that exposure to cognitive or affective stimulus information would affect perceptions of health risks and found that an affective focus had a stronger impact than a more cognitive focus.

In Study 2, we investigated whether adding cognitive versus affective information to a description of a risk can make this information more predictive of risky choice. We expected a stronger relation between negative affect and risky choice in the affect condition, and a stronger relation between perceived risk and risky choice in the cognition condition.

METHOD

Participants and procedure

A total of 193 undergraduate students, 56 men and 137 women, from the University of Amsterdam with a mean age of 20.6 years (*SD*=2.9 years) participated for course credit. Participants were randomly assigned to either the cognition or the affect condition and received a booklet with two vignettes, the order of which was again counterbalanced. Participants were randomly assigned to an individual cubicle where the booklets were included in a set of unrelated questionnaires.

Materials

We used two of the vignettes (Drink 'n Drive and Going Out) from Study 1. The two vignettes were supplemented with two sentences of extra information that were intended to render either cognition or affect salient. The sentences were almost identical except for two references to either cognition-related words (e.g. references to frequencies or probabilities) or affect-laden words (e.g. references to feelings and emotions). This information contained no references to either the likelihood or the severity of the risk itself and the added text was related to the risk description, but purposefully ambiguous. For the 'Drink 'n Drive' vignette presented earlier the added information in the cognition condition read:

> The number of people that drive with a too high blood alcohol concentration has decreased in recent years. The reason for this is not so much the possibility of getting a fine, but rather the chance of having an accident.

In the affect condition it read:

> The anxiety of people for driving with a too high blood alcohol concentration has increased in recent years. The reason for this is not so much the possibility of getting a fine, but rather people's worries about having an accident.

The items and scales for the predictor and outcome variables were identical to the ones used in Study 1. Cronbach's alpha for the negative affect scales was .87 for Drink 'n Drive,

and .96 for Going Out. Finally, in order to assess the perceived strength of the cognitive and affective manipulations, participants were asked how convincing they found the vignettes and to what extent they could imagine themselves being in the described situation.

RESULTS

One participant indicated not to have participated seriously and was excluded from further analyses. The strength of the manipulations was measured with *t*-tests. No differences were found between the conditions for either the item measuring the extent to which the vignette was convincing or the item pertaining to the extent to which the risky situation was imaginable. From this we conclude that the intensity of the manipulations was equal for both the affect and cognition conditions and the results therefore cannot be attributed to differences in intensity of the cognition or affect manipulation. Furthermore, as can be seen in Table 3.4, there were no significant differences in means between conditions for the predictor variables and the outcome variable for either vignette. In Table 3.4, moderate to strong correlations are shown between the predictor variables, negative affect and perceived risk and the outcome variable risky choice for both vignettes.

We predicted that in the cognition condition, perceived risk would be more strongly related to risky choice relative to the affect condition, whereas negative affect would be more strongly related to risky choice in the affect condition, relative to the cognition condition. As in Study 1, to test this prediction we used multigroup structural equation modelling (SEM) using AMOS 7.0 (Arbuckle, 2006).

We again considered eight different models. In some of these models we freed up the structural paths linking the exogenous latent variables negative affect and perceived risk with the endogenous latent variable risky choice across the two experimental conditions to check whether these models fared better than models in which these paths were constrained to be equal across the two experimental conditions to check whether these models fared better than models in which these paths were constrained to be equal across the two experimental conditions.

Table 3.4 Descriptives and correlations of perceived risk, negative affect and risky choice for Drink 'n Drive and Going Out (Study 2)

Variables	Drink 'n Drive M(SD)		Going Out M(SD)				
	Cognition[1]	Affect[2]	Cognition[1]	Affect[2]	1	2	3
1. Perceived risk	41.95(18.83)	44.88(18.24)	40.69(18.66)	42.21(20.31)	--	.59**	-.60**
2. Negative affect	6.89(1.60)	7.19(1.55)	5.56(1.73)	5.83(1.77)	.42**	--	-.61**
4. Risky choice	-8.7(17.79)	-12.73(18.00)	5.20(15.59)	2.28(19.49)	-.51**	-.49**	--

Note: * $p < .05$, ** $p < .01$; [1] = cognition condition, [2] = affect condition; correlations of both conditions in the Drink 'n Drive sample are shown above the diagonal; those of both conditions in the Going Out sample are shown below the diagonal. The possible range of the different scales is explained in the text.

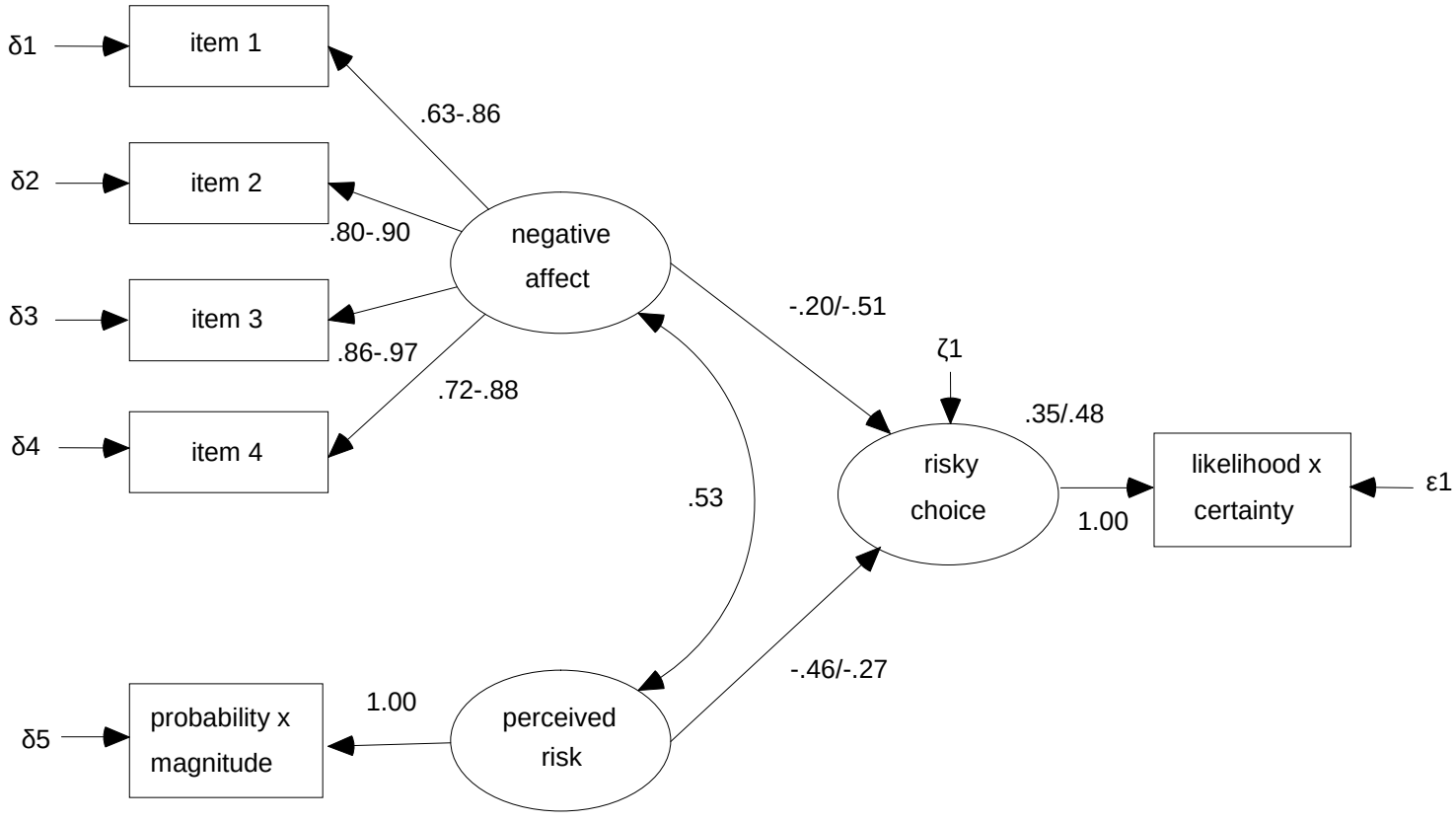
The first three SEM models we considered (models 1, 2, and 3a, see Table 5) are the same as the SEM models considered in Table 3.3 of Study 1. However, in the fourth model (model 3b) we allowed the structural paths in the affect condition to be different from the structural paths in the cognition condition. Note that the structural paths between the vignettes in the same condition were fixed to be equal. The fifth (3b) and sixth (3c) models were similar to model 3b but now with additional structural (co)variances (3b) or structural (co)variances plus structural residuals (3c) fixed to be equal across the vignettes. The seventh (3d) model was equal to model 3d, but now the two parameters which were freed up across the two conditions in model 3b, 3c, and 3d were fixed to be equal. In model eight (3f), all parameters were constrained to be equal across vignettes similar to model 3e in study 1 (Table 3.3). The results are reported in Table 3.5. Similar fit indices and cut-off points were used as in Study 1, i.e., TLI >.90, RMSEA<.05 or *p*-close>.01, and a PCFI>.90.

Additionally, we checked whether consecutive models in Table 5 were not less worse (i.e., 'better' because more parsimonious) than the previous models. This resulted in the following model improvements/deteriorations. Model 3a was not significantly worse than model 2 ($\Delta\chi^2_{(df=9)}$=15.77, p=.07), model 3b was not significantly worse than model 3a ($\Delta\chi^2_{(df=4)}$=2.44, p=.66), model 3c was not significantly worse than model 3b ($\Delta\chi^2_{(df=9)}$=10.55, p=.31), model 3d was not significantly worse than model 3c ($\Delta\chi^2_{(df=3)}$=3.56, p=.31), but model 3e was significantly worse than model 3d ($\Delta\chi^2_{(df=2)}$=12.23, p<.01), and model 3f was significantly worse than model 3e ($\Delta\chi^2_{(df=12)}$=146.28, p<.01). Based on these model comparisons, the fit indices and parsimony, the structural residuals model with the structural paths freed across the two (cognition and affect) conditions (model 3d, see Table 3.5) appears to be the 'best' model. This model is represented in Figure 3.2.

Table 3.5 Comparison of Fit Indices of different models in Study 2

	χ^2	df	*p*	TLI	RMSEA	90% CI	*p*-close	PCFI
1. Independent	1420.15	60	.00	.00	.244	.233-.255	.00	.00
2. Unconstrained	49.39	32	.03	.98	.038	.014-.058	.83	.53
3. Constrained								
a) Measurement weights (λ's)	65.17	41	.01	.97	.039	.020-.057	.83	.67
b) 3a + Structural weights (2 γ's free: see text)	67.60	45	.02	.98	.036	.016-.053	.90	.74
c) 3b + Structural (co)variances (Φ)	78.15	54	.02	.98	.034	.015-.050	.95	.88
d) 3c + Structural residuals (Ψ)	**81.70**	**57**	**.02**	**.98**	**.034**	**.015-.049**	**.96**	**.93**
e) 3d + 2 γ's constrained	93.93	59	.00	.97	.039	.024-.054	.88	.96
f) 3e + Measurement residuals (Θ_δ)	240.21	71	.00	.89	.079	.068-.090	.00	1.04

Figure 3.2 Standardized estimates in the structural residuals model of relations between perceived risk, negative affect, and risky choice in Study 2 (see text for explanation)



Again, as in Study 1, because the measurement residuals were not found to be equal across vignettes, we report the range of values of the measurement weights (λ's) linking negative affect with its indicators. In Figure 3.2, the values of the standardized structural paths in the two conditions are also shown. The leftmost value of the standardized structural paths is associated with the cognitive condition, the rightmost value with the affect condition. All of the values reported are significant at $p<.01$. As can be seen, in the cognitive condition the standardized path coefficient linking perceived risk and risky choice (γ=-.46) was stronger than in the affect condition (γ=-.27). Additionally, in the cognitive condition the standardized path coefficient linking negative affect and risky choice (γ=-.20) was weaker than in the affect condition (γ=-.51). Because this model (3d, see Table 3.5) was significantly better than a model in which these parameters were constrained to be equal (model 3e), we can conclude that our expectations were confirmed.

CONCLUSION

The results again showed both negative affect and perceived risk to be significantly related to risky choice. Furthermore, in line with our expectations, it was shown that in the cognition condition, perceived risk was more strongly related to risky choice relative to the affect condition, whereas negative affect was more strongly related to risky choice in the affect condition, relative to the cognition condition, thereby providing further support for a dual-process model of risky choice. However, Study 2 contained an obtrusive manipulation of cognitive and affective modes. In Study 3, we investigated whether it is possible to get similar results using an unobtrusive manipulation.

STUDY 3

In Study 3 we examined whether activating a cognitive or affective processing mode by means of a priming task also leads to risk evaluation primarily based on cognition or affect. Hsee and Rottenstreich (2004) primed a cognitive processing mode ('valuation by calculation) by asking participants to answer questions that required conscious and deliberate calculation and an affective processing mode ('valuation by feeling') by presenting participants questions that required them to examine and report their feelings. They found that valuation by calculation made people sensitive to variations in scope, whereas valuation by feeling made people insensitive to scope, but sensitive to the presence or absence of a stimulus instead.

In another recent study, the impact of affect and cognition was investigated in the context of attitudes (Van den Berg, Manstead, Van der Pligt & Wigboldus, 2006). They attempted to activate either a cognitive or affective processing mode in an unobtrusive manner by priming words related to affect (e.g. the word 'feeling') or cognition (e.g. the word 'thinking'). In Study 3, we adopted this approach and investigated whether this less obtrusive manipulation of processing mode results in risk evaluations on either a more cognitive or more affective basis. Finding evidence for this assumption lends further support to the risk-as-feelings versus risk-as-analysis distinction and is also in line with other dual-process approaches, providing additional evidence for the two suggested ways in which risks can be evaluated.

To prime processing mode, participants were asked to solve a word-search puzzle that contained words that were related to either affect or to cognition. Subsequently, in a supposedly unrelated experiment, participants were presented two of the vignettes used in Study 1 (Airplane and Exams). The expectations were similar to those of Study 2. Negative Affect was expected to be a better predictor of risky choice when participants are induced to use a more affective processing mode. Similar expectations apply to the cognitive processing mode; in this mode we expected cognitive appraisal of risk to more strongly predict risky choice relative to affective appraisal of risk. In sum, primed processing mode should enhance the relations between the appraisal of risk in that mode and risky choice.

METHOD

Participants and procedure

A total of 201 undergraduate students, 58 male and 143 female, with an average age of 20.2 years (*SD*=2.1 years) from the University of Amsterdam participated for course credit. Participants were randomly assigned to either the cognition or affect condition. Within these conditions, participants were again randomly presented one of two booklet versions containing two vignettes in counterbalanced order. The puzzle and the risk vignettes were included in a set of questionnaires that, aside from the materials used in the present study, were unrelated.

Materials

To prime processing mode and make either affect or cognition salient, participants worked for five minutes on a word-search puzzle developed by Van den Berg, Manstead, Van der

Pligt, and Wigboldus (2005). The puzzle consisted of a 15 by 15 letter matrix in which participants searched for hidden words. Words could be hidden from top to bottom, from bottom to top, from left to right, from right to left, or diagonally. Participants were asked to mark the words they found. In order to make the puzzle and vignettes seem unrelated, the instructions read that the goal of the puzzle task was to see which words were found first by the participants and that they therefore had to also indicate the order in which they found the different words. The seven words that had to be found were listed next to the puzzle. In the affect condition, participants searched for the (Dutch translations of the) following words; 'feeling,' 'emotion,' 'sensation,' 'state of mind,' 'intuition,' 'impression,' and 'experiencing'. In the cognition condition, participants searched for 'thinking,' 'logic,' 'analyzing,' 'rational,' 'knowing,' 'mind,' and 'reasoning'.

The items and scales of the predictors and the dependent variable were identical to those used in the previous studies. Cronbach's alpha for the negative affect scales was .92 for the Airplane vignette and .86 for the Exams vignette.

RESULTS

Two participants indicated not to have participated seriously and were excluded from further analyses. Three other participants only found five or less of the seven words that were hidden in the puzzle. Because it was unclear whether they had skipped the remainder of the puzzle or were indeed unable to find the words, it was decided to exclude them from the analyses as well. In Table 3.6, the means, standard deviations, and correlations for the predictors and the outcome variable for both conditions are displayed. For the Exams vignette, there was a significant difference for perceived risk as participants scored higher on this variable in the affect condition. There were no other significant differences in the means between conditions. In correspondence with Studies 1 and 2, the results showed moderate to strong correlations between the predictor variables, negative affect and perceived risk and the outcome variable risky choice for both vignettes.

As in Study 2, we tested the prediction that in the affect condition risky choice is more strongly related to negative affect relative to the cognition condition, whereas in the latter condition, risky choice is better predicted by perceived risk compared to the affect condition. Similar to Study 2, we formulated a number of structural equation models (SEM's), in which parameters were either freed up or constrained across the different vignettes and conditions. The models, which are the same as the ones explained in Study 2, are presented in Table 3.7. Again, we used the following cut-off values and model comparison statistics to select our final model. The cut-off values for the fit indices were:

TLI >.90, RMSEA<.05 or *p*-close>.01, and PCFI>.90. When comparing the models represented in Table 3.7, we found model 3a not to be significantly worse (at $p<.01$) than the unconstrained model 2 ($\Delta\chi^2_{(df=9)}=22.08$, $p=.01$). However, model 3b was significantly worse than model 3a ($\Delta\chi^2_{(df=4)}=23.28$, $p<.01$). Model 3c fared better, it was not significantly worse (at $p<.01$) than model 3b ($\Delta\chi^2_{(df=9)}=18.48$, $p=.03$). Model 3d was not significantly worse than model 3c ($\Delta\chi^2_{(df=3)}=3.93$, $p=.12$), but model 3e was significantly worse than model 3d ($\Delta\chi^2_{(df=2)}=14.54$, $p<.01$), and model 3f was significantly worse than model 3e ($\Delta\chi^2_{(df=12)}=58.04$, $p<.01$).

In contrast to Study 1 and Study 2, in this study we were unable to unambiguously assign a 'best' model based on the fit criteria and model comparison statistics. Based on model comparison, we should have selected the measurement weights model. This model also performed slightly better in terms of the TLI and RMSEA criteria. However, it performed much worse on the parsimony fit index PCFI. When we compared models that were more parsimonious, the structural residuals model with 2 free structural paths (model 3d) performed best. The consecutive models 3e and 3f, in which the two parameters were constrained to be equal across the two experimental conditions fared significantly worse than model 3d in which these two parameters were allowed to be free. Because the TLI and RMSEA/*p*-close values were not much worse, and because the PCFI approached the value of .90, we opted for this model, which is displayed in Figure 3.3.

Table 3.6 Descriptives and correlations of perceived risk, negative affect and risky choice (Study 3)

Variables	Airplane M (SD)		Exams M (SD)				
	Cognition[1]	Affect[2]	Cognition	Affect	1	2	3
1. Perceived risk	32.03(17.78)	32.18(16.83)	28.51(13.27)	33.76(17.72)†	--	.59**	-.64**
2. Negative affect	6.25(1.75)	6.62(1.73)	4.75(1.50)	5.18(1.77)	.54**	--	-.65**
3. Risky choice	4.04(16.57)	3.52(13.88)	21.25(10.37)	17.82(14.54)	-.39**	-.43**	--

Note: * $p < .05$, ** $p < .01$; † mean (between conditions within a vignette) is significantly higher at $p < .05$; [1] = cognitive condition, [2] = affect condition; correlations of both conditions in the Airplane sample are shown above the diagonal; those of both conditions in the Exams sample are shown below the diagonal. The possible range of the different scales is explained in the text.

Figure 3.3 Standardized estimates in the structural residuals model of relations between perceived risk, negative affect, and risky choice in Study 3 (see text for explanation)

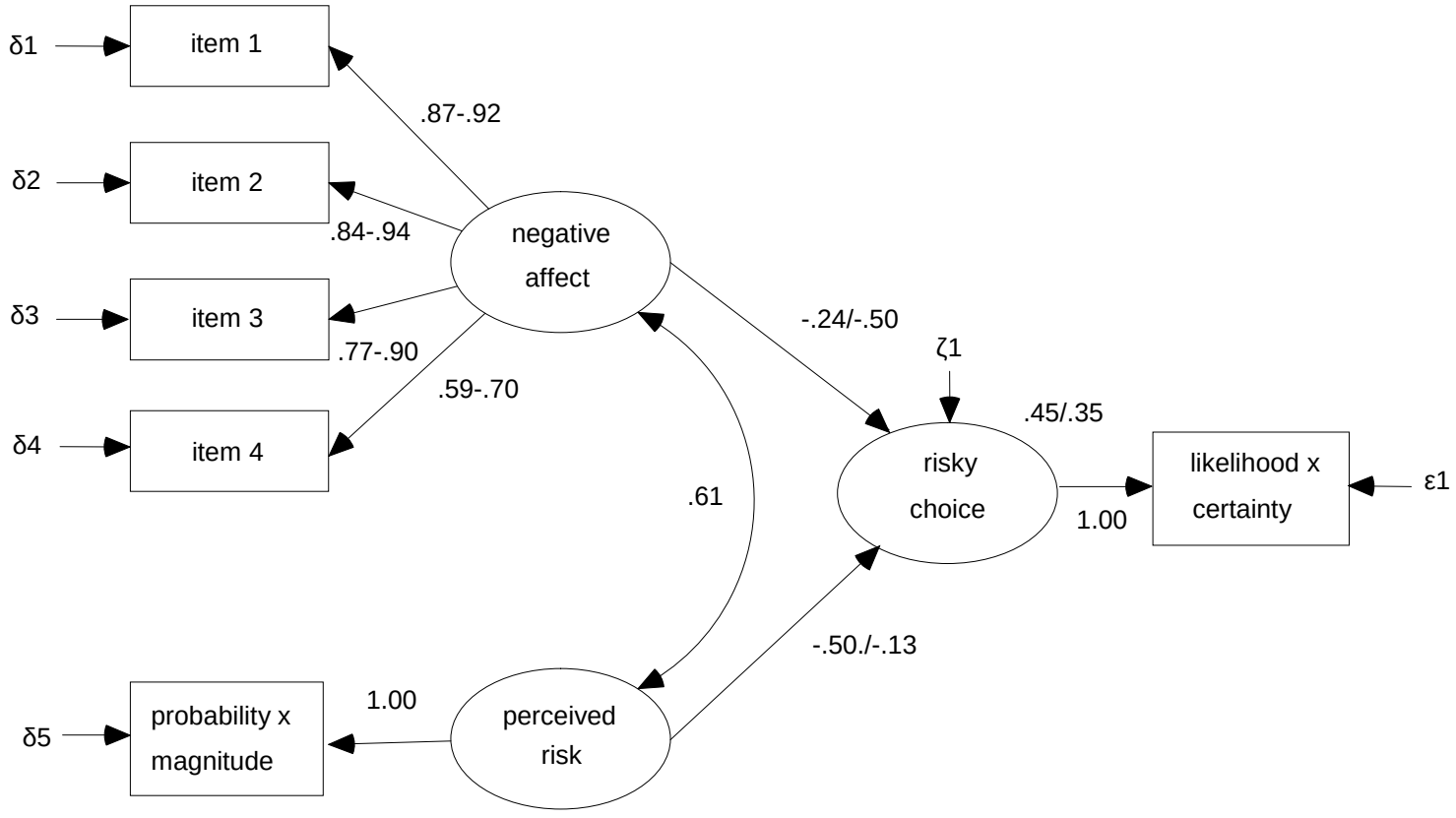


Table 3.7 Comparison of Fit Indices of different models in Study 3

	χ^2	df	*p*	TLI	RMSEA	90% CI	*p*-close	PCFI
1. Independent	1506.49	60	.00	.00	.246	.235-.257	.00	.00
2. Unconstrained	90.70	32	.00	.92	.068	.052-.085	.04	.51
3. Constrained								
a) Measurement weights (λ's)	112.78	41	.00	.93	.066	.052-.081	.03	.65
b) 3a + Structural weights (2 γ's free: see text)	136.06	45	.00	.92	.071	.058-.085	.01	.70
c) 3b + Structural (co)variances (Φ)	154.55	54	.00	.92	.068	.056-.081	.01	.84
d) 3c + Structural residuals (Ψ)	**160.47**	**57**	**.00**	**.92**	**.068**	**.055-.080**	**.01**	**.88**
e) 3d + 2 γ's constrained	175.01	59	.00	.92	.070	.058-.082	.00	.90
f) 3e + Measurement residuals (Θ_δ)	233.05	71	.00	.91	.076	.065-.087	.00	1.05

In Figure 3.3, again the leftmost value of the standardized structural paths is associated with the cognitive condition, the rightmost value with the affect condition. Except for the structural path in the affect condition from perceived risk to risky choice (γ=-.13, p=.09), all of the values reported are significant at p<.01. In the cognitive condition the standardized path coefficient linking perceived risk and risky choice (γ=-.50) was stronger than in the affect condition (γ=-.13). Additionally, in the cognitive condition the standardized path coefficient linking negative affect and risky choice (γ=-.24) was weaker than in the affect condition (γ=-.50). Because the model in which the parameters were freed up across experimental conditions (model 3d, see Table 3.7) performed significantly better than the model in which these parameters were constrained to be equal (model 3e), we can conclude that our expectations were confirmed.

CONCLUSION

Analogous to the results of Study 1 and Study 2, the results of Study 3 showed both negative affect and perceived risk to be related to risky choice. Furthermore, in line with the results of Study 2, in the affect condition negative affect was more strongly related to risky choice than perceived risk, whereas in the cognitive condition, perceived risk was more strongly related to risky choice than negative affect.

GENERAL DISCUSSION

In this chapter we examined the influence of perceived risk and negative affect on risky choice in different ways and found support for a dual-process model of risky choice based on affective and cognitive considerations. In Study 1, we found negative affect and perceived risk to simultaneously influence risky choice. These findings were replicated in Study 2 and Study 3. Although the findings are important in their own right, from Study 1 alone it cannot be ascertained under what specific circumstances cognitions and affect are related – or not – to risky choice. For that purpose we designed two more studies. Study 2, in which cognitions and affect were manipulated, showed that making affect salient by adding affective information to the description of a risk leads to increases in negative affect as a predictor of risky choice, whereas adding cognitive information makes perceived risk more predictive of risky choice. Study 3 showed that the way a risk is processed can also be influenced by unobtrusively activating a cognitive or affective

processing mode, which, in correspondence with the processing mode activated, increases the relative weight of either perceived risk or negative affect as predictors of risky choice. In other words, Studies 2 and 3 show that it is possible to influence the strengths of cognition and affect as predictors of risky choice, and in different – obtrusive and unobtrusive – ways.

These findings extend previous research in various ways. As was mentioned in the introduction, both cognitive considerations and affective reactions separately have been demonstrated to influence risk perception and risky choice. Furthermore, the theoretical underpinnings of dual-processing models have also acquired empirical basis. Yet, evidence for separate modes of information processing with respect to risk evaluation and risky choice has not yet been reported in the literature, nor has been examined to what extent people can be made to rely on a 'risk-as-feelings' or 'risk-as-analysis' strategy. Even though studies have shown the nature of presented information (e.g. statistical versus anecdotal or abstract versus specific) can influence risk perception and/or risky choice, the affect versus cognition distinction used in our study has not been examined before. Finally, the unobtrusive priming of cognitive and affective processing strategies has been done in the context of attitudes and the valuation of stimuli, but is new with respect to risk processing.

Considered in conjunction the results of the three studies make a strong case not only for taking up affect in models of risky choice but also for considering risky decision making as subject to dual modes of information processing. The findings show that people can be made to rely more on either their feelings or their thoughts through the addition of cognitive or more affective information to a description of a risk when making a choice. Furthermore, the results of Study 3 demonstrate that it is possible to influence the way risk information is processed unobtrusively by means of a priming task unrelated to the risk. In other words, the mode in which risk information is processed can be influenced both in subtle and also relatively straightforward ways. The findings from Study 2 and Study 3 also demonstrate that affect-based and cognition-based modes can be manipulated independently from each other. This, additionally, extends previous research on attitudes (Van den Berg, Manstead, Van der Pligt & Wigboldus, 2006) and the valuation of stimuli (Hsee & Rottenstreich, 2004), and shows that processing mode can also be related to risk. Finally, participants were not inclined to make riskier or less risky choices when evaluating risk in either processing mode, implying that it is possible to influence the way in which risk is processed *without* influencing actual risky choice behaviour. In sum, these findings provide the first direct support for dual-process models of risky choice.

When considering these results, it should be noted that this study used vignettes, which are unlikely to trigger very strong emotions. Real-life situations may invoke stronger affective reactions that may override cognitive considerations. Sunstein (2003), for

example, showed that when strong emotions are involved, people tend to ignore the likelihood of occurrence of a negative event and focus only on the bad outcome itself. Also, the impact of visceral states could reduce the influence of cognitive considerations to a minimum or eliminate them altogether (see e.g. Loewenstein, 1996). Therefore, future research may use situations that trigger more intense emotions to evaluate their influence on risk perception and -choice. Loewenstein et al. (2001) argue that "[e]liciting powerful emotions in normal populations is certainly problematic; perhaps the best opportunities for such research occur in naturalistic settings in which emotions reliably run high (e.g., just before parachuting, or in the courtroom). But even under 'normal' circumstances the question what characteristics of the context make either cognition or affect dominant in a decision making situation deserves more investigation. We agree with Finucane et al. (2000, p. 14) who argued that the "[r]eliance on affect probably ebbs and flows according to various contextual factors, including the extent to which stimuli evoke images that are tagged clearly with positive or negative feelings". Future research should therefore focus on the influence of contextual factors on risk perception and risky choice in order to increase our understanding of how they influence cognitions, feelings and, our behaviour.

A particularly interesting future line of inquiry with regard to dual-process models and risky choice concerns the comparison of well-defined situations with known probabilities and information about risk magnitude versus more ambiguous situations where these parameters are unclear or unknown. Risk research and decision theory has tended to favour the former kind, yet most real-world situations tend to be of the latter variety. It may well be that cognition-based processing tends to dominate in well-defined risk situations. The question that remains is how we can pursue a risk-as-analysis strategy when the input for analysis is vague, unreliable or even absent.

Another question regards how we can optimally benefit from both modes of processing and in what situations we should give more importance to either our feelings or our thoughts (see e.g. Damasio, 1994). Triggering or activating processing mode by means of the presentation of information may prove especially relevant with respect to informing the general public about risk and trying to optimize the impact of campaigns to this end. To return to the question posed in the introduction of this chapter: when should appeals be directed to cognitive considerations and be aimed at changing beliefs by means of statistics and probabilities? And when should efforts rather be directed at changing the feelings associated with risks and risky behaviour? Discussing policy against terrorist threat, Sunstein argues: "(…) government is unlikely to be successful if it attempts to reduce fear by emphasizing the low likelihood of another terrorist attack. It might do better if it changes the subject or instead stresses the affirmative social values associated with running the risk" (2003, p. 122). Implicit in this example are again the two separate

processing modes and the limited use of appealing to cognitive considerations when a risk is evaluated on an affective basis. Terrorist threat appears to be a paradigm example of such a risk due to the strong affective imagery this type of risk evokes and appeals to 'use one's head' will indeed be unlikely to generate much effect in this case.

APPENDIX

Airplane

Imagine the following: You are going on holiday to a destination on the Mediterranean Sea with a group of friends. You just heard on the news that the airline you are supposed to fly with has been warned for the bad maintenance of their aircraft. Last week one of the planes of the airline had a problem and had to make an emergency landing. This incident has led the French government to issue a prohibition to land for the aircraft of the airline until they meet the safety requirements. Inquiries at the travel agency where you booked the flight make it clear that it is impossible to cancel your flight and get a refund because the flight is still normally scheduled for departure.

Exams[11]

Imagine the following: You are about to leave your house one morning to take an important exam and you are running late. On the radio you hear the weather forecast by the National Meteorological Institute, which issues a warning that the roads are very slippery due to icing and strongly advices people not to go on the road unless absolutely necessary. It's about fifteen minutes cycling to the place where you have to take your exam. Just before mounting your bike you notice that the street is indeed extremely slippery. Due to the weather, public transportation is disrupted and there is no way of getting a taxi on short notice. If you walk you'll be late for sure. The only possible way to get to there in time is by bicycle.

Going Out

Imagine the following: You are on your way on your bike to a café where you are supposed to meet some friends. From your house it is about half an hour cycling to the café. Just before arriving at your destination one of your friend calls you on your cell phone and warns you that there are preventive ID checks at different locations in the city and also around the café. You had not anticipated this and therefore do not carry an ID with you. As a rule there are no exceptions made and everybody who gets checked and does not carry his ID has to pay a fine of 50 euro.

[11] When reading this vignette one should take into account that in the Netherlands most people own bikes and that in the city of Amsterdam, where the study was conducted, bikes are the principal mode of transportation and estimates of the number of bikes equal the number of inhabitants of that city.

4 TRAITS AND STATES: INTEGRATING PERSONALITY AND AFFECT INTO A MODEL OF CRIMINAL DECISION MAKING[12]

Abstract

We propose and test a model of criminal decision making that integrates the individual differences perspective with research and theorizing on proximal factors. The individual differences perspective is operationalized using the recent HEXACO personality structure. This structure incorporates the main personality traits, but it carries the advantage of also incorporating Self-Control within its personality sphere, and an additional trait termed Honesty-Humility. Furthermore, the model offers a new perspective on proximal predictors, "states," of criminal decisions by adding affect to the rational choice–crime equation. The proposed model is tested among a representative sample of the Dutch population (N = 495). As predicted by the model, personality was both directly and indirectly related to criminal decision making. Specifically, the traits Emotionality, Self-Control, and Honesty-Humility were mediated by both affect and rational choice variables. Conscientiousness operated only indirectly on criminal decision making via rational choice. Together, the findings support a trait-state model of criminal decision making.

[12] Based on Van Gelder & De Vries (2012a)

Extant literature on personality and crime reveals consistent correlations between the two (e.g., Agnew et al., 2002; Caspi et al., 1994; Eysenck, 1977, 1996; Miller & Lynam, 2001; Jones, Miller & Lynam, 2012). There is also ample evidence that the perceived costs and benefits of crime, as suggested by rational choice and deterrence theorists, influence decisions to offend (e.g., Becker, 1968; Cornish & Clarke, 1986; Nagin & Pogarsky, 2001; Paternoster & Pogarsky, 2009). Both lines of thought have a restricted focus; one is confined to individual characteristics, whereas the other tends to limit itself to proximal variables that pertain directly to the crime situation. That is, although personality trait research can identify individual differences in predispositions to offend, it does little to explain what proximal variables may influence offending behavior. Conversely, deterrence and rational choice-based theories can help detect factors that alter the balance in cost-benefit analyses, but generally they do not examine individual differences in criminal propensity.

However, as Nagin and Paternoster (1993) noted, a belief that variation in offending is reflective of differences in criminal propensity between individuals does not preclude the possibility that would-be offenders are insensitive to the attractions and deterrents of crime. Therefore, instead of being distinctively separate, these perspectives complement each other and the joint consideration of both perspectives can significantly enhance our understanding of criminal decision making. In the words of Miller and Lynam (2001, p. 781), in order to truly understand relations between personality and crime, the mechanisms underlying them must be identified, which requires an examination of the intervening or mediating processes that connect the distal and the proximal levels. Developing and testing an integrative model that does so is the goal of the present study.

Beyond integrating these perspectives in a comprehensive model of criminal decision making, we also extend them separately. We contribute to the individual differences perspective by using a recent and more encompassing structure of personality, the HEXACO model, than models that have been used in crime research thus far. We extend proximal approaches by adding feelings, or affect, to the rational choice-crime equation drawing from dual-process models of information processing.

To denote stable individual dispositions related to offending, we use the term "traits". Proximal factors, which operate in the moment of decision making, are referred to as "states". Below, we first deal with the trait component of the model followed by a discussion of the state component. Subsequently, we discuss their integration and the hypotheses before presenting the results of the study.

TRAITS: PERSONALITY AND CRIME

Arguably the most important individual-level correlate of delinquent behavior is self-control. An abundance of research has shown that people with difficulty controlling their impulses and considering the broader consequences of their actions are more prone to offend than those who do not (Pratt & Cullen, 2000). Although not rooted in personality psychology, the self-control concept essentially implies a personality trait as it refers to stable individual differences in the propensity to act, think, and feel in certain ways. In the words of Gottfredson and Hirschi (1990, p. 87), "individual differences in the tendency to commit criminal acts (…) remain reasonably stable with change in the social location of individuals and change in their knowledge of the operation of sanction systems." Self-control is therefore "well within the meaning of 'personality trait'" (Gottfredson & Hirschi, 1990, p. 109).

The success of the self-control concept in explaining crime and delinquent behavior is likely to have overshadowed findings from research drawing from psychological models of personality, which has established consistent relations between personality traits other than self-control and delinquent behavior (e.g., Caspi et al., 1994; Eysenck, 1977, 1996; Miller & Lynam, 2001; Moffitt et al., 2000; Tellegen, 1985). Indeed, as Caspi et al. (1994) suggested, crime-proneness is not likely to be defined only by self-control, but instead by multiple psychological components.

Models of personality

While various multi-dimensional models of personality have been proposed over the years, there has been increasing agreement among researchers that a handful of main dimensions, or traits, together cover the human personality. The so-called Big Five consensus distinguishes the following traits: Extraversion, Conscientiousness, Openness to Experience, Agreeableness, and (Emotional Stability versus) Neuroticism (e.g., Costa and McCrae, 1990, 1992; Goldberg, 1990McCrae & Costa, 1990). The Big Five traits are also represented in, and referred to as, the Five-Factor Model (FFM) (Costa & McCrae, 1992). Each of the five main traits is, in turn, made up of lower level factors or "facets". For example, Conscientiousness, which refers to the ability to exert self-discipline and control impulses, and the tendency to think carefully before acting, is composed of facets such as competence, achievement striving, self-discipline, and deliberation (Costa & McCrae, 1998). Besides Conscientiousness, the traits Agreeableness, which regards individuals' interpersonal relationships and their tendency to be trusting, straightforward, and

empathic, and Neuroticism, which refers to people's emotional adjustment and stability, have emerged as consistent correlates of antisocial behavior in crime research (Jones, Miller & Lynam, 2012; Miller & Lynam, 2001).

Together, the Big Five/FFM personality traits and their constitutive facets were thought to embody the overarching structure behind all personality traits. However, recent reanalyses of the same data that have led to the development of the Big Five suggest that there is a sixth main dimension of personality (Ashton & Lee, 2008; Ashton et al., 2004). The new structure, the HEXACO model, that emerged from these analyses builds on, and is in many ways similar to, the Big Five and FFM models, but extends and refines them in ways that may be particularly relevant for criminological research (for an overview of similarities and differences, see: Ashton et al., 2004).

Three of the six HEXACO dimensions, Extraversion, Conscientiousness, and Openness to Experience, are identical to their equally named Big Five/FFM counterparts. Two other HEXACO dimensions, Agreeableness and Emotionality, are modified versions of Big Five/FFM Agreeableness and Neuroticism. That is, apart from the fearfulness and depression facets, FFM Neuroticism contains a hostility/anger facet, which, in the HEXACO model, has shifted to Agreeableness. At the same time the sentimentality component of Big Five Agreeableness has shifted to HEXACO Emotionality.

These shifts may explain the paradoxical finding that both high and low Big Five/FFM Neuroticism have been found to be correlated with crime (see Miller & Lynam, 2001). The paradox is resolved by the described shift of facets between the dimensions: When reframed in terms of the HEXACO model, both low Agreeableness (i.e., *high* Big Five/FFM Neuroticism), through its association with anger and hostility, and low Emotionality (i.e., *low* Big Five/FFM Neuroticism), through its association with lack of fearfulness and lack of empathy, are personality traits that may predispose individuals to different kinds of criminal offenses.

The most significant departure of the HEXACO model from its five-dimensional predecessors, however, and the most relevant one for crime research, is the addition of a sixth dimension of personality, Honesty-Humility (Ashton et al., 2004; De Vries, Ashton, & Lee, 2009). This dimension refers to individual differences in the tendency to be interpersonally genuine, to avoid fraud and corruption, to be uninterested in status and wealth, to be modest and unassuming, and the reluctance to take advantage of others to satisfy one's own needs (Lee & Ashton, 2004). Individuals scoring low on Honesty-Humility tend to feel a strong sense of self-importance, are motivated by material gain, feel tempted to "bend" laws for personal profit, and flatter others when this is instrumental in the pursuit of their own goals. We argue that these individuals are more likely to violate

rules both because they have lower moral standards and because they care less about the well-being of others who may be affected by their behavior.

Recent empirical research has shown that by virtue of the inclusion of Honesty-Humility in the HEXACO structure, it outperforms both the FFM and the Big Five model with respect to a number of behavioral criteria related to offending such as psychopathy, Machiavellianism, egoism, immorality, pretentiousness, unethical decision making, and employee integrity (Ashton & Lee, 2008; De Vries, De Vries, De Hoogh, & Feij, 2009; De Vries & Van Kampen, 2010).

Finally, the HEXACO model yields another important advantage over other models of personality, which is its ability to integrate the psychological personality perspective with the criminological self-control paradigm. Within the HEXACO personality space, self-control can be viewed and operationalized as an interstitial trait based on a set of facets pertaining to several of the main dimensions of the model. Essentially, self-control as defined by Gottfredson and Hirschi (1990) is a broad dimension of individual disposition that consists of more specific elements such as self-centeredness, risk-seeking behaviour and impulsivity. These elements are also represented as facets in the HEXACO model and therefore a self-control scale can be derived from the model (see the Method section for further explication).

In other words, the HEXACO model offers a broad conceptualization of personality that encompasses and extends five-factor models in important ways, but also incorporates self-control. Thereby the model is able to locate the latter within the broader personality structure of individuals and integrate the psychological personality perspective with the most important individual disposition paradigm in criminology. In sum, we believe the HEXACO model has much to contribute to crime research and therefore use it as the operationalization of the trait component of the trait-state model of criminal decision making. Next, we discuss the other constitutive component of the model, "states".

STATES: RATIONAL CHOICE AND AFFECT

Rational choice theories posit a reasoning actor who balances costs against benefits in order to arrive at a decision. The assumption is that, when faced with several possible courses of action, people will gravitate towards the option they believe is likely to have the best overall outcome (Elster, 1989). According to rational choice theory's punishment corollary, deterrence theory, people will offend when they perceive the potential benefits to exceed the anticipated costs, and will refrain from doing so when costs outweigh gains. Perceived costs such as the severity and certainty of punishment are therefore central

inputs to the criminal choice calculus. According to this perspective, a criminal act essentially implies taking a risk (i.e. making a decision with an uncertain outcome and a possibility of loss).

Although rational choice and deterrence models tend to be largely cognitive in nature (i.e. based on thinking), various authors have noted that feelings may also play an important role in decisions to commit a crime (e.g., Agnew, 1992; Athens, 2005; Katz, 1988; Wright & Decker, 1994 1997). We argue that adding feelings to the rational choice-crime equation is likely to generate a more encompassing picture of the criminal decision making process, compared with focusing only on cognition or feelings. One important reason for differentiating between cognitive and affective (i.e. feeling-based) reactions to risk and criminal decision making, is the different operative logic underlying each. That is, cognitive appraisals and emotional reactions to risk have different determinants. For example, emotions respond differently to probabilities and outcomes, the two central input variables of rational choice and deterrence models, than cognitive evaluations of riskiness (see Loewenstein et al., 2001). As Frijda (1988, p. 355) noted "emotions know no probabilities. They do not weigh likelihoods. What they know, they know for sure." Emotions *are*, however, influenced by variables that play only a minor role in cognitive evaluations, such as the time interval between the decision and the realization of outcomes and the degree to which a risk is known or controllable (Loewenstein et al., 2001). In short, because feelings have determinants that differ from cognitions about a risk, and can therefore cue different behavioral responses, we believe them to be an important addition to models of criminal decision making.

In this chapter, we focus on feelings of fear and insecurity, which we denote as "negative affect", evoked by decision making situations and examine these feelings in conjunction with perceived severity and certainty of punishment to examine how both are related to criminal decisions. We do so by drawing from so-called *dual-process* and *dual-system models of information processing* (e.g., Chaiken & Trope, 1999; Epstein, 1994; Metcalfe & Mischel, 1999; Smith & Neumann, 2005; Strack & Deutsch, 2004; ; Van Gelder, 2012; Van Gelder et al., 2009). The central assumption of these models is that there are two separate modes or systems of mental processing that operate simultaneously when we engage in acts such as making judgments, considering risky prospects, valuing stimuli and processing information. One mode, which we will refer to as the cool mode, is largely cognitive in nature and based on more deliberate and analytical considerations. The cool mode, therefore, operates roughly according to the precepts of rational choice theory. The other mode, the hot mode, relies more on intuitive, automatic and affect-based processing (e.g.,

Metcalfe & Mischel, 1999; Van Gelder et al., 2009; Van Gelder, 2012), and has a proper operative logic.[13]

When it comes to evaluating risky prospects, dual-process notions assume the two modes of processing to respond to different characteristics of a situation (Kahneman, 2003; Slovic et al., 2002; Van Gelder et al., 2009). The cool, thinking-based, mode is sensitive to risk considerations such as probabilities. The hot mode is relatively unresponsive to probabilities of decision outcomes, but instead responds to properties of a situation that play only a minor role in cognitive evaluations, such as the vividness with which the outcomes can be imagined and their temporal or spatial proximity (Loewenstein et al., 2001; Slovic et al., 2002). Importantly, the hot mode is tied to the here and now, whereas the cool mode can also consider the future. For example, emotions such as fear or anger alert us of imminent threat and ready us to respond immediately to a situation, while cognitions take delayed consequences into account.

The potential divergence in behavioral responses cued by the hot mode and the cool mode explains why we can think about something one way (e.g., "I really shouldn't do it because it is too risky"), but feel about it differently (e.g., "I crave it, so I'll just take my chances"). Precisely because the way individuals think about a situation may differ from how they feel about it, as implied by dual-process models, it makes sense to study cognition and affect in conjunction as proximal predictors of delinquent behaviour. See Van Gelder et al. (2009) for evidence for a dual-process model on the basis of this distinction with respect to (non-criminal) risky decision making.

Anticipated versus immediate affect

Even though emotions have occasionally been included in models of criminal decision making, our approach differs from those taken in previous studies. When addressing affect, previous research has incorporated emotions such as anticipated shame and expected guilt (e.g., Grasmick & Bursik, 1990; Nagin & Paternoster, 1993; Paternoster & Simpson, 1996; Piquero & Tibbetts, 1996). These *anticipated* emotions enter the decision calculus as costs that can be taken into account as such by the decision maker (Loewenstein et al., 2001). However, the emotions themselves are expected to be felt only once outcomes have materialized, instead of at the time of decision. I am, for example, unlikely to feel guilty about or ashamed of something I have not done (yet). In other

[13] Note that not all dual-process models that have been proposed characterize the dividing line between the two modes as one of cognition versus affect. Even though the models share several characteristics, they differ on other, subtler, points.

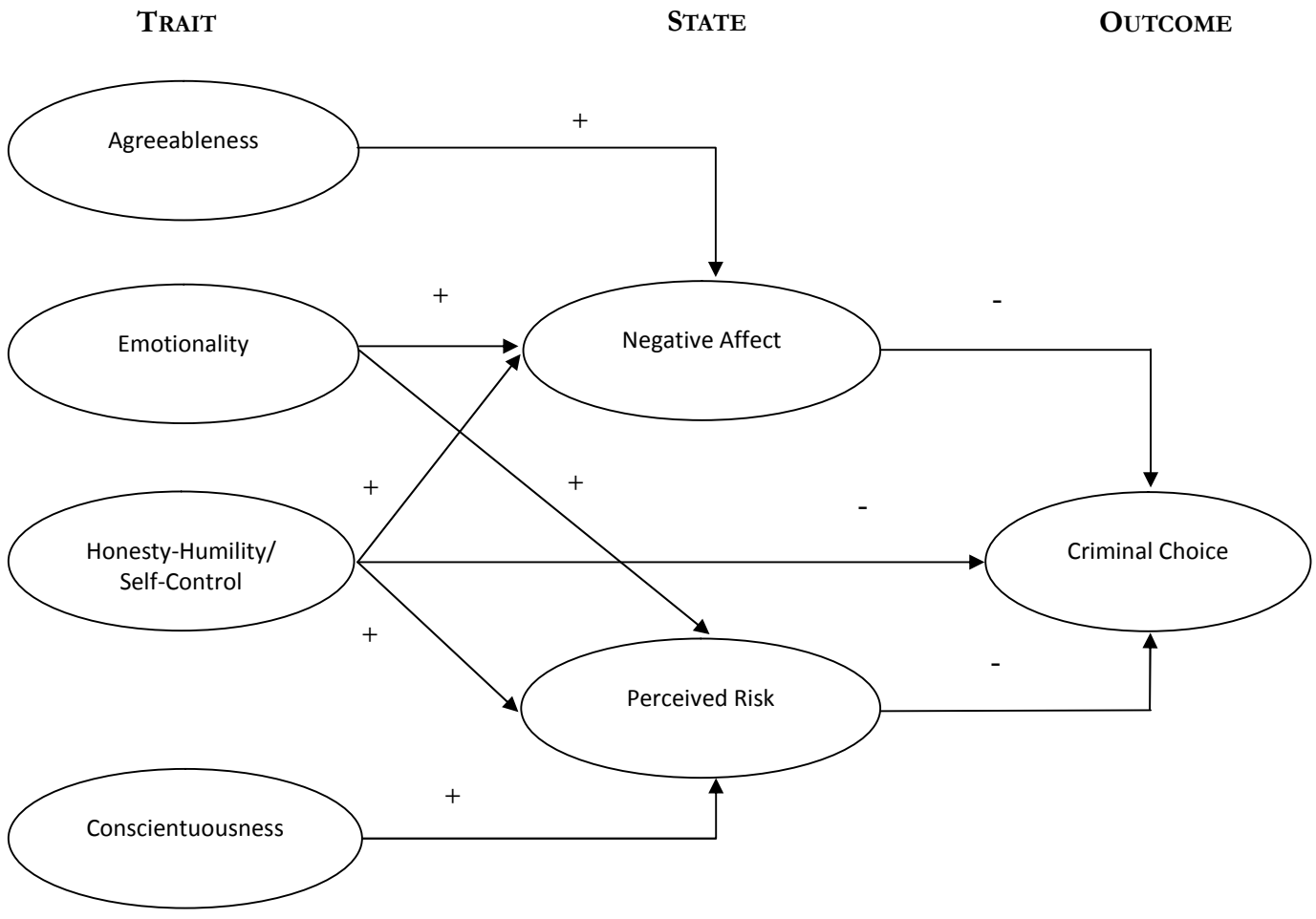
words, this type of emotion essentially regards predictions about future emotional states rather than emotions experienced at the moment of deciding on a course of action. In terms of the dual-process approach, the consideration of potential future regret, guilt and shame, like estimates of probability and severity, belongs to the domain of the cool, cognitive, mode as they, at the time of decision, primarily regard *thoughts about feelings* instead of feelings themselves. For example, note the fundamental difference between the following two considerations that may be relevant when facing a criminal choice: "If I do this now, I will regret it later" versus "The thought of apprehension scares me". Although the regret is expected to materialize after a certain course of action has been chosen, the fear of apprehension operates in the moment of decision making. Recall in this respect the difference between the hot mode which operates in the here-and-now, whereas the cool mode can also consider factors that do not pertain to the immediate present.

The immediate visceral reactions to risks and uncertain situations, such as fear, so-called *anticipatory* emotions, *are* experienced at the time of decision (Loewenstein et al., 2001). Therefore, these emotions imply processing by the affect-based, hot mode. While immediate affect includes a wide range of feelings, such as anger and greed, but also positive affect such as thrill, excitement, relief and satisfaction, we limit ourselves to feelings of fear and anxiety triggered by a decision situation in this chapter. We think this is a particularly productive point of departure with respect to criminal decision making as these feelings form the affective counterpart of cognitions about risk and deterrence (i.e. the perceived probability and severity punishment).

INTEGRATING TRAITS AND STATES

The general assumption underlying the proposed model is that taking into account both individual traits and proximal, state, variables offers a more complete picture of criminal decision making than looking at either component in isolation. At the basis of this assumption is the hypothesis that different aspects of personality are differentially related to the proximal variables under study. We therefore examine the HEXACO model of personality as a predictor of criminal choice while drawing from dual-process models by distinguishing perceived risk of sanction from the state affect evoked by a situation. In this study, we focus on the role of one specific type of state affect, i.e. the negative feelings of fear and worry evoked by a situation, which is henceforth referred to as "negative affect". We hypothesize that negative affect and perceived risk mediate the relationship between personality and criminal choice. The proposed trait-state model is presented in Figure 4.1.

Figure 4.1 Hypothesized Relations between HEXACO Agreeableness, Emotionality, Honesty-Humility, Self-Control, Conscientiousness, Negative affect, Perceived Risk and Criminal Choice



In line with the reasoning above, we believe HEXACO Honesty-Humility, Emotionality, Conscientiousness, Agreeableness, and Self-Control to be important predictors of criminal choice. We hypothesize Emotionality to operate both through negative affect (i.e. feelings of worry and fear), and through state cognition (i.e. perceived risk) in preventing or provoking criminal decisions. That is, people low in Emotionality tend to be less fearful in nature, are less anxious about possible consequences of their actions, and lack feelings of dependence on - and sentimentality towards - other people. Lack of fearfulness has been shown to be the most important predictor of thrill and adventure seeking (De Vries, De Vries, & Feij, 2009), and is therefore expected to result in lower levels of negative affect in situations that carry risk. At the same time, a lack of anxiety about the possible consequences of one's actions is also likely to result in lower levels of anticipation of the severity and likelihood of the consequences of criminal actions. That is, to reverse the argument, people high in Emotionality are probably more likely than people low in Emotionality to be able to imagine what may happen to themselves (anticipated punishment) and others (anticipated empathy) in case they would opt for the criminal option, and consequently, are less inclined to choose it.

In a similar vein, people low on Agreeableness, who are more likely to experience anger and hostility when feeling "wronged", are more likely to have a lower threshold for offending. Their impatience and quick loss of temper may crowd out feelings of fear and insecurity that may be evoked by the decision situation which consequently lose their deterrent potential. But in contrast to Emotionality, we expect their response to potential crime situations to be mediated only by negative affect and not by cognitions that may temper their impulsive responses. That is, although Agreeableness has been found to be only weakly (negatively) related to sensation seeking and risk-taking behaviors (De Vries, De Vries, & Feij, 2009), we believe that higher or lower levels of Agreeableness do not make much of a difference with respect to the levels of anticipated consequences of one's actions.

In contrast to Agreeableness, we believe Conscientiousness to operate mainly through perceived risk. People high in Conscientiousness are more inclined to carefully assess the consequences of their actions, whereas people low on Conscientiousness are less likely to perceive the risks involved and to evaluate the long-term implications of their actions, and they are thus more likely to commit criminal acts. That is, although people low in Conscientiousness are more impulsive and disinhibited when it comes to risky situations (see De Vries, De Vries, & Feij, 2009) and are consequently less likely to think about the risks associated with theft, embezzlement, fraud or other criminal activities, people high on Conscientiousness are more prudent and more likely to carefully contemplate the long-term risks associated with these activities, and to more extensively

consider the potentially negative consequences (e.g., fines, social disapproval, jail and ostracism) of their actions. Note that the impulsivity implicated in low levels of Conscientiousness does not signify that people low in Conscientiousness are often in a "hot" mode. Impulsivity may be unrelated to feelings of fear, worry or anger, although the reverse may also be true (i.e., lack of control over these emotions may cause someone to act impulsively).

Honesty-Humility is expected to operate both directly on criminal decisions, through automatic (learned) behaviors, and indirectly by impacting on both negative affect and perceived risk. The direct effect of Honesty-Humility on criminal choices may come about because people low on Honesty-Humility are more likely to have acquired, from an early age on, the ability to automatically detect criminal opportunities - such as opportunities for theft – and act on them once they arise and as a consequence, these behaviors may have become habitual in nature. Honesty-Humility is also expected to be associated with negative affect. That is, 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 less likely to commit them. At the same time, they are more likely to think about the possible negative consequences of criminal decisions. In contrast to Conscientiousness, which regards thinking through the possible consequences for oneself, people high in Honesty-Humility are also more likely to consider the consequences of criminal activities for other people and society as a whole. That is, the contemplated anticipated unfairness and negative implications, not so much for themselves, but mainly for others and for society, are more likely to play a more important role for people high in Honesty-Humility than they do for people low in Honesty-Humility.

Finally, in accordance with the conceptualization of Self-Control as an interstitial trait which is aligned with Conscientiousness, Honesty-Humility, and Emotionality, we assume Self-Control to operate both directly and indirectly, through negative affect and perceived risk on criminal choice. That is, people low on Self-Control are more likely 1) to engage in impulsive risky behaviors associated with crime and, as a consequence, are more prone to habitually commit criminal acts, 2) to have lower levels of fearfulness, which is characteristic of people who exhibit less negative affect, and 3) to have lower levels of prudence and "fair play" attitudes, associated with lower levels of mental activity used for planning and thinking about the potential costs of criminal decision and hence perceived risk. The hypothesized relations, which are described earlier, are shown in Figure 1 and tested using different scenario's featuring criminal dilemmas and Structural Equation Modeling (SEM).

METHOD

Respondents and Procedure

Data were gathered through a large-scale internet panel, set up strictly for research purposes.[14] The panel consists of approximately 20,000 members and is representative of the Dutch population with respect to gender, age, education level and province of residence. To ensure representativeness, data from Statistics Netherlands are used. Panel members are invited to complete online surveys various times a year.

Data were gathered over two different waves. In the first wave, a randomly selected subsample of 2,000 Dutch adult (≥ 18 years) citizens was drawn from the panel and approached through email. In this wave, which was conducted in April 2008, HEXACO personality data were gathered. In the second wave, which was conducted 1.5 years later, in October 2009, data regarding the state and criminal choice variables were collected.

In the first wave, 68.9% of the sample (1,377 respondents; 50.2% women) responded to the call. The second wave targeted the respondents of the first wave of which 52% responded to the call. This sample therefore consisted of 716 Dutch citizens (52.8% women) ranging from 19 to 88 years with a mean age of 50.8 (sd = 14.4) who had also participated in the first wave. We decided to restrict the upper age limit for inclusion to 60 years as we felt that people beyond this age would be beyond the life stage of those whose criminal decision-making is of most interest to criminologists.[15]

By restricting ourselves to adult participants up until 60 years old, the second wave consisted of a final sample of 495 respondents (57.4% female) in the age range of 19-60 who participated in both waves. The mean age of the respondents was 43.8 (sd = 10.6) and their educational levels ranged from primary education (2.2%), lower-level secondary education (17.8%), higher-level secondary education (18.8%), lower-level tertiary education

[14] The panel is certified by the International Organization for Standardization (ISO) is a non-governmental organization that sets worldwide industrial and commercial standards. ISO certification refers to a quality mark that testifies to the adherence to a set of strict standards and norms for research panels with respect to the design and execution of research. Panel members are recruited through send-to-a-friend campaigns among existing panel members, newsletters, and lists of addresses from third parties taking part in surveys. The panel also grows autonomously by word-of-mouth. In exchange for participation, respondents received credits which can be saved and, at a later moment, be exchanged for goods.

[15] Even though the choice of 60 years is somewhat arbitrary, and an age limit of around 40 may seem more appropriate given the decline in offending over the life course, we found no differences in correlations between the independent and dependent variables for these age groups. Furthermore, we deliberately drafted scenarios that were relevant to both younger and older adults (see the discussion in the next section).

(6.1%), medium-level tertiary education (25.9%), higher-level tertiary education (17.6%), to university level education (11.7%).

To check for sample loss, we compared the original targeted sample with the final sample on a number of variables. The results indicate differences between both samples only with respect to gender; women were significantly over-represented in our sample (57.4% versus 50.2% in the original sample, $p < .001$). No differences in education were found between the two samples. In terms of province, the breakdown also closely follows that of the original sample. Finally, there were no differences on the scores on the HEXACO personality traits between the first wave and the final sample.

Scenarios

To test the trait-state model, a scenario design comprising four different scenarios was developed. The scenarios were presented as 'dilemmas' in a short introduction to the study. Each of the four dilemmas featured a description (8–12 lines) of a criminal choice situation. Respondents were asked to imagine that they were in the described situation and to answer several questions pertaining to it. To optimize ecological validity an attempt was made to design scenarios that were personally relevant to the respondents and that described relatively common, everyday criminal choice situations (e.g., illegal downloading and purchase of stolen goods). To optimize external validity, multiple scenarios were used. One of the scenarios, "A new computer", reads as follows (for the other scenarios, see Appendix):

> *Imagine the following*: You need a new computer. One of your colleagues mentioned that he bought his computer through an acquaintance for a very attractive price, about 40% below the retail value. Your colleague told you that the acquaintance has more new computers for sale that meet your criteria and that come in the original packaging. Your colleague also mentioned that the computers probably "fell off a truck" somewhere, so there is no receipt. However, you are being assured, in case problems arise with your computer within two years after purchase it will be replaced by a new one without cost so that you don't need to worry about the guarantee. Buying, possessing or selling goods of which one knows or could know that these have been obtained through a criminal act is illegal in the Netherlands, and the fine for complicity can be quite high.

Independent Variables

Each scenario was followed by items measuring anticipated punishment probability (henceforth "probability"), anticipated punishment severity (henceforth "severity"), negative affect, and the dependent variable criminal choice. For each of the constructs, we aggregated the responses on all of the scenarios to arrive at more reliable and valid measures. We used all scenarios to reduce as much as possible the influence of individual experiences, feelings, and/or cognitions vis-à-vis particular scenarios on the responses provided. Aggregating the responses on all scenarios reduces error variance and ensures a more valid estimate of the typical response to a potentially criminal situation than responses to a single scenario.

Perceived Risk Perceived Risk is a composite measure of punishment probability times punishment severity. Two items per scenario, using 7-point scales, measured punishment probability (e.g. "How likely is it that you will be caught when you buy the potentially stolen computer?" [*very unlikely-very likely*] and "How big do you think is the chance that you will be found out if you buy the computer of your colleague's acquaintance?" [*very small-very large*]). Rather than experimentally manipulating probability, respondents were asked to give their own estimate to avoid the artificiality of furnishing probabilities that respondents could find unrealistic (see Nagin and Pogarsky, 2001). The same approach was apllied to punishment severity, which was also measured by two items using 7-point scales (e.g., "How serious do you consider the possible consequences of being caught to be?" [*not at all serious-very serious*] and "How annoying do you find the potential negative consequences of buying the computer through your colleague's acquaintance?" [*not at all annoying-very annoying*]). A perceived (sanction) risk measure that reflected both probability and severity (*Probability x Severity*) was constructed by multiplying the mean scores of the probability items with the mean scores of the severity items (see Nagin & Paternoster, 1993).[16] The composite Perceived Risk measure for the four different scenarios consisted of eight items (two per scenario) each based on the Probability x Severity multiplication (multiplying the scores of the first with the second item, and the third with the fourth item). The scale, for which scores could range from 1 to 49, had an alpha reliability of .86.

Negative Affect Negative Affect was measured with five items per scenario using 7-point scales (*strongly disagree-strongly agree*). The items were preceded by the sentence: "Imagine you decide to commit/do [the offense]": "Would this situation make you feel insecure?", "Do

[16] As an alternative measure of perceived risk, we also computed a variable based on the mean scores of the probability and the severity items and correlated this sum measure and the original multiplicative measure with the other variables. The patterns are nearly identical for both measures with the multiplicative measure doing slightly better. We therefore retained the multiplicative measure for the analyses.

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).* A negative affect scale was computed based on the averaged responses on the negative affect items of the four scenarios, which resulted in a score range of 1-7. The scale had an alpha reliability of .96.

HEXACO Personality Inventory Personality was measured using the 200-item version of the HEXACO Personality Inventory Revised (Ashton & Lee, 2008; De Vries, Ashton, & Lee, 2009).[17] Each of the six HEXACO dimensions is measured by 32 items, eight per facet, on five-point (*strongly disagree–strongly agree*) scales. One interstitial facet represents Altruism. In previous studies, Principal Component Analysis (PCA) on the 24 facets representing the six dimensions revealed six main factors with eigenvalue >1, a clear break of eigenvalues after the sixth factor, and highest loading of the facets on their intended factors (De Vries, Ashton, & Lee, 2009; Lee and Ashton, 2004).[18] The HEXACO-PI-R factor scales are computed on the basis of the averaged item scores and hence have a range of 1-5. All of the alpha reliabilities of the factor scales exceeded .84 and none of the absolute correlations between the factor scales exceeded .28.

HEXACO Self-Control According to Gottfredson and Hirschi (1990), self-control is a broad individual disposition that contains impulsivity, lack of diligence and persistence, preference for physical (as opposed to cognitive) activities, risk-seeking, self-centeredness, and low frustration tolerance. This conceptualization lies at the basis of the self-control scale developed by Grasmick, Tittle, Bursik and Arneklev (1993), which is the most commonly used operationalization of the concept in crime research. In this study, we will follow this conceptualization of self-control and operationalize it as an interstitial trait in the HEXACO personality space based on various facets of different main dimensions of the HEXACO model.[19]

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[17] The 100-item version of the HEXACO Personality Inventory can be freely obtained (for research purposes) from www.hexaco.org. For information on the 200-item version, please contact the authors.

[18] Because five items of the Fairness facet of the Honesty-Humility dimension were tautological in nature for the purposes of the present research, i.e. showed predictor-criterion overlap (e.g., "I would never accept a bribe, even if it were very large"), these items were omitted from the analyses.

[19] The reason for basing the analyses on the HEXACO Self-Control operationalization instead of the Grasmick et al. (1993) scale, beyond demonstrating how self-control can be incorporated within the HEXACO personality sphere, is that when tested simultaneously in a regression analysis, the HEXACO Self-Control measure turned out be a better predictor of criminal choice (= .23, $p < .01$) than the Grasmick measure (=.12, $p = .03$), $R^2 = .10$, $F(1, 492) = 27.68$, $p < .001$.

This is done following the approach suggested by De Vries, De Vries, and Feij (2009) consisting of three steps. First, we selected the HEXACO facets that correlated most strongly with the Grasmick et al. (1993) Self-Control scale. Second, we ran regressions using these facets with Grasmick et al. Self-Control as a dependent variable. Third, we simplified the regression to the following formula in which multiplication terms were assigned to the facets on the basis of the value of the standardized regression coefficients of each facet: HEXACO Self-Control = (3*Prudence + 2*(Fairness + Modesty + Fearfulness + Flexibility) + (Social Self-esteem + Patience + Inquisitiveness + Diligence + Altruism))/16. That is, HEXACO Self-Control is interstitial in the six-dimensional personality sphere consisting of the Conscientiousness facet Prudence, the Honesty-Humility facets Fairness and Modesty, the Emotionality facet Fearfulness, and the Agreeableness facet Flexibility, and to a lesser extent of the Extraversion facet Social Self-esteem, the Agreeableness facet Patience, the Openness to Experience facet Inquisitiveness, the Conscientiousness facet Diligence, and the interstitial facet Altruism.

Dependent Variable

Criminal Choice The dependent variable, criminal choice, was measured with three items. Two items inquired about the likelihood that the respondent would choose the criminal option. In one of these items, respondents were asked to give a percentage estimate of this likelihood. The other item also inquired about likelihood, but used a 7-point scale (e.g., "How likely is it that you would decide to buy the computer of your colleague's acquaintance" [*very unlikely–very likely*]). The third item measured the degree of certainty of the criminal choice (i.e., "How certain are you about this?" [*not at all–completely*]). 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 could range from -21 to +21. Together with the percentage estimate item, this resulted in a composite criminal choice measure based on eight items (two per scenario) with a reliability of .96.

Table 4.1 Correlations of the HEXACO-PI-R scales and HEXACO Self-Control with Perceived Risk, Negative Affect, and Criminal Choice

		1	2	3	4	5	6	7	8	9	10
Mean		3.80	3.14	3.35	3.05	3.44	3.21	3.42	34.06	4.66	19.66
Sd		.49	.47	.47	.44	.40	.47	.27	20.08	1.36	9.22
1.	Honesty-Humility	-									
2.	Emotionality	.13**	-								
3.	Extraversion	-.04	-.28**	-							
4.	Agreeableness	.28**	-.15**	.12**	-						
5.	Conscientiousness	.08	-.03	.18**	.05	-					
6.	Openness to Experience	-.10*	-.17**	.24**	.06	.08	-				
7.	HEXACO Self-Control	.63**	.13**	.13**	.58**	.45**	.07	-			
8.	Perceived Risk	.26**	.21**	-.09*	.12**	.16**	-.04	.24**	-		
9.	Negative Affect	.31**	.35**	-.18**	.09*	.03	-.03	.28**	.66**	-	
10.	Criminal Choice	-.29**	-.06	.03	-.17**	-.10*	-.04	-.24**	-.52**	-.58**	-

Note. * $p < .05$, ** $p < .01$; $N = 495$

RESULTS

To test the trait-state model, we first computed the bivariate correlations between the HEXACO personality dimensions, Negative Affect and Perceived Risk, and the dependent variable Criminal Choice for the combined score of the four scenarios (Table 4.1). Honesty-Humility, Agreeableness, Conscientiousness and Self-Control were significantly correlated with Criminal Choice. No significant correlations between Emotionality, Openness to Experience, and Extraversion on the one hand and Criminal Choice on the other were found. Both Perceived Risk (i.e. Probability x Severity) and Negative Affect were strongly related to Criminal Choice.[20] Furthermore, Honesty-Humility, Agreeableness, Emotionality and Extraversion and HEXACO Self-Control were all significantly correlated with both Perceived Risk and Negative affect. Conscientiousness was related only to Perceived Risk.

Subsequently, we tested our prediction that Negative Affect and Perceived Risk mediated the relations between personality and Criminal Choice. This prediction was tested over two separate models using Structural Equation Modeling in AMOS (Arbuckle, 2007). In the first Structural Equation Model (SEM), we included the main HEXACO dimensions as trait variables but not HEXACO Self-Control. In the second model we included HEXACO Self-Control but omitted the main HEXACO dimensions. The reason for testing the predictions over separate models instead of combining them into one model is that if tested simultaneously, the overlap in facets between HEXACO Self-Control and the other HEXACO dimensions would distort the relationships between the variables in the model.

We decided to use latent variables in the SEMs in order to obtain better (e.g., disattenuated) estimates of the model's path coefficients. For each of the latent variables two parallel parcels were constructed that were used as manifest indicators. For the HEXACO variables, we included items of the half-length (100-item; see De Vries, Ashton, & Lee, 2009) version of the HEXACO variables into one parcel, and the remaining items into another parcel. Similarly, for the proximal variables and Criminal Choice, we included half of the items from the different scenarios into one parcel and the remaining items in a second parcel.

The decision in favor of the "two parallel parcels" approach instead of using individual items as manifest variables or –in the case of the HEXACO personality scales– as personality facets, was based on several considerations. First, items are known to

[20] For each scenario there were also significant correlations ($p < .01$) among anticipated punishment probability, anticipated punishment severity and criminal choice.

contain unique variance and spurious crossloadings, which is parceled out when combining them, thus ensuring more reliable indicators of a latent construct and a better approximation of normality in continuous distributed variables. Additionally, using items in models increases their complexity manifold and raises the number of degrees of freedom relative to the sample N, leading to poorer model fit (Bentler & Chou, 1987; Hagtvet & Nasser, 2004). Second, as a result of their interstitial nature, the use of personality facets often leads to the occurrence of cross-loadings which also results in poor model fit (Ashton, Lee, Goldberg, & De Vries, 2009). The procedure adopted in this study prevents cross-loadings and offers a parsimonious way of testing the effects of personality on the other variables compared with models in which all the personality dimensions are represented by the original items or facets.

To model the two-way relation between Negative Affect and Perceived Risk, we decided to allow the errors (ζ's) of the two proximal variables to covary. Furthermore, we also allowed the error terms of the Criminal Choice variable to covary. Given the fact that the wording of two of the original items was very similar and referred to the likelihood of making a criminal choice, it was proper to include this error covariance.

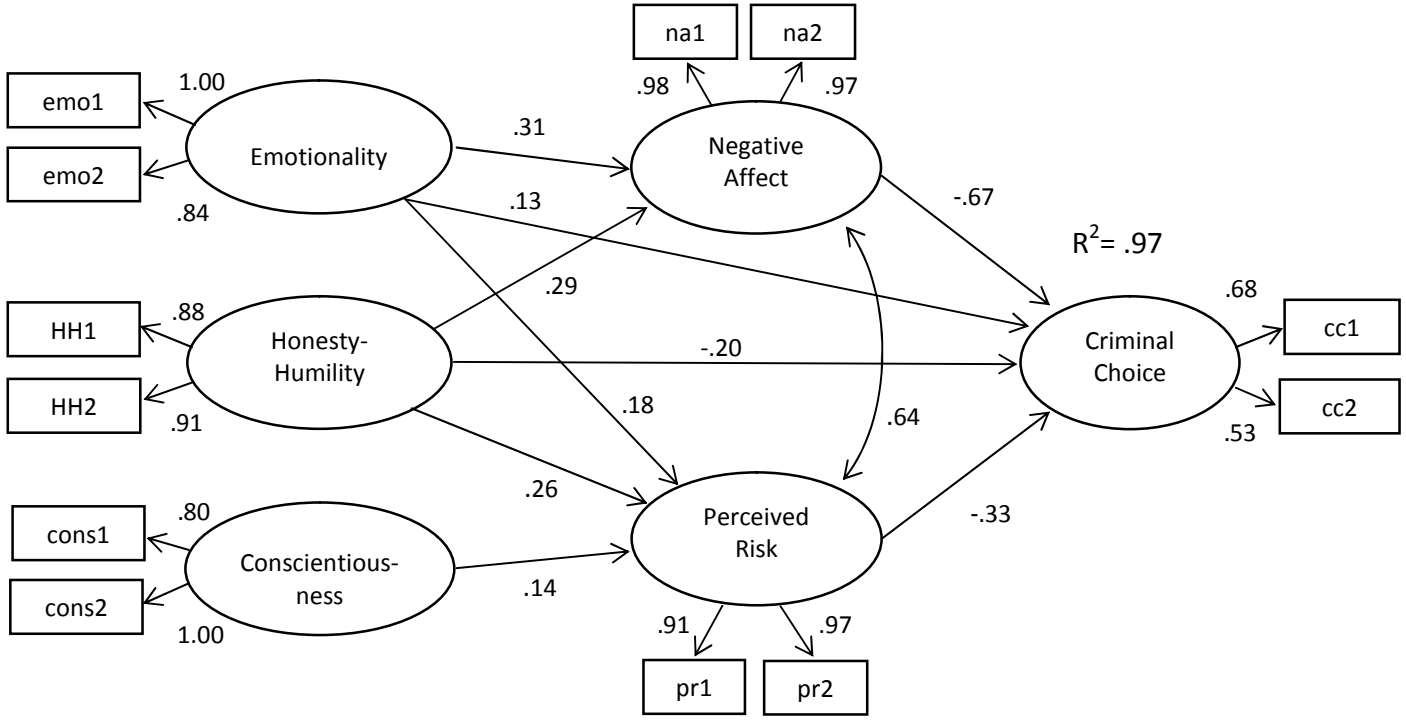
Finally, because there is no single measure that identifies a correct model given the sample data, it is good practice to report various fit indices of structural and measurement models (e.g., Gibbs, Giever & Higgins, 2003; Hoyle & Panter, 1995; Hu & Bentler, 1999; Schumacker & Lomax, 2004). For the comparative fit index (CFI), the goodness of fit index (GFI), and the Tucker-Lewis index (TLI), values close to .95 indicate good fit (Hu & Bentler, 1999; Schumacker & Lomax, 2004). For the root mean square error of approximation (RMSEA), values equal to or smaller than .05 indicate good fit (Hu & Bentler, 1999).

Model 1: Main HEXACO dimensions, Negative affect, Perceived Risk, and Criminal Choice

In Model 1 we included the HEXACO trait variables Honesty-Humility, Emotionality, Agreeableness, and Conscientiousness; the mediating proximal variables Negative Affect and Perceived Risk; and the outcome variable Criminal Choice on the basis of the hypothesized relationships (see Figure 4.1). The model, which was based on the product moment correlation matrix and maximum likelihood (ML) estimation had an adequate fit $\chi^2(df=63)=128.50$, $p<.01$; CFI=.95, GFI=.96, TLI=.92, RMSEA=.05. However, even though this model had a satisfactory fit, the standardized path coefficient from Agreeableness to Negative Affect was not significant ($\gamma=.02$, $p=.88$). We therefore decided

to remove this path from the model. Note that by removing this path, Agreeableness was completely removed from the model. The final model, containing the standardized path coefficients of the main latent and observed, i.e. manifest, variables and the errors and covariances, is shown in Figure 4.2. Ellipses in Figure 4.2 represent the latent variables, whereas rectangles represent the observed variables. This final model also had an adequate fit ($\chi^2(df=43)=100.70$, $p<.01$; CFI=.95, GFI=.97, TLI=.92, RMSEA=.05) and provided the most parsimonious representation of the relations between Criminal Choice and both the trait and state variables.

Figure 4.2 Structural Paths between the Latent Variables in the Structural Equation Model Involving HEXACO Main Dimensions, HEXACO Self-Control, Negative affect, Perceived Risk, and Criminal Choice



Note. The paths from the latent to the observed variables refer to standardized factor loadings. The double-headed arrow refers to the covariance between errors (ζ's). All error terms of the manifest variables have been omitted.

Table 4.2 Unstandardized and standardized path coefficients and significance levels for Model in Figure 4.2 (N=495)

Estimates	Unstandardized coefficients (S.E.)	Standardized coefficients
Measurement model		
Emotionality - emo1†	1.51(.05)**	1.00
Emotionality - emo2	1.00**	.84
Honesty-Humility - hones1	1.10(.09)**	.88
Honesty-Humility - hones2	1.00**	.91
Conscientiousness - consc1	.84(.03)**	.80
Conscientiousness - consc2	1.00**	1.00
Negative Affect - na1	1.00**	.98
Negative Affect - na2	.96(.02)**	.97
Perceived Risk - pr1	1.00**	.91
Perceived Risk - pr2	1.15(.04)**	.97
Criminal Choice - CC1	1.00**	.68
Criminal Choice - CC2	2.06(.15)**	.53
Structural model (direct effects)		
Emotionality → Negative Affect	1.23(.18)**	.31
Emotionality → Perceived Risk	4.29(1.12)**	.18
Emotionality → Criminal Choice	2.15(.94)*	.13
Honesty-Humility → Negative Affect	.93(.15)**	.29
Honesty-Humility → Perceived Risk	5.01(.96)**	.26
Honesty-Humility → Criminal Choice	-2.74(.80)**	-.20
Conscientiousness → Perceived Risk	2.83(.73)*	.14
Negative Affect → Criminal Choice	-2.88(.33)**	-.67
Perceived Risk → Criminal Choice	-.24(.05)**	-.33
Negative Affect → Perceived Risk	5.91(.55)**	.64

Table 4.2 (Cont.)

Structural model (indirect effects)		
Honesty-Humility → Criminal Choice	-3.86(.72)**	-.28
Conscientiousness → Criminal Choice	-.67(.26)**	-.05
Structural model (total effects)		
Emotionality → Criminal Choice	-2.39(1.21)*	-.14
Honesty-Humility → Criminal Choice	-6.59(1.36)**	-.49
Conscientiousness → Criminal Choice	-.67(.26)**	-.05

Note. $\chi^2(df=43)=100.70$, $p<.01$; CFI=.95, GFI=.97, TLI=.92, RMSEA=.05; † See Figure 4.2 for a graphical explanation of the variables.

As shown in Table 4.2 the main determinants of Criminal Choice were (in order of predictive importance) Negative affect, Perceived Risk, Honesty-Humility and Emotionality. Honesty-Humility and Emotionality were both directly and indirectly, via Negative Affect and Perceived Risk related to Criminal Choice. That is, Honesty-Humility and Emotionality were positively related to both Negative Affect and Perceived Risk, which in turn were negatively related to Criminal Choice. However, while Honesty-Humility had a negative direct effect on Criminal Choice, this effect was positive for Emotionality. Conscientiousness was only (positively) related to Perceived Risk.

The indirect effects from the personality traits to the outcome variable Criminal Choice were all significant (see Table 4.2). In other words, the effects of Honesty-Humility and Emotionality operated both through Negative Affect and Perceived Risk, and directly on Criminal Choice. Conscientiousness, however, was only indirectly related to Criminal Choice as its effect operated via Perceived Risk. Note the negative indirect of Emotionality on Criminal Choice that is countered by a positive direct effect which leads to a total effect that is near zero.

The (total) indirect effects do not speak to whether the effect between a trait and the outcome variable is mediated by either Negative Affect, Perceived Risk or by both state variables. In order to test our mediation hypotheses, i.e. to examine whether the *specific* indirect effects between the traits Honesty-Humility and Emotionality, and Criminal

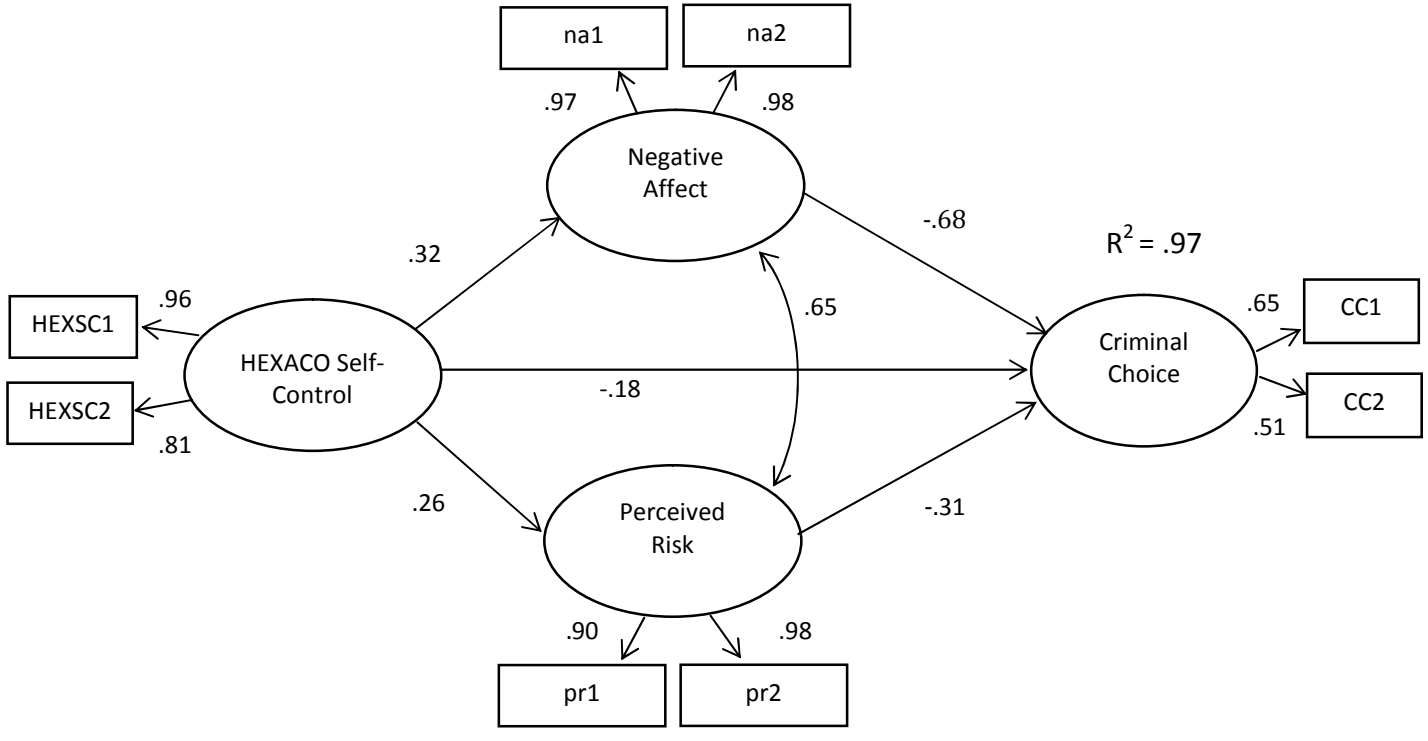
Choice are significant, we use the distribution of products approach (MacKinnon et al., 2002). This approach involves the conversion of the parameter estimates that comprise a mediation relation (e.g. from Honesty-Humility to Negative Affect, and from Negative Affect to Criminal Choice) into z-scores 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. We find that both state variables are statistically significant mediators of the relation between both Honesty-Humility and Emotionality, and Criminal Choice ($p <$ .001).

In sum, not only do Honesty-Humility and Emotionality directly affect criminal choice, but they also lead to higher levels of Negative Affect and higher Perceived Risk, both of which, in turn, are negatively related to Criminal Choice. Conscientiousness, however, only influences criminal choices indirectly through Perceived Risk. Higher levels of Conscientiousness lead to higher Perceived Risk which in turn leads to less criminal choice.

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

In the second model, we included HEXACO Self-Control as a trait predictor together with the states Perceived Risk and Negative Affect as mediators of the relation between HEXACO Self-Control and Criminal Choice (Figure 4.3). We employed an analysis strategy analogous to the one used for the previous model again basing the SEM model on the product moment correlation matrix and using ML estimation. This model showed a very good fit ($\chi^2(df=14)=38.20$, $p<.01$; CFI=.99, GFI=.98, TLI=.99, RMSEA=.06).

Figure 4.3 Structural Paths between the Latent Variables in the Structural Equation Model Involving HEXACO Self-Control, Negative Affect, Perceived Risk, and Criminal Choice



Note. The paths from the latent to the observed variables refer to standardized factor loadings. The double-headed arrow refers to the covariance between errors (ζ's). All error terms of the manifest variables have been omitted.

Table 4.3 Unstandardized and standardized path coefficients and significance levels for Model in Figure 4.3 (N=495)

Estimates	Unstandardized coefficients (S.E.)	Standardized coefficients
Measurement model		
Self-Control - HEXSC1†	1.23(.12)**	.96
Self-Control - HEXSC2	1.00**	.81
Negative Affect - na1	1.00**	.97
Negative Affect - na2	.97(.02)**	.98
Perceived Risk - pr1	.86(.03)**	.90
Perceived Risk - pr2	1.00**	.98
Criminal Choice - CC1	1.00**	.65
Criminal Choice - CC2	2.08(.15)**	.51
Structural model (direct effects)		
Self-Control → Negative Affect	1.87(.27)**	.32
Self-Control → Perceived Risk	10.88(1.94)**	.26
Self-Control → Criminal Choice	-4.40(1.41)**	-.18
Negative Affect → Criminal Choice	-2.88(.32)**	-.68
Perceived Risk → Criminal Choice	-.18(.05)**	-.31
Negative Affect → Perceived Risk	7.71(.67)**	.65
Structural model (indirect effects)		
Self-Control → Criminal Choice	-7.39(1.28)**	-.30
Structural model (total effect)		
Self-Control → Criminal Choice	-11.79(1.94)**	-.48

Note. $\chi^2(df=14)=38.20$, $p<.01$; CFI=.99, GFI=.98, TLI=.99, NFI=.99, RMSEA=.06; †See Figure 4.3 for a graphical explanation of the variables.

The results in Table 4.3 indicate that Self-Control is both directly and indirectly related to Criminal Choice. Again using the method proposed by MacKinnon et al. (2002) based on the product of coefficients ($\tilde{\gamma}_\alpha\tilde{\gamma}_\beta$) as a test for significance of the specific indirect effects, we find that both state variables are statistically significant mediators of the relation between Self-Control and Criminal Choice ($p < .001$). In sum, having more Self-Control leads to higher Perceived Risk and more experienced Negative Affect which in turn are negatively related to Criminal Choice. Furthermore, there is also a direct negative effect of Self-Control on Criminal Choice.

As a final step in the analyses, we compared a model with HEXACO Honesty-Humility, Emotionality, Conscientiousness, and HEXACO Self-Control (Model 1) with a model with the three main dimensions but without Self-Control (Model 2) and a model with only HEXACO Self-Control (Model 3) to examine the parsimony of both the HEXACO model without Self-Control and the Self-Control model without the other HEXACO variables. Because HEXACO Self-Control is made up of facets of the other main dimensions, we included four error covariances between HEXACO Self-Control and the other manifest variables in the SEM. In Model 2, we set all path coefficients linking Self-Control to the mediators and the outcome variable to zero. In Model 3, we did the same for the other HEXACO variables while freeing up the path coefficients from HEXACO Self-Control. Subsequently, we compared the fit of the three models (Model 1: $\chi^2(df=56)=123.16$, $p<.01$; CFI=.95, GFI=.96, TLI=.92, RMSEA=.05; Model 2: $\chi^2(df=59)=131.18$, $p<.01$; CFI=.95, GFI=.96, TLI=.92, RMSEA=.05; Model 3: $\chi^2(df=63)=188.21$, $p<.01$; CFI=.91, GFI=.95, TLI=.87, RMSEA=.06). The difference between Model 1 and Model 2 was just significant ($\Delta\chi^2(df=3)=8.02$, $p=.05$), indicating that the HEXACO model without Self-Control bordered on being better than a model with Self-Control. However, the Self-Control model without the other HEXACO variables was significantly worse than a model which included the HEXACO variables ($\Delta\chi^2(df=7)=65.05$, $p<.01$). Additionally, the Bayesian Information Criterion (BIC), which takes into account the parsimony of the model, was lower in Model 2 (BIC = 416.59) than in the Model 3 (BIC = 448.80), showing that the HEXACO model without Self-Control had a better relative fit than a comparable model with Self-Control but without the other three HEXACO variables.

DISCUSSION

As in previous studies that have examined the relation between individual dispositions and delinquent behavior (see e.g., Miller & Lynam, 2001), we found Conscientiousness,

Agreeableness, and Self-Control to be correlated with criminal choice. Furthermore, the Honesty-Humility dimension of the HEXACO model, which is not represented in other models of personality, turned out to be the strongest personality correlate of criminal choice. Honesty-Humility, it will be recalled, refers to individual differences in the proactive willingness to use others for personal gain and includes self-enhancing and immoral behaviors, such as greed and immodesty and active violations of social norms through insincerity and unfairness.

This finding ties in with research that links morality (i.e. reflections of what is right and wrong with respect to values and conduct [e.g., Wikström, 2004]), and egoism (i.e. the excessive concern with one's own pleasure or advantage at the expense of community well-being [De Vries, Ashton, & Lee, 2009; De Vries, De Vries, De Hoogh, & Feij, 2009; Weigel, Hessing, & Elffers, 1999]), to criminal behavior. However, Honesty-Humility carries the advantage over these other measures in that it is integrated in a broader structure of personality, instead of being an isolated trait. This finding provides insight into how it is related to personality in general, which implies greater precision in terms of the psychological processes at stake compared with isolated measures.

A similar point can be made regarding the HEXACO operationalization of Self-Control. An important strength of the HEXACO model is that it offers a broad conceptualization of personality that encompasses both the Big Five/FFM dimensions and Self-Control and locates the latter within the broader personality space. Although it has been shown previously that the main crime-related element of Self-Control is primarily associated with Big Five/FFM Conscientiousness (Romero, Gómez-Fraguela, Luengo, & Sobral, 2003), common operationalizations of Self-Control in crime research suggest that it is actually an interstitial trait based mainly on facets from Honesty-Humility, Conscientiousness, and Agreeableness (cf. De Vries, De Vries, and Feij, 2009 – see also the correlations in table 1 of HEXACO Self-Control with the other HEXACO scales). The results of the present study support this broader notion of Self-Control and as such contribute to our understanding of the precise nature of this concept.

We hypothesized perceived risk of sanction and negative affect to mediate the personality-crime relation drawing from dual-process models of information processing. Indeed, both variables were found to mediate the effects of the personality dimensions Emotionality, Honesty-Humility, and Self-Control on criminal choice. Individuals scoring high on Honesty-Humility were both more inclined to feel negatively about the consequences of a criminal choice and to perceive risk of sanction as higher than low scorers. The same effect was found for Emotionality. For Self-Control too, high scorers reported higher levels of negative affect, and perceiving higher risk of sanction. In terms of the dual-process model discussed in the introduction, this means that Honesty-Humility,

Emotionality and Self-Control operate both through the hot mode and the cool mode of information processing. For Conscientiousness, only perceived risk of sanction mediated the relation with criminal choice. Note that while Conscientiousness was only indirectly related to Criminal Choice, Honesty-Humility, Emotionality and Self-Control also operated directly on it. One remarkable finding with respect to Emotionality should be noted. As hypothesized, we found an indirect negative effect of Emotionality on Criminal Choice. However, the direct effect of Emotionality on Criminal Choice was positive in nature. Although caution is advised when interpreting the positive effect, we speculate that people scoring high on Emotionality, i.e., who exhibit a greater tendency to be worried, fearful, sentimental and dependent, may –out of fear of criminal-minded others or to please them– in some instances be more likely to engage in certain types of illegal behavior.

It could be argued that the high correlation between perceived risk and negative affect suggests that these are highly similar constructs. Note, however, that there are differences in the extent to which personality explains both and also in the extent to which Criminal Choice is explained by each. These differences underscore our argument regarding the fact that these are different variables and the necessity of differentiating between the two in models of criminal decision making. The stronger relation between negative affect and criminal choice compared with perceived risk of sanction suggests that the former may more often cue the ultimate behavioral response in a criminogenic situation than the latter.

It is interesting to note that these effects were found using scenarios describing criminogenic situations that actually invite deliberation and the making of cost-benefit assessments (e.g., insurance fraud and illegal downloading). Future studies should address situations where this is less likely or evident and in which divergence between emotional appraisals and cognitive risk assessments is more plausible and larger. It seems, for example, likely that impulsive "hot" crimes (i.e. crimes associated with a high level of affective arousal, such as certain sexual offenses [e.g., date rape], violence-related offenses [e.g., road rage, retaliation], hot-blooded murders [e.g., crimes of passion], and offenses committed by craving drug addicts [e.g., street robbery] make poor candidates for deterrence precisely because they require individuals to take into consideration the long-term consequences of their actions whereas intense emotional states, drugs and sexual arousal all operate to confine attention to the immediate present. In each of these situations, the immediate benefits and long-terms costs of behavior are negatively correlated and the benefits appeal to and work on feelings (e.g., sexual gratification and quenching a thirst for revenge) whereas the consideration of the potential costs of rule violation is a cognitive exercise for the most part. For example, Wright and Decker (1994,

p. 61) in their study on burglars and street life write that "the offenders, at the time of actually contemplating offenses, typically perceived themselves to be in a situation of immediate need [which] has at least two important implications. First, it suggests a mind-set in which they were seeking less to maximize their gains than to deal with a present crisis. Second, it indicates an element of desperation which might have weakened the influence of threatened sanctions and neutralized any misgivings about the morality of breaking into dwellings". Conversely, crimes committed in an emotionally neutral state belong to the domain of rational, cold, processing and should be, we believe, more susceptible to be influenced by anticipated sanctions.

One of the advantages of an approach, such as the hot/cool approach advocated in this study, that can examine the influence of feelings alongside rational and cognitive considerations is its ability to shed light on what specific delinquent behaviors can be deterred by altering the balance in the cost-benefit equation of such behaviors, and what kinds of behavior are less susceptible to such influence. For crimes that are intimately related to feelings, impacting the cost-benefit calculus is unlikely to generate much effect as affect, which implicates hot processing, is relatively irresponsive to rational and cognitive considerations such as punishment probability and severity.

Examined in conjunction with a structural model of personality, such as the HEXACO model, it becomes clear that questions regarding what aspects of personality are particularly susceptible to what type of influence, and what aspects of personality are not, can be addressed. For example, individuals dispositionally low in Emotionality are unlikely to be deterred by simply increasing the severity of a sanction or its probability. For these individuals, behavioral interventions that also aim to sensitize them to experiencing negative affect and the risks associated with their unlawful actions may form a productive complementary strategy. A similar point can be made for Honesty-Humility and Self-Control, which operate both indirectly and directly on Criminal Choice. Furthermore, if Honesty-Humility is the main correlate, interventions should also be aimed at instilling (moral) awareness, promoting greed avoidant behaviors, and diminishing self-centeredness. For Conscientiousness, the reverse appears to be the case: as willful offenders, individuals low in Conscientiousness may be sensitive only to sanction severity and probability.

In criminology, trait and state factors have generally been examined in isolation. Most situational, or state, perspectives, such as rational choice theory, routine activities theory (Cohen & Felson, 1979; Felson, 2006), deterrence, and situational crime prevention (Clarke, 1997), are based on behavioral models that posit a rational offender but generally do not address offender characteristics or affect, let alone scrutinize the ways in which they may be interrelated. A similar point can be made about theories that look at individual

differences; only rarely do proximal factors receive extensive treatment in these perspectives. Yet, as was remarked in the introduction, the fact that there may be stable differences between individuals in terms of their criminal propensity does not exclude the possibility that potential offenders are insensitive to the perceived attractions and deterrents of crime (Nagin & Paternoster, 1993). Furthermore, it is unlikely that situational factors exert the same influence on individuals regardless of their psychological make-up. In other words, instead of incompatible, trait and state perspectives are actually complementary and therefore the two need to be integrated in models that attempt to explain crime. Previous models (e.g., Nagin & Paternoster, 1993; Piquero & Tibbetts, 1996) focusing on differences in individual disposition in combination with proximal states were generally restricted to rational choice variables and self-control. The trait-state model presented and tested in this chapter broadens our current knowledge by using a new model of personality, the HEXACO model, and by including state affect next to rational choice considerations as predictors of crime.

Having said that, we consider this study to be only an initial step in the development of a comprehensive trait-state model of criminal decision-making. As such the study was also prone to a number of limitations that should be kept in mind when considering the results. Firstly, we opted for a scenario method as this allowed us to link personality to state variables and intentions to offend in a single model. We recognize that a weakness of this method is that it measures behavioral intentions rather than actual behavior. However, provided certain conditions are observed there is a high correlation between a person's intention to perform a behavior and his actual performance of that behavior (Fishbein & Ajzen, 1975, see also: Nagin & Paternoster, 1993). These conditions are the degree to which the intention to behave is measured with the same specificity as the behaviour that is being predicted, the stability of the expressed intention, and, the degree to which the individual is able to wilfully carry out the intention (Nagin & Paternoster, 1993, pp. 473-474). The scenarios we developed for this study were developed with these criteria in mind.

Another limitation of this study is that the research population consisted of a community sample, instead of an offender population, which implied that the scenarios were not about severe antisocial behavior, but about relatively common everyday crimes instead. This poses limits on the generalizability of the results, such as how personality plays out in the case of persistent offenders. As a next step, it is commendable to test the model among an offender population instead of a community sample, and for offenses more serious than the ones used in this study. Determining whether the structural properties and correlates of the variables used are similar in offender and community

samples can shed light on whether similar or dissimilar psychological processes are at play in these different populations (Ručević, 2010).

Additionally, this study addressed a prevalent and important type of affect with respect to criminal decision making, i.e. feelings of fear and insecurity triggered by the decision situation, but not other types of affect that are also likely to play a role such as excitement, thrills, and anger. The correlations between personality, affect and crime will depend on the type of affect under study. Therefore, in order to generate a more encompassing view of the role of feelings on criminal decision making, future research should address other types of affect.

To conclude, we concur with Miller and Lynam (2001) that more specificity in the outcome variable is also warranted in future research on the personality-crime relationship, which should examine what particular aspects of personality are more strongly related to what specific type of crime. For example, even though some authors have contended that a lack of self-control is equally related to virtually all types of crime (Gottfredson and Hirschi, 1990), and that beyond self-control few dimensions of personality are useful in the explanation of crime (Hirschi, 2004), it is not unlikely that Honesty-Humility is more strongly correlated with those types of crime in which financial self-enhancement plays a role, such as fraud and white-collar crimes, whereas self-control is a more important correlate of crimes in which impulsivity and intense emotions are at stake.

Furthermore, disentangling the different elements of self-control implies that future research can obtain a better grasp of what specific aspects are related to which specific types of crime and at what point during the life-cycle certain aspects bear stronger relations than others (see also Jones, Miller & Lynam, 2012). The use of different traits in an encompassing model of personality instead of one unitary personality concept opens up the possibility of differentially predicting specific types of offenses, something that the single self-control concept has been unable to do. Establishing meaningful relationships between specific traits and specific types of offenses could, besides providing important theoretical input, also imply an important step forward in the treatment of offenders. Exploring these questions in more detail, we think, will make for a productive line of future empirical inquiry and a welcome step in the further development of trait-state models of criminal decision making.

APPENDIX

Summer holiday

Imagine the following: You are on holiday with friends at a sunny destination on the Mediterranean Sea and are greatly enjoying your stay there. Your new fancy camera was stolen when you were distracted upon arrival in your hotel, but you immediately reported the theft to the local authorities and sent the police report to your insurance company. The company let you know that theft is fully covered and immediately transferred the money to your bank account.

The friends with whom you are on holiday have decided to stay a week longer before returning home. You would very much like to stay too, but you financial situation doesn't really allow it. Then, at the end of your holiday, your camera is returned to you by hotel staff. Even though you should report this to your insurance company and transfer the money back to them, you can stay a week longer on holiday if you don't, since you would have enough money to cover the additional holiday expenses. If your insurance company detects fraud, this will lead to legal prosecution. You are faced with the choice to either report to your insurance company that you got your camera back and transfer the money you have received in compensation for the theft back to the company, or not to do so and stay on at your holiday destination for one more week.

Downloading

Imagine the following: You need a particular computer program for a personal project. The program costs about €100. You consider buying the program but you think you won't be using it anymore after finishing the project, and therefore hesitate about buying it. A colleague has explained to you where and how 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 sampling and report it to the authorities. This has already led to the prosecution of a significant number of individual users.

Leak

Imagine the following: A part of your house needs a rather urgent paint job due to a leak. You have asked for various quotations from different painting businesses and these turned out to be rather high; about twice your household's monthly income. When you mentioned this to one of your colleagues recently, he told you about some experienced illegal Polish painters who would be able to do the work illegally for about half the money and offer the same quality as the regular Dutch painting businesses. The Polish painters do not have a

work permit in the Netherlands and the work would therefore have to be done illegally. Because part of the work has to be done on the outside of your house, it could be noticed. The labor inspection has recently announced that it will check more intensively for illegal labor with private individuals and the number of inspectors in your area has been increased. If the labor inspection ascertains that you have employed illegal workers, it leads to a fine, and taxes are added to the work. In short, you face the choice to have the work done illegally by the Polish painters or legally by a Dutch firm.

5 RATIONAL MISBEHAVIOR? EVALUATING AN INTEGRATED DUAL-PROCESS MODEL OF CRIMINAL DECISION MAKING[21]

Abstract

Drawing from recent research and theorizing (Van Gelder, 2012; Van Gelder & De Vries, 2012a), we tested and found support for 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. In Study 1, negative state affect, i.e. feelings of fear 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 when deciding on whether or not to make a criminal choice. We found processing mode to moderate the relations between negative affect and perceived risk and criminal choice. In conjunction, these results contribute to a new and emerging integrative approach to criminal decision making linking stable individual traits to proximal states that operate in the moment of decision making.

[21] Based on Van Gelder & De Vries (2012b)

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, why individuals without the assumed risk factor also offend, and why individuals determined to abstain from crime at one moment, become determined to commit it the next (Jacobs & Wright, 1999, p. 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 & 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 & Sampson, 1993; Nagin & Paternoster, 1993, 1994; Nagin & Pogarsky, 2003; Piquero & Tibbetts, 1996; Van Gelder & De Vries, 2012a). In this chapter we intend to contribute to these emerging integrative perspectives by using insights from personality psychology and information processing theories common in the cognitive sciences.

In particular, we extend proximal, 'state', perspectives on crime by also examining the role of negative feelings in the decision process drawing from the recently proposed hot/cool perspective on criminal decision making (Van Gelder, 2012). We add to the distal, 'trait' perspective by examining not only crime's most commonly researched individual-level correlate, self-control, but by also looking at the role of morality in crime causation. 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: RATIONAL CHOICE, COGNITION AND AFFECT

Traditionally, rational choice-based theories of crime 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. Becker, 1968; Clarke & Felson, 2004; Cornish & Clarke, 1986;

Nagin & Pogarsky, 2001). The behavioral model underlying these theories is based on the notion 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. Situational crime prevention, for example, tends to focus on opportunities to play out criminal intent starting from the idea that everybody is able to imagine the anticipated benefits of rule transgression (cf. Clarke, 1997). Opportunities with lower costs will be preferred over opportunities with higher costs, and for some opportunities anticipated cost may be outweighed by the benefits and hence result in decisions to commit crime. In a similar vein, routine activity theory (Cohen & Felson, 1979) also assumes offenders to make calculations regarding the likelihood of success in criminal acts (Clarke & Felson, 2004). Focusing on the cost side of the equation, deterrence frameworks assume that would-be offenders can be dissuaded from committing crime by increasing its costs, and are therefore also consistent with the central premises underlying rational choice (Nagin, 1998).

While these approaches envision the decision process as a largely cognitive enterprise in which feelings play little role, examples that suggest that affect is a likely correlate of delinquency easily come to mind. Acts of vigilantism, road rage, lashing out at someone following a derisive remark, sexual assault and crimes of passion, are all acts that tend to be committed in states of emotional arousal, potentially leading individuals to lose control up to the point of acting directly contrary to their self-interest. The notion that some behaviors are more emotional and less volitional than others has also intuitively been grasped by our criminal justice systems. The 'crime passionel', for instance, tends to be less severely punished than premeditated, cold-blooded murder.

In two studies we intend to demonstrate that feelings also play a fundamental role in situations that do not evoke intense emotions and may also guide behavior in seemingly calculating crimes. We will argue that by explicitly incorporating feelings *alongside* rational considerations such as benefits and costs, models of criminal decision making can significantly enhance their explanatory scope. A first step in understanding how feelings operate with respect to criminal decision making is by distinguishing affective from cognitive appraisals.

Affect and cognition

Part of the merit of differentiating between cognitive and affective evaluations of a criminal prospect resides in the fact that feelings operate according to a different logic

than, and may decouple from, cognitive estimates (Van Gelder, 2012). Emotions, for example, are much less sensitive to changes in probabilities and outcomes of a prospect, the two central input variables of rational choice and deterrence models, than cognitive evaluations (Frijda, 1988; Loewenstein, et al., 2001). One's emotional reaction to a potential fine of $50, for instance, may not differ much from that to a fine that is 50% higher. Emotions *are*, in turn, influenced by variables that play only a minor role in cognitive evaluations, such as the time interval between the decision and the realization of its outcome, or the degree to which a risk or situation is familiar or perceived as controllable (Loewenstein, et al., 2001). For example, a first-time delinquent will probably experience more fear than a persistent offender when contemplating a robbery (regardless of the actual chance of apprehension). Another crucial difference regards the fact that while cognitions can be evaluated for their correctness, i.e. tradeoffs between costs and benefits may be considered as 'bad' or inadequate, affect cannot be tested in terms of its accuracy or validity (Zajonc, 2000). Emotions simply *feel* valid (Frijda, 1988).

Indeed, if feelings are predictive of human decision making, this could provide at least part of the explanation of why deterrence only has a modest effect (cf. Nagin, 1998) and why rational choice and utility models often have limited predictive value (cf. Loewenstein, 1996). It could also add to our understanding of the rather paradoxical finding that people who commit certain types of crime engage in behavior that yields only modest benefits at the risk of incurring much more serious costs, something that is generally attributed to individual differences in the ability to exert self-control (Hirschi & Gottfredson, 2001).

THE TRAIT PERSPECTIVE: SELF-CONTROL AND MORALITY

Self-control

According to Gottfredson and Hirschi (1990), individuals low in self-control 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 & Gottfredson, 2001; Wilson & Herrnstein, 1985). In this sense, the self-control perspective is compatible with rational choice-based perspectives as both assume the choice for crime to result from cost-benefit tradeoffs, the difference being that the latter is a state perspective explaining *crime,* whereas self-control theory is a trait perspective explaining *criminality* (Gottfredson & Hirschi, 1990). Conceptually, this means that the self-control-crime relation operates at least in part indirectly on crime

through altered perceptions of the associated costs and benefits of criminal action. Empirical support for the assertion that low self-control reduces the effects of anticipated formal and informal sanction costs, comes from Nagin and Paternoster (1993, 1994), Piquero and Tibbetts (1996), Nagin and Pogarsky (2001), and recently, Van Gelder and De Vries (2012a).

We think that self-control may also operate on crime in another indirect way, and that is by reducing negative feelings evoked by a criminogenic situation that normally operate as a constraint on delinquent behavior. Gottfredson and Hirschi (1990), for instance, argue that individuals low in self-control find criminal acts exciting and thrilling and enjoy taking risks. Therefore, we assume these individuals to experience less feelings of fear when considering a criminal prospect which makes them more likely to engage in delinquent behavior also for this reason (Van Gelder & De Vries, 2012a). Indeed fearfulness has been shown in research to be an important predictor of sensation seeking behavior (De Vries, De Vries & Feij, 2009). Other psychological research has also highlighted the affective dimension of self-control (e.g. Baumeister & Heatherton, 1996; Loewenstein, 1996; Metcalfe & Mischel, 1999; Mischel, Cantor, & Feldman, 1996; Tangney, Baumeister, & Boone, 2004). Furthermore, the insensitivity to the suffering of others associated with low self-control is also likely to mute feelings of fear and worry when contemplating an offense. In short, we expect individuals low in 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 & 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 the urge for immediate gratification that typifies individuals low in self-control is also reflective of time-stable habitual responses to engage in crime (Gottfredson & Hirschi, 1990).

Morality

While self-control has been extensively researched by criminologists (see e.g. Pratt & Cullen, 2000), another important, yet less researched, correlate of criminal behavior is

morality (Antonaccio & Tittle, 2008; Van Gelder & De Vries, 2012a; Wikström, 2006). Various studies employing rational choice and deterrence frameworks have, for example, found moral emotions such as anticipated regret or shame to be negatively related to offending (Bachman, Paternoster, & Ward, 1992; Grasmick & Bursik, 1990; Nagin & Paternoster, 1993, 1994; Paternoster & Simpson, 1996; Piquero & Tibbetts, 1996). Furthermore, various scholars have noted (e.g. Etzioni, 1990; Hart, 1961/1994), 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.

Our approach to morality differs somewhat from these approaches. We examine morality as an enduring individual disposition to think, feel and behave according to a set of implicit and explicit moral guidelines. As a dispositional measure of morality we use the Honesty-Humility personality trait, which is incorporated in the recent six-factor HEXACO personality structure (Lee & Ashton, 2004).[22] 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 & Ashton, 2004).

Van Gelder and De Vries (2012a) 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 behavioral criteria related to crime such as psychopathy, Machiavellianism, egoism, immorality, pretentiousness, unethical decision making, and employee integrity (Ashton & Lee, 2005; De Vries, De Vries, De Hoogh, & Feij, 2009; De Vries & Van Kampen, 2010; Lee & Ashton, 2004). Recently, Honesty-Humility was also found to be an important predictor of criminal choice and self-reported delinquency (De Vries & Van Gelder, 2012; Van Gelder & De Vries, 2012a).

We expect Honesty-Humility to be directly related to individuals' tendency to make criminal choices as 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. We also expect Honesty-Humility to be indirectly related to criminal choice by impacting both the perception of risk and the negative feelings evoked by a situation. That is, we expect individuals low in Honesty-Humility to be more focused on the material benefits of a (criminal) prospect to the detriment of considering the potential negative

[22] The properties of the HEXACO personality structure are elaborated on in the Method section.

consequences of their actions and hence to impact the cost-benefit calculation that precedes criminal decisions. Furthermore, 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 evoked by 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 & De Vries, 2012a).

THE PRESENT RESEARCH

In two studies we test the hypothesis that dispositional self-control and morality relate to criminal decision making via different mental pathways, a cognitive one and a more affective one. In Study 1, using a vignette design comprised of two scenarios describing different types of crime, insurance fraud and illegal downloading, we examine the effects of the traits Honesty-Humility and self-control on criminal choice hypothesizing that both are directly as well as indirectly, via the states perceived risk of sanction and negative affect, related. Study 2 replicates these findings but additionally examines the hypothesis that the state mediators operate via different mental processing paths, a 'cool' cognitive mode and a 'hot' affective mode as suggested by Van Gelder (2012). In other words, Study 2 examines to what extent processing mode moderates the relations between negative affect and perceived risk on the one hand, and criminal choice on the other. Both studies employ Structural Equation Modeling (SEM) to model and test the hypothesized relations.

METHOD

Participants and procedure

A total of 153 undergraduate psychology students (69.9% female, M_{age} = 20.4, age range: 17-34 years) participated. The students were approached by email and asked to participate in a short study about dilemmas. Clicking on a link in the email took them directly to the survey. In exchange for participation, they were entered in a raffle in which they could win €50,-. Personality data of the participants had been gathered prior to the study 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, Ashton & Lee, 2009; Lee & Ashton, 2004). The HEXACO model builds on and extends the well-known Big Five and Five-Factor models (Goldberg, 1990; Costa & McCrae, 1992). With several modifications (see Lee & Ashton, 2004), the HEXACO model incorporates the same five main personality dimensions as the Big Five and Five-Factor models, i.e. Emotionality Extraversion, Agreeableness, Conscientiousness, and Openness to Experience but also contains the additional trait Honesty-Humility (Ashton et al., 2004; Ashton & Lee, 2008; De Vries, Ashton, & Lee, 2009). [23]

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.[24] Each facet is measured by four items on 1-5 (*completely disagree-completely agree*) scales. One interstitial facet represents Altruism.

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., 2009; De Vries et al., 2008; Lee and Ashton, 2004). Internal consistency alpha reliabilities ranged from .79 (Extraversion) to .83 (Conscientiousness, Openness to Experience). None of the absolute correlations between the factor scales exceeded the .30 level. Scale descriptives are presented in Table 5.1.

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[23] Emotionality and Agreeableness are rotational variants of the Neuroticism and Agreeableness dimensions of the Big Five model respectively (see Lee & Ashton, 2004).

[24] 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. This version includes additional Fairness items that do not show this overlap.

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 (2012a) showed that self-control can be conceived of as an interstitial construct, i.e. pertaining to blends of various factors, in the six-dimensional personality space of the HEXACO model. We followed the procedure used by Van Gelder and De Vries (2012a) to construct a HEXACO Self-Control measure, which is based on the self-control scale developed by Grasmick et al. (1993), 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. These elements are impulsivity, desire for simple tasks, risk seeking, preference for physical activity, self-centeredness, and temper.

To construct HEXACO Self-Control, Van Gelder and De Vries (2012a) 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. The HEXACO Self-Control scale had an alpha reliability of .74.

Scenarios Two scenarios, adapted from Van Gelder and De Vries (2012a), 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.

Table 5.1 Correlations of the HEXACO-PI-R, HEXACO Self-Control, Perceived Risk, Negative Affect and Criminal Choice (Study 1)

		1	2	3	4	5	6	7	8	9	10
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
1.	Honesty-Humility	-									
2.	Emotionality	.18*	-								
3.	Extraversion	-.02	-.13	-							
4.	Agreeableness	.28**	-.14	.04	-						
5.	Conscientiousness	.19*	.11	.06	.02	-					
6.	Openness to Experience	-.01	-.14	.03	.17*	.12	-				
7.	HEXACO Self-Control	.66**	.24**	.10	.44**	.61**	.06	-			
8.	Perceived Risk	.19*	.07	.12	.07	.14	.11	.23**	-		
9.	Negative Affect	.25**	.23**	.01	.10	.23**	-.00	.32**	.68**	-	
10.	Criminal Choice	-.38**	-.17*	-.10	-.02	-.16*	-.04	-.32**	-.57**	-.60**	-

Note. * $p < .05$, ** $p < .01$; $N = 153$

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.

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 when 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 perceived (sanction) risk scales were constructed by multiplying the scores of the probability items with the mean scores of the severity items (multiplying the scores of the first with the second item, and third with the fourth item (Nagin & Paternoster, 1993; Van Gelder & De Vries, 2012a). The composite Perceived Risk scale for the two scenarios consisted of the mean scores of 4 items (2 per scenario) each based on the probability x severity multiplication. Higher scores on the scale reflect higher perceived risk. The alpha reliability of the scale was .81.

Negative Affect Negative affect was measured with five items per scenario using 7-point Likert scales. The items, preceded by the sentence: 'Imagine you decide to do [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 (2012a), 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 used a percentage estimate to measure 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

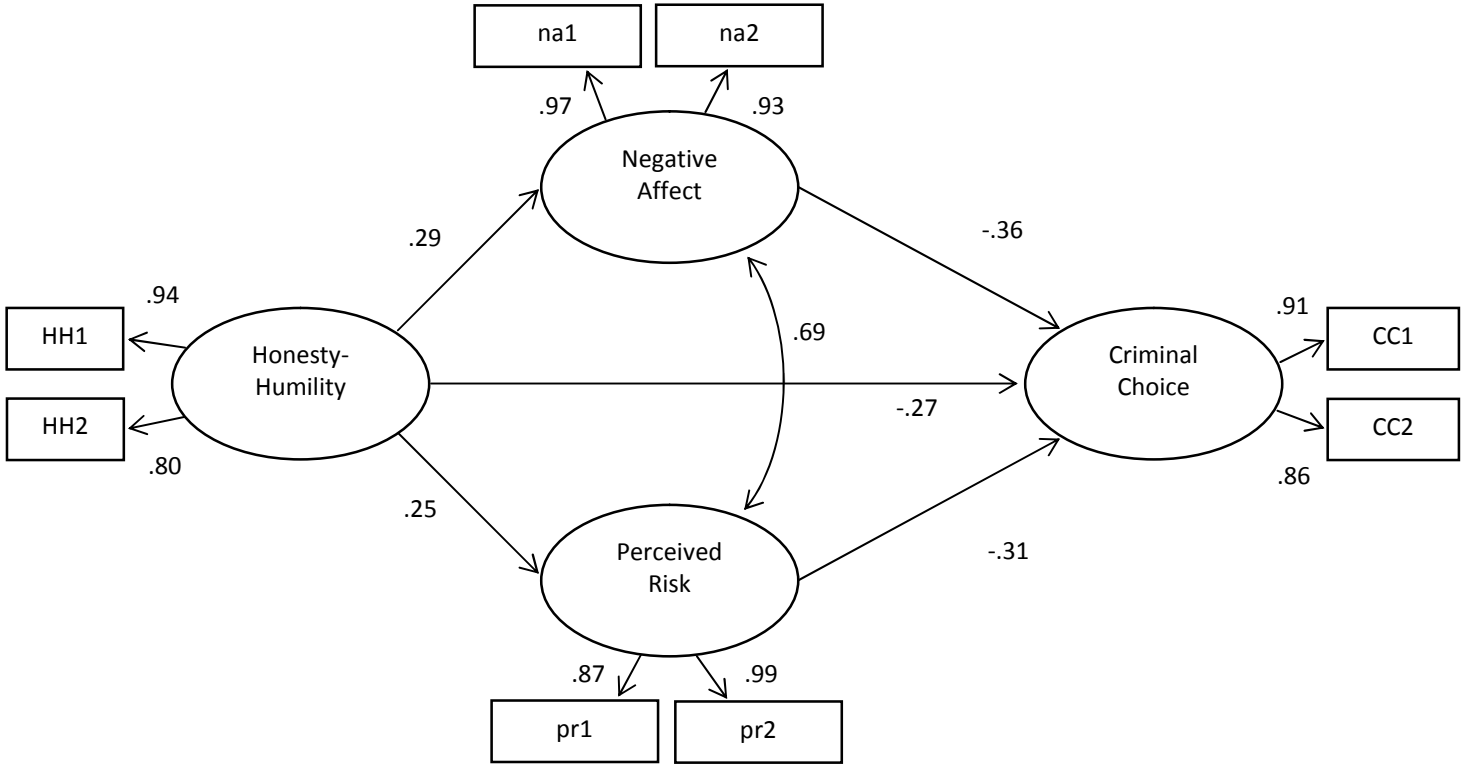
We first computed the bivariate correlations between HEXACO personality, Perceived Risk Negative Affect, and Criminal Choice (Table 5.1). For HEXACO personality, means and standard deviations were highly similar to the means and standard deviations obtained in previous samples (see De Vries et al., 2008; De Vries & Van Kampen, 2010). Honesty-Humility, Emotionality, Conscientiousness, HEXACO Self-Control, Perceived Risk and Negative affect were significantly negatively correlated with Criminal Choice, which also corresponds with findings reported in prior research (Miller & Lynam, 2001; Van Gelder & De Vries, 2012a).

Table 5.2 Stepwise Regression in the Prediction of Criminal Choice using the HEXACO-PI-R Main Dimensions and HEXACO Self-Control (Study 1)

	Step 1	Step 2		Step 1	Step 2
Honesty-Humility	-.38**	-.28**			
Emotionality	-.11	-.02			
eXtraversion	-.12	-.07			
Agreeableness	.09	.12			
Conscientiousness	-.07	.02			
Openness to Exp.	-.06	-.04	HEX. Self-Control	-.32**	-.14*
Perceived Risk		-.27**	Perceived Risk		-.30**
Negative Affect		-.36**	Negative Affect		-.35**
R^2	.18**	.48**	R^2	.11**	.43**

Note. * $p < .05$, ** $p < .01$; $N = 153$

Figure 5.1 Structural Paths between the Latent Variables in the Structural Equation Model Involving HEXACO Honesty-Humility, Negative Affect, Perceived Risk, and Criminal Choice (Study 1)



Note. The paths from the latent to the observed variables refer to standardized factor loadings. The double-headed arrow refers to the covariance between errors (ζ's). All error terms of the manifest variables have been omitted.

To further examine the relations between HEXACO personality and Criminal Choice, we ran two regression analyses (Table 5.2). In the first regression, we entered the six HEXACO main dimensions in Step 1, and Perceived Risk and Negative affect in Step 2. In the second regression, we entered HEXACO Self-Control in Step 1, and Perceived Risk and Negative affect in Step 2.[25] As can be seen in Table 5.2, in the first regression Honesty-Humility was a significant predictor of Criminal Choice in both steps, whereas none of the other personality variables was in either step.

In the second regression, HEXACO Self-Control significantly predicted Criminal Choice in both steps. We conclude that of the six main dimensions of the HEXACO model, Honesty-Humility is the most important predictor. The subsequent analyses will therefore regard Honesty-Humility and HEXACO Self-Control as trait predictors of Criminal Choice.

To examine the direct and indirect effects of Honesty-Humility and HEXACO Self-Control 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), we created two parcels as indicators of each latent variable instead of using individual items. For Honesty-Humility, Self-Control, Perceived Risk and Negative 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. To model the two-way relation between Negative affect and Perceived Risk, we allowed their errors (ζ's) to covary. Furthermore, we also allowed the error terms of the Criminal Choice variable to covary. Given the fact that the wording of two of the original items was very similar and that both items referred to the likelihood of making a criminal choice, we deemed it proper to include this error covariance.

[25] Note that the overlap in content between HEXACO Self-Control and the other HEXACO dimensions would result in multicollinearity if entered in the regression analysis simultaneously. Hence, the other HEXACO main dimensions were omitted.

Table 5.3 Unstandardized and standardized path coefficients for Model in Figure 5.1

Estimates	Unstandardized coefficients and S.E.	Standardized coefficients
Measurement model		
Honesty-Humility - HH1†	1.18(.19)**	.94
Honesty-Humility - HH2	1.00**	.80
Negative Affect - na1	1.00**	.97
Negative Affect - na2	.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 Affect	.81(.24)**	.29
Honesty-Humility → Perceived Risk	8.41(2.85)**	.25
Honesty-Humility → Criminal Choice	-.84(.22)**	-.27
Negative Affect → Criminal Choice	-.40(.11)**	-.36
Perceived Risk → Criminal Choice	-.03(.00)**	-.31
Negative 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

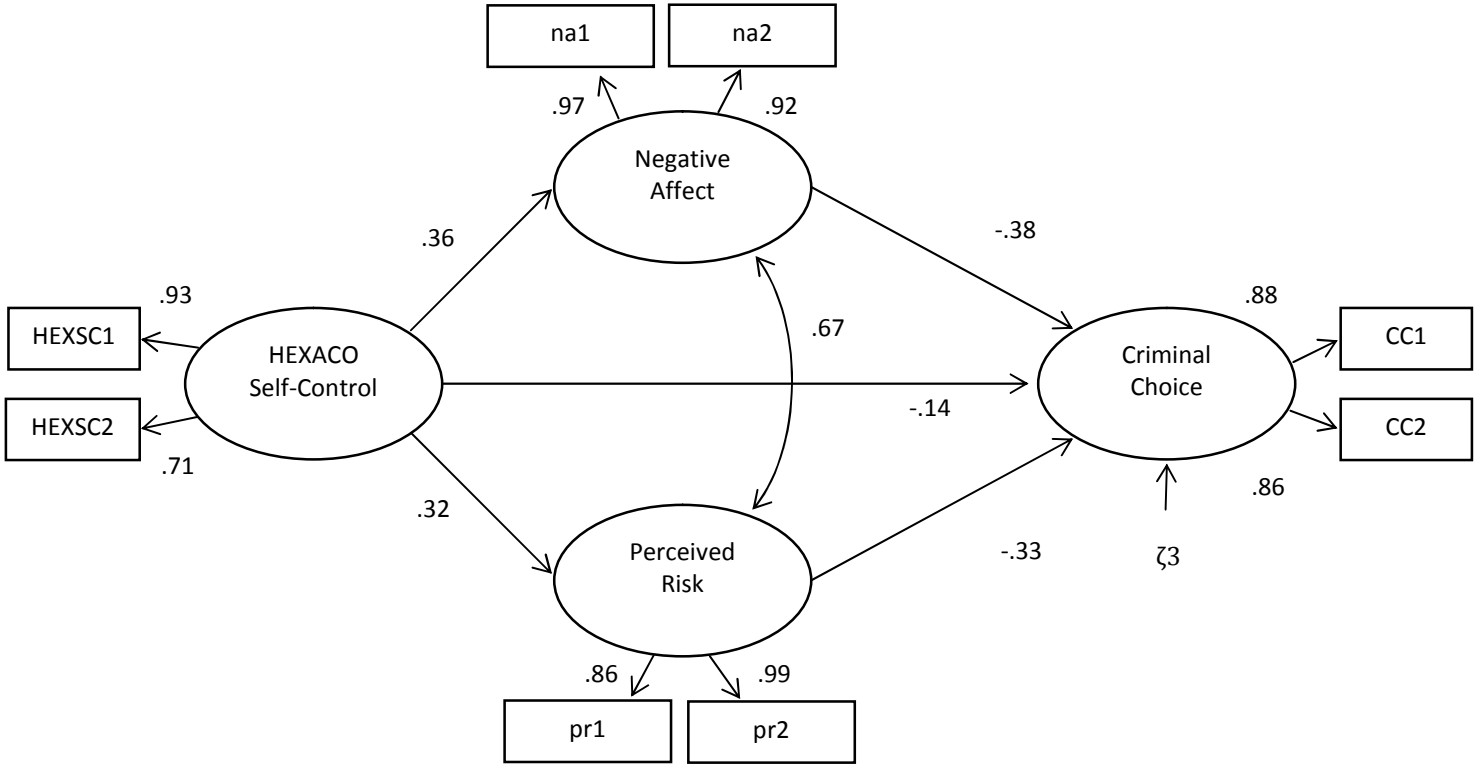
Note. $\chi^2(df=14)=12.97$, $p=.53$; CFI=1.00, GFI=.98, TLI=1.00, RMSEA=.00; $N=153$; † See Figure 5.1 for a graphical explanation of the variables

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

The SEM containing the standardized structural coefficients linking the predictor variables with the outcome variable is displayed in Figure 5.1. The model, which is based on maximum likelihood (ML) estimation, had a more than adequate fit $\chi^2(df=14)=12.97$, $p=.53$; CFI=1.00, TLI=1.00, RMSEA=.00. Table 5.3 displays the standardized and unstandardized direct, indirect and total effects. As can be seen, Negative 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 are significant, we used the distribution of products approach (MacKinnon, Lockwood, Hoffman, West, & Sheets, 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 Affect, and $p<.05$ for Perceived risk.

Figure 5.2 Structural Paths between the Latent Variables in the Structural Equation Model Involving HEXACO Self-Control, Negative Affect, Perceived Risk, and Criminal Choice (Study 1)



Note. The paths from the latent to the observed variables refer to standardized factor loadings. The double-headed arrow refers to the covariance between errors (ζ's). All error terms of the manifest variables have been omitted.

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

The second SEM we tested included HEXACO Self-Control together with Perceived Risk and Negative affect and Criminal Choice (Figure 5.2). The same procedure and constraints as for Model 1 apply to this model. Furthermore, we again used ML estimation. The 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 Figure 5.2, the standardized structural coefficients linking HEXACO Self-Control to Negative Affect and Perceived Risk were both significant ($p < .01$). The structural path from HEXACO Self-Control to Criminal Choice was marginally significant ($p = .07$). Finally, the standardized structural coefficients linking Negative 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 ($p < .01$).

PRELIMINARY DISCUSSION

This study examined the direct and indirect relations between Honesty-Humility and criminal choice and between self-control and criminal choice. We hypothesized that both traits would be directly as well as indirectly, via perceived risk and negative affect, related to the outcome variable. This hypothesis was supported by the results. Furthermore, we found both perceived risk and negative affect to be negatively related to criminal choice. In other words, people do not necessarily conform to the image of the rational decision makers they are often taken to be but are also led by how they feel, 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 suggested in the introduction. This hypothesis will be addressed in Study 2.

Table 5.4 Unstandardized and standardized path coefficients for Model in Figure 5.2

Estimates	Unstandardized coefficients and S.E.	Standardized coefficients
Measurement model		
Self-Control - HEXSC1†	1.46(.31)**	.93
Self-Control - HEXSC2	1.00**	.71
Negative Affect - na1	1.00**	.97
Negative Affect - na2	.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 Affect	2.04(.50)**	.36
Self-Control → Perceived Risk	21.47(5.81)**	.32
Self-Control → Criminal Choice	-.86(.47)	-.14
Negative Affect → Criminal Choice	-.41(.11)**	-.38
Perceived Risk → Criminal Choice	-.03(.01)**	-.33
Negative 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

Note. (χ^2(*df*=14)=11.04, *p*=.68; CFI=1.00, GFI=.98, TLI=1.00, RMSEA=.00; *N*=153; †See Figure 5.2 for a graphical explanation of the variables.

STUDY 2

Recent theorizing argues that how people feel about a risk and the way they think about it may be under the control of separate, and partially independent, systems or modes of information processing (Kahneman, 2003; Slovic, Finucane, Peters, & MacGregor, 2004; Van Gelder, De Vries, & Pligt, 2009). In other words, there may be two, instead of one, mental modes in which risks can be evaluated; one based more on deliberate and analytical considerations, the other based on intuitive, relatively fast and affect-based processing. A recent review (Weber & Johnson, 2009) documents how these so-called dual-process models can account for a large variety of judgment and decision making phenomena.

Van Gelder (2012) took the dual-process hypothesis as the basis for developing a hot/cool perspective of criminal decision making arguing that if criminal acts are envisioned as taking a risk, the idea of two separate modes of mental processing that guide behavior can also prove to be informative for understanding criminal decision making. The model posits a 'cool' cognitive processing mode responsible for processing probabilistic information, weighing costs against benefits and making projections about the long-term consequences of decisions. This mode operates largely in accordance with the basic assumptions underlying rational choice theories. The other mode the hot/cool perspective assumes is an affect-based 'hot' mode that accounts for non-volitional and automatic processing (Van Gelder, 2012). Whereas the cool mode is the seat of self-regulation, the hot mode is under stimulus control (Metcalfe & Mischel, 1999). This latter mode lacks representation in current criminological models of decision making.

The hot/cool perspective on criminal decision making assumes behavior to be the result of an interaction between the two modes. In other words, people are assumed to rely both on cognitive cost-benefit analyses and their feelings when making criminal choices. However, the modes do not necessarily operate in concert. Of particular relevance are situations in which the hedonic properties of immediate and long-term consequences of a prospect are negatively correlated (e.g. what I *think* is the best option, is not be the option I *feel* like). In these cases the hot mode and the cool mode may trigger opposite behavioral responses. If this happens and the hot mode determines the response, seemingly irrational or self-defeating behavior is the result.

Its ability to explain this kind of behavior reflects an explanatory scope of the hot/cool perspective that exceeds that of strictly cognitive models of decision making, as the latter can only designate it as 'irrational' but are forced to stop short of explaining why it occurs. The hot/cool perspective explains this behavior through the fact that cognitive appraisals of a (criminal) risk, which implicate the cool mode, can diverge from emotional reactions to it, which are associated with the hot mode. The affective hot mode does not weigh

probabilities but evaluates in a more intuitive way. It is tied to the here-and-now and responds to elements such as the vividness with which decision outcomes can be imagined and their immediacy (Loewenstein et al., 2001).

As was also mentioned earlier, Gottfredson and Hirschi (1990) remark that most crime carries immediate benefits while costs tend to be more long-term. It is easy to see how the hot/cool perspective explains this. As the hot mode operates in the here-and-now and is under stimulus control, it is insensitive to the delayed costs, the consideration of which belongs to the operational domain of the cool mode. Hence, if the cool mode is not able to override the response generated by the hot mode, criminal and potentially self-defeating behavior ensues. In other words, if the hot mode is responsible for cueing the behavior, such as in circumstances that trigger strong affect, appeals to sanction severity and probability lose their deterrent effect.

Activating processing mode

We rely on extant social psychological literature on priming to induce processing mode (e.g. Bargh, Chen, & Burrows, 1996; Innes-Ker & Niedenthal, 2002; Srull & Wyer, 1979). Priming temporarily increases the activation level of a processing mode which results in short-term effects on behavior (Chaiken & Trope, 1999; Metcalfe & Mischel, 1999; Van Gelder, et al., 2009). The idea underlying priming is using apparently unrelated prior tasks that include content that activates the relevant processing mode (Bargh & Chartrand, 1999; Frankish & Evans, 2009). The mode that is targeted is expected to subsequently affect judgments and choices that follow the prime (Higgins, Rholes, & Jones, 1977).

In this study, processing mode is primed by presenting a task in which participants have to unscramble sentences that either contain words related to affect or to cognition (Srull & Wyer, 1979). Subsequently, in a supposedly unrelated experiment, participants are presented the same vignettes used in Study 1. We expect negative affect to be a stronger predictor of criminal choice for participants in the hot processing condition in which they have to unscramble sentences with affect-related words. In the cool processing condition, we expect perceived risk to more strongly predict criminal choice.

METHOD

Participants & procedure

Hundred twenty-nine undergraduate psychology students (59.7% female, M_{age} = 20.4, age range: 17-38 years) participated in the study in exchange for either course credit or monetary

compensation. Participants were seated in separate cubicles where they filled out the materials for this study, which were included in a larger unrelated data collection.

Materials

Priming task Participants were presented with strings of five words in random order and instructed to create a grammatically correct sentence using all five words. Whereas this sentence unscrambling task is a common way of priming concepts, no such task yet existed for inducing either hot or cool processing mode. The task used was therefore developed specifically for the purposes of this study

Two different versions of the task were created. In the affect version, 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, participants were presented the same strings, however, the affect-related words were substituted for cognition-related words, e.g., thinking, rational, reasoning, 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 the Appendix. All statements were neutral in the sense that they contained no value references (e.g. good, bad, excellent), references to 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 was created analogously to the previous study and had an alpha reliability of .75. Means and standard deviations for both scales were also similar to the previous study with mean values of 3.38 (*sd* = .50) for Honesty-Humility, and 3.28 (*sd* = .33) for HEXACO Self-Control.

Negative 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 affect, .76 for Perceived Risk, and .73 for Criminal Choice. Means and standard deviations were similar to the previous study with mean values of 3.99 (*sd* = 1.11) for Negative affect, 14.34 (*sd* = 7.86) for Perceived Risk, and .00 (s*d* = 2.96) for Criminal Choice.

Table 5.5 Correlations of HEXACO-PI-R, HEXACO Self-Control, Perceived Risk, Negative Affect and Criminal Choice (Study 2)

		1	2	3	4	5	6	7	8	9	10	11
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
1.	Condition	-										
2.	Honesty-Humility	.06	-									
3.	Emotionality	.08	.16	-								
4.	Extraversion	-.02	-.15	-.21*	-							
5.	Agreeableness	.08	.20*	-.19*	.13	-						
6.	Conscientiousness	.06	.18*	.20*	-.13	.03	-					
7.	Openness to Experience	-.02	.20*	-.04	.09	.08	-.03	-				
8.	HEXACO Self-Control	.03	.68**	.32**	-.09	.44**	.60**	.10	-			
9.	Perceived Risk	-.02	.20*	.30**	-.22*	-.05	.21*	.08	.29**	-		
10.	Negative Affect	-.07	.18*	.35**	-.19*	-.15	.09	-.04	.19*	.48**	-	
11.	Criminal Choice	.12	-.23*	-.25*	.22*	.18*	-.21*	-.02	-.28**	-.58**	-.55**	-

Note. * $p < .05$, ** $p < .01$; $N = 129$

RESULTS

Table 5.5 shows the correlations, means and standard deviations of HEXACO personality, Perceived Risk, Negative Affect and Criminal Choice. Equal to the results of Study 1, Honesty-Humility, Emotionality, Conscientiousness, HEXACO Self-Control, Perceived Risk and Negative Affect were all significantly correlated with Criminal Choice. However, Extraversion and Agreeableness were also significantly correlated with Criminal Choice in this sample. Prior to testing the hypotheses, we examined 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 on any of the variables. From this we conclude that any possible differences between the groups 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 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, and again using AMOS 18 (Arbuckle, 2009).

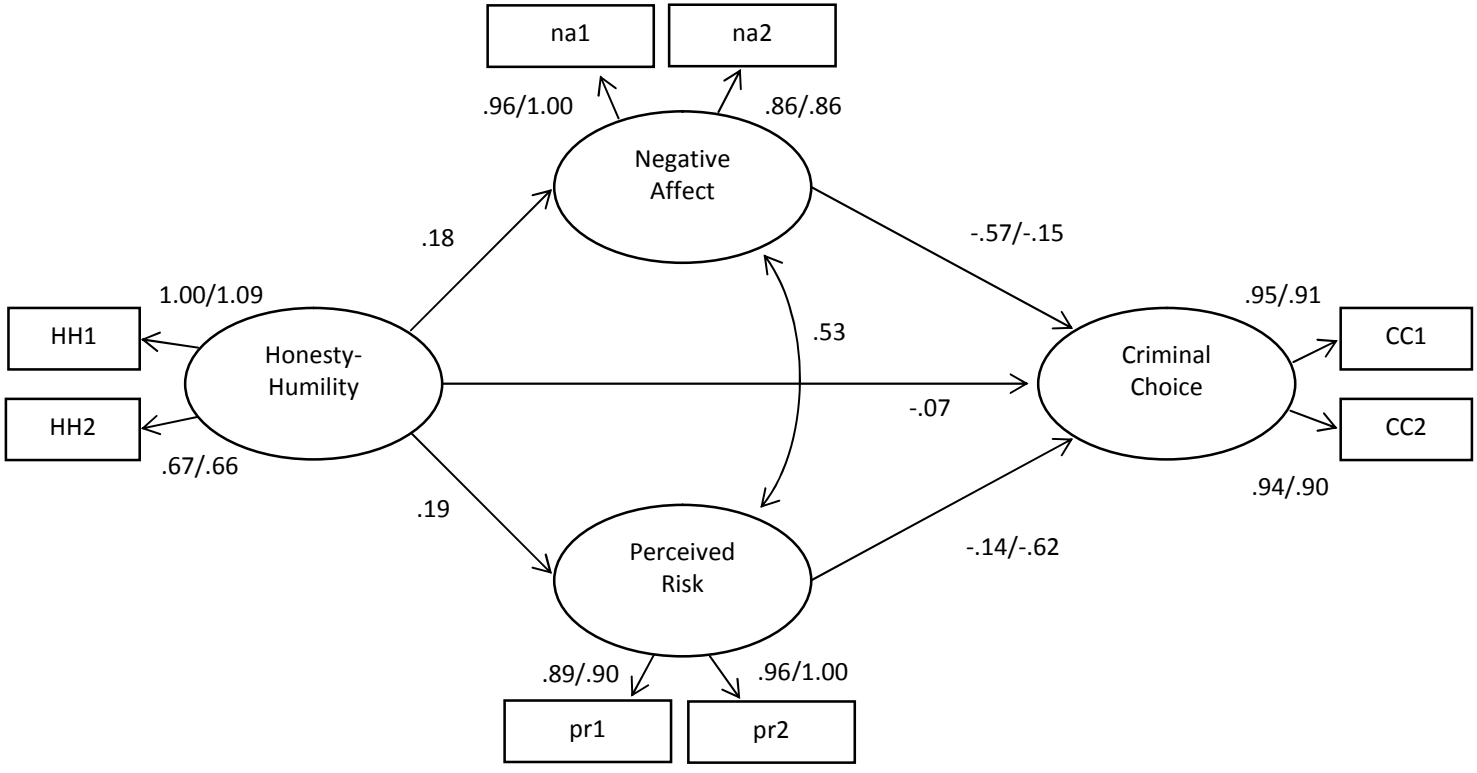
The (unconstrained) Model for Honesty-Humility showed adequate fit $\chi^2(df=16)=31.65$, $p=.01$; CFI=.98, TLI=.96, RMSEA=.09. The (unconstrained) Model for HEXACO Self-Control showed slightly better fit $\chi^2(df=16)=21.19$, $p=.17$; CFI=.99, TLI=.99, RMSEA=.05.[26] Different from the results obtained in Study 1, the direct effects from both Honesty-Humility to Criminal Choice and from Self-Control to Criminal Choice were both not significant in this sample ($p > .05$), implying only indirect, i.e. mediated, effects of both dispositions on Criminal Choice.

Moderation effects

In order to test for differences in the relative strengths of the relations between Negative Affect and Criminal Choice and Perceived Risk and Criminal Choice for the two experimental conditions, we again modeled two separate SEM's.

[26] The ML estimation for this model gave rise to one Heywood case (i.e. negative error variance) which prevented a solution from being generated. The occurrence of the Heywood case was dealt with by setting its variance to zero as suggested by Dillon, Mulani and Kumar (1987).

Figure 5.3 Structural Paths between the Latent Variables in the Structural Residuals Model Involving Honesty-Humility, Negative Affect, Perceived Risk, and Criminal Choice (Study 2)



Note. The paths from the latent to the observed variables refer to standardized factor loadings. The double-headed arrow refers to the covariance between errors (ζ's). All error terms of the manifest variables have been omitted.

Analyses for both the Honesty-Humility model and the HEXACO Self-Control model are presented in two steps. In the first step we compare the fit of different models (constrained versus unconstrained) using multi-group modeling. In the second step we examine the strength of the structural paths between Negative Affect and Criminal Choice and between Perceived Risk and Criminal Choice for both conditions. Standardized coefficients appear in Figure 5.3 (Honesty-Humility Model) and Figure 5.4 (HEXACO Self-Control model). For space considerations, unstandardized coefficients are not reported.

In the first step, we consider eight different models. In some of these models, we free up the structural paths linking the latent endogenous variables Negative Affect and Perceived Risk to the outcome variable Criminal Choice to examine whether these models show better model fit than models in which these paths are constrained to be equal across the experimental conditions. Through the specification of equality constraints, differences between conditions can be tested as they force the AMOS program to derive equal unstandardized estimates of that parameter within both samples. The fit of the constrained model is compared with that of the unconstrained model. If the fit of the constrained model is significantly worse than that of the unconstrained model, we conclude that the parameters are not equal in both conditions.

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

We compared the following SEM models (Table 5.6): (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 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 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.[27]

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

Table 5.6 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

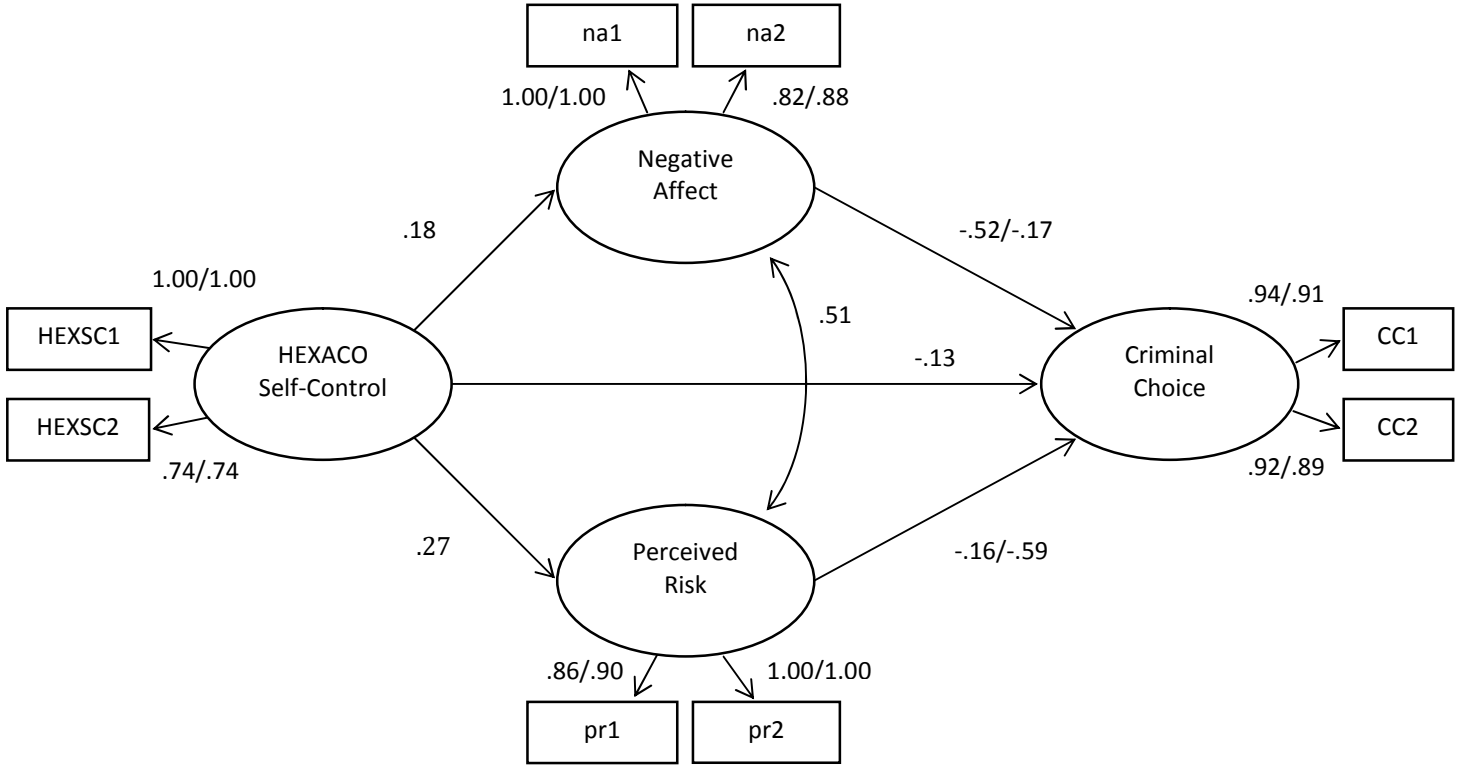
Note. The structural residuals model is selected as the 'best' model (see text) and is represented in Figure 5.3.

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 signifies that constrained (nested) models are significantly worse. Applied to the nested models in Table 5.6, 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 in combination with the other fit indices (see Table 5.6), the structural residuals model (model 3d) appears to be the 'best' model. This model is shown in Figure 5.3. 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 therefore take this model as the basis for comparing the relative strength of the standardized structural paths from Negative 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 affect to Criminal Choice would 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.

In support of our hypotheses, the standardized path linking Negative Affect to Criminal Choice was significant in the Hot Processing Condition (β=-.52, p < .001), but not in the Cool Processing Condition (β=-.17, p=.15). Conversely, the standardized path linking Perceived Risk to Criminal Choice was significant in the Cool Processing Condition (β=-.59, p < .001), but not in the Hot Processing Condition (β=-.16, p=.18).

Figure 5.4 Structural Paths between the Latent Variables in the Structural Residuals Model Involving HEXACO Self-Control, Negative Affect, Perceived Risk, and Criminal Choice (Study 2)



Note. The paths from the latent to the observed variables refer to standardized factor loadings. The double-headed arrow refers to the covariance between errors (ζ's). All error terms of the manifest variables have been omitted.

Table 5.7 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

Note. The structural residuals model is selected as the 'best' model and is represented in Figure 5.4.

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

For the model containing HEXACO Self-Control, we followed a similar two-step analysis strategy.[28] We again compared eight different structural models and used the same indices to examine and compare model fit (Table 5.7). Applied to the models that appear in Table 5.7, 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 5.7, we conclude that the structural residuals model (model 3d) is the 'best' model. The graphic for this model is presented in Figure 5.4.

Consequently, we take this model as the basis for comparing the relative strength of the standardized structural paths from Negative affect to Criminal Choice and from Perceived Risk to Criminal Choice for both experimental conditions and test our hypotheses. The standardized path linking Negative Affect to Criminal Choice was significant in the Hot Processing Condition (β=-.52, p< .001), but not in the Cool Processing Condition (β=-.17, p=.15). Conversely, the standardized path linking Perceived Risk to Criminal Choice was significant in the Cool Processing Condition (β=-.59, p< .001) but not in the Hot Processing Condition (β=-.16, p=.18). 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, which was 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. Processing mode was found to moderate the relations between both state variables and criminal choice.

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

These findings extend what we know from previous research in different ways. First, they add to our knowledge of the psychological mechanisms underlying the personality-crime relationship by revealing the different pathways through which individual traits relate to criminal choice. 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 the commonly used cognitive factors, such as the costs and benefits 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 suggested by Van Gelder (2012) by showing that there are two different modes in which criminal prospects are processed. Taken together, these findings suggest that an extension of rational choice-based models along the lines suggested in the present research could significantly enhance their predictive scope.

However, when interpreting the results 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. While we acknowledge this, we have reason to believe that the mechanisms at stake are general and extend across populations. Findings reported by Van Gelder et al. (2009) who tested a dual-process model of (general) risky choice correspond with the results of the present research. Furthermore, Van Gelder and De Vries (2012a) found similar mediation patterns in a representative sample of the Dutch population.

A second consideration that prompts caution with respect to the interpretation of the results regards the fact that this study used vignettes instead of actual 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 & Bouffard, 2010). We have attempted to maximize the correlation between reported intention and actual behavior by using vignettes that were both relevant to and familiar for the target group which is likely to increase the correlation between intention and actual behavior (Ajzen, 1991; Fishbein & 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 & Paternoster, 1994, p. 590). Given these points and the fact that the possibilities for measuring the hypothesized relationships during the performance of an actual crime are limited, we think our design was appropriate for examining the phenomena under study and that the reported behavioral intentions approximate decisions in the real-world.

While this research showed that it is possible to activate processing mode through priming, the relevance for crime research lies primarily in the influence of emotions engaging

the hot mode and influencing criminal behavior. It should be noted 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 calculating, cool, 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 to evaluate their influence on crime and delinquency. 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.

The results of this research also carry policy implications. When offenses are intimately associated with affect, e.g. road-rage, hooliganism, domestic violence, bar fights, offenders may be relatively unaffected by increasing punishment or attempting to reduce the associated benefits, even when they are motivated to abstain from offending. In these situations, affective processing ties their focus to the immediate present and encourages making those (criminal) choices that yield immediate gratification. If the cognitive mode is unable to override the response generated by the hot mode, the latter dominates and risky or impulsive behavior ensues. The assumption is that lapses in self-control occur when the hot system temporarily takes over, which leads behavior to be determined by the immediate associations generated by stimuli and their hedonic properties, rather than the assessed valence and probability of future consequences. Note that this implies that individual differences in the ability to exert self-control are at least partially rooted in the strength of the cool and hot modes.

Policies that stress cost-benefit considerations are unlikely to be successful when offenses are particularly associated with affect and this will be even more prominent for offenders who suffer from low (dispositional) self-control. To effectively alter patterns of self-defeating behavior, it is necessary to address the automatic construals and reflexive affective reactions underlying them so that they can be brought under volitional control (Mischel, Cantor & Feldman, 1996). In other words, it requires a cool mode able to inhibit the response cued by the hot mode. For crime theorists, it is therefore important to focus on the interaction between the two modes and how and to what extent volitional processes in the cool mode can be used to inhibit or channel impulses from a hot mode that seeks immediate gratification. Not surprisingly, cognitive behavioral interventions often promote emotion regulation skills through effortful overriding impulsive and automatic response

tendencies (Mischel, 2004). By making offenders aware of how their perception and behavior are influenced by their own state of arousal they can learn to compensate for such influences (Ariely & Loewenstein, 2006). Furthermore, priming can also be used as a tool in therapeutic contexts to enhance self-control, by diverting attention away from the hot mode and activating the cool mode in response to a problematic arousal eliciting stimulus (Metcalfe & Mischel, 1999).

Even though we see this research only as an initial step in testing the hot/cool perspective –integrated with individual dispositions–, we think it has much potential for the study of crime. Further empirical support for a 'criminal dual-process' hypothesis is important as it could shed new light on a series of fundamental issues that challenge crime researchers, 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 criminologists to use the hot/cool perspective as a point of departure for future research that addresses these and other related 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.

6 DISCUSSION

The preceding chapters have examined the role of cognition and affect in risky and criminal decision making. Drawing from social psychology and judgment and decision making research, a model was proposed that assumed both cognitive perceptions of risk and feelings evoked by the situation to influence people's choices. The influence of feelings was shown to stretch far beyond what has been assumed to be their role by traditional decision making models. It was demonstrated that also in seemingly calculating, white-collar type, offenses affect plays a fundamental role *alongside* cognitive considerations. This dissertation concludes by reviewing these findings in a broader perspective, discussing limitations and strengths of the research approach employed, and addressing open questions that need to be addressed in future research. We begin, however, by discussing the main findings.

SUMMARY OF KEY FINDINGS

This dissertation started out with a brief description of a dilemma that could potentially result in a criminal choice. You were asked to imagine that you had bought some valuable items during a holiday abroad. You had not considered that importing the items was actually not allowed without an export license from the country where you bought them. While you wait for your baggage to arrive on the conveyor belt you realize you are faced with the dilemma of whether or not to report them to the customs authorities. Reporting them would imply their confiscation; not doing so would mean not only risking confiscation but also a hefty fine.

Following the description, several key questions were posed that subsequent chapters were to address. The first question regarded whether you, if you would find yourself in this situation, would try to get past customs even if this implied a legal sanction in case your baggage would get checked. Another question regarded whether you thought your behavior in this case would be guided more by your deliberations or by what your feelings tell you. Furthermore, it was asked whether your reliance on cognition or affect could be influenced, even without you realizing it. Finally, you were asked to what extent you think your personality would influence your choice.

As will be clear by now, the description of the dilemma you read bears quite some resemblance to the scenarios that were used in the various studies reported in the preceding chapters. On the basis of their results, we should therefore now be able to

answer the above questions with some confidence, except for the first one –i.e. would you do it?– the answer to which only you know. Instead of following the typical chapter-by-chapter review of key findings, I will take these questions as a guide for reiterating the results.

What you think about it or how you feel about it?

Are risky choices determined by thoughts, reasoning and 'cold' calculation as assumed by rationalist decision perspectives and utility models, or is it all about emotions and gut feelings? This question was central to all chapters. In Chapter Two, the theoretical case was made for the joint influence of thinking *and* feeling on how we make risky and criminal choices. This hypothesis was supported by each of the empirical studies in all three subsequent chapters. The first set of studies, which was presented in Chapter Three, showed that both perceived risk and negative affect are important predictors of risky choice in general. The studies reported in Chapters Four and Five replicated these findings for criminal choice.

Additionally, it was shown that both cognition, operationalized as the perceived risk of sanction, and negative affect, i.e. the feelings of fear and worry that are generated by the criminal prospect, are roughly equal in predictive strength. To revert back to the question posed earlier, both thinking and feeling appear to influence criminal choice. The merit of a dual-process perspective in comparison to single-process perspectives in this respect resides in its ability to move beyond the oft-assumed binary opposition between reason and emotion, but instead to be inclusive and to accommodate the influence of both thinking and feeling on decisions.

Can reliance on thinking or feeling be influenced?

Another question that was posed regarded whether reliance on thinking or feeling when deciding on a risky or criminal action can be influenced. Recall that in Chapter Two it was argued that according to the dual-process assumption underlying the hot/cool perspective of criminal decision making, the cool cognitive and hot affective modes operate relatively independently of each other. To provide evidence for this assertion it was necessary to demonstrate that both modes could separately be influenced. To this end, we employed different techniques to activate processing mode. In Study 2 of Chapter 3 we did so by adding affective or cognitive information to risk descriptions. This led to respective increases in the strength of negative affect and perceived risk as

predictors of risky choice. In the third study in this Chapter, we provided further support for the existence of two relatively independent modes of processing by which risks can be evaluated using a priming task. This task consisted of a puzzle containing either affect-related words, e.g. emotion, feeling, sensation, or cognition-related words, e.g. thinking, reasoning, calculate. It was found that processing mode can indeed be activated. In a subsequent task, the predictive weight of perceived risk increased in the cognition condition relative to the affect condition. In the affect condition the relative weight of negative affect increased as a predictor of risky choice.

In Study 2 of Chapter 5, these findings were replicated for *criminal* choice using an alternative priming task to influence processing mode. In this study, prior to being presented criminal choice vignettes, participants were presented a task in which they had to form correct sentences from series of five words. Similar to the puzzle manipulation, in the affect condition, the sentences that had to be 'unscrambled' contained affect-related words, whereas in the cognition condition they contained cognition-related words. The results of this study coincide with those of Chapter 3; activating a cool cognitive processing mode led to an increase in the relative weight of perceived risk as a predictor of risky choice, whereas activating a hot affective processing mode led to an increase in the relative weight of negative affect.

In conjunction, these results provide evidence for the existence of two separate modes of mental information processing, a largely cognitive one and another one that is affect-based, that influence how individuals make criminal choices and risky decisions in general. In other words, these findings support the theoretical case made in Chapter Two for a hot/cool perspective of criminal decision making.

Do people differ?

The last question that needs to be addressed prior to reverting back to the general research question is whether interpersonal differences play a role in the sense that people with different personality characteristics evaluate the risks involved differently. This question was addressed in Chapters 4 and 5. In Chapter 4, we proposed what was termed a 'trait-state' model of criminal decision making that investigated how the different personality traits incorporated in the HEXACO personality structure were related to criminal choice among a representative sample of the Dutch adult population. We hypothesized both direct and indirect relationships, via perceived risk and negative affect, between personality and criminal choice.

In line with our hypotheses, we found that the HEXACO traits Emotionality and Honesty-Humility, and an interstitial Self-Control trait based on the HEXACO personality structure, were all directly and indirectly, via both perceived risk and negative affect, related to criminal choice. Scoring high on these dimensions led to more negative feelings about the consequences of a criminal choice and a higher perceived risk of sanction. Each of these three personality variables was also directly related to criminal choice, i.e. unmediated by either perceived risk or negative affect. Conscientiousness was, as we had hypothesized, a largely cognitive trait and related to perceived risk only. In Chapter 5, we replicated these findings for Honesty-Humility and HEXACO Self-Control, which were by far the strongest personality predictors of criminal choice. In conjunction, these findings support our hypothesized trait-state model of criminal decision making.

Research question revisited

We are now able to answer the overarching research question of this dissertation: Can a dual-process perspective that incorporates both thinking and feeling –and individual dispositions– better explain and predict criminal decisions than the existing single-process perspectives that currently dominate criminal decision making research and theorizing? The answer to this question, it will now probably be evident, is: Yes it can. The studies presented in the preceding chapters show that feelings play a very significant role in a wide variety of criminal decision processes, even in seemingly calculated ones. Furthermore, the findings show that an integrated perspective that includes both proximal factors that operate in the moment of making a choice, i.e. states, and enduring individual dispositions related to crime, i.e. traits, presents a more encompassing picture of why crime occurs than examining either traits or states in isolation.

STRENGTHS, LIMITATIONS & IMPLICATIONS

Strengths

In the study of crime, the dominant decision making models have been rational choice-based perspectives which posit a reasoning actor who engages in some type of cost-benefit calculation, however rudimentary, to arrive at a decision of whether or not to commit a crime. This has meant that the study of criminal decision making has largely remained confined to cognitive approaches that pay little interest to the potential role of

feelings as inputs in the choice process. In doing so this research has remained somewhat oblivious to insights that have been handed down for centuries, such as the passion versus reason dualism discussed in the introduction. This has led to an incomplete perspective on human decision making. As phrased by sociologist Norbert Elias (1939/1994, p. 486): "Every investigation that considers only the consciousness of men, their "reason" or "ideas", while disregarding the structure of drives, the direction and form of human affects and passions, can from the outset be of only limited value". In this dissertation it was shown that 'human affects' and 'passions' are indeed fundamental inputs in risky and criminal decision processes.

Of course many criminologists have pointed out this limitation of criminal decision theory and suggested that passions too are germane to the study of crime. Most of our knowledge of how feelings influence crime derives from narrative and interpretative approaches (e.g. Anderson, 1999; Athens, 2005, 1997; Collins, 2008; De Haan & Loader, 2002; Katz, 1988; Scheff & Retzinger, 1991; Shover, 1996; Shover & Honaker, 1992; Wright & Decker, 1997, 1994). While invaluable to our understanding of crime, studies that rely on self-reports are unlikely to give full insight into the psychological mechanisms underlying choice. Retrospective biases pose limits to the reliability of personal accounts. Furthermore, people are likely to underestimate the effect of emotional states and other visceral drives on their prior behavior (Loewenstein, 1996; Nordgren, Van der Pligt & Harreveld, 2006) or may alter what was an emotion-laden and impulsive decision process into a balanced and calculated one, for example after the sobering experience of spending time in prison (Shover & Copes, 2010; see also Cromwell, Olson & Avary, 1991). Most importantly, relying on what people say about their motivations does not constitute (direct) evidence for the actual precursors of behavior. Therefore, the existing studies that have noted the influence of feelings on offender decision making, while highly informative, are limited in their ability to explain the actual psychological processes at stake.

To unveil the mental mechanisms through which both affect and cognition, in combination with individual dispositions, operate on people's tendency to make risky or criminal choices, this dissertation took a different and more direct approach using quantitative and experimental methods. Nonetheless, this approach is also prone to a series of shortcomings, that narrative approaches do not suffer from, and that require discussion.

Limitations

While in terms of theory, this dissertation has referred to affect and cognition in a general fashion, both have been operationalized in specific ways. Whereas affect includes moods, specific emotions and visceral drive states, we have opted for a restricted operationalization as the feelings of fear and worry that emerge when individuals face a criminal choice prospect. In other words, we addressed only one particular type of (negatively valenced) affect. However, a variety of other feelings that have been associated with crime, such as thrill, excitement, resentment, rage and anger, sexual arousal and craving for drugs have not been dealt with. These different types of affect, even though all implicating the hot mode, do not have to trigger the same behavioral response. Even different types of negatively valenced emotions can trigger opposite responses. Fear, for example, which involves uncertainty about one's ability to withstand or handle a given threat, leads to higher perceptions of risk and inhibits criminal behavior. Anger, on the other hand, is associated with lower risk perception (Lerner & Keltner, 2000, 2001) and therefore facilitates crime (e.g. Wortley, 2008).

In a similar vein, cognition was also operationalized in a restricted way, i.e. as the perceived risk of sanction. By focusing on *thoughts* about perceived costs of the potential negative outcome, the operationalization essentially mirrored its affective counterpart, which regarded the *feelings* evoked by the potential negative outcome. This carries the advantage of a relatively straightforward comparison between the hot and cool processing modes, which was our goal. However, our operationalization of cognition was limited to the formal cost side of the equation. Different types of benefits associated with the crime were not considered, nor were informal costs such as anticipated regret and shame.

Arguably the greatest limitation in this dissertation, in spite of all its talk about emotions, is the fact that in none of the studies affect was actually induced. Instead we relied on the subconscious activation of a processing mode that was *assumed* to be activated in a similar way as when emotions are experienced (see also: Lieberman, 2009). Of course, the crucial point here, and the main difference with the actual experience of emotions, is that we expect the latter to also actually influence decisions, and not just the strength of the path leading from predictor to outcome variable. More specifically, the actual experience of a crime-relevant emotion will increase or decrease an individual's tendency to make a criminal choice. In some cases it will inhibit it, such as in the case of fear or feelings of empathy with a potential victim, in others it will facilitate it, such as when rage is experienced or in states of sexual arousal (cf. Ariely & Loewenstein, 2006; Mackenzie, 2006; Tedeschi & Felson, 1994). We will return to this point in the next

section, but it can already be noted that crime research that explicitly addresses the role of emotions is compatible with the predictions of the hot/cool perspective and the results reported in this book.

From these limitations emerge several suggestions for future research. For one thing, research should examine the effect different types of (induced or naturally occurring) affect. Some research to this end is currently already being undertaken. Together with my colleagues Henk Elffers and Danielle Reynald, for example, we have recently started researching the question to what extent induced feelings of (immediate) anger mute the impact of (anticipated) shame on decisions to offend. Whereas the first is assumed to increase the likelihood of offending, the latter has been shown to function as a deterrent. This research can also shed light on the interaction between the hot and the cool mode because anger, it will be recalled, pertains to the hot mode, while anticipated shame refers to a prediction of a future emotional state, and hence *thinking about feeling* rather than the actual experience of the emotion itself. Future research should additionally examine the role of informal costs, e.g. social disapproval, and also the perceived material and immaterial benefits of crime. The influence of positively valenced affect, such as thrill and excitement, on the propensity to engage in crime is another interesting avenue for future research to explore. Together with Reinout de Vries I intend to undertake a number of exciting studies in this direction in the near future.

Each of the empirical chapters in this thesis relied on scenarios to make its case. This method of investigation has its strengths and drawbacks which have already been discussed in detail in the various chapters themselves and therefore do not require elaborate reiteration here. A number of short observations will suffice. The two main limitations of this approach are the assumption that people's intention to perform a crime is reflective of their actual behavior, and restrictions regarding the type and severity of crime that can be measured through it. A related limitation of the studies reported is that most of them have used undergraduate students as research subjects, which poses challenges to the generalizability of the results. This latter point plays out in two different ways. For one thing, student samples consist of higher educated and mostly young people. As most crime is committed between late adolescence and early adulthood, the age of the sample is not too problematic. However, it is clear that the average student deviates in important ways from the typical delinquent in terms of education, gender (most delinquents are male), intelligence, socio-economic background, ethnicity, level of self-control, etc.

The use of specialized samples like this one also restricts the type of scenario that can be used, which excludes the more serious offenses. However, it should be noted that one of the studies employed a community sample representative of the Dutch adult

population (below the age of 60) and the results of this study coincided with those of the other studies. Furthermore, results of research among squatters facing the risk of eviction in the city of Buenos Aires were highly similar to the results of the present studies (Van Gelder, 2009). 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 the squatters were willing to invest in their dwellings, and hence take risks. The fact that the findings seem to hold across settings, cultures and for different types of risks, i.e. criminal and general, bolsters confidence in the assertion that they are generalizable across populations and risk behaviors.

Another issue that should be mentioned here regards to strong correlation between perceived risk and negative affect. The reader may argue that the high correlations (between .50 and .70) between the two variables pulls into doubt the validity of claims regarding their relative independence. My reply to this critique is twofold. Firstly, the high correlation between these two constructs can hardly be surprising: both regard reactions to risk, the difference being that one regards the way we contemplate risk and the other how we feel about it. Hence the *absence* of a strong correlation here would be a source of concern regarding the validity of measurement and the theory underlying it, and not vice versa. Secondly, it was repeatedly shown that the hot affective and cool cognitive processing modes could be primed independently, that is without influencing the other mode, which is a clear indication of their independence. Indeed, as Zajonc (1980) notes, even though feeling is generally not entirely free of thought, and thought free of feelings, affect is *always* present as a companion to thought, whereas the converse is not true for cognition (Zajonc, 1980). Neuroscientific research supports this claim as the hard-wiring of the brain allows for an emotional reaction without the participation of a cognitive appraisal (LeDoux, 1996; Zajonc, 1998, p. 597).

EXPLAINING THE BEHAVIOR OF PERSISTENT OFFENDERS: RATIONAL MISBEHAVIOR?

If the hot/cool perspective is indeed as 'general' as it purports to be, and for it to live up to its claim that it is capable of explaining criminal behavior that is hard to accommodate by rationalist perspectives, we should relate it to other findings in criminology and examine to what extent the hot/cool perspective shows 'better fit' with the data than other perspectives. Also in the light of the limitations regarding the samples and the scenario approach used, and the fact that emotions were not actually induced in this dissertation, there is much to be gained from using the hot/cool framework to explain

the behavior of persistent offenders. These individuals with extensive track records of what seems to be almost habitual crime seem an appropriate sample to 'test' the hot/cool framework against. The argument I will make is that even in the offending behavior of these individuals, affect plays a crucial role. Below, I will discuss several important findings from narrative and interpretative approaches on hardened criminals committing serious offenses and tentatively sketch out how they can be explained in terms of the hot/cool perspective. It is important to stress that this is a speculative attempt serving exploratory purposes only.

Life as party

One thing that has puzzled criminologists for some decades now is that the behavior of offenders sometimes appears to be conforming to the basic premise underlying rational choice, i.e. when faced with several possible courses of action, people weigh costs against benefits and go for the option they believe is likely to have the best overall outcome, but at other times their misbehavior seems to be rather at odds with this description and appears to be irrational because it is self-defeating.

Shover and Honaker (1992, p. 283) note that it is instructive to examine the decision making of persistent (property) offenders in the context of the lifestyle that is characteristic of many in their ranks; a lifestyle the authors refer to as *life as party* (see also: Copes & Vieraitis, 2009; Jacobs & Wright, 1999; Katz, 1991; Shover, 1996; Wright & Decker, 1994, 1997). Life as party refers to a cycle of expensive, self-indulgent activities on which criminal proceeds are spent (e.g. gambling, drug use, drinking, partying, non-essential consumption, display of luxury) and that feed on themselves and call for more of the same. In the words of Wright and Decker (1997, p. 35), this lifestyle resembles "an open-ended quest for excitement and sensory stimulation". Rationality and long-range planning are eschewed in these cycles in favor of enjoying the moment (Shover & Honaker, 1992, p. 287). To be able to perpetuate this cycle of self-indulgence and pleasure offenders need money, generally a lot, and the approach they employ to get it is crime. Legitimate options are rarely considered.

In their books *Burglars on the job* (1994) and *Armed robbers in action* (1997), Richard Wright and Scott Decker explain that the crimes committed by these offenders are hard to envision as one-off discrete and deliberate choices but instead seem to emerge out of a natural flow of events: [i]t is not so much that these actors consciously choose to commit crime, as they elect to get involved in situations that drive them toward lawbreaking" (1994, p. 40). Burglars that were interviewed made conscious choices

throughout their crimes but at the same time their offending "did not appear to be an independent, freely chosen event so much as it was part of a general flow of action emanating from and shaped by their involvement with street culture." In their book on armed robbers, Wright and Decker (1997, p. 61) write that the offenders they interviewed did not pick their targets in a calm, deliberate manner, but rather in a state of perceived desperation. In the throes of such a state, they were not inclined to weigh carefully the pros and cons of each target. Comparable findings are reported by Cromwell, Olson and Avery (1991) who argue that the burglars they studied only tended to attend to the present and that future events or consequences did not weigh heavily in their risk assessments. In a similar vein, Shover and Honaker (1992), in their study on incarcerated persistent property offenders, found that they not only failed to consider the formal risks of crime, but that they gave no thought to legitimate alternatives either. Copes and Vieraitis (2009) in their study on identity theft report similar results for the offenders in their sample.

Wright and Decker (1997) note that the motivation of the armed robbers in their sample to commit a stickup "emerged during a period of intense self-indulgence and from a growing sense of frustration and anger because they felt themselves to be locked into a cycle of events that was leading them nowhere. The following quote taken from Shover and Honaker (1992) reflects this: "It … gets to the point that you're into such a desperation. You're not working, you can't work. You're drunk as hell, been that way two or three weeks. You're no good to yourself, and you're no good to anybody else. Self-esteem is gone [and you are] spiritually, mentally, physically, financially bankrupt. You ain't got nothing to lose" (p. 288).

How to explain this behavior which at times shows clear patterns of informed cost-benefit tradeoffs, yet at other times appears to directly contradict sound deliberation? Accommodating it is arguably possible in a rational choice framework, provided a sufficiently broad definition of rationality, but as Wright and Decker (1994, p. 205) note, it is doubtful whether this would substantially advance our understanding of the way in which criminals decide to commit offenses. Additionally, rational choice frameworks could account for a preference for option A, e.g. burglary, over option B, e.g. robbery, but not the events that lead up to the actual moment of choice, which implicate the *motivation* to commit crime. Indeed, as noted by Shover and Honaker (1992), offenders' target selection decision making appears more rational in the conventional sense than do crime commission decisions. Rational choice-based models simply posit a motivated offender as one of their assumptions (cf. Cohen & Felson, 1979; Cornish & Clarke, 2006). Hence a crucial part in the analysis of offending behavior appears to be missing in these models.

In terms of the hot/cool perspective

How then might these findings be accommodated by the hot/cool perspective? Recall first that the hot/cool framework does not assume that rational considerations such as costs and benefits not to play a role in criminal decision making. Instead it argues that feelings play an important role alongside rational or, better said, cognitive considerations. Costs and benefits are processed, but situations that trigger strong affect make careful assessments less likely.[29] More importantly, the ultimate behavioral response in these situations is more likely to be dictated by the hot mode instead of the cool mode. While feelings of stress, desperation, anger and frustration typical of the life-as-party lifestyle, potentiate the hot mode, at high levels they render the cool mode increasingly dysfunctional (Metcalfe & Mischel, 1999). These intense levels of stress and affect that are experienced in situations of 'desperate partying' (Wright & Decker, 1997) when offenders are confronted with the 'necessity' to engage in crime can therefore explain the self-defeating behavior of these individuals.

Another explanatory element of the hot/cool perspective is the difference in time-orientation between the two modes. Recall the operative logic of the hot mode which is triggered by stimuli in the immediate environment and whose temporal horizon is tied to the present. The cool mode, on the other hand, is responsible for making projections regarding the future which allows for an evaluation of different alternative courses of action. As the cool mode can take into account both short-term and long-term payoffs, it enables individuals to resist immediate rewards and strive for more valuable future outcomes. Legitimate alternatives, for example, require a long-term perspective as their yields are typically temporally remote. However, in situations of intense arousal, attempts at self-control are directly undermined and the hot mode encourages making the (criminal) choice that offers immediate benefit at the risk of incurring much more serious delayed costs.

Anecdotal evidence from persistent property offenders supports this idea. For example, Wright and Decker (1994, p. 61) note that at the time of actually contemplating their crimes, offenders typically perceived themselves to be in a situation of immediate need, which led to a mind-set in which they were seeking less to maximize their gains than to deal with a present crisis. Furthermore, it indicates an element of feelings of

[29] It is possible, I assume, that they completely fail to recognize their behavior is self-defeating and to process costs and benefits. But perhaps it is even more likely that they do recognize the self-defeating nature of the tradeoff, but are simply unable to translate this perception into an abstention from criminal behavior. This is another unresolved yet highly relevant topic for future research to address.

desperation which might have weakened the influence of threatened sanctions and neutralized any misgivings about the morality of breaking into dwellings." Several decades earlier, Lofland (1969, pp. 50-54) offered a very similar perspective arguing that the pressure of their immediate situation attenuates the perceptual link between offending and the risk of incurring sanctions; offenders enter a state of 'encapsulation' in which all that matters is dealing with the present crisis. Evidence from social psychology supports this view. Baumeister and Heatherton (1996), for example, note about the interrelation between emotion and self-control that emotions increase the salience of whatever produces them. Most commonly, something in the immediate situation is the cause and so emotion tends to have the effect of concentrating in the here and now, thereby thwarting transcendence and making self-regulation difficult. The fact that the hot mode is only partially under cognitive control and operates largely non-volitional also explains the oft-reported finding that offenders may experience and define themselves as propelled by forces beyond their control (Katz, 1988; Shover & Honaker, 1992).

An offender may try to alleviate his negative mood, such as feelings of frustration born out of failure at legitimate activities, through crime as it provides him with the opportunity to establish himself as a competent individual and to (re)gain some sense of control over his life (Shover & Honaker, 1992; Wright & Decker, 1994). The link between negative mood alleviation and risky behavior is also supported by experimental research which shows that people may give in to their impulses to make themselves feel better (Tice, Bratslavsky & Baumeister, 2001). Leith and Baumeister (1996) found that people's negative moods were related to lower self-control, which in turn led to riskier choice behavior. They explain this finding by arguing that "[p]eople who are upset seem merely to seek out the best possible outcome and grab for it, without being deterred by rational cost-benefit calculations or even by the prospect of possible unpleasant consequences" (Leith & Baumeister, 1996, p. 1264).

In short, the notion of separate modes of processing that each operate according to a different set of principles and respond to different elements of a situation, can contribute much to our understanding of the behavior of persistent offenders too. The automatic, affect-based hot mode of processing tends to respond to immediate considerations, and operates in the here and now, while the controlled, cognitive cool mode is capable of abstract thinking and contemplating the future. When the hedonic properties of immediate and long-term consequences are negatively correlated, the responses of the two modes are likely to contradict each other and 'irrational' or self-defeating behavior, may ensue. A perspective that perceives decision processes as solely

based on cognition can only call this behavior 'irrational', and remains silent as to how to explain them and why they occur.

IMPLICATIONS

In the introduction of this dissertation, I briefly touched upon the historical context of the dual-process hypothesis arguing that its core idea dates back to the ancient Greeks who saw 'passion' as an unruly and potentially harmful independent source of conduct, and 'reason' coming to the rescue after a potentially undesirable course of action was instigated by the passions (Zajonc, 2001, p. 31). Even though history has known periods which reversed the primacy of reason over passion, such as during the romantic era and, arguably, the 1960s (Lazarus & Lazarus, 1994), the binary opposition between thinking and feeling itself seems to have always been around in one form or another. These notions pointing towards the importance of feelings in virtually all forms of human behavior were for a long time ignored in decision theory and social psychology. Behavioral economist George Loewenstein eloquently summarizes this point:

> "The decision-making paradigm, as it has developed, is the product of a marriage between cognitive psychology and economics. From economics, decision theory inherited, or was socialized into, the language of preferences and beliefs, and the religion of utility maximization that provides a unitary perspective for understanding all behavior. From cognitive psychology, decision theory inherited its descriptive focus, concern with process, and many specific theoretical insights. Decision theory is thus the brilliant child of equally brilliant parents. With all its cleverness, however, decision theory is somewhat crippled emotionally, and thus detached from the emotional and visceral richness of life." (1996, p. 289).

The neglect of the affective side of our mental operations with respect to crime causation is also characteristic of criminological research albeit for a different reason. Bouffard, Exum and Paternoster (2000, p. 159) argue that this neglect was due to the strict disciplinary boundaries in the field and scholars' desire to first carve out and protect their own intellectual turf. As many sociologists first attempted to capture the study of crime, the idea for a focus on the individual level of analysis did not sit well with them. Instead they held to the belief that any cause of crime must be social, i.e. supra-

individual (Bouffard, Exum & Paternoster, 2000). Consequently, with few exceptions, the role of affect has systematically been downplayed by criminologists.

However, over the past two decades, decision theorists and behavioral economists have come to realize that virtually all human decisions involve some form of affect. In social psychology, and social cognition in particular, the dual-process hypothesis has established a solid theoretical and empirical basis in recent years and nowadays represents mainstream thinking (Smith & Neumann, 2005).[30] The idea that feelings influence (criminal) decisions is still far from being accepted in criminology, and the idea of two different modes of mental information processing that guide our behavior, and by implication also our criminal inclinations, is altogether absent in the crime literature. This dissertation should therefore be seen, at least in part, as a modest attempt to introduce these insights to criminology.

Two minds or a single metaphor?

One issue that has not been dealt with so far regards to what extent there actually are exactly two independent modes or systems of information processing in the human mind. While it seems clear that there is more than one, this does not exclude the possibility of more than two processing modes. Why not three, 18 or more? Gilbert (1999, p. 3) notes that the answer to this question may vary depending on the disciplinary perspective of the beholder: "The neuroscientist who says that a particular phenomenon is the result of two processes usually means to say something unambiguous –for example, that the inferior cortex does one thing, that the limbic system does another and that together the electrochemical activities of these two anatomical regions produce a feeling of ennui, the aroma of stale cabbage, or the sneaking suspicion that one's spouse has been replaced by a replica." The social psychologist can't make such claims because there are no tangible referents for the processes specified by the psychologist's talk of dual processes. By definition, then, any serious attempt to answer the question as to how many processes there are is beyond the scope of this book.

The way I see it, the 'take home message' of this dissertation in this respect is that making the conceptual step from one to two modes of mental processing opens up the

[30] Note that while passion and reason, or emotion and ratio, have often been pitted against each other and the former was often seen as merely a destructive force, current psychological perspectives tend to stress the adaptive function of emotions, which are deemed necessary for our functioning and survival (Cosmides & Tooby, 2000; Frijda, 1986).

possibility of explaining a wide variety of behaviors in more straightforward and plausible ways than single process accounts can. Precisely this is its merit. One such issue was dealt with earlier in this discussion and regards how behavior that seems to conform to the basic requirements of rationality on one moment, can turn into a self-defeating course of action just moments later. The dual-process idea, as we saw, solves this behavioral puzzle by positing two forces each of which operating according to a distinct set of principles that may contradict each other depending on their levels of activation. Some dual-process theorists even go so far as to posit two separate minds that sometimes enter into conflict with each other (Evans, 2009; Stanovich, 2004).

Crime policy & criminal justice implications

Frankish and Evans (2009, p. 24) argue that the notion of dual processes, only one of which corresponding to personal volitional cognition, has wide implications beyond the cognitive sciences. Indeed, these authors note, the fact that much of our thought and behavior is controlled by automatic, non-volitional, and inaccessible cognitive processes challenges some of our most fundamental and cherished notions about personal and legal responsibility. I think dual-process theorizing can in the long run also have major implications for various areas related to crime prevention and criminal justice. Instead of relegating this issue outright to future research and concluding this book, I want to make a couple of brief remarks on this issue.

One important area for which dual-processing can have implications is crime prevention and punishment. Because feelings are largely insensitive to changes in sanction probability and severity, deterrence is unlikely to be effective when transgressions are intimately associated with affect. If crimes are the consequence of cool calculation, deterrence-based polices may be a more proper course of action to pursue but, as was shown in this dissertation, even for seemingly calculating crimes feelings also play a significant role as precursors of behavior. In this respect there is still a lot to learn about the interactions between the hot and the cool mode.

A better understanding of the affective and cognitive processes underlying crime, and their interplay, opens up new possibilities for more effectively reducing delinquency and offender treatment. As was already remarked in Chapter 2, crimes intimately associated with affect require a different response from the criminal justice system if they are to be effectively prevented. At least for offenders that display a motivation to abstain from future offending and other at-risk groups, it may be crucial to create awareness of the influence of affect on their behavior and strengthen their ability to resist impulses,

rather than placing faith in the unlikely assumption that in the future adequate cost-benefit calculations will be made after having felt the pain of punishment instilled by the state.

The hot/cool perspective of criminal decision making can also have consequences for sentencing. One important area regards the serious questions it raises about culpability and personal responsibility. With a better understanding of the effects and strength of visceral factors, judges may apply this knowledge in the sentencing process. Alternative sanctions coupled with treatment of offenders in which they are made aware of the influence of affect on their behavior and learn to deal productively with it, or learn to avoid situations that trigger strong affect altogether, seem more effective avenues for reducing certain types of crime than cries for harsher punishment. In a similar vein, probation institutions may benefit as insights from the hot/cool perspective can assist in tailoring interventions that help increase inhibitory processes.

CONCLUDING THOUGHTS

One of the leading questions which have guided crime research since its genesis –i.e. to what extent is a certain delinquent behavior 'rational' or not?– may have actually misguided it. This question has obscured a more important, and more fundamental, question. This question regards the extent to which the behavior is guided by cognition or affect, each of which, it was shown, operates according to a different set of principles.

In 1985, Clarke and Cornish noted that a "considerable body of recent psychological research on information processing and decision making has passed largely unnoticed by criminologists" (p. 158). This led them to draw out a widely influential cognitive framework of criminal decision making based on this research —the rational choice perspective— which would form the behavioral foundation of a plethora of situational crime theories.

Ironically, while crime researchers busied themselves with researching and applying the rational choice perspective over the past 25 years, major advances in psychological research on information processing and decision making, the very same traditions that formed its basis, have been largely neglected in criminology. In other words, the rational choice perspective fell prey to the same neglect it accused its contemporaries of. Furthermore, the rational choice perspective and other situational perspectives on crime have insisted that differences in individual disposition were largely irrelevant for understanding crime, erroneously to be sure.

It was my goal in this dissertation to point out some of the omissions and the one-sidedness of the rational choice perspective and related theories, drawing from recent insights in social psychology and decision making research. The various studies reported demonstrate the fundamental role of affect as a driver of risky and criminal decisions, even absent a state of emotional arousal, and that cognition and affect pertain to two independent modes of mental information processing. Additionally, the integrative perspective that was laid out also included personality traits and showed how these are related to criminal choice. In doing so, this dissertation hopefully provided some new input for an update of traditional models of criminal decision making and new research into this undeniably highly exciting field.

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SUMMARY IN DUTCH

Stel je voor dat je net op Schiphol bent geland na een reis in het buitenland. Je had de reis deels ondernomen omdat je graag wat lokale voorwerpen wilde kopen. Je bent echter vergeten te controleren of je deze voorwerpen eigenlijk wel mag invoeren. Terwijl je wacht op je bagage bij de band valt je oog op een bord waarop staat dat het verboden is cultuurgoederen te importeren zonder export licentie van het land waar je ze hebt gekocht. Dat heb je niet gedaan zodat je je nu geconfronteerd ziet met een keuze. Of je geeft de voorwerpen aan en ze worden geconfisqueerd of je doet het niet. In het laatste geval riskeer je niet alleen confiscatie maar ook een behoorlijke boete.

Als jij je in deze situatie zou bevinden, zou je dan overwegen om het aangeven van de goederen 'te vergeten'? En zou je beslissing een kwestie zijn van een 'koude' afweging van kosten, baten en kansen, of speelt wat je gevoel je zegt ook een rol? En kan dit worden beïnvloed in de zin dat je op het ene moment meer naar je gevoel luistert terwijl je het andere moment aan het rekenen slaat? En in hoeverre denk je dat je persoonlijkheid een rol speelt bij je keuze? En waarom zou je dit eigenlijk allemaal willen weten, d.w.z. zijn er eigenlijk praktische implicaties?

Dit zijn de vragen die centraal staan in deze dissertatie. Tezamen dienen ze ter beantwoording van een bredere onderzoeksvraag: Is een zogenaamde 'dual-process' benadering dat zowel denken als voelen en persoonskernmerken omvat beter in staat om criminele beslissingen te verklaren en voorspellen dan de 'single-process' perspectieven die momenteel domineren in de criminologie? Het antwoord, zo blijkt uit een reeks studies die wordt gerapporteerd in dit boek, is: jazeker.

De kern van de dissertatie bestaat uit vier hoofdstukken. In het eerste hoofdstuk wordt gebruikmakend van met name sociaalpsychologische literatuur een 'hot/cool perspective of criminal decision making' geïntroduceerd. De drie hoofdstukken die hierna volgen zijn empirisch van aard en toetsen (delen van) het hot/cool model voor risicovolle beslissingen in het algemeen en delinquente beslissingen specifiek.

Het eerste (theoretische) hoofdstuk legt de relatie tussen delinquent gedrag en beslisgedrag in het algemeen. In de psychologie en verwante gebieden zoals behavioral economics en de neurowetenschappen wordt steeds meer onderzoek gedaan naar zgn. *dual-process* modellen. Deze modellen gaan ervan dat informatie niet op een manier, maar op twee verschillende manieren wordt verwerkt in onze hersenen. Bij gebrek aan goede Nederlandse vertaling hou ik hieronder de oorspronkelijke terminologie aan en spreek ik van 'modes (of information processing)'. Een van die modes is vergelijkbaar met de 'traditionele' calculerende manier van informatieverwerking: het afwegen van kosten en baten, waarin waarschijnlijkheden van verschillende mogelijke uitkomsten worden

meegenomen in de afweging en deze overwegingen 'rationeel' van aard zijn. De andere manier van informatieverwerking, die tegelijkertijd opereert, is juist automatisch en intuïtief van aard en sterk gerelateerd aan 'affect', d.w.z. ons gevoel. Deze mode opereert deels onderbewust waardoor je je dus van niet bewust van zijn invloed. Ik versta onder affect trouwens niet alleen emoties, maar ook stemmingen en zgn. 'visceral drives'. Deze laatsten verwijzen naar gevoelsstaten zoals honger, behoefte aan verdovende middelen of alcohol, en seksuele opwinding. Beide 'modes', die ik naar Metcalfe en Mischel (1999) de cool mode en de hot mode noem, opereren volgens een eigen logica. Waar de cool mode dus gevoelig is voor probabilistische informatie is de hot mode dat juist niet. Dit leidt ertoe dat we in een bepaalde situatie, soms het ene kunnen denken maar het heel anders voelen. Denk maar eens aan spreken in het openbaar. Objectief is er weinig risico (cool mode), toch kan onze angst (hot mode) dicteren dat we ervan afzien hoe belachelijk we dat misschien ook van onszelf vinden.

Iets vergelijkbaars geldt voor delinquente keuzes. Er wordt vaak aangenomen en ook bewezen dat veel crimineel gedrag niet loont. Toch bezondigen criminelen zich er keer op keer aan, hoe vaak ze ook worden opgepakt en gestraft woren. Een rationeel keuze model is daarmee problematisch want het wordt geforceerd dit gedrag 'irrationeel' te noemen maar veel verder komt het niet. In dit hoofdstuk leg ik verder uit dat veel crimineel gedrag dat niet begrepen kan worden vanuit traditionele modellen, zoals het rationele keuze perspectief, wel kunnen worden verklaard vanuit het hot/cool model.

In Hoofdstuk 3 test ik het hot/cool model voor risicogedrag in het algemeen. Deze stap was noodzakelijk omdat een dual-process perspectief voor risicogedrag, hoewel herhaaldelijk gesuggereerd, nog niet eerder is getoetst. Er was, met andere woorden, nog geen empirische steun voor. In dit hoofdstuk wordt deze steun gevonden in drie verschillende studies. Alledrie de studies maken gebruik van scenario's. Dat zijn korte beschrijvingen waarin mensen zich moeten inleven en vervolgens worden gevraagd welke keuze zij zouden maken in die situatie. De introductie van deze samenvatting waarin je werd gevraagd je in te leven in de 'Schiphol-situatie' is daar een voorbeeld van. In de eerste studie wordt gekeken naar de voorspellende waarde van de gepercipieerde pakkans en strafzwaarte (de operationalisatie van de cool mode) en negatief affect, d.w.z. de gevoelens van angst en onzekerheid die de situatie oproept (de operationalisatie van de hot mode). Beide blijken ongeveer even goed crimineel gedrag te voorspellen en dit kan dus worden geïnterpreteerd als voorlopige steun van het hot/cool model. Echter, deze studie betekent nog geen daadwerkelijke steun voor een dual-process hypothese welke ervan uitgaat dat de hot en de cool mode *onafhankelijk* van elkaar opereren. Dit bewijs wordt geleverd in Studie 2 en Studie 3 van dit hoofdstuk.

In Studie 2 is ofwel cognitieve informatie ofwel affectieve informatie aan de scenario's toegevoegd om vervolgens te kijken in hoeverre dit de voorspellende sterkte van negatief affect (hot mode) en gepercipieerde pakkans en strafzwaarte (cool mode) beïnvloedt. Uit de resultaten blijkt dat in het eerste geval negatief affect veel beter risicogedrag voorspelt terwijl dit in het tweede geval juist pakkans en strafzwaarte is. In Studie 3 wordt een zgn. *unobtrusive* maat gebruikt. Respondenten krijgen voordat ze de scenario's krijgen gepresenteerd in een zogenaamd ongerelateerde taak een lettersoep puzzel voorgelegd. In de ene conditie bevat de puzzel cognitieve woorden zoals 'denken', 'analyseren', 'rationeel' etc. In de andere conditie verwijzen de woorden juist naar affect zoals 'emotie', 'sensatie', 'beleving' etc. De veronderstelling is dat we hiermee de processing modes kunnen activeren. D.w.z. de cool mode in het eerste geval en de hot mode in het tweede. Als ze vervolgens de scenario's krijgen voorgelegd blijkt dat mensen in de eerste conditie, de cool conditie, inderdaad veel meer worden geleid door pakkans en strafzwaarte in het bepalen van hun al dan niet criminele keuze dan door hun gevoel. In de hot conditie is dit, zoals verwacht, precies andersom. Met andere woorden, in het geval van risicovolle keuzes blijkt zowel gevoel als rationaliteit een rol te spelen en blijkt de mate waarin dit het geval is ook beïnvloedbaar te zijn.

In Hoofdstuk 4 wordt het model uitgebreid met persoonlijkheid en wordt de groep respondenten gevormd door een representatieve steekproef van de Nederlandse bevolking. Op een eerder tijdstip was van deze groep respondenten reeds persoonlijkheidsdata verzameld. Deze data is om een bijzondere reden relevant omdat ze gebaseerd is op een recent persoonlijkheidsmodel dat nog niet eerder is ingezet in criminologisch onderzoek. Dit HEXACO model veronderstelt dat de persoonlijkheid van individuen eigenlijk kan worden onderverdeeld in zes hoofddimensies. Tot voor kort was de algemene aanname dat er 'slechts' vijf hoofddimensies zijn, de zgn. 'Big Five'. De zesde dimensie van het HEXACO model heet 'Integriteit' (in het Engels: Honesty-Humility) en lijkt dus bijzonder relevant voor onderzoek op het gebied van criminaliteit. Er zit echter nóg een belangrijk voordeel aan het gebuik van het HEXACO model en dat is de mogelijkheid om er een zgn. Zelfcontrole maat uit te herleiden. Zelfcontrole is het belangrijkste en meest onderzochte correlaat van delinquentie op individueel niveau in de criminologie. Door de mogelijkheid zowel Zelfcontrole, Integriteit en Big Five persoonlijkheid in een en hetzelfde model te incorporeren ontstaat dus in potentie een belangrijke en omvattende nieuwe maat om de relatie tussen individuele disposities en criminaliteit te meten.

Als gevolg van de beschikbaarheid van de HEXACO persoonlijkheidsdata zijn we nu in staat niet alleen te kijken naar de invloed van processing modes, welke vooral een rol spelen op het moment van het nemen van een beslissing, maar ook naar de relatie

tussen persoonlijkheid en gedrag en ook hoe persoonlijkheid gerelateerd is aan de processing modes. Met andere woorden, we kunnen ook stabiele verschillen tussen individuen meenemen in de analyse. Het gebruik van het HEXACO model betekent bovendien dus een nieuwe kijk op persoonlijkheid als gevolg van de toevoeging van de Integriteitsdimensie.

De resultaten van deze studie komen, zoals verwacht, overeen met het hot/cool hypothese en ook met de resultaten van de studies die worden gerapporteerd in Hoofdstuk 3. Zowel negatief affect als cognitie (strafkans x strafzwaarte) zijn significante voorspellers van het maken van criminele keuzes. Ook persoonlijkheid blijkt een belangrijke voorspeller van crimineel gedrag. Emotionaliteit, Conscientieusheid, Zelfcontrole en Integriteit blijken belangrijke voorspellers. Het lijkt er zelfs op dat Honesty-Humility een ongeveer even sterke voorspeller is als Zelfcontrole en daarmee dus een zeer belangrijke toevoeging vormt voor criminologisch onderzoek.

Een andere belangrijke bevinding is dat de genoemde persoonlijkheidsdimensies (m.u.v. van Conscientieusheid) zowel direct als indirect gerelateerd zijn aan criminele keuzes. Lage Zelfcontrole leidt bijvoorbeeld tot minder negatieve gevoelens bij het overwegen van een criminele keuze. Ook schatten mensen met weinig Zelfcontrole de strafkans en strafzwaarte lager in. Maar tevens is er dus een direct effect van Zelfcontrole op crimineel gedrag, zonder mediatie van cognitie of affect. Vergelijkbare resultaten worden gevonden voor zowel Integriteit als Emotionaliteit.

In het vijfde en laatste empirische hoofdstuk worden alle inzichten uit voorgaande hoofdstukken geïntegreerd. Als persoonlijkheidsdimensies zijn Zelfcontrole en Integriteit (als sterkste voorspellers) meegenomen. Verder is wederom gekeken naar negatief affect en cognitie (in de vorm van strafkans x strafzwaarte) die tezamen met persoonlijkheid worden geïntrigeerd in een model. Echter, in dit hoofdstuk wordt net als in Hoofdstuk 3 ook processing mode gemanipuleerd. Deelnemers krijgen voordat ze de scenarios krijgen voorgelegd weer een taak waarmee processing mode wordt geïnduceerd.

De resultaten laten een vergelijkbaar beeld zien als de studies uit de andere hoofdstukken. Zowel cognitie als negatief affect is een belangrijke voorspeller van criminele keuzes. Voorts zijn zowel Integriteit als Zelfcontrole direct als indirect gerelateerd aan criminele keuzes. Ook wordt wederom het bestaan van twee onafhankelijk opererende processing modes aangetoond.

Alles bij elkaar genomen lijkt het erop dat rationele keuzemodellen behoorlijk moeten worden uitgebreid. Belangrijker, het geïntegreerde hot/cool model dat ook persoonlijkheid omvat blijkt veel beter in staat te zijn om criminele keuzes te voorspellen dan bestaande modellen. Ook is de dual-process notie die ten grondslag ligt aan veel sociaalpsychologisch onderzoek maar ook wordt gebruikt in de neurowetenschappen en

behavioral economics goed toe te passen goed toe te passen op crimineel gedrag. Het feit dat de resultaten steeds konden worden gerepliceerd in verschillende studies betekent dat we redelijk wat vertrouwen kunnen hebben in de robuustheid van het model.

Tenslotte nog enkele opmerkingen/kanttekeningen. Je kunt je bijvoorbeeld afvragen of het gebruik van scenario's helemaal adequaat is als proxy van crimineel gedrag. Het gaat tenslotte om situaties die mensen zich moeten voorstellen, niet situaties waar ze zich daadwerkelijk in bevinden en bovendien zijn de criminele daden die erin beschreven worden relatief mild van aard (zoals illegaal downloaden en verzekeringsfraude). Of de resultaten opgaan voor zwaardere misdrijven zal moeten blijken uit vervolgonderzoek. Een deel van dat onderzoek wordt momenteel door Reinout de Vries en mijzelf opgezet. Echter, om het beantwoorden van deze vraag niet helemaal uit de weg te gaan heb ik in het concluderende hoofdstuk gekeken op basis van de resultaten van bestaand, met name kwalitatief, onderzoek onder zware en veelvuldig recidiverende criminelen in hoeverre het hot/cool framework het gedrag van deze groep kan verklaren. Het lijkt erop dat dat heel aardig lukt.

Belangrijker is om tenslotte op te merken dat het hot/cool model niet alleen veel beter in staat is dit gedrag te beschrijven en te verklaren maar juist een stap verder kan gaan dan de bestaande keuze modellen op dit gebied. Deze modellen moet vaak concluderen dat bepaald gedrag 'irrationeel' is omdat de kosten van het gedrag veel hoger liggen dan de baten ervan of ze moeten hun toevlucht nemen tot vergezochte verklaringen. Doordat het hot/cool model een veel realistischer beschrijving geeft van de psychologie van het daadwerkelijke besluitvormingsproces is het in potentie dus een 'grote stap voorwaarts' in de criminologie, en criminele besluitvorming in het bijzonder.

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