Babeș-Bolyai University
Faculty of Psychology and Educational Sciences
Doctoral School of Applied Cognitive Psychology

Moral Decision and Emotion: Roles of Personality, Religiosity and Empathy

Summary

Supervisor:
Professor Andrei C. Miu, Ph.D.

Candidate:
Raluca-Diana Szekely (Szekely-Copîndean)

2018
Cluj-Napoca

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Keywords

Moral; Decision; Emotion; Personality; Religiosity; Empathy; Moral Judgment; Moral Dilemmas; Moral Decision; Individual Differences

Acknowledgements

First, I would like to thank the 1344 participants who generously donated their time for science.

Second, I would like to thank the people that either made certain studies possible or brought extremely valuable contributions to one or more of the studies included in the current thesis:

- Dr. Romana Vulturar and dr. Adina Chiș, my colleagues from the Cognitive Neuroscience Laboratory, for making Study 7 possible and for taking the time to introduce me to genetics and biochemical measures.
- Prof. Ticu Constantin and dr. Cristina M. Bostan, who generously provided the majority of participants in Study 2 and ensured data collection.
- Lect. Andrei Ion, who generously provided all the participants in Study 3 and ensured data collection.
- Lect. Marius Cioară, who generously provided many of the participants from Studies 1 and 2 and ensured data collection.
- Cognitive Neuroscience Laboratory interns and volunteers who helped with study promotion materials, data collection, and personalized feedback distribution, in Studies 2, 3 and 7: Simina Pițur, Marius Acsinte, Ioana Meșterelu, Maria Bega, Flavia Cherecheș, Mara Miclea, Paula Florea and Vladimir Couți.

Third, I would like to thank my Doctoral Advisory Committee, prof. Aurora Szentagotai-Tătar, prof. Petru L. Curșeu, assoc. prof. Laura Visu-Petra and lect. Oana Negru-Subțirică, for their valuable feedback, recommendations and support throughout these years.

Then, I would like to thank my colleagues from the doctoral program, especially, Mirela Bîlc, Ioana Bunea and Alexandra Huh, from whom I learned a lot, for their scientific and moral support. Also, I would like to thank lect. Lavinia Cheie, dr. Oana Mărcuș, dr. Amalia Ciucă and dr. Gabriela Culda, for their valuable advice and moral support throughout these years. Moreover, I would like to thank my colleagues, Monica Buta and Andrada Ciucă, for their moral support, and my former colleagues, Liviu Crișan and Mihai Cărnuță, for our many inspiring scientific discussions.

Last, but most importantly, I would like to thank my supervisor and mentor, prof. Andrei C. Miu, for his major contribution in making all these studies possible. Also, I would like to thank him for pointing me towards moral judgment and decision making research in the first place, when I was just a first-year undergraduate. During this time, he has helped me refine my research ideas, my writing technique and my overall research skills. I am grateful to him for his guidance and support in the last decade, and for being the person who motivated me to strive to become the best researcher I can be.

On a personal note, I would like to express gratitude to my family. My husband has been there for me, teaching me how to enjoy success and helping me to embrace challenges and failures. My parents have supported my every endeavor and have always encouraged me to pursue my passions, for which I am extremely grateful. They have also taught me to be curious about the world, which eventually led me to aspire to become a researcher. My late grandfather, my grandmother and my uncle have taught me about the importance of being a

moral person. They taught me about integrity and kindness from an early age, and about belief in God, for which I am extremely grateful. Also, I would like to thank my best friend, for putting up with endless scientific conversations outside her expertise, and for her valuable moral support. Finally, I am grateful to my extended family, our godparents and to all my friends for their prayers, advice and good thoughts sent throughout these years.

CHAPTER 1
THEORETICAL BACKGROUND

Morality is an integral part of a person's identity (Strohminger & Nichols, 2014), which is why investigating how people think about moral issues has been the focus of intense interdisciplinary research in the last twenty years. From neuroscience and philosophy, to behavioral economics and cognitive, social and personality psychology, researchers addressed a central question: "How is moral cognition generated in the mind and the brain?". To answer this question, researchers focused on antecedents of moral evaluative cognitions, or moral judgments. A working definition of moral judgments would be that they refer to an *appraisal* of whether an (in)action is right or wrong and/or whether the person doing it is good or bad (Cushman, Knobe, & Sinnott-Armstrong, 2008; Haidt, 2001; Uhlmann, Pizarro, & Diermeier, 2015).

A conventional way to study moral judgments is by creating conflict between competing moral concerns and asking people to decide between them (Crockett, Kurth-Nelson, Siegel, Dayan, & Dolan, 2014; Miller & Cushman, 2018). A typical example is a decision between either refraining from harm or actively harming another person, when it is a means to save many other people (Cushman & Greene, 2012). This approach may have the advantage of measuring how people attach relative subjective value to moral concerns (Crockett, 2013), possibly through action and outcome appraisals (Cushman, 2013), and/or person-focused appraisals (Siegel, Crockett, & Dolan, 2017; Uhlmann, Zhu, & Tannenbaum, 2013). Also, this approach has been used to test whether individual differences, as distal antecedents of moral cognition, influence preferences for one decision over the other (Conway & Gawronski, 2013; Moore, Stevens, & Conway, 2011). At the same time, it has been used to investigate whether moral judgments are flexible to proximal antecedents (Bartels, Bauman, Cushman, Pizarro, & McGraw, 2015), such as situational factors (e.g., harming one's kin versus harming a stranger) (Kurzban, DeScioli, & Fein, 2012; Tassy, Oullier, Mancini, & Wicker, 2013). In short, moral judgment and decision making research has been successfully used to construct theoretical models of moral cognition (Cushman, 2013).

Models of Moral Cognition

Early models of moral cognition focused on whether moral cognition is the product of rational, deliberate thinking (Kohlberg, 1981), or the product of intuitive, automatic reactions (Haidt, 2001), or both (Greene & Haidt, 2002). In contrast, recent models have tried to map the kind of information people process in order to generate moral judgments, and to understand how this information is integrated in the brain (Cushman, 2013; Van Bavel, FeldmanHall, & Mende-Siedlecki, 2015), and the mind (Gray & Schein, 2012).

Dual-Process Model

The dual-process model of moral judgment and decision making is the product of early research investigating the interplay between cognition and emotion in moral judgment (Greene, Nystrom, Engell, Darley, & Cohen, 2004; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001). This model is in line with the classic dual-system framework, which

describes two competing ways of thinking, one emotional (automatic) and one rational (controlled) (Epstein, 1994; Kahneman, 2011). An early formulation of the dual-process model stated that people's moral judgments may involve conflict between (automatic) emotional processes and (controlled) cognitive processes (McClure, Botvinick, Yeung, Greene, & Cohen, 2007). Also, it stated that the way people resolve this conflict, either by relying on or by controlling one's emotions, may dictate their subsequent moral decisions (Greene, 2008).

The dual-process model was also argued to integrate two long-standing philosophical traditions on morality and moral norms, Deontology (Kant, 1785/1993) and Utilitarianism (Mill, 1863), from a psychological point of view. The main experimental paradigms used to measure moral judgment were inspired by philosophical thought experiments. A famous such thought experiment is the "Trolley problem" (Thomson, 1985), which presents a paradox between two moral dilemmas. In one dilemma, people are asked to consider whether it is morally acceptable to pull a switch to divert a runaway trolley heading towards five people, onto a track with only one person. In the other dilemma, people are asked to assess the same situation, but this time, instead of pulling a switch, they are asked to consider the moral acceptability of pushing a man off a footbridge to save the five people on the track. Researchers wanted to explain why, paradoxically, most people judge that it is morally acceptable to pull the switch, but not to push the man. Decisions to reject harm, no matter the consequences were described as characteristically deontological, because a deontological norm such as "Do not harm others." is enforced. Decisions to endorse harm for the greater good were described as characteristically utilitarian, because they tend to maximize the greater good.

Another assumption of the dual-process model was that deontological decisions were mainly supported by automatic emotional processes (Bartels, 2008; Cushman, Young, & Greene, 2010), while utilitarian decisions were the product of cognitive control (McClure et al., 2007). In other words, the model emphasized the idea of a competition between emotional and cognitive processes in supporting two mutually exclusive types of moral decisions. The assumptions of the dual-process model were tested, on the one hand, by investigating whether emotional processes were critical in producing deontological decisions (Ciaramelli, Muccioli, Làdavas, & di Pellegrino, 2007; Koenigs et al., 2007), and on the other hand, whether utilitarian decisions depended on exerting cognitive control (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008).

An important methodological critique of the dual-process model stemmed from the assumption that choosing the deontological decision (e.g., do no harm, no matter the consequences) would automatically imply rejecting the utilitarian decision (e.g., harming is allowed as means to achieve a greater good). However, dilemmas like the footbridge scenario were consistently described as "high-conflict" (Greene et al., 2008; Koenigs et al., 2007). It was argued that if conflict existed, then people who end up choosing the deontological alternative might also have thought about the utilitarian alternative, and this information is lost when measuring both preferences as inversely related (Conway & Gawronski, 2013). Using an adaptation of the classic process dissociation procedure (Jacoby, 1991), Conway and Gawronski (2013) measured both people's deontological and their utilitarian preferences. The process dissociation approach provided a way to separately investigate the contributions

of emotion and cognition to deontological, and respectively, utilitarian decisions (Conway & Gawronski, 2013). This approach tackled the dual-process model limitation regarding how deontological decisions and utilitarian decisions were measured.

Dual-System Framework

The dual-process model was criticized for assuming an antithetical relation between emotion and cognition in moral judgment and decision making. It was argued that moral judgments involve a complex integration of a cognitive component, understood as information processing, with an emotional component, understood as subjective value (Cushman, 2013; Moll & Schulkin, 2009; see also Pessoa, 2008). The dual-system framework (Cushman, 2013) was inspired from formal models of learning and decision, like reinforcement learning algorithms (Sutton, 1988). According to this framework, moral judgment relies on two types of value representations, one attaching intrinsic value to actions, and the other attaching value to actions based on expected outcomes of actions. Action- and outcome-based processes include both cognitive and emotional elements, yet the former process would trigger mainly deontological decisions (Crockett, 2013), while the latter would trigger utilitarian decisions, in the context of moral dilemmas.

According to Cushman (2013), action-based value representations are consistent with "model-free" algorithms (i.e., heuristics), while outcome-based value representations are consistent with "model-based" algorithms. In this mindset, the value representation of an action would depend on the action itself and, possibly, the contextual cues or (internal/external) states surrounding that action (Cushman, 2013). Conversely, "model-based" algorithms, commonly known as reasoning (Cushman, 2013), require a mental representation of alternate courses of action, such as decision trees (Crockett, 2013). Applying formal models to moral cognition, in contrast with the automatic/controlled framework (McClure et al., 2007), may better suit research focused on characterizing (proximal) antecedents and mechanisms (e.g., value representation of a harmful action) involved in the generation of moral judgments and decisions.

Adopting an action- and outcome-based dual-system framework enabled studying the contributions of affect in moral judgment and decision making (Miller, Hannikainen, & Cushman, 2014). The mechanism proposed for action-based value appraisals was action aversion (i.e., negative emotional reaction/withdrawal) (Cushman, Gray, Gaffey, & Mendes, 2012). The hypothesis was that action aversion would devalue and lead to rejecting the harmful action when making a moral decision (i.e., deontological decision). Action aversion may prompt an appraisal that the harmful action is "bad" (see Ayars, 2016), but it may not be sufficient to produce a judgment that the respective action is morally "wrong" (Nichols, 2002). On these lines, it was suggested that moral norms may prompt such a "wrongness" appraisal (Cushman, 2015). Judging the morality of an action may, therefore, involve the integration of more than two kinds of antecedents (i.e., action concerns, outcome concerns); processing and integrating moral norms into one's moral judgment is one example supporting this idea.

Dynamic Systems Approach

Functional imaging studies consistently reported that several brain regions (i.e., involved in different kinds of processes) were active during moral cognition (Bzdok et al., 2012; Garrigan, Adlam, & Langdon, 2016; Greene & Haidt, 2002; Sevinc & Spreng, 2014). It

was argued that moral cognition should be studied by breaking down the kinds of information being processed and by describing how (i.e., rather than how fast) this information was integrated (Moll, de Oliveira-Souza, & Zahn, 2008; Van Bavel et al., 2015). Therefore, moral cognition may be more accurately described through a dynamic systems approach (de Oliveira-Souza, Zahn, & Moll, 2015; Forbes & Grafman, 2010; Van Bavel et al., 2015). To generate a moral judgment, people may need to process information about actions and outcomes (Cushman, 2013), but they may also need to integrate social information (i.e., information about other people) (Forbes & Grafman, 2010), personal information (i.e., information about the self) (Crockett, 2013), and/or information about moral norms (Moll et al., 2008).

Social information may help people determine whether another person's action was intentional or not (Gray, Young, & Waytz, 2012). Also, social information may be relevant when people try to figure out whether another person is good or bad (Goodwin, Piazza, & Rozin, 2014; Uhlmann et al., 2013; 2015), and whether it deserves to be praised or blamed for their actions (Siegel et al., 2017). In moral dilemmas, processing information about other people may refer to potential victims of the harmful action. In this case, deciding upon the morality of a harmful action may involve integrating one's reactions and concern for the wellbeing of the potential victims (Cushman, 2015). Such a process was also described within the more general framework of social cognition as empathy (i.e., feeling with and for the other) (Bzdok et al., 2012).

Personal information may be closely intertwined with social information in moral cognition (Denny, Kober, Wager, & Ochsner, 2012). It was suggested that appraising other people's actions may be similar to how a person appraises their own actions (Miller & Cushman, 2013, 2018). People's personal aversion to harm predicted judgments about whether it was morally acceptable for another person to endorse harmful actions in dilemmas (Miller & Cushman, 2013; Miller et al., 2014). Moreover, people's past experiences and personal learning history regarding morally relevant events may inform moral judgment and decision making (Nazarov et al., 2016). Aversive reactions to physical harms were argued to have a both an innate and a learned components (Gęsiarz & Crockett, 2015; Miller & Cushman, 2013). Such reactions were suggested to influence people's willingness to endorse or reject harm in moral dilemmas (Crockett, 2013).

Moral norms were defined as public, socially shared and culturally endorsed standards for moral conduct (Bicchieri, 2005). They are abstract concepts about what is right and wrong, grouping morally relevant (in)actions regarding what people shouldn't (i.e., proscriptive norms) or should (i.e., prescriptive norms) do (Gawronski, Armstrong, Conway, Friesdorf, & Hütter, 2017). People may feel constrained by or compelled to follow moral norms (Cushman, 2015), which may indicate that they hold intrinsic value (Goodwin & Darley, 2008). Moral norms were argued to contribute to moral judgment indirectly (Bicchieri, 2005), with the more proximal antecedent being internalized moral norms (i.e., norms known and endorsed by the individual). Also, it was argued that for moral norms to exist and have an impact, they have to be shared in the minds of groups of people (Bicchieri, 2005; Graham et al., 2011). Therefore, researchers investigated the kinds of moral norms shared and endorsed by societies and cultures. An influential approach was the *moral foundations theory* (Haidt & Joseph, 2004), which stated that moral norms could be clustered

into (at least) five categories (i.e., foundations) (Graham et al., 2013): "harm", "fairness", "authority", "ingroup" and "purity". Moral foundations were argued to reflect people's intuitive (i.e., automatic) sensitivity to moral norms (Graham, Haidt, & Nosek, 2009). The kinds of moral norms people personally endorse were argued to influence their moral judgments (Graham et al., 2009).

Distal and Proximal Antecedents to Moral Judgment and Decision Making

People may navigate morality based on their more stable features, like personality traits, central values and general needs, and/or internalized socio-cultural norms (de Oliveira-Souza et al., 2015). At the same time, for moral judgments about what is right and what is wrong to do in a specific situation, people may rely on a complex interplay between sensitivity to moral norms, sense of agency and theory of mind, personal aversions, empathy and moral emotions (see de Oliveira-Souza et al., 2015). In other words, the way people think about and experience morality may be the product of both stable dispositional traits (i.e., distal antecedents) and more flexible mechanisms triggered by situational cues (i.e., proximal antecedents). In the present thesis, we use the terms "distal" and "proximal" antecedents having as frame of reference the appraisal processes behind moral judgments and decisions elicited in specific situations. Therefore, we refer to individual differences in stable, dispositional traits (e.g., personality traits), as distal antecedents, and to situational cues and contextual factors, as proximal antecedents.

Distal Antecedents

Investigating dispositional traits may offer insight into how different people approach moral conflicts (Skitka, Bauman, Seargis 2005). A way to investigate why people often fail to find consensus on whether certain actions (e.g., euthanasia) are morally wrong (Cushman et al., 2008) may be to look at how they usually think, feel, or tend to act across different situations (i.e., dispositional traits) (Baron & Ritov, 2004). Depending on their narrow or wide applicability across different kinds of situations, these dispositions may be specific, like a personal tendency to be concerned for others in suffering (i.e., dispositional empathy), or more general, like the orientation towards engaging in positive relationships with everyone (i.e., agreeableness).

The interest for individual differences in moral judgment and decision making was elicited by observations that people varied quite a lot in how they dealt with moral conflicts (Bartels, 2008). It was suggested that (some) people may possess mental shortcuts for solving moral conflicts (Baron & Ritov, 2004), like a preference for indirectly harming others when the alternative is direct harm (Royzman & Baron, 2002). This may block their ability to flexibly adjust their response to the particularities of a situation. More recently, researchers discussed the necessity of investigating the role of individual differences in moral judgment and decision making (Cushman, 2015; Prehn & Heekeren, 2009; L. Young & Saxe, 2011).

Theoretical accounts of how people evaluate moral situations supported the view that moral judgment relies on basic psychological processes (e.g., value representation, cognitive control). Individual differences may arise at the level of these psychological processes, which, in turn, may influence moral judgment and decision making (L. Young & Saxe, 2011). Building on dual-process accounts like the dual-process model (Greene, 2008) and dual-system framework (Cushman, 2013), studies investigated people's dispositional thinking patterns on the one hand (Bartels, 2008; see also Conway & Gawronski, 2013), and their

dispositional affective responses (Gleichgerrcht & Young, 2013; Miller et al., 2014), on the other hand.

When studying morality, it was emphasized that researchers should focus on the "person as a whole" (Cervone & Tripathi, 2009; see also de Oliveira-Souza et al., 2015). In the case of moral judgment and decision making, it was argued that a person may reach a final response motivated by their own goals and belief systems (Bartels et al., 2015; de Oliveira-Souza et al., 2015). Being a good person who is respected in one's community, doing (what one believes to be) the right thing (Skitka, 2010), or caring about/for others (Marsh et al., 2014) may be such personal (positive) social motivations (Bartels et al., 2015). Studies from other fields of psychology have long suggested that individual differences in personality traits may shape social motivations (Moffitt et al., 2011; Ozer & Benet-Martínez, 2006; Ryan & Deci, 2000). Research on moral judgment and decision making has dedicated much interest to investigating people with generally negative social motivations, such as people with psychopathy.

At the lowest end of the "care" continuum are people clinically diagnosed with psychopathy (Marsh et al., 2014). In relation to moral judgment, early research supported the idea that psychopaths may lack the capacity to distinguish between right and wrong (Blair, 1995). More recent studies, however, showed that psychopaths did understand moral norm violations (Aharoni, Sinnott-Armstrong, & Kiehl, 2014). Instead of a lack of understanding moral norms, psychopaths were argued to lack the necessary motivation to comply with moral norms (Cima, Tonnaer, & Hauser, 2010), or have a reduced concern for the wellbeing of other people (Marshall, Watts, & Lilienfeld, 2016). When faced with moral dilemmas in which harming another person is pitted against saving many other people, psychopaths were found to prefer harming the person (Marshall et al., 2016). However, the way people respond to moral dilemmas may not discriminate between healthy and impaired moral function (Marshall et al., 2016). Therefore, investigating effects of psychopathic traits in moral dilemmas may be less informative of the kind of motives (typical) people rely on to deal with such moral conflicts (Kahane, Everett, Earp, Farias, & Savulescu, 2015).

Proximal Antecedents

To study whether people's judgments and decisions were sensitive to situation characteristics, researchers manipulated different situational cues in moral dilemmas (Greene et al., 2008, 2001). A multitude of situational effects were tested (Christensen & Gomila, 2012). Most manipulations of dilemma characteristics can be grouped into action-related effects and outcome-related effects. Researchers investigated moral judgments about different forms of harmful actions, by manipulating different aspects relating to the action itself (Cushman, 2008; Greene et al., 2009), and who should consider whether to perform it (Meindl & Graham, 2014). Harmful actions almost always imply a harmful outcome (Gray, Waytz, & Young, 2012; Miller et al., 2014). The main experimental manipulations regarding outcome-related effects involved changing the characteristics of the proximal victim (Conway & Gawronski, 2013), and/or the number of the distal victims (Bartels, 2008).

What makes moral dilemmas difficult is that there is a positive result to harming one person, as people get the chance to save more lives (Cushman & Greene, 2012). However, it was found that people have a poor ability to process an idea such as the suffering of thousands of people (Slovic, 2007). A potential mechanism proposed in the literature was a

phenomenon called “collapse of compassion” (Cameron & Payne, 2011), which refers to the fact that people may be motivated to regulate their emotional reactions in the face of mass suffering, out of self-preservation. Studies found that people who were habitually controlling their emotional reactions (i.e., emotion regulation) were less sensitive to mass suffering (Cameron & Payne, 2011), and more willing to harm another person in moral dilemmas (Szekely & Miu, 2015).

Integrating Distal and Proximal Antecedents

People’s motivations to remain faithful to their moral beliefs may often be challenged when the right thing to do in a certain situation may not be obvious. In this case, they may need to address inconsistencies between their own beliefs and relevant situational cues, in order to deal with moral conflicts, a process called moral flexibility (Bartels et al., 2015). However, people may be rather inflexible about moral issues (Graham et al., 2009; Skitka, 2010; Wisneski, Lytle, & Skitka, 2009), having personal attachments to their own beliefs (e.g., protected values, emotionally-charged internalized norms) (Bartels, 2008; Nichols, 2002; Ritov & Baron, 1999). This may provide them with mental shortcuts (heuristics) to deal with moral dilemmas quickly and, possibly, feeling less conflicted about their decisions (Gürçay & Baron, 2017). It was recently argued that studying moral flexibility of judgment and decision making should involve integrating an individual differences approach with an experimental approach (Graham, Valdesolo, & Wallace, 2016; Gürçay & Baron, 2017; Lee & Gino, 2018). By characterizing decision makers, researchers may be able to quantify the magnitude of situational effects in moral dilemmas (L. Young & Saxe, 2011). However, this approach may be less informative for investigating whether people flexibly integrate situational demands with their personal beliefs. Another approach would be to ask the same participants to read multiple kinds of moral dilemmas. An issue with this approach would be that people may be influenced in their judgments and decisions by the order of the different dilemmas (Lombrozo, 2009; Wiegmann, Okan, & Nagel, 2012; Wiegmann & Waldmann, 2014). Another approach involves the contrast between what people may think is the morally right thing to do in a situation and what they would personally do in that situation (Tassy, Oullier, et al., 2013). Studies found that people endorsed the harmful action less when they were thinking about their personal decision, compared to their abstract appraisal about what may be the right thing to do in general (Schaich Borg, Hynes, Van Horn, Grafton, & Sinnott-Armstrong, 2006; Tassy, Oullier, et al., 2013). Moreover, a recent meta-analysis indicated that the two kinds of processes may even rely on slightly different patterns of neural activity (Garrigan et al., 2016). Moral flexibility research may gain important insight by studying the role of dispositional traits in how people respond to moral dilemmas from both personal and more abstract perspectives.

An important goal of moral judgment and decision making research was to find out what happens in people’s minds when they think about and deal with moral conflicts. In one approach, researchers turned to studying people’s brain activity to figure out what kind of information was being processed and how it was integrated at the neural level (Koenigs et al., 2007; Shenhav & Greene, 2014). This approach discussed the importance of investigating value representations and their role in moral judgment and decision making (Cushman, 2013; Van Bavel et al., 2015). In another approach, researchers turned to studying mental

representations from a cognitive perspective, focusing on identifying the content of morally relevant representations (Gray, Schein, & Ward, 2014; Schein & Gray, 2018).

According to the dual-system framework, and the dynamic systems approach (Van Bavel et al., 2015), moral judgment and decision making might be generated by processing different kinds of information (i.e., information about actions and outcomes, social and/or personal information, information about moral norms). However, all these kinds of information may need to be integrated, to help people deal with the conflicts they are challenged with, in moral dilemmas. Neuroimaging studies suggested that the ventromedial prefrontal cortex (vmPFC) may be responsible for integrating value representations of actions and outcomes to produce an overall, "all things considered" moral judgment (Hutcherson, Bushong, & Rangel, 2015; Shenhav & Greene, 2014). Value representations may also guide the moral judgment and decision making process (Crockett, 2016), potentially through by engaging (at least) one of three systems involved in generating value representations: the model-free, the model-based and, respectively, the Pavlovian system (Crockett, 2013; Daw & O'Doherty, 2014). In the case of moral decision making, researchers proposed that people may decide to reject harm in moral dilemmas using action-based value representations (Cushman, 2013). This type of value representation was argued to depend on the model-free system, which assigns value to actions based on past contingencies (e.g., harmful actions were punished). Conversely, people may decide to endorse harm using outcome-based value representations. This type of value representation was argued to depend on the model-based system, which assigns value to actions based on their predicted outcomes (e.g., taking one life will spare other five) (Cushman, 2013). In the case of the Pavlovian system, the value of action depends on how aversive (or appetitive) it is (Crockett, 2013).

These valuation systems have well-documented neural underpinnings (Montague, King-Casas, & Cohen, 2006). Therefore, researchers investigated whether manipulating neurotransmitters that were previously associated with aversive and appetitive neural value generation (i.e., serotonin and dopamine) would impact moral decision making. Researchers used a pharmacological intervention that increased levels of serotonin available in the brain, administering a drug that blocked the reuptake of serotonin from the synaptic cleft (i.e., citalopram). They found that the pharmacological intervention reduced people's tendencies to endorse harmful actions in moral dilemmas (Crockett, Clark, Hauser, & Robbins, 2010). Their interpretation of this finding was that serotonin increased people's aversion to harm, which may have devalued decisions to endorse harm in dilemmas (Crockett et al., 2015).

For cognitive psychologists, a pending question that remained unanswered by cognitive neuroscience research was: what exactly differentiated immoral (wrong) actions from simply "bad" (aversive) actions? One proposal was that immoral actions were actions that transgressed internalized moral norms (Ayars, 2016; Haidt & Joseph, 2004). According to another proposal, the answer was the perceived harmfulness of the action (i.e., rather than objective harm). This answer was detailed within the *theory of dyadic morality* (Gray et al., 2014; Schein & Gray, 2018). The theory of dyadic morality proposed that appraisals of immorality were based on the integration of three elements: a mental representation of harm, a moral norm violation and negative affect (Schein & Gray, 2018).

Affective Contributions to Moral Judgment and Decision Making

Contemporary models of moral cognition have assumed that affective processes play an important role (Cushman et al., 2010; Greene, 2014). However, researchers are still currently debating about what this role (or roles) might be (Avramova & Inbar, 2013; Huebner, Dwyer, & Hauser, 2009; Valdesolo, 2018).

A commonly accepted working model of emotion posits that a person generates an emotion when confronted with a situation, to which they direct their attention, and for which they create meaning (i.e., appraisal) (Barrett, Ochsner, & Gross, 2007). For almost 40 years, studies from fields like behavioral economics, psychology and neuroscience have investigated the role of emotion in decision making (Lerner, Li, Valdesolo, & Kassam, 2015; Phelps, Lempert, & Sokol-Hessner, 2014). In a typical model of decision making, a person reaches a decision after assessing given options. During assessment, the decision maker may generate value representations of each choice option. These value representations may depend on multiple parameters, like the personal characteristics of the decision maker (e.g., aversion to risk), and the kind of (expected) outcomes associated with each choice option (e.g., a delayed, but positive outcome). A recent model of emotion and decision making proposed that emotions may influence the value representation of choices through three pathways (Lerner et al., 2015): the *current emotions* pathway, which involves the experience of emotions while deciding; the *expected emotions* pathway, which may not involve the actual experience of emotions, but may influence choice value representations; the *incidental emotions* pathway, which involves influences due to people's mood or previously elicited emotions.

Current Emotions

The experience of emotions while deciding in a situation was argued to help people discern good options from bad ones (Västfjäll et al., 2016). When people read a scenario that poses a moral dilemma, research indicated that their mood may change; specifically, positive mood may decrease, while negative mood may increase (Horne & Powell, 2016). At the same time, people's attention may be directed towards multiple situational cues. To approach the moral dilemma, they may need to integrate emotions that were elicited by the appraisal of a situational cue, like performing a harmful action. People may also use such a cue to generate value representations of choice options (i.e., endorse/reject harm) (Miller & Cushman, 2018). The kind of harm may matter for the emotional input, with physical harm being the most aversive to people (Cushman et al., 2012); percieving harm may involve integrating cues about both the actor that is doing the harmful action and the victim(s) that receive the outcome of the harmful actions (Gray et al., 2014; Gray, Waytz, et al., 2012). The suffering inflicted to other people by a harmful action may trigger aversive responses (Miller et al., 2014; Reynolds & Conway, 2018). Therefore, people's moral judgments and decisions may depend on a delicate balance between what they may feel is the right thing to do and who (or how many people) may get hurt in the process. This may be why, when researchers asked people how they felt while deliberating upon a response in a moral dilemma, they reported multiple kinds of discrete emotions.

People's emotional experience during moral judgment and decision making was found to vary from fear and sadness to disgust, anger, empathy and even guilt (Baron, Gürçay, & Luce, 2017; Choe & Min, 2011; Horne & Powell, 2016; Szekely & Miu, 2015). Results from these studies may suggest that people appraise and react to various situational cues in moral

dilemmas. Fear and anxiety may be a reflection of people's aversion to both harm and suffering (Marsh, 2016). In the case of the other emotions, it was argued, for instance, that anger and disgust may be elicited in relation to the actor (the person doing the harm) and the harmful action, while sadness and empathy may be elicited with regard to victims and suffering (Gray & Wegner, 2011; see also Eisenberg, 2000; Russell & Giner-Sorolla, 2011). Moreover, what makes moral dilemmas difficult may be the fact that people are equally emotionally invested in the available decision alternatives, which may elicit conflict (Moll & Schulkin, 2009). Therefore, some of these emotions may reflect conflict (e.g., anxiety), while others may reflect reactions to certain stimuli (e.g., sadness for the victims).

Expected Emotions

When people think about what to decide, they may also take into account how they would feel like after making a certain decision (i.e., expected emotions), which may impact their final decision (Lerner et al., 2015). In moral dilemmas, researchers hypothesized that people may simulate emotional outcomes associated with each decision, by engaging in counterfactual thinking (Tasso, Sarlo, & Lotto, 2017; see also Migliore, Curcio, Mancini, & Cappa, 2014). Particularly, researchers suggested that people may use counterfactual comparisons to integrate expected emotions while deliberating on a decision in moral dilemmas (see also Pletti, Lotto, Tasso, & Sarlo, 2016; Tasso et al., 2017).

Expected post-decision emotions were mostly measured after people made a moral decision (but see Horne & Powell, 2016). This approach may be informative about how people integrate emotions into their moral decisions (e.g., through counterfactual comparisons). However, this approach may not account for emotional changes that may occur before people make a decision, and that are linked to expected emotions. Rather, people may be motivated to protect themselves from expected emotional exhaustion, in situations in which they would have to help (e.g., donate money) certain victims (Cameron, Harris, & Payne, 2016; Cameron & Payne, 2011; Slovic, 2007; Västfjäll, Slovic, Mayorga, & Peters, 2014). Therefore, it may be the case that, even before making a decision, people may engage in emotion regulation (for effects of emotion regulation in moral dilemmas, see Feinberg, Willer, Antonenko, & John, 2012; Lee & Gino, 2015; Szekely & Miu, 2015), anticipating the emotional costs of their actions.

Incidental Emotions

People's moral judgments and decisions may be sensitive to emotional influences that were not generated by the current situation (e.g., moral dilemma). Pre-existing mood/emotion may be able to alter people's moral judgments and decisions; this hypothesis by eliciting positive or negative mood, and positive or negative discrete emotions. Researchers induced positive mood (e.g., watching a comedy video) before people read about the footbridge dilemma (Valdesolo & DeSteno, 2006) and found that the manipulation increased people's endorsement of the harmful action (for a similar result, see Horne & Powell, 2016).

The effects of incidental negative mood were also examined in relation to moral judgment and decision making (Youssef et al., 2012; see also Kirschbaum, Pirke, & Hellhammer, 1993). Inducing social stress increased endorsements of physical harm to the proximal victim, in dilemmas (Youssef et al., 2012). This effect was also found in people with posttraumatic stress disorder (Nazarov et al., 2016). Such results may indicate that

negative mood may amplify the negative emotions triggered, in this case, by harm in moral dilemmas (Västfjäll et al., 2016).

In relation to judgment and decision making in moral dilemmas, studies found that incidental disgust was associated with reduced endorsement of the harmful action (Ugazio, Lamm, & Singer, 2012). Researchers argued that disgust has a strong avoidance component; therefore, when people contemplate harmful actions in moral dilemmas, disgust may motivate them to avoid such an action (Ugazio et al., 2012). Perceptions of harm were found to mediate the relation between incidental disgust and moral judgment (Schein, Ritter, & Gray, 2016). Contrasting the effect of disgust, incidental anger (i.e., an emotion with a strong approach component) was found to increase endorsements of harmful actions in dilemmas (Ugazio et al., 2012).

Research Aims and General Methods

Both distal and proximal antecedents have an important role in shaping moral cognition, in the mind and the brain. The central question of the current thesis was how these antecedents are integrated into people's moral judgments and decisions.

Aim 1

Addressing this question, our first aim was to examine individual differences in solving moral conflicts. In Studies 1-3, we sought to identify which personality traits, as general distal antecedents, contributed to how people approached moral conflicts. We examined their interaction with a proximal antecedent like the participants' perspective of the situation, contrasting abstract with personal points of view. In Studies 4 and 5, we focused on more specific distal antecedents. Particularly, in Study 4, we focused on individual differences in religiosity in relation to solving moral conflicts from a personal point of view. In Study 5, we focused on dispositional empathy in relation to solving moral conflicts from abstract and personal points of view.

Aim 2

Our second aim was to study people's emotional experience while solving moral conflicts. To address this aim, in Studies 1-5, we assessed relations between individual differences in personality traits, religiosity and dispositional empathy, on the one hand, and emotional intensity and valence during moral conflict, on the other hand. In Studies 6-7, we focused on affective mechanisms. In Study 6, we examined sharing other people's emotions (affect sharing), as an empathic mechanism, in relation to approaching a moral conflict from a personal point of view. In Study 7, we tested a potential neurobiological mechanism in relation to affect sharing and solving moral conflicts, by experimentally reducing the level of serotonin synthesis in the brain.

Moral Dilemma Methodology

Moral dilemmas have been used as a method to generate moral conflict, in order to study moral judgment and decision making (Cushman & Greene, 2012). They typically describe hypothetical scenarios in which a harmful action violating a moral norm is pitted against an outcome that upholds a greater good. From a moral philosophy stance, both rejecting and endorsing the tradeoff could be viewed as "the right" response. Particularly, it may be argued that rejecting the tradeoff may imply people followed a deontological philosophy, while endorsing the tradeoff may imply they followed a utilitarian philosophy (Greene, 2008; but see Kahane, 2015). However, the relevance of moral dilemmas for

utilitarian and deontological philosophies has been debated (Gray & Schein, 2012; Kahane et al., 2015).

People may engage in multiple mental processes when considering moral dilemmas (Cushman & Greene, 2012; Gürçay & Baron, 2017). In our review of the literature, we outlined the kind of information processed in moral cognition, and how this information may be integrated in the mind and the brain. Many of the models of moral cognition were based on investigating judgment and decision making in moral dilemmas. Therefore, moral dilemmas might be an adequate method to studying antecedents of moral judgment and decision making.

Moral dilemma methodology has received three important criticisms. First, when people are confronted with hypothetical moral scenarios, they may engage in counterfactual thinking, beyond the scenario. It was argued that this may violate the "closed world assumption", in which researchers assume people will stick to the details of the moral scenario to make a decision (Bennis, Medin, & Bartels, 2010; but see Bazerman & Greene, 2010). We acknowledge this limitation. However, this limitation may also have an advantage, in terms of internal validity. Particularly, researchers that used such moral scenarios were able to isolate multiple types of situational effects on moral judgment and decision making (for a review, see Christensen & Gomila, 2012). One way we addressed this issue in our studies was to instruct participants to read the moral scenarios carefully and try to imagine them as described. Also, in Studies 6 and 7, we chose moral scenarios that happened in real life as described, and informed participants about it.

A second criticism to moral dilemma methodology was that they are not realistic enough and provide low external validity (Bauman, McGraw, Bartels, & Warren, 2014). This refers to both the hypothetical nature of the scenarios, and the abstract (out of context) way in which they are described. However, using abstract hypothetical scenarios may allow researchers to carefully study the contribution of certain situational elements to moral judgment and decision making. Nonetheless, we addressed this issue in three ways. In Studies 1, 2 and 5, we statistically controlled for random variation due to different moral scenarios, which allows for better generalizability of results. To address the out of context criticism, in Studies 1-5, we also measured participants' success in imagining the scenarios. Lastly, in Studies 6 and 7, we adapted a moral dilemma task using moral scenarios that happened in real life.

A third criticism referred to the moral domain covered by the content of the moral scenario (Graham et al., 2011). Particularly, it was argued that the content of moral dilemmas should refer not only about the morality of harmful actions, but also actions that transgress other kinds of norms, like purity norms (e.g., *incest*). However, it was recently emphasized that people's perception of harm can be identified in all types of moral transgressions (Gray et al., 2014; Schein & Gray, 2018). Moreover, harm-related transgressions were found as prototypical for morally relevant actions (Schein & Gray, 2015), and very salient in people's everyday life (Hofmann, Wisneski, Brandt, & Skitka, 2014). Therefore, in all our studies, we used moral dilemmas that refer to the harm moral domain.

Individual Differences

There are individual differences in how people approach moral dilemmas (Baron & Ritov, 2004). Individual differences may be more likely to occur in situations with

compelling alternative responses (Caspi & Moffitt, 1993). In our studies, we focused only on moral dilemmas that posed intractable tradeoffs (Cushman & Greene, 2012), like harming one person to save many others.

It was emphasized that individual differences in moral judgment and decision making may be better understood by investigating potential correlates, like people's traits/dispositions (Baron, Scott, Fincher, & Emlen Metz, 2015). In Studies 1-5, we investigated three kinds of distal antecedents. We first looked at personality traits, because they summarize relatively independent domains of individual differences (Studies 1-3). Then, in Study 4, we investigated dispositional religious thinking, as potential indicator of how much people relied on moral norms in solving moral dilemmas. In Study 5, we investigated dispositional empathic responses, as potential indicator of how much people relied on affective information in solving moral dilemmas.

It was recently suggested that moral judgment and decision making may be a product of distal antecedents and proximal ones (Graham et al., 2016; Lee & Gino, 2018). In Studies 1-3 and 5, we investigated interactions between distal antecedents and a proximal antecedent like people's perspective in moral dilemmas. Particularly, we built on a previously documented distinction between moral judgment and moral choice, which refer to solving moral dilemmas from an abstract and, respectively, a personal perspective (Tassy, Oullier, et al., 2013). In Studies 2 and 3, we also integrated a previously documented distinction between being an observer and being an actor in the moral dilemmas, with our measures of moral judgment and moral choice (Nadelhoffer & Feltz, 2008).

Emotion

Moral dilemmas were associated with a predominantly negative emotion experience (Choe & Min, 2011; Horne & Powell, 2016; Szekely & Miu, 2015). In all our studies, we measured emotion experience in relation to reading about moral dilemmas and deliberating on a response. In Studies 1, 4 and 5, we looked at emotion intensity and valence in relation to reading about moral dilemmas. In Studies 2 and 3, we assessed emotion intensity and valence right after making a moral judgment and, respectively, a moral choice. Here, we asked people to consider their emotions while deliberating on a response. In these studies, we assessed relations between emotion experience in moral dilemmas and distal antecedents (i.e., personality traits, dispositional emotional attachment to one's religious beliefs and dispositional empathic responses).

In Studies 6 and 7, we used a novel task, in order to provide a fine-grained assessment of (current) emotion experience in moral dilemmas. Particularly, we measured emotion intensity of five negative discrete emotions, using a validated measure of discrete emotions (Harmon-Jones, Bastian, & Harmon-Jones, 2016). Moreover, we measured emotions both after reading a moral dilemma, and after deliberation, but before committing to a final response. This was done to assess potential differences between emotion experience when confronted with the moral scenario and when considering alternative responses.

The presence of victims in moral dilemmas was argued to be a proximal antecedent (situational cue) of moral judgment and decision making (Miller et al., 2014; Reynolds & Conway, 2018). In Studies 6 and 7, we also assessed emotion experience attributed to victims. This allowed us to investigate the contribution of an empathic mechanism like affect sharing (Coll et al., 2017), to how people approached moral dilemmas. In Study 7, we further

investigated a potential neurobiological underpinning of this empathic mechanism. Particularly, we used a psychopharmacological manipulation (i.e., acute tryptophan depletion), hypothesized to modulate people's personal aversive reactions (Crockett & Cools, 2015).

CHAPTER 2
PERSONALITY IN MORAL DILEMMAS: ROLES OF AGREEABLENESS AND CONCIENTIOUSNESS (STUDIES 1-3)

Does personality play a role in how people deal with moral conflicts? When people have to choose between their personal beliefs and concerns and what needs to be done in a situation, they may experience conflict (Bartels et al., 2015). In moral dilemmas, conflict may arise when people are motivated to obey moral norms but by doing so, they may harm others. Such situations challenge people' general orientation towards doing the right thing and being a good person (Miller & Cushman, 2018). In this case, it was argued that people's personality traits may shape the way they approach moral dilemmas (de Oliveira-Souza et al., 2015; Graham et al., 2016).

Moral Dilemmas

When harming one person is the price one has to pay for saving many others, people are faced with a moral dilemma (Greene et al., 2001). Such a situation may be particularly difficult (Cushman & Greene, 2012), as available alternatives may be equally compelling (Moll & Schulkin, 2009). In moral dilemmas, people may want to avoid doing something that is both immoral (i.e., it transgresses a moral norm) and aversive, like harming another person (Miller et al., 2014; Schein & Gray, 2018). At the same time, they may want to save as many people as possible (Conway & Gawronski, 2013). To give a response in moral dilemmas, people may need to (flexibly) integrate their own beliefs and preferences with situational cues (e.g., harm is inflicted personally; not harming may produce many victims) (Bartels et al., 2015). Given that people vary quite a lot in terms of beliefs and preferences (McCrae & Costa, 1997), this variability may translate into the way they approach moral dilemmas.

Judgment and Choice in Moral Dilemmas

If people appraise whether it is morally acceptable to harm someone for the greater good (moral judgment), would their response coincide with what they would personally do in that situation (moral choice) (Cushman, 2015)? Some studies found that people tended to judge an action like pushing a person off a footbridge to save five others as morally inacceptable (wrong) and that very few people reported they would personally do such an action (Kurzban et al., 2012; Schaich Borg et al., 2006). Other studies found the opposite pattern. People reported the harmful action was morally inacceptable, but that they would personally do it (McGuire, Brüne, & Langdon, 2017; Tassy, Oullier, et al., 2013). It is less clear how people's responses to moral dilemmas differ when they are prompted to consider the moral acceptability (moral judgment) of the harmful action, compared to when prompted to consider whether they would personally do it (moral choice).

Moral Judgment, Moral Choice and Individual Differences

Individual differences may be more likely to impact people's judgments and choices in situations in which it is less clear which is the better approach (Caspi & Moffitt, 1993). When confronted with moral dilemmas, studies found that some people always trust their own intuitions and beliefs, rigidly applying them to all scenarios (Baron & Ritov, 2004; Ritov & Baron, 1999). Conversely, other people may flexibly integrate the particularities of each situation with their instincts and beliefs (Bartels et al., 2015; Bartels, 2008), in order to make a judgment and/or a choice. It was argued that researchers should investigate such individual

differences by focusing on people's traits and abilities (Baron et al., 2015; L. Young & Saxe, 2011).

Big Five Personality Traits and Morality

Morality is perceived as a defining characteristic to one's personality (Strohminger & Nichols, 2014). In turn, personality was argued to reflect the stable, enduring features that may help people deal with moral conflicts in a way that is coherent with who they are (de Oliveira-Souza et al., 2015). An ontogenetically and culturally valid model of personality is the Big Five model (John & Srivastava, 1999; McCrae & Costa, 1997). It summarizes five relatively independent domains of individual differences: agreeableness, conscientiousness, extraversion, neuroticism and openness to experience.

Big Five traits were argued to bring an important contribution to shaping people's general social tendencies (Moffitt et al., 2011; Ozer & Benet-Martínez, 2006). It was recently suggested that openness to experience, agreeableness and conscientiousness may be particularly relevant in shaping people's moral concerns (see Graham et al., 2016; McCrae & Costa, 1997; Prehn et al., 2015). In relation to moral dilemmas, we found only one study that examined the role of Big Five personality traits (Christensen, Flexas, Calabrese, Gut, & Gomila, 2014). The study focused on moral choices in dilemmas, and findings indicated that agreeableness and conscientiousness were associated with moral choices to endorse the harm (Christensen, Flexas, Calabrese, et al., 2014). However, a more recent study found that the pathological versions of agreeableness (i.e., antagonism) and conscientiousness (i.e., impulsivity) were also associated with endorsing harm in moral dilemmas (Zeigler-Hill, Besser, Cronin, & Vrabel, 2018). The former study focused on moral choice, while the latter focused on combining responses to the moral judgment and moral choice questions. Therefore, it is possible that the contribution of individual differences in agreeableness and conscientiousness to responses in moral dilemmas may depend on whether people need to make a moral judgment or a moral choice.

The Present Studies

Across three studies, we investigated Big Five personality traits in relation to people's moral judgments and moral choices in dilemmas that typically elicit intense conflict (Greene et al., 2008; Koenigs et al., 2007). Particularly, we focused on moral dilemmas in which saving many people can be done by means of harming another person. Such moral dilemmas may also elicit intense negative emotional experience (e.g., aversive reactions to harm) (Horne & Powell, 2016; Szekely & Miu, 2015). In this sense, we also investigated whether Big Five personality traits were associated with people's emotional experience in such dilemmas.

Studies 1 and 2

In Studies 1 and 2, we investigated whether the Big Five traits were associated with moral judgments and moral choices towards either rejecting or endorsing harmful actions in moral dilemmas. We investigated the contribution of Big Five personality traits to people's responses in moral dilemmas, both when making moral judgments and when making moral choices. We expected to find contributions of agreeableness, conscientiousness (Christensen, Flexas, Calabrese, et al., 2014), but also openness to experience (Prehn et al., 2015). Additionally, we examined whether extraversion and neuroticism contributed to people's responses in moral dilemmas. Given that these traits encompass individual differences in the

tendency to experience positive, and respectively, negative emotions (John, Naumann, & Soto, 2008), we also investigated whether these traits were associated with people's emotional experience in moral dilemmas.

Study 1[1]

Method

Participants

Three hundred ninety-three (330 females; mean age 24.09 ± 7.51 years) participants volunteered for this study.

Materials

Moral dilemmas. The twelve moral dilemmas that were used in this study corresponded to the "high-conflict" scenarios used in a study by Greene et al. (2008) (see also Greene et al., 2004). For measuring moral judgment and moral choice, we followed the procedure used by Tassy, Oullier, et al. (2013).

Big Five personality traits. Personality traits were assessed with the 44-item version of the Big Five Inventory (BFI) (John, Donahue, & Kentle, 1991; John & Srivastava, 1999).

Procedure

Personality traits were assessed first. In a separate day, participants carried out the moral dilemma task. After reading each dilemma, participants were asked to rate how well they managed to imagine the situation described in each dilemma, on a 7-point scale (1 = *Not at all*, 7 = *Very much*). Then, they were asked if they felt an emotion (*yes*/*no*). If they responded "yes", on a 7-point scale, they were asked to rate how pleasant it was (1 = *Very unpleasant*, 7 = *Very pleasant*), and respectively, how intense it was (1 = *Not at all intense*, 7 = *Very intense*). Then, they responded with either "yes" or "no" to the moral judgment, and the moral choice questions. The order of the questions was counterbalanced between dilemmas.

Statistical Analyses

We adjusted mean valence and arousal ratings to account for cases in which participants reported they did not feel any emotion, using a formula from Boden, Thompson, Dizén, Berenbaum, and Baker (2013). For our main analyses, we used mixed-effect models (Baayen, Davidson, & Bates, 2008; Jaeger, 2008; Judd, Westfall, & Kenny, 2012). This analytical approach was justified by the within-participant design and by the fact that moral dilemmas had a similar structure (i.e., harming one person is the means to save others), but different scenarios (Gürçay & Baron, 2017). Participants and dilemmas were added as crossed random effects to our models (Gürçay & Baron, 2017).

Results

Descriptives

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[1] Results from Study 1 were presented at two international conferences:

Szekely, R. D., & Miu, A. C. (2017). *Big Five personality traits and moral decisions: Distinctions between judgment and choice*. International Convention of Psychological Science, Vienna, Austria.

Szekely, R. D., & Miu, A. C. (2016). *Personality in moral judgment and moral choice*. Cognitive and Neural Mechanisms of Human Memory, Cluj-Napoca, Romania.

Participants reported that they were successful in imagining the moral scenarios, M = 5.73, SD = 1.13, t (1, 392) = 30.26, p < .001. Accounting for cases in which no emotion was reported, adjusted ratings indicated that participants experienced higher levels of negative emotions, M = 1.71, SD = 1.01, t (1, 392) = -44.79, p < .001, of moderate intensity, M = 4.27, SD = 1.82, t (1, 392) = 2.92, p = .004.

Across participants and dilemmas, 58.57 % of responses to the moral judgment question, and 65.79% of responses to the moral choice question, were to reject the harmful action. For both questions, two-tailed binomial tests revealed that responses to reject the harmful action were significantly more frequent than responses to endorse the harmful action, $p_{judgment}$ < .001, 95% CI [57, 59]; p_{choice} < .001, 95% CI [64, 67].

Main Analyses

Results from the logistic mixed-effect models revealed the full model, which included interactions between Big Five traits and question type, provided a better fit. We found a significant interaction between agreeableness and question type, OR = 1.49, 95% CI [1.18, 1.92], p < .001. Individual differences in agreeableness were positively associated with rejecting harmful actions in moral dilemmas, when participants were asked to make moral choices, compared to moral judgments. Moreover, we found a main effect of conscientiousness on responses to moral dilemmas, OR = 1.41, 95% CI [1.06, 1.80], p = .012. Individual differences in conscientiousness were positively associated with rejecting harmful actions, irrespective of whether participants had to make a moral judgment or a moral choice.

Multiple linear regression analysis revealed that agreeableness, but not the other traits, was positively associated with emotion intensity in moral dilemmas, B = 0.66, 95% CI [0.34, 0.98], p < .001, R^2/R^2_{adj} = .076/.064. This finding indicates that the level of emotional impact of a moral dilemma is influenced by individual differences in agreeableness.

Study 2[2]

In Study 2, we wanted to replicate findings from Study 1, in a laboratory setting. An important distinction from Study 1 was that we used a different version of the moral dilemmas to measure moral judgment. In line with a recent study, which used a similar approach (McGuire et al., 2017), we adapted a version of the moral dilemmas in which the participant was an observer, and another character in the scenario was the protagonist.

Method

Participants

Three hundred forty-three (284 females, mean age 22.3 ± 5.5 years) participants from different cities in Romania (i.e., Cluj-Napoca, Iași, Oradea) were recruited for this study.

Materials

Moral dilemmas. We used the moral dilemmas from Study 1. To measure moral judgment, we reworded all scenarios in the third-person. The moral judgment question was also reworded, accordingly. Half of the moral dilemmas had male protagonists, while the other half had female protagonists, randomly assigned to each scenario.

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[2] Results from Studies 1 and 2 were presented at an international conference:

Szekely, R. D., & Miu, A. C. (2017). *Moral judgment and moral choice: the effects of personality traits*. 18th General meeting of the European Association of Social Psychology, Granada, Spain.

Big Five personality traits. Personality traits were assessed with the 44-item version of the BFI (John et al., 1991; John & Srivastava, 1999).

Procedure

Personality traits were measured first. In a separate day, participants completed the moral dilemma task, which was administered in a computer laboratory. Participants were informed about the two types of trials. The twenty-four moral dilemmas were displayed in pseudo-random order, for each participant. Responses to the judgment/choice question were made on a 6-point scale (1 = *More likely YES*, 6 = *More likely NO*). After responding, for each dilemma, participants were prompted to remember how they felt while reading about the situation and deliberated on a response. They rated the intensity of their emotions on a 7-point scale (1 = *Not at all intense*, 7 = *Extremely intense*). Afterwards, participants reported how well they managed to either imagine the situation/imagine themselves in the situation on a 7-point scale (1 = *Not at all*, 7 = *Very well*).

Statistical Analyses

We ran linear mixed-effect models (Baayen et al., 2008). Moral judgment and moral choice were recoded as a factor (condition; corresponding to question type in Study 1), with moral judgment being the reference. Models for responses to moral dilemmas were constructed like in Study 1. We also ran similar models on emotion intensity ratings.

Results

Participants reported they were successful in imagining the moral scenarios at higher levels when they were the protagonists, compared to when they were observers, M_{choice} = 5.64, SD = 1.19, M_{judgment} = 5.58, SD = 1.10), t (1, 342) = 2.15, p = 0.032. Therefore, we added the centered imagination ratings in all our models, as covariate.

Results from linear mixed-effect models showed the model that included interactions between Big Five traits and condition (judgment, choice) provided a better fit. Participants' ratings towards rejecting the harmful action were higher in the choice condition (M = 3.78, SD = 1.04), compared to the judgment condition (M = 3.65, SD = 1.12), p = .002.

Agreeableness was associated with the tendency to reject harmful actions in moral dilemmas, only when making moral choices, but not moral judgments, B = 0.23, 95% CI [0.08, 0.38], p = .006. In this study we replicated a trend for the positive association between conscientiousness and rejecting the harmful action in dilemmas (p = .061).

Across dilemmas, participants reported feeling more intense emotions when they made moral choices (M = 5.25, SD = 1.44), compared to when they made moral judgments (M = 4.66, SD = 1.51), p < .001. Linear mixed-effect models showed a positive association between agreeableness and emotion intensity, replicating the finding from Study 1. Furthermore, consistent with our initial predictions, we found that neuroticism was positively associated with emotion intensity in moral dilemmas. We also found that conscientiousness was positively associated with emotion intensity.

Discussion

Across two studies, we found that agreeableness was associated with moral choices, but not moral judgments, to reject harm in moral dilemmas. This finding is in contrast with a previous study, which reported that agreeableness was associated with moral choices to endorse harm dilemmas (Christensen, Flexas, Calabrese, et al., 2014). A potential explanation may be that in the respective study, they used dilemmas in which harm to one person was the

means to saving other people, but also dilemmas in which harm was a side-effect of an intrinsically neutral action (e.g., pulling a switch). Agreeableness may promote moral choices to reject harm when it is particularly aversive (i.e., one must personally inflict harm to another individual). This interpretation may also be supported by the positive relation we found between agreeableness and emotional arousal associated with reading and deliberating on a response in moral dilemmas. However, agreeableness may also promote choices to endorse harm when people are more concerned with saving as many people as possible. We tested this hypothesis in Study 3.

In Study 1, we found that conscientiousness was associated with rejecting harm in dilemmas both when making moral judgments and when making moral choices. In Study 2, we replicated a similar trend which, however, was not statistically significant. What was different about this study was that we measured moral judgment and moral choice on a 6-point scale. It is possible that allowing participants to be relatively undecided may have diluted the effect. As in the case of agreeableness, our results were in contrast with those reported in a previous study (Christensen, Flexas, Calabrese, et al., 2014). At the same time, they are complementary to a more recent study that associated the pathological version of conscientiousness with moral judgments to endorse harm in dilemmas (Zeigler-Hill et al., 2018).

An important limitation of Studies 1 and 2 was that people could either reject or endorse the harmful action in moral dilemmas, which may pit the two concerns against one another (Conway & Gawronski, 2013). To overcome this limitation, in Study 3, we used a process dissociation approach and measured both the tendency to avoid harm and the tendency to endorse it for the greater good in moral dilemmas.

Study 3[3]

In moral dilemmas, a characteristically deontological tendency to avoid harm is pitted against a characteristically utilitarian tendency to save as many people as possible (Greene, 2008). However, people may want to both avoid harm and minimize it by saving as many people as possible (Conway & Gawronski, 2013). By having people decide towards one alternative over the other, they may need to suppress one type of tendency, which may impact relations observed between personality traits and deontological and utilitarian tendencies.

In the present study, we investigated the relation between Big Five traits and deontological and utilitarian tendencies, using a process dissociation approach (Conway & Gawronski, 2013). This approach involves using two types of moral dilemmas, called *incongruent* and *congruent* dilemmas. While the incongruent dilemmas generate conflict between utilitarian and deontological tendencies, the congruent dilemmas make it easier to reject the harmful action on both deontological and utilitarian grounds.

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[3] Results from Study 1, 2 and 3 were presented at a doctoral conference:

Szekely-Copîndean, R. D., Bostan, C. M., Ion, A., Cioară, M., Constantin, T., & Miu, A. C. (2018). *Big Five Personality Traits and Moral Dilemmas: Contributions of Agreeableness and Conscientiousness*. 1st Annual Doctoral Conference in Psychology and Educational Sciences, Iași, Romania.

Based on findings from Studies 1 and 2, we expected agreeableness and conscientiousness to be positively associated with deontological tendencies, to avoid harm in moral dilemmas. Moreover, the present study allowed us to also investigate whether agreeableness and conscientiousness were associated with utilitarian tendencies, to save as many people as possible in dilemmas. In this study, we also measured emotional arousal associated with deliberating on a response in dilemmas, to replicate findings from Studies 1 and 2 on a different set of moral scenarios.

Method

Participants

One hundred seventy-three (158 females, mean age 21 ± 2.4 years) participants were recruited for this study.

Materials

Moral dilemmas. We used twenty moral dilemmas from Conway and Gawronski (2013), in this study. Half of them were *incongruent* dilemmas, like dilemmas used in Studies 1 and 2. The other half were *congruent* dilemmas.

Big Five personality traits. Personality traits were assessed with the 60-item version of the Big Five Inventory (BFI-2, Soto & John, 2016).

Procedure

Personality traits were measured first. In a separated day, participants carried out the moral dilemma task. Dilemmas were displayed in pseudo-random order across conditions (i.e., judgment/choice, congruent/incongruent), for each participant. Participants responded with either "yes" or "no" to the judgment and choice questions.

After giving a response, participants were prompted to remember how they felt while reading the situation and deliberated on the response. They rated the intensity of their emotions on 7-point scale (1 = *Not at all intense*, 7 = *Extremely intense*). Afterwards, participants reported how well they managed to either imagine the situation and, respectively, imagine themselves in the situation, on a 7-point scale (1 = *Not at all*, 7 = *Very well*).

We calculated scores for deontological and utilitarian tendencies following specifications from Conway and Gawronski (2013). Responses were aggregated across incongruent and congruent moral dilemmas. The deontological parameter was obtained by dividing the probability of "no" responses in the incongruent dilemmas by one minus the utilitarian parameter value. The utilitarian parameter was obtained by subtracting the probability of "no" responses in the congruent dilemmas from the probability of "no" responses in the incongruent dilemmas.

Statistical Analyses

We ran a 2 (incongruent, congruent) x 2 (judgment, choice) repeated-measures analysis of variance to investigate participants' emotion intensity and imagine ratings, aggregated across dilemmas. Two linear mixed-effect models with Big Five traits and condition (judgment/choice) were run on each parameter (deontological, utilitarian). A linear mixed-effect model was run on emotion intensity ratings from incongruent dilemmas, with Big Five traits and condition as fixed effects.

Results

Participants reported they were more successful in imagining the moral scenarios in incongruent dilemmas (M = 5.58, SD = 0.92), compared to congruent dilemmas (M = 5.51,

SD = 0.96), *F* (1, 172) = 9.63, *MSE* = 0.09, *p* = .002, η_G^2 = .001. Imagine ratings did not differ between moral judgment and moral choice, *F* (1, 172) = 2.56, *MSE* = 0.22, *p* = .11. The interaction between dilemma type and condition was significant, *F* (1, 172) = 5.17, *MSE* = 0.06, *p* = .02, η_G^2 = .0005. Post-hoc comparisons with Bonferroni correction revealed that participants reported being more successful in imagining the incongruent, compared to the congruent scenarios, only in the judgment, *t* (172) = 3.84, *p* < .001, but not the choice condition, *t* (172) = 0.92, *p* > .10.

Emotion intensity was higher in the choice condition (*M* = 4.96, *SD* = 1.05), compared to the judgment condition (*M* = 4.68, *SD* = 1.11,), *F* (1, 172) = 69.38, *MSE* = 0.19, p < .001, η_G^2 = .02. Also, emotion intensity was higher in incongruent dilemmas (*M* = 4.96, *SD* = 1.07), compared to congruent dilemmas (*M* = 4.69, *SD* = 1.09), *F* (1, 172) = 85.69, *MSE* = 0.14, p < .001, η_G^2 = .02.

Deontological tendencies were not significantly associated with either Big Five traits, or condition. However, agreeableness trended towards a positive association with deontological tendencies, *B* = 0.05, 95% boot*CI* = [-0.08, 0.35], *p* = .074. Utilitarian tendencies were negatively associated with conscientiousness, *B* = -0.06, 95% boot*CI* = [-0.09, -0.03], *p* = .001. In other words, the more conscientious were the participants, the less they were motivated to save as many people as possible in moral dilemmas. Moreover, utilitarian tendencies were higher in the choice condition, compared to the judgment condition. This finding is in contrast with results from Studies 1 and 2.

Emotional arousal was higher in the moral choice condition, *B* = 0.30, 95% bootCI [0.22, 0.39], *p* < .001. We replicated the positive association between agreeableness and emotional arousal, *B* = 0.41, 95% bootCI [0.14, 0.73], *p* = .009.

Discussion

The main finding from this study was that conscientiousness was negatively associated with utilitarian tendencies. In other words, this finding suggests people that are focused on doing their duty, being disciplined and following norms may be less concerned about minimizing the outcomes of harm. The relation between conscientiousness and utilitarian tendencies did not depend on whether participants made a moral judgment or a moral choice. This latter finding replicates results from Studies 1 and 2, suggesting that conscientiousness may promote consistency between what a person thinks is morally acceptable and what they would be willing to do in a moral dilemma. Interestingly, conscientiousness was not positively associated with deontological tendencies.

Agreeableness trended towards a positive association with deontological tendencies. We did not find a relation between agreeableness and deontological tendencies in moral choice, relative to moral judgment. Compared to Studies 1 and 2, we used a different set of moral dilemmas, which may have impacted how people approached moral dilemmas (Christensen & Gomila, 2012). Moreover, agreeableness was positively associated with the emotional arousal elicited while deliberating on a response in moral dilemmas, replicating results from our first two studies. Therefore, it is possible that agreeableness may enhance the contribution of aversive situational cues in people's responses to moral dilemmas.

General Discussion

Across three studies, we found that, out of the Big Five traits, only agreeableness and conscientiousness were associated with people's responses to moral dilemmas. Agreeableness

was associated with moral choices to reject harm, but not moral judgments. Also, it positively predicted the emotional arousal elicited while reading and deliberating on a response in moral dilemmas. Conscientiousness was associated with both moral judgment and moral choices to reject harm. However, when we measured tendencies to reject and to endorse harm separately, in moral dilemmas, we found that conscientiousness was associated with a lower tendency to endorse harm for the greater good in dilemmas.

In Studies 1 and 2, we used a conventional way to assess responses in moral dilemmas, in which moral concerns about avoiding harm were pitted against moral concerns about endorsing harm as means to achieve a greater good. We focused on contrasting the moral acceptability of harm in dilemmas (moral judgment) with what one would personally do in such a situation (moral choice). Using this approach, we found that agreeableness predicted moral choices to reject harm in moral dilemmas, but not judgments. This finding complements past research (Pletti, Lotto, Buodo, & Sarlo, 2017; Tassy, Deruelle, Mancini, Leistedt, & Wicker, 2013), while also adding to more recent research, which found that the pathological version of agreeableness was associated with endorsing harm in dilemmas (Zeigler-Hill et al., 2018).

The difference between Study 1 and Study 2 was that in the latter study we used separate dilemmas to measure moral judgment and moral choice, which allowed us to investigate a potential effect of type of perspective on the relation between agreeableness and responses to moral dilemmas. It is possible that people with a heightened orientation towards caring and helping others may be more inclined to avoid harm when they would personally have to inflict it (Graziano, Habashi, Sheese, & Tobin, 2007).

In our first two studies, we also found that conscientiousness, like agreeableness, was associated with responses to reject harm in moral dilemmas. However, the relationship did not depend on the perspective from which the response was being made (i.e., moral judgment, moral choice). It is possible that conscientious people may be more inclined to reject harm for the greater good in order to respect a deontological moral norm that forbids harm (Roberts, Lejuez, Krueger, Richards, & Hill, 2014), no matter the consequences.

In Study 3, we addressed an important limitation of the conventional way to measure responses in moral dilemmas. Process dissociation (Conway & Gawronski, 2013; Conway, Goldstein-Greenwood, Polacek, & Greene, 2018) allowed us to investigate whether agreeableness and conscientiousness were associated with each of the two tendencies. We replicated a positive trend between agreeableness and deontological tendencies, across moral judgment and moral choice. We suggest that agreeableness may enhance the relevance of the aversive nature of harm in dilemmas, when deliberating on a response (Miller & Cushman, 2013). An indicator for this interpretation refers to the positive relation that we found across all three studies between agreeableness and emotional arousal elicited while reading a dilemma and deliberating on a response.

Like in the case of agreeableness, we were expecting to find a positive relation between conscientiousness and deontological tendencies. Instead, we found a negative relation between conscientiousness and utilitarian tendencies. Process dissociation revealed that these responses were driven by a reduced concern for promoting the greater good, rather than an increased concern for avoiding harm. This finding may be particularly puzzling given that more recent studies found a similar relation between utilitarian tendencies and

psychopathic traits (Conway et al., 2018). However, conscientiousness is a personality trait that comprises both the need to follow social norms and the inclination towards self-control (Roberts et al., 2014). It is possible that in moral dilemmas, conscientious people may be more concerned about breaking a moral norm against harm, and actively inhibit a need to minimize harm/achieve a greater good.

In conclusion, in line with past suggestions (Graham et al., 2016), we found that, out of the Big Five personality traits, agreeableness and conscientiousness contributed to how people approached moral dilemmas. On the one hand, agreeableness promoted responses to avoid harm in moral dilemmas, potentially through emotional channels. On the other hand, conscientiousness promoted the same responses, potentially through controlling an underlying need to help others. Our findings further emphasize the need for studying the contribution of individual differences in moral dilemmas (Baron & Ritov, 2004; Baron et al., 2015). They also bring support to more recent theoretical accounts, that underlined the important role of personal beliefs and motivations in how people deal with moral dilemmas (Miller & Cushman, 2018).

CHAPTER 3
RELIGIOSITY ENHANCES EMOTION AND DEONTOLOGICAL CHOICE IN MORAL DILEMMAS (STUDY 4)[4]

Introduction

In the last three decades, the relation between religiosity and moral decision making has been debated by psychologists. While some early perspectives saw religiosity and moral decisions as unrelated (Kohlberg, 1981), others acknowledged possible interactions between the two (Turiel, 2002). More recent work was in a better position to approach this relation, due to methodological and theoretical advances in the study of moral decisions (Christensen & Gomila, 2012) and individual differences in religiosity (e.g., Joseph & DiDuca, 2007). These advances highlighted the multiple links that may exist between different dimensions of religiosity and moral decision making. To our knowledge, this is the first study that takes a multidimensional approach to religiosity and investigates its influence on emotions and decisions in moral dilemmas that challenge the religious imperative of not harming others.

Moral Dilemmas, Emotion and Moral Choice

Originating in philosophy, moral dilemmas have been widely used to study moral judgment and decision-making in psychology and cognitive neuroscience (Christensen & Gomila, 2012; Cushman & Greene, 2012). In one type of dilemma (i.e., "harm to save" or H2S), saving the lives of other people is pitted against harming one person (Greene et al., 2004, 2001). In H2S moral dilemmas, deciding between deontological and utilitarian alternatives may be particularly difficult not only because harming another person is against social and religious norms, but also because such actions are typically perceived as unpleasant (Cushman & Greene, 2012). Pondering on dilemmas involving harmful actions is associated with moderately intense negative emotions (Szekely & Miu, 2015). By changing the perspective from which moral decision is made, researchers have distinguished between abstract moral judgment and personal moral choice (Tassy, Oullier, et al., 2013). Moral choice may be particularly appropriate for studying emotions and decisions in moral dilemmas (Tassy, Deruelle, et al., 2013) and their connections to individual differences such as religiosity.

Religiosity and Moral Judgment

Recent studies on moral judgment indicate that individual differences in religiosity may contribute to response tendencies in moral dilemmas. For example, religious convictions (Antonenko Young, Willer, & Keltner, 2013) and religious practices (Conway & Gawronski, 2013) are associated with reduced endorsement of H2S actions and deontological moral judgments. When explaining why certain moral transgressions are wrong, religious individuals focus on norm violation rather than action consequences (Piazza, 2012).

These recent studies have contributed to a renewed interest in the influence of religiosity on moral decision making. However, they all focused on abstract judgments in moral dilemmas, raising the question of whether religiosity might also influence moral

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[4] The current chapter was published as an original study:

Szekely, R. D., Opre, A., & Miu, A. C. (2015). Religiosity enhances emotion and deontological choice in moral dilemmas. *Personality and Individual Differences*, 79, 104–109. doi: 10.1016/j.paid.2015.01.036.

decisions when they are framed as personal choices (Szekely & Miu, 2015; Tassy, Oullier, et al., 2013). In addition, all previous studies on religiosity employed global assessments of religiosity such as holding religious beliefs or practicing religious rituals. In light of recent developments in religiosity models, it remains unclear which religiosity dimension (e.g. cognitive, emotional, motivational) might influence moral choices. Finally, these studies did not investigate the influence that religiosity may have on emotions associated with decision making in moral dilemmas.

The Present Study

The present study investigated the relations between religiosity, emotional experience and moral choice in H2S moral dilemmas, in a Christian sample. For this purpose, we used a multidimensional approach to religiosity, developed by Joseph and DiDuca (2007) for Christian population, which assesses thoughts and feelings associated with belief in God. This approach is based on four dimensions of religiosity that capture cognitive (i.e., conviction in and preoccupation with religious beliefs), emotional (i.e., religious feelings) and motivational aspects of religiosity (i.e., commitment to follow religious norms in everyday behavior) (Joseph & DiDuca, 2007). In this study, participants considered moral dilemmas from a personal perspective and they reported emotional experience and moral choice. The main focus of the study was on individual differences in religiosity, but we were also interested in the effects of social desirability (Sedikides & Gebauer, 2010) and mood (Neumann, Seibt, & Strack, 2001) on emotions and decisions in moral dilemmas.

Participants

Three hundred and seventeen participants (265 women; age: 23.1 ± 3.8 years) volunteered for this study. More than 93% of the participants reported Christianity as their religious affiliation.

Materials

Moral dilemmas. Twelve H2S moral dilemmas were used in this study, which were previously shown to induce emotional conflict (Greene et al., 2004, 2001). The participants were asked if they would choose to harm a person in order to save several other people, and they answered with "yes" (i.e., utilitarian decision) or "no" (i.e., deontological decision).

Religiosity assessment. Individual differences in religiosity were assessed with Dimensions of Religiosity Scale (DRS) (Joseph & DiDuca, 2007). This scale has 20 items related to four dimensions of religious thoughts and feelings, which are suitable for Christian participants: (1) Conviction; (2) Preoccupation; (3) Emotional Involvement; and (4) Guidance.

Social desirability. We measured social desirability using the 17-item Social Desirability Scale (SDS-17) (Stöber, 2001).

Mood. The 41-item version of the Positive and Negative Affect Schedule (PANAS) (Watson & Clark, 1994) was used to measure mood before starting the moral dilemmas task.

Procedure

First, participants filled in the self-report questionnaires (i.e., DRS, SDS-17, and PANAS). Then, they received the moral dilemmas. After each dilemma, the participants were requested to indicate if they felt an emotion while they were deliberating on the situation (yes/no). If they reported having felt an emotion during a dilemma, they also had to rate: (1) emotional arousal (5-point Likert scale from 1, "not at all intense" to 5, "very

intense") and (2) emotional valence (5-point Likert scale from 1, "unpleasant" - 5, "pleasant"). Participants were also asked to rate their success in personally engaging in the situation described by each moral dilemma (5-point Likert scale from 1, "low" to 5, "high").

Statistical Analyses

We used multiple logistic regression fitted with generalized estimating equations (GEE) method to test whether the four dimensions of religiosity, social desirability and mood predicted emotion presence and moral choice. The GEE method was employed to account for within-participant correlations, in line with statistical guidelines (Zeger, Liang, & Albert, 1988; Zeger & Liang, 1986; see also Hanley, Negassa, Edwardes, & Forrester, 2003) and previous research using moral dilemmas (e.g., Koenigs et al., 2007; Tassy, Deruelle, et al., 2013).

Results

Participants reported increased levels of engagement across dilemmas (M = 3.7, SD = 1.07). Across dilemmas, 62.38% of the choices were deontological and 78.73% of participants reported having felt an emotion. Emotion presence did not significantly correlate with deontological choices across dilemmas (r_s = 0.01, p = .82). Emotional arousal was increased (M = 3.76, SD = 0.99) and emotional valence was in the negative range (M = 1.66, SD = 0.98). Deontological responses did not significantly correlate with mean emotional arousal (r_s = -0.01, p = .80) and mean emotional valence (r_s = 0.08, p = .13).

Multiple logistic regression fitted with the GEE method, with religiosity scores (i.e., Conviction, Preoccupation, Emotional Involvement, and Guidance), social desirability and mood (i.e., Positive Affect, Negative Affect) as predictors indicated that religious Guidance, B = 0.07, SE = 0.02, Wald χ^2 = 7.63, Exp(B) =1.07, p < .01, and social desirability, B = 0.05, SE = 0.01, Wald χ^2 = 7.1, Exp(B) =1.05, p < .01, were associated with increased odds of making deontological choices.

A similar analysis indicated that religious Emotional Involvement was a significant positive predictor of emotion presence in moral dilemmas, B = 0.11, SE = 0.05, Wald χ^2 = 4.14, Exp(B) =1.12, p < .05.

Discussion

Based on a relatively large Christian sample, this study yielded two main results. First, individual differences in seeking religious guidance from God (i.e., religious motivation) and social desirability were positively related to deontological choices in moral dilemmas. Second, religious emotional involvement positively predicted emotion presence in moral choice.

Moving beyond global measures of religiosity such as holding a religious belief or practicing religious rituals, this study assessed religious thoughts, feelings and motivational tendencies. In addition, we focused on personal choice in moral dilemmas, which was recently suggested to offer more fertile ground for the study of emotions and moral decisions. Results indicate that it is not religious beliefs *per se* which bias moral choice, but rather their motivational influence. The tendency to use religious beliefs in everyday behavior, but not conviction, preoccupation or feelings associated with these beliefs was positively related to deontological choices in moral dilemmas. These results highlight the multidimensional nature

of the relation between religiosity and moral decisions and show for the first time that the influence of religiosity (i.e., religious motivation) extends to moral choice.

This study also found that social desirability was associated with deontological choices. Based on these results, it is not possible to indicate whether the effects of social desirability and religious motivation are independent or not. Considering that religiosity has been related to increased preoccupation for social image (Gervais & Norenzayan, 2012) and social compliance (Sedikides & Gebauer, 2010), future studies may investigate whether social desirability moderates the relation between religiosity and moral choice.

Emotions in moral dilemmas were also investigated in this study. Framing decisions as personal choices may enhance emotional salience of moral dilemmas (Szekely & Miu, 2015; Tassy, Oullier, et al., 2013). However, these results did not support an association between emotional experience and moral choices, possibly because of the increased emotional salience of moral dilemmas and the limited variance of emotions relative to decisions. We found that emotion presence was positively predicted by religious feelings, but not other dimensions of religiosity, social desirability and mood. This finding is in line with other studies showing that religious individuals have higher emotional reactivity to moral transgressions (Christensen, Flexas, de Miguel, Cela-Conde, & Munar, 2014; Hofmann et al., 2014), but do not clarify whether reactivity is specific to moral dilemmas. Future studies might investigate this issue using control dilemmas that do not involve moral transgressions (e.g., Moll, de Oliveira-Souza, Bramati, & Grafman, 2002).

There are two potential limitations of this study, related to the self-report measure of religiosity and the use of moral dilemmas. Regarding religiosity, future investigations could incorporate recent developments in the assessment of religiosity, which focus on daily accounts of religious activities (Hardy, Zhang, Skalski, Melling, & Brinton, 2014). Behavioral measures (e.g., daily praying) might more reliably reflect religious motivation (Hofmann et al., 2014), in comparison to self-report. In addition, responding to moral dilemmas requires participants to make the assumption that the described situations refer to a "closed world" and there is no other way around the two courses of action (Bazerman & Greene, 2010; Bennis et al., 2010). Although this "closed world assumption" may seem artificial and interfere with personal engagement dilemmas create a conflict between the need to prioritize social welfare and the aversion towards committing a moral transgression, and have been widely used in moral psychology as an insightful approach to studying the involvement of emotion in moral decision.

In conclusion, this study dissociated two distinct dimensions of religiosity that separately influence moral choice and emotional experience during H2S moral dilemmas. This underscores the multifaceted nature of the relations between religiosity, emotions and moral decision making, offering a nuanced perspective for future individual difference and experimental research on this topic.

CHAPTER 4
CONCERNED ABOUT VICTIMS OR SHARING THEIR SUFFERING? DISENTANGLING DISPOSITIONAL AND SITUATIONAL EMPATHY IN MORAL DILEMMAS (STUDIES 5 – 7)

Morality and empathy are closely intertwined (Decety & Cowell, 2014b), but the nature of this relationship is still currently under much debate (see Bloom, 2017; Zaki, 2017). An important research question is whether empathy helps or hinders people in approaching moral conflicts (Decety & Cowell, 2014b). To approach such conflicts, people may need to integrate how they feel about the immoral action and its outcomes (Shenhav & Greene, 2014). In doing so, they may experience empathic emotional states, which may motivate them to express concern for victims of the immoral action (Eisenberg & Eggum, 2009; Zaki, 2018). At the same time, they may feel emotionally overwhelmed by suffering inflicted to other people (Tasso et al., 2017), which may motivate them to regulate their emotions (Cameron & Payne, 2011; Sarlo, Lotto, Rumiati, & Palomba, 2014).

To disentangle the role of empathy in dealing with moral conflicts, two important aspects may need to be taken into account. On the one hand, it was argued that empathy is shaped by both personal dispositions and the particularities of each situation (Eisenberg & Eggum, 2009; Zaki, 2018). This emphasizes the need to assess both dispositional and situational empathy in relation to how people deal with moral conflicts. On the other hand, given that empathy is a multi-faceted construct (Batson, 2009; Lamm, Rütgen, & Wagner, 2017), it was suggested that researchers could clearly state which aspects of empathy they addressed (Decety & Cowell, 2014b). This may have important consequences for how empathy is measured (Coll et al., 2017). Across three studies, we addressed the contributions of dispositional empathic responses (Davis, 1983), and of situational sharing of other people's emotions (Coll et al., 2017) to how people dealt with moral dilemmas.

Moral Dilemmas and Emotions

Moral dilemmas refer to hypothetical scenarios in which harm must be inflicted to one or more proximal victims in order to save many other potential (distal) victims (Miller et al., 2014). The only possible choices to such moral dilemmas are either rejecting or endorsing this tradeoff. Conflict is bound to arise when people are equally emotionally invested in these choice alternatives (Moll & Schulkin, 2009).

Discrete Emotions in Moral Dilemmas

Reading about a situation that poses a moral dilemma was found to increase negative mood and decrease positive mood (Horne & Powell, 2016). Studies found that people reported feeling discrete negative emotions like fear/anxiety, sadness, anger or disgust, while reading about moral dilemmas and deliberating on a response (Choe & Min, 2011; Szekely & Miu, 2015; Tasso et al., 2017). Such findings may suggest that people appraise multiple aspects in moral dilemmas, as these discrete emotions may be elicited by different situational cues.

Harm Aversion in Moral Dilemmas

Actions and outcomes are the situational cues most salient in moral dilemmas (for a review, see Christensen & Gomila, 2012). On the one hand, simulating performing a physically harmful action was found to generate an aversive emotional reaction at the

physiological level (i.e., peripheral vasoconstriction) (Cushman et al., 2012). On the other hand, outcomes refer to the victims in the moral dilemma (Miller et al., 2014), which were argued to elicit empathic responses (Blair, 1995).

Aversion to actions and aversion to outcomes have been contrasted in the literature (Miller et al., 2014). However, studies also found that people's mental representations (perceptions) of harm were a combination between an action and an outcome (Gray & Schein, 2012; Schein & Gray, 2018). It was argued that this perception of harm may actually be the one triggering aversion, but that the reverse may also be valid, in that aversion may trigger more severe perceptions of harm (Schein & Gray, 2018). This raises the question of how emotions are integrated into people's perceptions of harm, in moral dilemmas.

Empathy

Several lines of research have attempted to define empathy and its core processes (for a review, see Batson, 2009; Miu & Vuoskoski, 2017). What is fairly agreed upon is that empathy is a process that involves sharing the affective state of another person (de Vignemont & Singer, 2006; Decety & Cowell, 2014b; Lamm et al., 2017). In order to share another person's affective state, it was argued that one needs to either observe or imagine the emotions of the other person (i.e., empathic target) (Lamm et al., 2017). When imagining the emotions, it was suggested that people may derive the affective state from the situation that person is in (Bird & Viding, 2014). Another condition of empathy would be that the person experiencing empathy needs to be aware that their affective state was generated by another person's emotions (Bird & Viding, 2014).

The Role of Affect Sharing in Morality

Attending to another person's suffering (i.e., sympathy, compassion) may depend on people's ability to identify and share that person's emotions (Marsh, 2016). For instance, people characterized by extraordinary altruism (i.e., helping others by making extreme personal sacrifices) were found to have an enhanced ability to recognize fear in others, essential to determining when others are in distress (Marsh et al., 2014). In contrast, people that have been clinically diagnosed with psychopathy were found to have an impaired recognition of fear in others (Marsh & Cardinale, 2014). The ability to recognize other people's emotions was argued as the first necessary step towards affect sharing (Coll et al., 2017).

Dispositional Empathy and Moral Dilemmas

To investigate the role of empathy in moral dilemmas, researchers focused on assessing individual differences in dispositional empathy (Davis, 1983). In the measure proposed by Davis (1983), the Interpersonal Reactivity Index (IRI), dispositional empathy includes four kinds of dispositional empathic responses: empathic concern, personal distress, perspective taking and fantasy. Empathic concern was associated with people's responses to moral dilemmas (Gleichgerrcht & Young, 2013). Also, individual differences in empathic concern positively predicted people's tendency to reject the harmful action, but not their tendency to endorse it, to spare many more victims (Conway & Gawronski, 2013; Reynolds & Conway, 2018; see also Miller et al., 2014). However, two other studies did not replicate this finding (Cecchetto, Korb, Rumiati, & Aiello, 2018; Sarlo et al., 2014). Instead, they reported that empathic concern was associated with negative emotional experience while solving moral dilemmas (Cecchetto et al., 2018; see Sarlo et al., 2014).

The Present Studies

In the present studies, we assessed dispositional empathic responses and situational empathy, in moral dilemmas. In Study 5, we focused on dispositional empathic responses. Particularly, we wanted to investigate associations with emotion experience in moral dilemmas, on the one hand, and with people's responses to moral dilemmas, on the other hand. Then, in Study 6, we designed a novel task to assess situational empathy in a moral dilemma. Last, in Study 7, we looked at the role of serotonin, a neurotransmitter previously associated with aversive processing (Crockett et al., 2010; Crockett & Cools, 2015), in situational empathy and people's responses to moral dilemmas.

Study 5

Previous research found mixed results regarding the role of individual differences in dispositional empathic responses in relation with endorsing harmful actions in moral dilemmas (Conway & Gawronski, 2013; Sarlo et al., 2014). A potential explanation for the mixed findings may be that some studies asked people to evaluate the morally acceptable thing to do (moral judgment) (Conway & Gawronski, 2013; Miller et al., 2014), while others asked people what they would do (moral choice) in the moral dilemmas (Cecchetto et al., 2018; Sarlo et al., 2014). People's responses to moral dilemmas might vary depending on the moral judgment and moral choice questions, even when asked jointly (Tassy, Oullier, et al., 2013). Therefore, we investigated dispositional empathic responses in relation to judgment and choice in moral dilemmas. In past studies investigating the role of dispositional empathic responses, emotion experience was assessed after people made their decisions (Cecchetto et al., 2018; Sarlo et al., 2014), which may have affected their responses (Tasso et al., 2017). Therefore, we measured emotion experience right after reading about the moral dilemmas and before responding in the moral judgment and moral choice conditions.

Method

Participants

Three hundred eight (249 females, mean age 20.98 ± 3.15 years) participants volunteered for this study.

Materials

Moral dilemmas. The moral dilemmas that were used in this study were described in Chapter 2, Study 1.

Dispositional empathy. Dispositional empathy was assessed with the 28-item Interpersonal Reactivity Index (IRI) (Davis, 1980, 1983).

Procedure

Dispositional empathy was measured first. In a separate day, participants completed the moral dilemma task. The procedure for the moral dilemma task was described in Chapter 2, Study 1.

Statistical Analyses

We took the same analytical approach described in Chapter 2, Study 1. We used logistic mixed-effect models to investigate the effects of dispositional empathy (i.e., the four subscales) and question type on responses to moral dilemmas. Also, we used multiple linear regression to investigate the relation between dispositional empathy and emotion experience in moral dilemmas.

Results

Descriptive Statistics

Participants reported that they were successful in imagining the moral scenarios, M = 5.75, SD = 1.06, t (307) = 29.05, $p < 0.001$. In 82.79 % of cases across dilemmas, participants reported feeling emotions while reading the scenarios. Accounting for cases in which no emotion was reported (see Boden et al., 2013), adjusted ratings indicated that participants experienced significantly more negative emotions, M = 1.76, SD = 1.04, t (307) = -37.72, $p <$ 0.001, of moderate intensity, M = 4.25, SD = 1.76, t (307) = 11.14, $p < 0.001$.

Across participants and dilemmas, 55.98 % of responses to the judgment question, and 63.74 % of responses to the choice question, were to reject the harmful action. For both questions, two-tailed binomial tests revealed that responses to reject the harmful action were significantly more frequent than responses to endorse the harmful action, $p_{\text{judgment}} < .001$, 95% CI [62, 65]; $p_{\text{choice}} < .001$, 95% CI [55, 57].

Emotion Experience

Empathic concern and fantasy were positively associated with the emotional arousal in moral dilemmas, $B_{\text{empathic concern}} = 0.11$, 95% CI [0.07, 0.16], $p < .001$, and $B_{\text{fantasy}} = 0.05$, 95% CI [0.01, 0.09], $p = .013$, $R^2/R^2_{\text{adj}} = .138/.127$.

Moral Judgment and Moral Choice

We found main effects for dispositional empathy and question type, but no significant interactions between them (all ps > .319). Empathic concern was positively associated with rejecting harmful actions in moral dilemmas, OR = 1.09, 95% boot*CI* [1.04 – 1.14], p < .001. Also, participants rejected harmful actions more frequently when responding to the moral choice, compared to the moral judgment question.

Discussion

Empathic concern for other people's suffering was associated with people's emotion experience and their responses in moral dilemmas. Individual differences in empathic concern were associated with a more intense (negative) emotion experience when people read about moral dilemmas. This finding complements past research, which found that empathic concern was associated with an enhanced negative emotion experience while deliberating on decision alternatives in moral dilemmas (Sarlo et al., 2014).

Empathic concern was also associated with an enhanced tendency to reject the harmful action in moral dilemmas. Moreover, this association did not depend on taking a more abstract, evaluative perspective (moral judgment) or a personal perspective (moral choice), when deliberating on a response. The finding is both consistent with and adds to literature documenting the association between this type of dispositional empathic response and people's decisions in moral dilemmas (Conway & Gawronski, 2013; Gleichgerrcht & Young, 2013; Patil & Silani, 2014; Reynolds & Conway, 2018).

In line with more recent research (Cecchetto et al., 2018), we did find that individual differences in fantasy (i.e., the tendency to adopt the perspective of a hypothetical character) were associated with a more intense (negative) emotion experience in moral dilemmas. This finding may indicate that, for people to experience emotions while reading about hypothetical moral dilemmas, they may need to actively take the perspective of the protagonist.

Study 6

Empathy as process essentially involves *sharing the affective state of another person* (Bird & Viding, 2014; Lamm et al., 2017); yet, no study has examined whether and to what

extent people share the affective states of empathic targets in a moral dilemma. Therefore, the present study had two main aims: (1) to develop a measure of empathy in a moral dilemma; and (2) to examine the relation between empathy as process and moral decision. In order to assess empathy in terms of the shared affective state, it was suggested that researchers could measure the degree of overlap between the emotions experienced by participants and the emotions they attributed to empathic targets (Coll et al., 2017). We focused on negative discrete emotions (Harmon-Jones et al., 2016). The measure we chose in the present study covered the discrete emotions that were previously reported in moral dilemmas (Choe & Min, 2011; Szekely & Miu, 2015; Tasso et al., 2017): anger, anxiety, disgust, fear and sadness.

In the present study, we aimed to measure empathy in a moral dilemma as authentically as possible. Therefore, we used a situation that happened in real life instead of a hypothetical scenario (i.e., the Charlie Hebdo mass shooting in Paris, 2015; a journalist was threatened by terrorists with killing her child if she did not enter the access code into the building where she worked). As in Study 5, we measured dispositional empathic responses (dispositional empathy) and examined their relations with moral choice and empathy as process (situational empathy). Additionally, we also investigated the role of individual differences in dispositional aversion in relation to affect sharing and moral choice (Miller et al., 2014).

Method

Participants

Ninety (55 females, mean age 20.4 ± 3.4 years) participants volunteered for this study.

Materials

Moral dilemma. In this study, we adapted a moral dilemma from a real-life situation that happened during the Charlie Hebdo mass shooting, on January the 7th, 2015.

Discrete emotions. Five negative emotions, anger, anxiety, disgust, fear and sadness, were measured using the Discrete emotions questionnaire (DEQ) (Harmon-Jones et al., 2016).

Dispositional empathy. Trait empathy was assessed with the 28-item Interpersonal Reactivity Index (IRI) (Davis, 1980, 1983).

Action and outcome aversion. Action-outcome aversion was assessed with the 34-item Action and Outcome Aversion Questionnaire (Miller et al., 2014).

Procedure

First, participants completed the moral dilemma task. Later that day or in a subsequent day, they filled in the dispositional empathy and action – outcome aversion questionnaires. Figure 4.1 shows the general structure of the moral dilemma task. Participants responded to the moral choice question, using a 6-point scale (1 = *More likely NO*, 6 = *More likely YES*). After that, using 7-point scales (1 = *Not at all*; 7 = *Very much*), participants rated how much they thought, on the one hand, about the child, and on the other hand, about the colleagues, while reading and deliberating on a response. Finally, for *whomever they thought of the most (i.e., child, colleagues)*, participants were prompted to think about how they may have felt in that situation and rate the intensity of their emotions (using the DEQ).

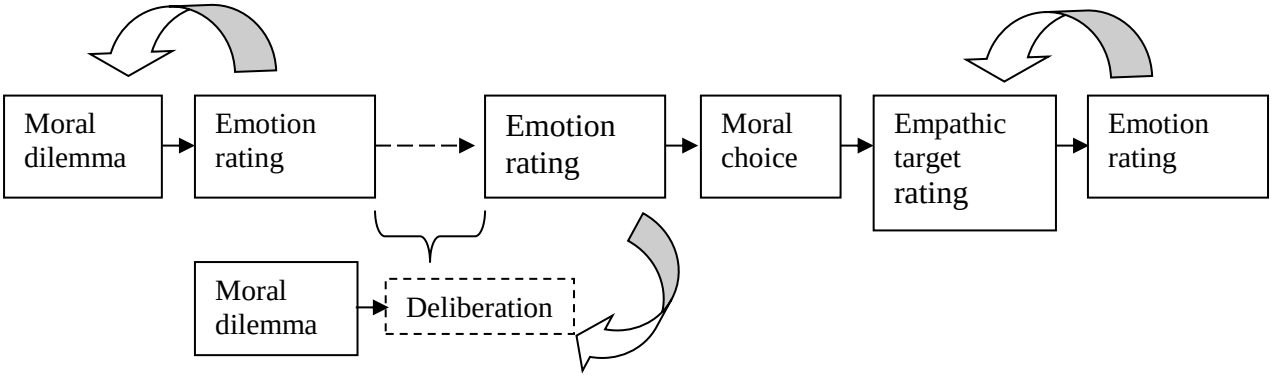

Figure 4.1. *The general structure of the moral dilemma task.*

Statistical Analyses

A repeated measures analysis of variance was used to investigate differences between emotions experienced while reading the moral dilemma and while deliberating on a response. Also, we used a similar analysis to investigate differences between emotions experienced by the participant and emotions attributed to victims in the dilemma.

We used partial correlations to examine whether reported salience of one empathic target relative to the other (i.e., the child, the colleagues) was specifically associated with one or more discrete emotions attributed to victims. The same analytical approach was used to examine the relation between the relative salience of the empathic targets and empathy as process. Moreover, we used bivariate correlations to investigate relations between our individual difference measures and empathy as process and the relative salience of empathic targets.

Ordinal logistic regression was used to investigate the relation between affect sharing and moral choice. A similar analysis was run on moral choice, with individual differences in dispositional empathy and action and outcome aversion as predictors.

Results

Data preparation and Preliminary Analyses

Affect sharing. Empathy as process was assessed by calculating *affect sharing* scores (Coll et al., 2017). For each discrete emotion, we calculated an affect sharing score using the following formula:

$$\boldsymbol{Affect\ sharing} = \frac{\boldsymbol{Attributed\ discrete\ emotion}}{\boldsymbol{Experienced\ discrete\ emotion}}$$

Attributed discrete emotion is the rating provided by the participant when they were prompted to think about how the victims may have felt in the moral dilemma. *Experienced discrete emotion* refers to the participant's emotional experience while reading and deliberating on the moral dilemma. A score of 1 indicated perfect overlap between the participants' attributed and experienced emotions. Scores *below* 1 indicated that experienced emotions were more intense relative to attributed emotions, or higher affect sharing (Coll et al., 2017). Scores *above* 1 indicated that experienced emotions were less intense relative to attributed emotions, or lower affect sharing.

Experienced emotions. A 2 (dilemma, deliberation) x 5 (anger, anxiety, disgust, fear, sadness) repeated measures analysis of variance was run on emotion intensity ratings. Emotion intensity across discrete emotions did not differ between dilemma and deliberation, F (1, 89) = 2.07, MSE = 1.17, p = .15, η_G^2 = 0.001. Discrete emotions across dilemma and deliberation did vary significantly, F (2.92, 260.31) = 55.60, MSE = 1.97, p < .001, η_G^2 = 0.13. Paired contrasts with Tuckey adjustment further revealed discrete emotions differed significantly between one another (all ps < .05). This suggests that participants distinguished between the five discrete emotions. However, the interaction between the moment in which they were measured (dilemma, deliberation) and each discrete emotion type was not significant (dilemma, deliberation), F (2.67, 237.66) = 0.62, MSE = 0.63, p = .58, η_G^2 = 0.0005. Therefore, for each discrete emotion, we calculated the mean score across the two moments in which they were assessed, which was the experienced emotions score that was further used to calculate affect sharing.

Empathic targets. At the sample level, a paired t test revealed that participants reported thinking significantly more about the child (M = 6.44, SD = 1.02, median = 7), compared to thinking about the colleagues (M = 4.32, SD = 1.68, median = 5), t (87) = 9.69, p < .001. Given that each participant rated both how much they thought about the child and how much they thought about the colleagues, we wanted to integrate the two ratings. Therefore, for each participant, we calculated an *empathic target score* using the following formula:

$$\textbf{\textit{Empathic target score}} = \frac{\textbf{\textit{Child rating}}}{\textbf{\textit{Colleagues rating}}}$$

The empathic target score was an index of how much participants thought about the child *relative to* how much they thought about the colleagues. Higher scores indicated that participants thought more about the child relative to the colleagues.

Attributed emotions and empathic targets. There was only one measure of attributed emotions, as we were interested in emotions identified in victims as a situational cue. However, given the two categories of victims in the dilemma (child, colleagues), we checked if the discrete emotions attributed to them were specifically associated with thinking more about one category relative to the other.

Partial correlations showed that there were no significant relations between the empathic target score and attributed discrete emotions (all ps > .216). This indicates that the emotions that were attributed to victims in the moral dilemma were not specifically associated with thinking more about one kind of victim relative to the other.

Main Analyses

Affect sharing. Affect sharing scores varied both between participants and between discrete emotions. Across participants, emotions like anger and disgust were more shared (experienced emotion was as intense as or more intense than attributed emotion), while emotions like anxiety, fear and sadness were less shared (attributed emotion was more intense than experienced).

We also examined the reported intensity of experienced emotions in comparison with attributed emotions. A 2 (experienced, attributed) x 5 (anger, anxiety, disgust, fear, sadness) repeated measures analysis of variance was run on emotion intensity ratings. There was a significant interaction effect on emotion intensity ratings, F (2.47, 221.21) = 77.74, MSE =

0.90, $p < .001$, $\eta_G^2 = 0.09$. Emotion intensity ratings differed between experienced and attributed emotions, depending on discrete emotions. On the one hand, participants experienced significantly lower fear, anxiety and sadness compared to the fear, anxiety and sadness attributed to the empathic targets. On the other hand, there were no significant differences between experienced anger and disgust, and anger and disgust attributed to empathic targets. Across participants, experienced emotions were of low to moderate intensity. Moreover, the fear and anxiety that were attributed to victims were significantly more intense than anger, disgust and sadness.

Additionally, we examined whether there were specific relations between affect sharing and empathic target score. A partial correlation analysis indicated that a lower level of fear sharing was associated with thinking more about the child relative to the colleagues, controlling for the other emotions, r (88) = .24, p = .025. In other words, participants who attributed higher fear to victims, but experienced lower fear themselves also reported thinking more about the child relative to the colleagues, in the moral dilemma.

Moral choice. The average response to the moral choice question was 4.58 (*SD* = 1.37, median = 5), which meant that participants were more inclined to endorse the action that saved the child in the moral dilemma. However, 66% of responses were at the high end of the rating scale (ratings of 5 or 6), while the rest of responses were middle- and low-range ratings (21% ratings of 3 or 4, 12 % ratings of 1 or 2, 1% missing). A chi-squared test for equality of proportions showed that high-range ratings were significantly more frequent than middle- and low-range ratings, $\chi^2(2, 90) = 44.58$, $p < .001$. Given the skewed distribution (skew = -1.11), we treated choice ratings as an ordinal variable.

Affect sharing and moral choice. The ordinal regression model revealed that anger sharing, and disgust sharing were significantly associated with moral choice. On the one hand, the less participants shared anger, the *less* likely they were to insert the access code to save the child and sacrifice the colleagues, *OR* = 0.26, 95% *CI* [0.10, 0.68], $\chi^2 = 7.57$, p = .006. On the other hand, the less participants shared disgust, the *more* likely they were to insert the access code and save the child, *OR* = 2.94, 95% *CI* [1.16, 7.73], $\chi^2 = 5.18$, p = .023.

Individual differences. While expected, we did not find a statistically significant relation between empathic concern and moral choice, *OR* = 1.08, 95% *CI* [0.98, 1.20], p = .131.

Empathic concern was significantly associated with anxiety, fear and, respectively, sadness sharing. Particularly, higher empathic concern was associated with higher affect sharing of these emotions, in the moral dilemma. Also, higher personal distress was associated with higher fear sharing in the moral dilemma. Higher fantasy was associated with higher anxiety sharing, but lower disgust sharing. Higher perspective taking was associated with thinking less about the child relative to the colleagues in the moral dilemma.

Individual differences in dispositional aversion correlated with trait empathy, affect sharing and empathic target score. We found a significant positive association between action aversion and personal distress. Also, higher action aversion was associated with higher anxiety and fear sharing, and with thinking less about the child relative to the colleagues in the moral dilemma. Outcome aversion was positively associated with all the types of empathic responses that were measured. Like action aversion, higher outcome aversion was associated with higher anxiety sharing and fear sharing, and with thinking less about the child

relative to the colleagues. General (control) aversion was positively associated only with personal distress.

Discussion

We developed a novel method to assess empathy as process in a moral dilemma, by focusing on the more specific concept of affect sharing. This involved calculating the extent to which emotions felt by participants in the moral dilemma overlapped with the emotions they attributed to the empathic targets (i.e., the victims). Main findings showed that (1) the levels of emotional experience and of affect sharing in the moral dilemma varied depending on the type of discrete emotion, and that (2) anger and disgust sharing were associated with moral choice.

Our results revealed that the moral dilemma we chose elicited a lower to moderately intense emotional experience (see also Tasso et al., 2017). More importantly, the level of emotional intensity depended on the discrete emotion type. Anxiety and fear were reported as the most intensely felt. Past research suggested these emotions reflected people's harm aversion (Marsh, 2016), which may indicate harm concerns were salient in the Charlie Hebdo dilemma. Anger, sadness and disgust were also elicited, albeit to a lower intensity, compared to anxiety and fear. These latter emotions were previously linked to appraising harmful actions (anger, disgust) (Russell & Giner-Sorolla, 2011; Schaich Borg, Lieberman, & Kiehl, 2008) and to witnessing outcomes of harm (sadness) (Eisenberg, 2000; Gray & Wegner, 2011).

By measuring the emotions that participants attributed to the empathic targets, we were able to calculate the extent to which participants' emotional experience involved affect sharing (Coll et al., 2017). Our findings showed that the emotions reported as most intensely felt, anxiety and fear, were least shared in terms of intensity. In other words, participants tended to attribute more intense anxiety and fear to the victims, compared to themselves. A potential explanation for this discrepancy may be that fear and anxiety (distress) are the emotions most likely to be elicited in victims, in moral dilemmas (Miller et al., 2014).

Conversely, we found that anger, disgust and sadness were more shared; in this case, the levels of experienced and attributed emotions were more similar in intensity. Unlike anxiety and fear, these emotions may not be typically identified in the victims described in the Charlie Hebdo dilemma. However, previous research indicated that such emotions may be elicited as part of an empathic process (Gray & Wegner, 2011; Hechler & Kessler, 2018; Shenhav & Mendes, 2014). For instance, a recent study found that people experienced empathic anger (i.e., anger on behalf of another person) when other people were being victimized (Hechler & Kessler, 2018). While the design of our study may not allow for testing directionality, it is possible that participants may have attributed their own anger, disgust or sadness when considering the empathic target's emotions.

We found that moral choice was associated with both anger sharing and disgust sharing. However, higher anger sharing was associated with a higher willingness to insert the access code to save the child, sacrificing the colleagues. In contrast, higher disgust sharing was associated with lower willingness to insert the access code. While previous research associated anger and disgust with appraising morally relevant actions (Russell & Giner-Sorolla, 2011; Schaich Borg et al., 2008), it also found that, when elicited, they promoted discrepant action tendencies in moral dilemmas (Ugazio et al., 2012). Specifically, while

anger was previously associated with accepting harmful actions in dilemmas, disgust was associated with avoiding such actions (Ugazio et al., 2012). It is possible that engaging in empathic processing (affect sharing) may have promoted moral choices that were more consistent with such action tendencies.

In line with previous research (Conway et al., 2018; J. S. Robinson, Joel, & Plaks, 2015), we found that moral choice reflected how much participants thought about one category of victims over the other. In the Charlie Hebdo dilemma, we also found that the individual (the child) was reported as significantly more salient than the group (the colleagues). This finding may be explained by both the spatial proximity of this victim (i.e., near the protagonist), but also the familial relationship between the child and the protagonist (i.e., a mother and her child). Both features were previously found to influence people's responses to moral dilemmas, by reducing the likelihood that the individual victim would be sacrificed (Greene et al., 2009; Tassy, Oullier, et al., 2013).

Study 7

People's dispositional aversion to harm was previously associated with reluctance to endorse harm for the greater good in moral dilemmas (Miller et al., 2014; Reynolds & Conway, 2018). In Study 6, we found that individual differences in dispositional harm aversion were associated with increased empathic distress (i.e., sharing the anxiety and fear of victims) in the Charlie Hebdo dilemma. Taken together, these findings raise the question of whether (and how) aversive processing of harm is involved in the relation between affect sharing (situational empathy) and moral choice in moral dilemmas.

Aversion to harm in moral dilemmas was linked to serotonin function (Crockett et al., 2015, 2010). Serotonin is a monoamine neurotransmitter with documented contributions to affective and social decision making (for a review, see Crockett & Cools, 2015). In relation to harm, serotonin was argued to modulate the link between aversion to harm and response inhibition (i.e., harm avoidance) (Siegel & Crockett, 2013). For instance, in moral dilemmas, researchers used a pharmacological manipulation to enhance brain serotonin levels by administering citalopram, a selective serotonin reuptake inhibitor (SSRI) (Crockett et al., 2010). Enhancing brain serotonin levels increased people's tendency to reject harming an individual victim to save a group (Crockett et al., 2010). This result was backed by a more recent pharmacological study, which found people's aversion to harming others was modulated by serotonin, but not dopamine enhancement (Crockett et al., 2015). Therefore, it was suggested that serotonin may be specifically involved in processing the value (utility) of harming others (Crockett, 2016).

Moreover, individual differences in dispositional empathy were found to moderate the effect of serotonin enhancement on responses to moral dilemmas (see Crockett et al., 2010). Researchers argued that people with high dispositional empathy may have elevated baseline levels of harm aversion (Siegel & Crockett, 2013). In their case, it was suggested that serotonin enhancement may have increased harm aversion even more (Siegel & Crockett, 2013). This raises the question of whether situational empathy would be altered by serotonin manipulation.

The contribution of serotonin in aversive processing and inhibition was also investigated by experimentally reducing brain serotonin levels (Siegel & Crockett, 2013). An experimental protocol extensively used to reduce the synthesis of serotonin in the brain is

acute tryptophan depletion (ATD) (Carpenter et al., 1998; Crockett, Clark, Roiser, et al., 2012; S. N. Young, 2013). ATD involves temporarily eliminating tryptophan, the chemical precursor of serotonin, from a person's dietary intake (Crockett, Clark, Roiser, et al., 2012).

ATD was found to alter neural processing of threatening emotional stimuli (angry faces), modulating the connectivity between the amygdala and the prefrontal cortex (Passamonti et al., 2012). Moreover, past research found that ATD eliminated the association between aversive outcome predictions (e.g., an expected punishment like losing money) and response inhibition (e.g., avoiding a certain choice) (Crockett, Clark, Apergis-Schoute, Morein-Zamir, & Robbins, 2012; Crockett, Clark, & Robbins, 2009; O. J. Robinson, Cools, & Sahakian, 2012). In other words, lower serotonin levels may reduce the relation between aversive reactions to potentially harmful outcomes and avoidance of such outcomes (Siegel & Crockett, 2013).

In moral dilemmas, considering personally performing a harmful action was found to elicit an intense aversive emotional response (Cushman et al., 2012). At the same time, an aversive emotional response may be triggered by simulating witnessing the pain and suffering of the victims (Crockett et al., 2010, 2014). This kind of aversion was argued to trigger an empathic response (Blair, 1995; Miller et al., 2014).

Effects of ATD have yet to be investigated in moral dilemmas. In the current study, we examined the effects of tryptophan depletion on affect sharing in moral dilemmas. Given its effects on emotional reactivity (Passamonti et al., 2012), it is possible that ATD may influence affect sharing in dilemmas. Also, lower serotonin levels were argued to reduce the link between predicting a harmful outcome and avoiding such an outcome (Siegel & Crockett, 2013). In moral dilemmas, a harmful outcome may refer to the victim(s) that would be sacrificed to save the group. Therefore, a second aim of this study was to examine the effects of ATD on the relation between affect sharing and moral choice. Moreover, as in Study 6, we examined affect sharing and moral choice in relation with dispositional empathy and dispositional harm aversion.

Method

Participants

Twenty eight male participants were recruited for this study (mean age = 22 ± 4.55 years). Participants were screened for neurologic and psychiatric disorders. We included only male participants to control for sex differences, which were previously documented in ATD (Nishizawa et al., 1997). The study was approved by the "Babeș-Bolyai" University Ethics Committee.

Experimental Design

We used a randomized, placebo-controlled, double-blind crossover design. Participants attended two testing sessions at least 6 days apart. In the tryptophan depletion condition, they received an L-tryptophan free amino acid mixture (ATD). In the control condition, they receive a nutritionally balanced amino acid mixture (BAL) that included L-tryptophan. Session order was approximately counter-balanced (N = 17 for ATD-BAL; N = 11 for BAL-ATD).

Materials

Amino acid mixtures. Amino acid mixtures followed the procedures described by S. N. Young (2013) and Clark et al. (2005), and proportions described by S. N. Young, Smith,

Pihl, and Ervin (1985). The drinks were prepared blindly. Participants reported no side effects apart from transient nausea while ingesting the drink and capsules.

Moral dilemmas. We used the moral dilemma from Study 6. Also, we built a parallel version of the task. We adapted a moral dilemma from a real-life situation that happened in December 2015, when a bus travelling from Mandera to Nairobi, Kenya, underwent an al-Shabab (Islamist militant group) attack. This dilemma was similar to the Charlie Hebdo dilemma, in that it required the protagonist to sacrifice the lives of three individuals to save a group. We added the fact that the protagonist would not be harmed, to increase similarity with the Charlie Hebdo dilemma.

Discrete emotions. Five negative emotions, anger, anxiety, disgust, fear and sadness, were measured using the Discrete emotions questionnaire (DEQ) (Harmon-Jones et al., 2016).

Dispositional empathy. Trait empathy was assessed with the 28-item Interpersonal Reactivity Index (IRI) (Davis, 1980, 1983). **Action and outcome aversion.** Action-outcome aversion was assessed with the 34-item Action and Outcome Aversion Questionnaire (Miller et al., 2014).

Mood. The 41-item version of the Positive and Negative Affect Schedule (PANAS) (Watson & Clark, 1994) was used to measure mood at the beginning of each testing session and 5.5 hours later the moral dilemmas task. Mood was measured as part of standard ATD protocol (S. N. Young, 2013).

General Procedure

Before the testing sessions, participants were instructed to restrict from food, alcohol and coffee intake the night before the study (i.e., 12 a.m.), and in the following morning, before coming to the laboratory. Participants were scheduled one to two per test day. When two participants were tested, they were instructed to engage in as little social interaction as possible. Participants arrived at the laboratory between 8:30 and 9:30 a.m. They first read and signed the informed consent. Then, they were administered the PANAS, to assess current mood. Blood samples were taken and after that, participants ingested the capsules and amino acid drink. There was a 5 hour and 30 minutes resting period, to ensure stable and low tryptophan levels (Cools, Robinson, & Sahakian, 2008; Passamonti et al., 2012). After the resting period, mood was assessed, and blood samples were collected again.

The moral dilemma task followed the procedure described in Study 6. However, each participant completed both the original version (Charlie Hebdo dilemma) and parallel versions of the task (i.e., Kenyan teacher dilemma). In the Kenyan teacher dilemma, we asked participants if they were willing to *surrender* the three students. In this case, a score of 6 (More likely YES) indicated participants were more willing to sacrifice the individual victims to save the group. We reverse-scored moral choice ratings so that for both dilemmas, higher ratings would indicate increased willingness to save the individual victims. The order of the original and parallel versions of the dilemma task was counterbalanced between participants and treatment conditions.

Statistical Analyses

We ran mixed analyses of variance on total plasma tryptophan levels and on TRP:ΣLNAA ratio, to check manipulation success. Then, to examine whether our manipulation affected participants' positive and, respectively, negative mood, we used

repeated measures analyses of variance. Afterwards, to examine treatment effects on experienced emotions in moral dilemmas, we ran a mixed analysis of variance. Dilemma sequence order (Charlie Hebdo dilemma first, Kenyan teacher dilemma first) was the between-participant factor. Treatment (ATD, BAL), time of measure (dilemma, deliberation) and discrete emotion (anger, anxiety, disgust, fear, sadness) were within-participant factors.

We also analyzed whether attributed emotions were associated with the empathic target score using a linear mixed-effect model. Mixed analyses of variance were run on affect sharing scores and moral choice ratings. Then, we used linear mixed-effect modeling to examine to examine relations between moral choice and affect sharing, depending on treatment conditions. Lastly, we used bivariate correlation analysis to examine relations between individual differences measures and affect sharing scores and empathic target score, across treatment conditions (Crockett, Clark, Smillie, & Robbins, 2012), and within treatment conditions.

Data Preparation

Biochemical measures. Venous blood samples (5 ml; taken in EDTA tubes) were analyzed to determine the total plasma tryptophan level and the ratio of tryptophan to other large neutral amino acids (TRP:ΣLNAA ratio). Specifically, the ratio was calculated from the concentrations of total tryptophan divided by the sum of the large neutral amino acids (tyrosine, phenylalanine, valine, isoleucine, leucine). This is important because the uptake of tryptophan in the brain is strongly associated with the amounts of other competing LNAAs due to non-specific transport across the blood-brain barrier.

Results

Preliminary Analyses

Tryptophan depletion. The ATD manipulation was successful. Total plasma tryptophan levels significantly decreased in ATD relative to BAL, F (1, 26) = 109.92, MSE = 289.81, $p < .001$, $\eta_G^2 = 0.53$. The same was found for TRP:ΣLNAA ratio, F (1, 26) = 131.78, MSE = 0.001, $p < .001$, $\eta_G^2 = 0.47$. Simple effects analysis showed that plasma tryptophan levels significantly decreased during the ATD session, $t(26) = 9.76$, $p < .001$, averaging a 78.76% reduction. Also, TRP:ΣLNAA ratio also significantly decreased during the ATD session, t (26) = 17.92, $p < .001$, averaging an 87% reduction. During the BAL session, plasma tryptophan levels significantly increased by an average of 63.59%, t (26) = -7.83, $p < .001$, but there were no significant changes in the TRP:ΣLNAA ratio, t (26) = 0.24, $p = .995$. There was no effect of treatment order (ATD-BAL, BAL-ATD) on plasma tryptophan levels or on the TRP:ΣLNAA ratio (ps > .37).

Mood. Positive and negative mood were not significantly altered during testing sessions, in either ATD or BAL. Positive mood did not significantly change between baseline (1) and 5.5 hours later (2), in neither testing session, M_{ATD1} = 52.44, SD = 11.66, M_{ATD2} = 54.04, SD = 14.05; M_{BAL1} = 53.70, SD = 11.29, M_{BAL2} = 52.11, SD = 11.25, F (1, 24) = 2.26, $p = .146$. Also, negative mood did not significantly change between baseline and 5.5 hours later, in neither testing session, M_{ATD1} = 28.33, SD = 7.75, M_{ATD2} = 25.33, SD = 4.69; M_{BAL1} = 26.93, SD = 5.21, M_{BAL2} = 26.11, SD = 4.76, F (1, 24) = 2.94, $p = .099$.

Affect sharing. We calculated affect sharing scores as in Study 6 (i.e., the ratio between attributed and experienced emotions). Prior to calculating the scores, we first

checked if discrete emotions differed between one another and between the moments in which they were measured (dilemma, deliberation). Then, we examined relations between attributed discrete emotions and the empathic target score (i.e., whether participants thought more about one category of victims relative to the other).

Experienced emotions. We found a main effect of time of measure, which is the moment in which discrete emotions were assessed (dilemma, deliberation), F (1, 26) = 4.94, MSE = 0.59, p = .04, η_G^2 = .002. Particularly, participants experienced slightly more intense emotions while deliberating, compared to reading the dilemma, t (26) = 2.22, p = .035. Also, there was a main effect of discrete emotion type, F (1.99, 51.82) = 13.76, MSE = 5.36, p < .001, η_G^2 = .10. The interaction between time of measure and discrete emotion type was not significant, F (2.69, 70.06) = 1.89, MSE = 0.48, p = .15, η_G^2 = .002. This suggests that across treatment conditions, intensity ratings for each discrete emotion did not differ between the two moments in which they were assessed (dilemma, deliberation). Therefore, as in Study 6, for experienced emotions, we used the mean of both ratings to calculate affect sharing scores for each discrete emotion. There were no main effects for treatment condition (ATD/BAL) or for dilemma sequence order. However, we did find an interaction between dilemma sequence order, treatment condition and discrete emotion, F (2.35, 60.98) = 4.85, MSE = 1.74, p = .008, η_G^2 = .02. Pairwise contrasts revealed that fear ratings were higher in the ATD treatment condition, compared to BAL, for participants that received the Charlie Hebdo dilemma first, t (84.44) = -3.25, p = .008. This suggests that tryptophan depletion may have enhanced experienced fear, but only when participants read about the Charlie Hebdo dilemma first. All other comparisons were not statistically significant (all ps > .087).

Empathic targets. As in Study 6, we calculated an empathic target score for each participant (i.e., the ratio between how much they thought about the proximal victims relative to the group). Empathic target scores were not significantly different between ATD and BAL (p = .270) or between dilemma sequence order (p = .592).

Attributed emotions and empathic targets. We found that attributing more fear to the victims in the ATD, relative to the BAL condition, was significantly associated with thinking less about the individual victim(s), relative to the group, B = -1.08, 95% CI [-1.97, -0.20], t (42.39) = -2.14, p = .038. Also, we found a similar association for attributed disgust, B = -0.82, 95% CI [-1.42, -0.24], t (42.65) = -2.43, p = .019. In other words, participants who thought less about the individual victim(s) relative to the group also attributed more fear and disgust to empathic targets, under ATD.

Main Analyses

Affect sharing. Participants who read about the Charlie Hebdo dilemma first, compared to those that read about the Kenyan teacher dilemma first, had increased levels of affect sharing (across discrete emotion type) in ATD, relative to BAL. There was a main effect of discrete emotion type, across treatment condition and dilemma sequence order, F (1.56, 40.67) = 17.37, MSE = 2.26, p < .001, η_G^2 = .15 (see Figure 4.4). However, affect sharing *scores* tended to be higher in the BAL, compared to the ATD condition, across discrete emotions, t (26) = 1.79, F (1, 26) = 3.24, MSE = 1.49, p = .08, η_G^2 = .01. Simple contrasts showed affect sharing scores were significantly higher (lower sharing) for anxiety and fear in the BAL, compared to the ATD condition, t_{fear} (79.56) = 2.15, p = .037, $t_{anxiety}$ (79.56) = 2.12, p = .034. These findings indicate that our manipulation may have increased

affect sharing, an effect that was significant for anxiety and fear, two discrete emotions depicting emotional distress.

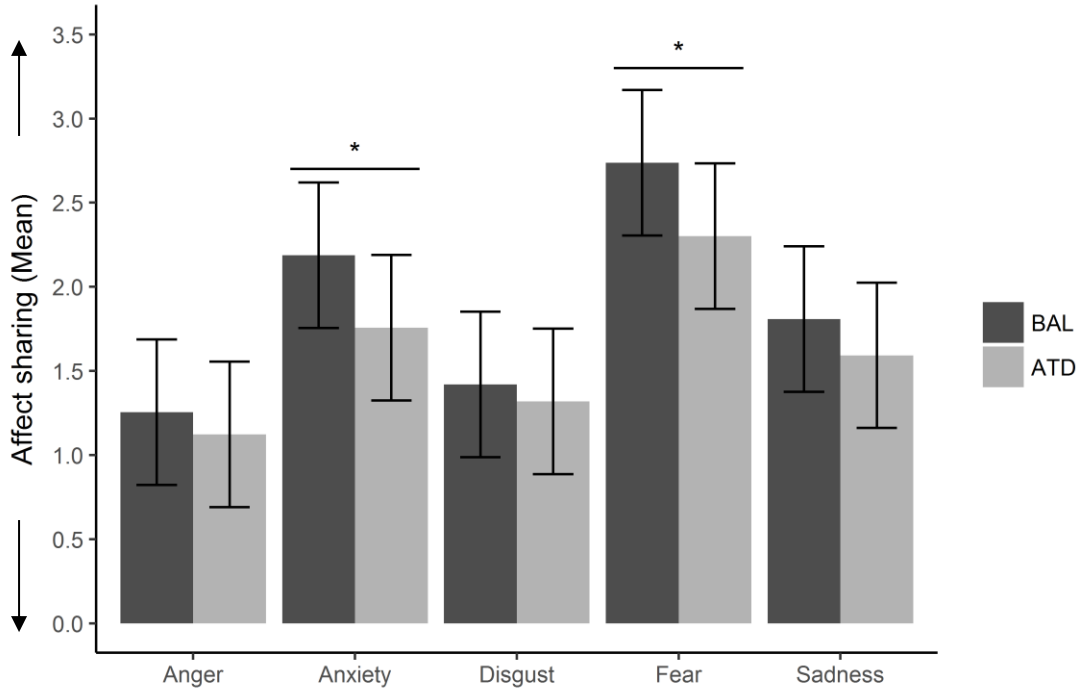

Figure 4.4. *Mean affect sharing differences between treatment conditions (BAL, ATD), for each discrete emotion. Higher scores mean lower sharing. Error bars represent 95% CIs. *p < .05.*

Moral choice. The effect of treatment on moral choice depended on dilemma sequence order, F (1, 26) = 7.92, MSE = 3.08, p = .009, η_G^2 = .14. We further examined distinctions between moral choices depending on treatment, for each dilemma sequence order. For participants who received the Charlie Hebdo dilemma first, choice ratings were higher (i.e., favored saving the individual victim(s)) in the ATD condition, compared to the BAL condition, t (26) = -2.81, p = .009. However, for participants who received the Kenyan teacher dilemma first, choice ratings were not significantly different between treatment conditions, t (26) = 1.23, p = .229.

Affect sharing and moral choice. We used linear mixed-effect modeling to examine relations between moral choice and affect sharing, depending on treatment conditions (ATD, BAL). We found a main effect of empathic target score, which was positively associated with moral choice across treatment conditions, B = 0.69, 95% bootCI [0.26, 1.18], t (54.5) = 3.06, p = .004. This finding replicates our result from Study 6; thinking more about the individual victim(s) than the group was associated with moral choice towards saving the individual victim(s).

We also found a significant interaction between fear sharing and treatment conditions, B = 1.57, 95% bootCI [0.43, 2.67], t(55.05) = 2.85, p = .006. We further examined slopes for fear sharing in the ATD and BAL conditions. We found that fear sharing was negatively associated with moral choice in the BAL condition, B = -1.03, t(55.93) = -2.85, p = .006. Under ATD, fear sharing trended towards a positive association with moral choice, B = 0.54, t (55.50) = 1.28, p = .204. In other words, we found that participants who attributed more fear

to empathic targets than they personally experienced (i.e., high affect sharing score) tended to favor saving the group under BAL, and the individual victims under ATD.

Individual Differences

Empathic concern was positively associated with anger and disgust sharing scores (i.e., lower affect sharing), across treatment conditions. Personal distress was negatively associated with anger and disgust sharing scores (i.e., higher affect sharing), across treatment conditions.

Discussion

In this study, we drew on previous research on the role of serotonin in aversive processing to investigate the role of harm aversion in affect sharing and its relation to moral choice. Findings revealed that ATD enhanced affect sharing, especially in the case of anxiety and fear. Our results also indicated that ATD modulated the relation between affect sharing in the case of fear and moral choice.

Serotonin function was previously associated with aversive processing. Increasing available serotonin levels through psychopharmacological manipulations was found to reduce the utility of harming one person for the benefit of a group (Crockett et al., 2010). It was argued that reducing serotonin levels may not produce the opposite effect, given that reduced serotonin is associated with mood disorders like depression (Crockett & Cools, 2015). Indeed, our results suggest that ATD enhanced affect sharing, increasing the similarity between experienced and attributed emotions in the moral dilemmas.

A potential explanation for our finding may be that ATD increased situational outcome aversion, by raising overall emotional experience in the moral dilemmas. We found that ATD enhanced experienced fear while reading and deliberating on a response. However, order effects were also relevant, as the effect was observed only for participants who received the Charlie Hebdo dilemma first. Another potential explanation may be that ATD reduced the distinction between experienced and attributed emotions by blurring the self-other distinction (Bird & Viding, 2014). For instance, studies on extraordinary altruists found they have an exacerbated neural response to other's distress (Marsh et al., 2014). More recent findings suggested this is because such people tend to represent others' distress very similarly to how they represent their own distress, at the neural level (Brethel-Haurwitz et al., 2018). ATD was previously found to alter how people processed emotional stimuli, by reducing connectivity between the amygdala and the prefrontal cortex (Passamonti et al., 2012). Therefore, it may be that ATD enhanced affect sharing by blurring self-other distinctions in appraising the distress of victims in the moral dilemmas.

In the present study, we also found that ATD influenced the relation between moral choice and sharing the fear of victims in moral dilemmas. Particularly, increased fear sharing was associated with saving the individual victim(s) under BAL (control condition) and trended towards saving the group under ATD. Past literature argued that an emotion like fear reflects harm aversion, and that empathizing with victims involves sharing their distress (Marsh, 2016). Also, sacrificing another person for the benefit of the group is likely to elicit harm aversion and an associated avoidance response (Crockett et al., 2010). However, reducing central serotonin synthesis through ATD was found to suppress the relation between aversive reactions and avoidance responses (Crockett, Clark, Apergis-Schoute, et al., 2012; Crockett et al., 2009). Our findings are in line with this research, suggesting that ATD

may have suppressed the need to avoid sacrificing one person for the benefit of the group. Additionally, attributing more fear in the ATD condition, relative to BAL, was associated with enhanced situational salience of the group. Taken together, our findings support the idea that serotonin is relevant in signaling utility of decisions about harming others (Siegel & Crockett, 2013).

General Discussion

Across three studies, we investigated dispositional empathic responses and situational empathy in moral dilemmas. While dispositional empathic responses have been intensely investigated, past research has yet to investigate situational empathy. This was an important contribution of the current research, as we developed a novel task to assess situational empathy. We discuss main findings, limitations and potential avenues for future research.

Dispositional Empathy

The role of dispositional empathy in shaping people's responses in moral dilemmas, while intensely investigated, is still currently less understood (Baron et al., 2017). In Study 5, we found that dispositional empathic concern was associated with responses to reject harm to moral dilemmas, both from an abstract and a personal point of view.

Dispositional empathic concern is a type of empathic response specifically linked to attending to the suffering of other people (i.e., also termed sympathy or compassion) (Eisenberg & Eggum, 2009; Lamm et al., 2017). We found a positive association between dispositional empathic concern and negative emotion intensity when people were confronted with the moral scenarios (Cecchetto et al., 2018; Sarlo et al., 2014). This kind of empathic response may depend on successful empathy, in which people experience an emotion while being aware that it came from another person (Lamm et al., 2017). Failure to make this latter distinction may result in another kind of empathic response, which is personal distress (Eisenberg & Eggum, 2009). While these kinds of empathic responses were previously addressed in relation to moral decision in dilemmas, it remained unclear how these dispositional tendencies were being translated when dealing with a moral dilemma. In other words, empathy as process had yet to be captured while people were reading and deliberating on a response in a moral dilemma.

Situational Empathy

Empathy is a complex construct and the way it is defined may have important consequences on how it is measured (Coll et al., 2017; Decety & Cowell, 2014b). To develop a measure of empathy in a moral dilemma, we integrated three lines of research. First, literature that has described current experience of emotions in moral dilemmas found that people reported feeling many different discrete emotions (Choe & Min, 2011; Szekely & Miu, 2015; Tasso et al., 2017). Second, moral dilemmas were argued to elicit aversive emotional reactions to situational cues, such as harmful actions or the presence of potential victims (Crockett, 2013). Aversion to harmful actions and outcomes was argued to shape people's perceptions of harm in moral dilemmas (Miller et al., 2014; Schein & Gray, 2018). Third, and most important, we integrated literature that has defined empathy through the concept of affect sharing (Coll et al., 2017; de Vignemont & Singer, 2006; Lamm et al., 2017). It was argued that measuring affect sharing could be defined as a function between emotions attributed to empathic targets and experienced emotions. The most simple function, the one we used, was extracting the ratio between the two ratings (Coll et al., 2017).

Our findings suggest that engaging in affect sharing in a moral dilemma may shape people's moral decision. In Study 6, we found that affect sharing for anger and disgust prompted moral choices in opposite directions. In the dilemma we used, performing the action individual victim, while not doing it saved the group. Empathic anger promoted choices towards performing the action, while empathic disgust hindered them. Both emotions were previously linked to appraising harmful actions (Russell & Giner-Sorolla, 2011; Shenhav & Mendes, 2014). Our findings may reveal potential functions of these emotions in moral dilemmas, when integrated in an empathic process.

Results from Study 7 suggest that serotonin, a neurotransmitter that was argued to play an important role in aversive processing (Siegel & Crockett, 2013), may have modulated the extent to which people engaged in sharing the distress of victims in moral dilemmas. Tryptophan depletion enhanced affect sharing, especially for anxiety and fear, emotions previously tied to harm aversion (Marsh, 2016). The role of serotonin was also argued to lie at the intersection between aversive processing and avoidance responses (inhibition) (Siegel & Crockett, 2013). Our results indicate that reducing serotonin synthesis may have suppressed the contribution of empathic distress in avoiding harm to individual victims for the benefit of the group in dilemmas (Crockett, Clark, Smillie, et al., 2012). It is possible that reducing serotonin synthesis may have allowed people to rely their empathy for the group when making a moral choice towards saving them. This interpretation is in line with recent findings showing that aversion to harmful outcomes was associated with choice preferences to save both the individual victims and the group in dilemmas (Reynolds & Conway, 2018).

Limitations and Future Directions

The novel task we developed to assess situational empathy may benefit from further improvements in future studies. First, the order in which experienced and attributed emotions were measured was not counterbalanced (see Coll et al., 2017). Our rationale was that we wanted to capture subjective experiences as accurately and as authentically as possible. Future studies could use between-participant designs to extract the magnitude of order effects. Second, we measured empathic target salience right after participants made the moral choice. This may have influenced their responses; an indicator was the significant association between the salience of one type of empathic target and moral choices to save that empathic target. A potential solution would be to assess moral choices and empathic target salience on separate occasions, counterbalancing the order of the assessment. Third, the moral dilemmas we chose in Study 7 were not completely equivalent. Although we wanted to make as few adjustments as possible, so that the descriptions would reproduce the real-life scenario, further validation of these dilemmas is needed.

Conclusion

The process of deciding whether to sacrifice one person for the benefit of the group can elicit complex emotional states such as empathy. In line with previous research, we found that being prone to feel concern for less fortunate others may influence both the emotional impact of moral dilemmas and the kind of decision one is ready to make. More importantly, by operationalizing empathy in terms of affect sharing, we were able to study the content of empathic states in a moral dilemma and found that an empathic state may be expressed in multiple discrete emotions. Moreover, our results suggest that dispositional empathy may be translated into sharing the distress of victims in a moral dilemma. Also, our findings suggest

empathy in moral dilemmas may involve aversive processing of harmful outcomes. Serotonin may have modulated the extent to which people who shared the victims' distress also tended to endorse harming for the greater good.

CHAPTER 5
GENERAL CONCLUSIONS

Investigating how moral cognition is organized in the mind and the brain has been the focus of intense interdisciplinary research in the last two decades. An effective strategy to breaking down and studying this complex mental process was to look at two classes of antecedents, which we called *distal* and, respectively, *proximal* antecedents. The former includes stable individual features like dispositional traits, while the latter refers to situational cues and context. In the present thesis, we addressed contributions of both classes of antecedents to moral evaluative cognitions, or moral judgments. Specifically, we investigated how distal and proximal antecedents were integrated when dealing with moral conflict.

General Theoretical Context and Premises

Across 7 studies, we assessed moral judgment and decision making in moral dilemmas. Moral dilemmas encompass intractable situations in which an aversive harmful action that transgresses a moral norm is matched against the chance to save many people, upholding a greater good (Cushman & Greene, 2012). These situations challenge people to process multiple kinds of information to find the response they are willing to settle with. This feature of moral dilemmas has made them suitable for studying both distal and proximal antecedents, in the current thesis. To identify the distal and proximal antecedents of moral cognition, we first reviewed theoretical models of moral cognition. We focused on the kinds of information and processes that were documented in the literature as essential to moral cognition.

Models of moral cognition were essentially built on moral judgment and decision making research. A critical insight from reviewing the dual-process model of moral cognition (Greene et al., 2004, 2001) was that the discussion about moral cognition should go beyond the cognition – emotion debate (Cushman, 2013; Moll & Schulkin, 2009). Antagonizing the contributions of deliberative and emotional processes has generated much research that has interpreted emotions as a biasing factor in moral cognition (McClure et al., 2007). A limitation of this approach was that it did not address how cognitive and emotional mechanisms were integrated at the psychological and the neural levels (see Cushman, 2013; Moll & Schulkin, 2009).

A step forward was the dual-system framework (Crockett, 2013; Cushman, 2013), which argued that people's moral judgments were a product of both cognition and emotion. On the one hand, the dual-process model initially argued that moral judgments and decisions to endorse harm needed to be less emotionally charged, in order to be endorsed (Greene, 2008; but see Cushman et al., 2010). However, research on the role of emotion, which we reviewed separately in the current thesis, has found mixed results.

On the other hand, the dual-system framework proposed that formal models of reinforcement learning and decision making may be used to describe processes people may employ when making moral judgments and decisions in moral dilemmas. A key point in this model referred to the role of value representations when generating a moral judgment in a dilemma (see Crockett, 2013; Cushman, 2013). For example, this approach helped shed new light on moral decision, by using it in research on patients with ventromedial prefrontal damage. They were found to be more willing to endorse harm in dilemmas, which was

interpreted as evidence for the effects of having blunted emotions (Ciaramelli et al., 2007; Koenigs et al., 2007). More recent functional imaging studies indicated this brain region has an integrative function, translating different information into a common value representation of decision alternatives (Shenhav & Greene, 2014). Rather than having no emotion when endorsing harm in dilemmas, patients with ventromedial prefrontal damage may have trouble decoding and comparing the relative value of alternative decisions in dilemmas (Shenhav & Greene, 2014).

The dual-system framework argued on the importance of two proximal antecedents of moral judgment, action- and outcome-related situational cues. In this sense, emphasis was placed on the role of aversive emotional reactions that may stem from appraising such situational cues (Crockett, 2013; Miller et al., 2014). Particularly, aversion to harm was argued to be a powerful motivator for rejecting the harmful action in moral dilemmas (Crockett, 2013; Cushman et al., 2012).

Two important amendments were made in the literature. First, people may have trouble distinguishing actions from outcomes when it comes to harm (Schein & Gray, 2018). Second, these situational cues may not be the only ones integrated when generating a moral judgment. In this case, an important piece of information, that may turn "good – bad" judgments into "right – wrong" judgments (Nichols, 2002), may be the salience of moral norms (Ayars, 2016; Cushman, 2015). The latter piece of information gave us another insight, prompting us to search for other models of moral cognition.

The dynamic systems approach, a more recent model, capitalized on neuroimaging research which found that many brain regions were active during moral cognition (Van Bavel et al., 2015). Therefore, researchers argued that moral cognition may involve appraisals of many other kinds of information. Also, this model is more coherent with recent views on the nature of moral cognition. Particularly, it was argued that moral cognition, rather than being a separate, independent phenomenon, may rely on the same kinds of processes that back, for instance, social cognition (Greene, 2015). This model has yet to gather as much empirical support from research on moral judgment and decision making. However, a key point of this model was that multiple kinds of information are integrated when people generate a moral cognition. This insight guided us towards investigating a process that is central for social cognition, which is empathy. It also directed us to investigate contributions of moral norms in moral cognition, through religious thinking.

In the last few years, both in psychology, and neuroscience, researchers have started to acknowledge that studying moral cognition should also focus on the individual (Bartels et al., 2015; de Oliveira-Souza et al., 2015). Moreover, in moral dilemma research, many observations were made of consistent individual differences in people's responses in moral dilemmas (Baron & Ritov, 2004; Greene et al., 2004). Individual differences were most pronounced in dilemmas in which a harmful, intentional, personally executed, action to one person, was the means to save many other people (Greene et al., 2009, 2001). On the one hand, in such dilemmas, people may experience an emotional conflict if motivated to both avoid harm and save many people (Moll & Schulkin, 2009). On the other hand, it was argued that people may either consider both alternatives and make an integrative judgment (Shenhav & Greene, 2014), or make use of their dispositional thinking habits (Baron et al., 2015). A hypothesis put forward was that such thinking habits may provide people with mental

shortcuts that would allow them to quickly make a decision in the moral dilemma (Baron et al., 2015). Thus, researchers emphasized that people's dispositional traits may influence people's decisions in moral dilemmas.

This latter insight led us to investigate potential ways in which dispositional traits, which we called distal antecedents, could be studied in relation to proximal antecedents, or situational cues. Researchers investigating moral cognition have only recently acknowledged the need to study both kinds of antecedents (Bartels et al., 2015; Lee & Gino, 2018). Past research used variations of moral dilemmas, in which different situational cues we manipulated. However, we found a critical argument, made outside the moral cognition literature, which suggested that the most fertile ground for investigating individual differences were situations in which the right response was less obvious (Caspi & Moffitt, 1993). This idea led us to consider only moral dilemmas that were particularly intractable, in which both decision alternatives could have been argued as "the right thing to do". Also, past studies used between-participant designs to investigate contributions of individual differences (Bartels, 2008). It was recently emphasized that studying the contribution of dispositional traits would benefit more from within-participant designs (Bartels et al., 2015). An idea that prompted our studies was that, by using such designs, and integrating both distal and proximal antecedents, we could study their relative contribution to moral judgment and decision making.

Our literature review of moral judgment and decision making research revealed three potential antecedents that were less understood: personality, religiosity and empathy. In the case of personality, a long tradition of segregated research pertaining to either personality psychology or social psychology, has negatively impacted knowledge on the relations between personality and morality (Cervone & Tripathi, 2009). Likewise, the contribution of religiosity in morality was highly debated for over three decades, potentially because studies overlooked the multidimensional nature of religiosity (Saroglou, 2011). In contrast, we found extensive research on the relation between empathy and morality, but mixed results, which have sparked heated debates (Bloom, 2017; Zaki, 2017). Investigating personality, religiosity and empathy, as potential determinants of individual differences in moral judgment and decision making, was the first aim of the current thesis.

Given their importance for moral cognition, we reviewed evidence for the role of emotions in moral judgment and decision making in a separate introductory section. We found abundant literature investigating emotions in moral judgment and decision making. We categorized findings based on three different kinds of emotions that were distinguished in the emotion and decision making literature: current, incidental and expected emotions (Lerner et al., 2015). In difficult moral dilemmas, current emotions are more likely to accompany both types of responses (i.e., rejecting harm/endorsing it for a greater good). Therefore, they may not be associated specifically with choosing one alternative (e.g., reject harm) over the other (Cushman et al., 2010). However, current emotions best reflect reactions to proximal antecedents; thus, we focused on this kind of emotions in the present thesis. This constituted the second aim of the present thesis.

Main Findings

Across our studies, we took a similar methodological approach. We confronted people with difficult moral dilemmas and investigated the contribution of dispositional traits to

moral judgment and decision making and current emotions. In this section, we briefly review and discuss main findings from each chapter.

Personality

Our approach to investigating personality as a distal antecedent to moral cognition was to build on research that has distinguished between taking two alternative perspectives in moral dilemmas (Nadelhoffer & Feltz, 2008; Tassy, Oullier, et al., 2013). In one case, people had to consider the morality of the harmful action; in the other, they had to consider what they would do if they were the protagonists in the scenarios. Across three studies, we investigated the role of Big Five personality traits in relation to people's responses in moral dilemmas and their associated emotion experience.

We found that agreeableness and conscientiousness were associated with people's responses to moral dilemmas, particularly, rejecting harmful actions. However, agreeableness was associated with responses to moral dilemmas only when people had to consider the moral dilemma from a personal perspective. We found that agreeableness was also positively associated with experiencing more intense negative emotions, and that taking a personal perspective was more emotionally engaging. Taken together, we argued that a distal antecedent such as agreeableness may influence moral choice, potentially, through emotional channels.

We observed a different pattern for conscientiousness, as it was associated with responses to moral dilemmas both when people had to consider the morality of the harmful action and when they had to consider whether they would perform it. When we assessed the two kinds of concerns that may drive the alternative responses in moral dilemmas (i.e., upholding a greater good, avoid causing harm), we found that conscientiousness was associated with lower concern for upholding a greater good. The findings on conscientiousness suggested that it may promote consistency across moral situations. However, the latter finding raised new questions about what kinds of concerns may underlie the association between conscientiousness and rejecting harmful actions in moral dilemmas.

Religiosity

Our investigation of religiosity was motivated by its important role in shaping people's belief systems. It was suggested that the extent to which moral norms matter for moral cognition may depend on how much people have integrated them into their belief systems (Bicchieri, 2005). Moreover, they may also need to be shared in the minds of groups of people (Graham et al., 2011). Religion may offer the necessary framework to uphold the latter condition. In addition, by focusing on dispositional religious thinking, we also tapped into the former condition.

The main finding of this study was that different dimensions of religious thinking may be associated with people's responses in moral dilemmas and their emotional experience. On the one hand, we found that the tendency to seek divine advice was positively associated with personally rejecting harm in moral dilemmas. On the other hand, we found that dispositional religious feelings were associated with negative emotion experience in moral dilemmas.

Empathy

When we reviewed literature on empathy in the context of morality, we found that studies using moral dilemma methodology focused almost exclusively on dispositional empathy. Moreover, research reported mixed findings on dispositional empathy in relation to

people's responses in moral dilemmas and associated emotion experience (for example, Cecchetto et al., 2018; Sarlo et al., 2014). In addition, we extended our literature review to include the more general research question regarding the role of empathy in morality. This was motivated by the fact that past research supported both a helping and a hindering role of empathy. In doing so, we found that a major issue that potentially led to mixed findings was that empathy was defined and operationalized in different ways (Batson, 2009; Coll et al., 2017).

In our investigation of empathy, we followed recommendations in the literature (Decety & Cowell, 2014a, 2014b; Miu & Vuoskoski, 2017), and first defined what we meant by empathy. We clarified that dispositional empathy, which we addressed, referred to dispositional empathic responses (e.g., sympathy/compassion). Our main findings were that dispositional empathic concern (i.e., the tendency to respond with sympathy or compassion to less fortunate others) was associated with rejecting harmful actions in moral dilemmas and with a more intense associated emotion experience. This investigation further clarified previous research but addressed only dispositional empathic responses.

Our literature review revealed that studies had yet to address situational empathy in moral dilemmas. Therefore, we built a novel task, in which we assessed affect sharing, which is the specific concept that has been most associated with situational empathy (Coll et al., 2017; Lamm et al., 2017). We followed two important aspects. First, we tried to address past critique of moral dilemma methodology, regarding the artificial nature of these stimuli (Bauman et al., 2014). Thus, we chose moral scenarios that were adapted from real life, that also had a similar structure to dilemmas we previously used. Second, we integrated past findings regarding the multitude of discrete emotions that may arise in moral dilemmas (Choe & Min, 2011; Szekely & Miu, 2015; Tasso et al., 2017). Particularly, we used a valid measure of discrete emotions to simultaneously assess emotion experience in moral dilemmas. Measuring the same emotions that people attributed to victims in the moral dilemmas allowed us to calculate an index of affect sharing. Additionally, based on past research that has documented the role of harm aversion in moral dilemmas, we also addressed the contribution of serotonin, a neurotransmitter involved in aversive processing, to affect sharing and moral choice in dilemmas.

Assessing situational empathy in moral dilemmas revealed that the type of discrete emotion may matter for how much it will be shared. Also, our findings indicated that sharing of different emotions may lead to opposite responses in moral dilemma (e.g., increased empathic anger promoted moral choice towards saving a proximal victim). Moreover, our results also indicated serotonin may be involved in the process of affect sharing (e.g., it increased sharing of anxiety and fear, emotions that may reflect harm aversion).

Implications and Future Research Directions

Findings from our personality studies further confirmed the need to investigate both distal and proximal antecedents, and if possible, their interactions (Bartels et al., 2015). They also offered a methodological starting point for investigating a phenomenon called moral flexibility (Bartels et al., 2015). Moral flexibility addresses the cases in which people are motivated to remain loyal to their core moral beliefs, but, when a situation (e.g., a moral dilemma) arises, they may need to flexibly reappraise them to meet situational demands. Based on our findings, it is possible that conscientiousness may promote inflexibility to

situational demands when solving moral conflicts. Future studies could address this hypothesis by tracking individual patterns of conscientiousness on an everyday basis (Helzer, Fleeson, Furr, Meindl, & Barranti, 2017; Roberts et al., 2014).

Through our religiosity study, we contributed to advancing the literature on the much-debated morality - religiosity link. We suggest that, to figure out the role of religiosity in morality, it might be necessary to consider the multidimensional nature of religiosity. Also, investigating dispositional religious thinking, as distal antecedent to moral cognition, may offer researchers a way to examine the contribution of moral norms in moral cognition.

Our investigation of empathy in relation to moral dilemmas also argued for the need to investigate both distal and proximal antecedents in moral cognition. More importantly, it supported past suggestions, on the need to clearly define what is meant by empathy, while also proposing a methodological approach to studying situational empathy in moral dilemmas. Situational empathy may be one mechanism through which proximal antecedents (e.g., information about victims) are integrated in moral judgment and decision making. Future studies could further address this research question, potentially, by using the task we developed in this sense.

General Conclusion

In response to our initial question about the structure of moral cognition, our findings indicate that moral cognition comprises a complex blend of individual characteristics, personal beliefs and engaging in empathic processing. Our results speak to the need to continue mapping the ingredients of moral cognition and offer potential methodological approaches to achieving this goal.

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