The Development of Morality in Relation to Age and Executive Functioning in Preschoolers

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Abstract

The present study examined the development of morality in preschoolers in relation to their age and executive functioning (EF) skills. A sample of 204 3- and 4-year-olds completed a moral and conventional norm storytelling task, a hot EF task, and a cool EF task. Based on past literature, it was expected that there would be a significant difference in children's ratings of severity of moral and conventional norm violations, as well as a significant age difference. It was also hypothesized that scores on the hot and cool EF tasks would be associated with scores on the stories about moral transgressions, while only scores on the cool EF task would be associated with scores on the stories about conventional transgressions. Results revealed that children rated moral transgressions as more severe than conventional, however, no age differences were found. Older children provided a higher proportion of reasons compared to younger children. Children suggested that moral transgressions were wrong because someone was a victim or the action was bad, while conventional transgressions were wrong because they violated a rule. Only hot EF scores were related to scores on the moral stories, while neither EF task was related to scores on conventional stories.

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The Development of Morality in Relation to Age and Executive Functioning in Preschoolers

From birth, children are taught what they should and should not do. They are taught social rules, such as saying please and thank you, keeping their elbows off the table when eating, and to listening to their teachers. However, they are also taught ethical rules, that it is wrong to push their friends, that sharing is caring, and that they should treat others how they would like to be treated. These different norms and values are essential to maintain the structure of society.

A child's morality is their view of what is right and what is wrong. How this sense of morality develops is understood through the child's social, cognitive, and affective development, all factors that belong to the concept of executive functioning (EF). EF refers to the cognitive skills individuals use to achieve a goal (Garon et al., 2008). To understand the development of morality and EF, past research and measures will be reviewed. To date, there is a lack of studies investigating the connection between EF and the development of moral/conventional norm understanding. The goal of the present study is to investigate the age at which preschoolers distinguish between moral and conventional norms, and how morality develops with EF.

Moral and Conventional Norms

Social domain theory examines the development of moral and social behaviour (Smetana et al, 2014). This theory purports that the development of morality follows a different trajectory than the development of conventional/social norm understanding (Smetana & Zelazo, 2013). Moral norms are those that protect the rights and harmony of society, while conventional norms are those that pertain to social structure and protocol

(Smetana & Braeges, 1990). Generally, moral norms are thought of as a universal system of rules that safeguard human rights and are independent of higher authority (Turiel 1983; Smetana, 2013). These norms are thought of as fixed, and learning these moral rules stems from social interactions.

Creating well-defined measures of morality in children has been a source of difficulty for many developmental researchers (Killen and Smetana, 2009). In moral psychology, a common method of measurement involves reading vignettes about moral decisions and asking participants to answer questions about them. For children, this is often done through the use of stories and images depicting scenes of moral and conventional (social) transgressions. Moral transgressions may include physical harm (e.g., hitting), stealing, or selfishness (Smetana & Braeges, 1990). Conventional transgressions include not listening to authority (e.g., a teacher), not being polite, or wearing something that deviates from the societal norm. After listening to the stories, children are typically asked if what happened was right or wrong and asked to justify their answer. Some tasks attempt to determine if the violation is thought of as independent from authority by asking if the transgression would be okay if authority figures were unaware that it had happened.

Following a study using moral and conventional stories by Smetana and Braeges (1990), it was found that children use certain criteria to judge between moral and conventional scenarios, such as the situation's generalizability, seriousness, and dependence on authority/rules. Moral norms are evaluated as more generalizable and serious than conventional norms, but less dependent on authority and rules. Measures of morality that ask children why a transgression is wrong often find that their reasoning

for moral transgressions is based on its impact on others (e.g., harm to wellbeing and rights), while conventional issues are determined by rules, punishments, and attempts to maintain order (Smetana, 2013). One important finding is that psychopaths, who are known for showing little regard for others' well-being and social rules in general, do not distinguish between moral norms and conventional norms (Blair et al., 1995). Instead, they simply lump all rules together as they do not have the capacity to use emotion to separate them. This suggests that distinguishing between these norms is an important step in the development of morality.

Moral Development

While the majority of research has found that morality rapidly develops in the preschool years, studies have found that even in the first and second years of life, infants can recognize moral violations (Dunn, 2006). Geraci and Surian (2011) found that infants differentiate between the fair and unfair distribution of resources, measured by both the amount of time spent looking at the fair and unfair interactions, and their choices between 'fair' and 'unfair' actors. This result, among similar findings in other literature, has been suggested to provide evidence for an innate sense of morality in infants, as it seems they understand or empathize with the need for fairness.

Generally, before the age of 3 years old, children cannot differentiate between moral and conventional norm violations (Smetana & Braeges, 1990). This ability begins around 3 years of age, however, children at this stage typically only distinguish them on the basis of generalizability (whether a transgression is wrong in all contexts or just a specific context; Smetana & Zelazo, 2013). By the ages of 4- and 5-years-old, children can understand the difference between moral and conventional norms in many different

areas, including their generalizability, seriousness, and relevance to authority or rules. Four-year-old children have been found to rate moral stories as more generalizable, serious, and separate from authority than 3-year-olds. While both younger and older preschoolers have typically been found to judge moral transgressions as worse than conventional ones, older preschoolers generally have a more pronounced differential rating (Smetana et al., 2014).

Another method of measuring morality is through children's judgements of social interactions. Dahl et al. (2013) measured this by looking at observation-based preferential helping, in which children between 1- and 2-years-old judged a 'prosocial' actor (one who engaged in positive and helpful behaviour) and an 'antisocial' actor (one who engaged in unhelpful and disruptive behaviour). Generally, the study found that the older children tended to help the prosocial actor more often than the antisocial actor initially, but most children were willing to help both when given the opportunity. It was also found that more time spent looking at the antisocial interaction was related an increased likelihood of helping the prosocial actor. Similarly, Kenward and Dahl (2011) performed a similar study with puppets; they found that 4-year-old children were more likely to distribute resources to prosocial puppets than antisocial puppets, but usually distributed them equally if given the opportunity. Age also played a role in this, where 4-year-olds were significantly more likely to unevenly distribute resources than 3-year-olds. The older children were also able to identify the prosocial and antisocial puppets more accurately than the younger children in this task, suggesting that the ability to understand the prosocial and antisocial interactions increased with age and could play a role in decision-making.

Researchers have also investigated children's reasoning for their judgements. Initially, it was thought that younger preschoolers based their moral judgements on the outcome of the transgression, while older preschoolers based their judgements on actors' intentions (Margoni & Surian, 2020). However, Margoni and Surian (2020) found that if the complexity of the task was reduced and required less cognitive strain, 3-year-olds justified their judgements by considering the actors' intentions. Older preschoolers (5- and 6-year-olds) were able to take intentions into consideration regardless of the complexity of the task. This suggests that as cognitive skills develop, so does moral reasoning. In fact, the ability to reason about intentions instead of outcomes may begin to develop as early as 2 or 2.5 years of age.

Moral judgements continue to develop with age (Jambon & Smetana, 2014). Eleven-year-olds are more likely than 5-year-olds to be forgiving and understanding in complex moral situations where harm was deemed necessary, though transgressions were still thought of as wrong and harmful across all ages. Researchers suggest that this is because older children can consider multiple aspects of moral situations and have a better understanding of others' behaviours and emotions.

Foundations of Moral Development

Two major components have been found to contribute to the development of a child's conscience (self-regulation): moral emotion and moral conduct (Kochanska & Aksan, 2006). Moral emotion refers to guilt, whether the child is actually feeling guilty or simply anticipating it. This mechanism provides motivation to avoid transgressions. Moral conduct, on the other hand, is the child's actual behaviour and their capacity to exhibit morality. In their review of previous research in this area, Kochanska and Askan

(2006) argued that within these two components, there are two main contributors to morality. First, they noted that a child's temperament plays a large role. Specifically, they focused on the role of behaviour inhibition, in which children who score high on behaviour inhibition are more fearful and less impulsive. Second, they noted that socialization, particularly parental discipline and parental responsiveness, contributed to a child's moral emotion and conduct. The roles of behaviour inhibition and parent socialization in the development of moral emotion and conduct are discussed below.

Moral emotion is typically studied as guilt, and is often coded as averting one's gaze, being physically tense, confessing or apologizing for a transgression, and blaming oneself (Kochanska & Aksan, 2006). To differentiate between guilt and shame, which are often used synonymously, Barrett (2005) asserted that guilt is when one feels responsible for a transgression, while shame is a feeling that one's whole person is bad, and that others feel the same way. Researchers have postulated that the more fearful a child is (or the greater their behavioural inhibition is), the greater their incentive to abide by moral standards. This guilt is also suggested to be influenced by the parent-child relationship. Relationships in which the parent is not forgiving, or understanding are associated with negative outcomes in the development of guilt. Instead of guilt, the child may feel anger and not view the moral norm as aligning with their own self and their values. Outcomes are better when the child wants to abide by the parents' rules. Parental warmth and responsiveness also increased feelings of guilt in preschoolers, especially if experienced during the first two years of life. However, as a child's behavioural inhibition increases, the importance of parental socialization in moral development decreases.

Moral conduct is similar to moral emotion in its association with fearfulness and parental socialization (Kochanska & Aksan, 2006). Typically, moral conduct is measured by a child's ability to inhibit a behaviour without an adult present. Effortful control, or response inhibition (unlike behavioural inhibition, which is more automatic and less controlled than response inhibition), has been found to predict a child's conduct, as it allows them power over their own impulses. It has been found to develop around 2 years of age, which agrees with past research on the age of development of cognition (Garon et al., 2008; Garon, 2016). Greater effortful control and decreased fearfulness have been found to predict a child's understanding of moral transgressions, particularly that moral rules are separate from and above authority (Smetana et al., 2012). The more a child understands that morality is separate from authority, the less likely they are to violate moral standards.

As social domain theory suggests, research has found that the development of morality is neither a completely innate trait nor solely determined by a child's environment. Biological bases like temperament (i.e., behavioural inhibition) have been associated with moral conscience, as have parental practices, such as forgiving disciplinary practices and responsiveness. Research into what specific areas of the brain are important in morality have also been touched on.

Brain Networks

The area of the brain deemed most important to moral development is located within the prefrontal cortex (PFC; José et al., 2020). Many components make up this area, but the area most associated with moral development is the ventromedial PFC

(VMPFC; Greene, 2014). The VMPFC has been related to emotions, decision-making, social behaviour, and inhibition.

Studying the VMPFC can be done through fMRI studies, but studying lesions in this area can also provide valuable data about important functions. Studies of VMPFC lesions show that these patients have deficits in processes involving motivation, goal-setting, self-control, and decision-making (José et al., 2020). In terms of morality, researchers have looked at the kind of moral decisions that patients with damage to their VMPFC make, either utilitarian or non-utilitarian. Utilitarian decisions are moral dilemmas that are solved with little emotion and keeping the majority in mind, while non-utilitarian decisions are based on emotion. VMPFC patients tend to make more utilitarian judgements rather than more emotionally-driven judgements. This suggests that the VMPFC is consequential to making moral judgements which are, in themselves, dependent on emotions. It has also been suggested that damage to this area causes patients to rely more on their dorsolateral prefrontal cortex (DLPFC), which involves components like working memory, problem-solving, and other cognitive executive skills. Research has found that this contributes to utilitarian decision-making as the DLPFC is less associated with emotional processing. Moral emotion (as mentioned previously) has also been specifically linked to the VMPFC when making moral decisions (King et al., 2006), as well as other areas of the brain associated with emotion (e.g., the amygdala).

Changes in moral decision-making in VMPFC patients is not only found in adults; patients who damaged their VMPFC before five years of age show significantly greater likelihood of breaking moral standards than those who experienced damage as

adults (Taber-Thomas et al., 2014). These findings suggest that the development of the VMPFC network before preschool is very important to the development of morality.

Studying psychopaths is another way to measure morality in the brain. Psychopaths have been found to show little conscience and emotion (Greene, 2014). While deficits are found in many areas of the brain in psychopaths, there is significantly reduced activity in the VMPFC when making moral judgements (Blair et al., 1995). This connection is important as it was previously discussed that psychopaths do not differentiate between moral and conventional norms and rules.

Executive Functioning

As preschoolers develop, it is easy to see how their ability to pay attention, remember information, wait patiently, and act more like a little adult gets better with time. This has to do with the development of their EF skills. EF involves abilities that individuals use to direct their attention and focus their responses and behaviour to achieve a goal (Garon et al., 2008).

EF can be split into two categories: cool and hot. These differences can be distinguished early on (Semenov & Zelazo, 2018), with hot EF developing later than cool EF. Cool EF is associated with the DLPFC and is important for cognition, such as working memory, response inhibition, and shifting (Garon et al., 2008; Semenov & Zelazo, 2018). Hot EF is associated with the VMPFC, and plays an important role in emotion, motivation, and decision-making (Scheneider & Koenigs, 2017).

Cool Executive Functioning

Cool EF has long been associated with cognitive skills and is therefore important in predicting future academic and social outcomes (Garon et al., 2014). Attention has

been found to be a very important factor within cool EF (Garon et al., 2008), developing in the first year of life and continuing to improve between the ages of 2 and 6 years. The components of cool EF have been linked to the DLPFC, which has been found to play a role in memory and cognition. These three components include working memory, response inhibition, and shifting.

Working memory refers to how individuals hold representations in their mind, as well as manipulate and update these representations (Baddeley, 1996; Garon et al, 2014). Tasks that involve holding information in one's mind are considered simple working memory tasks, such as a delayed response task (finding a hidden item after a delay; Garon et al., 2008). Complex working memory tasks are tasks that involve manipulating and updating these representations. Garon et al. (2014) administered a task in which children watched as the experimenter hid an animal behind a flap, were told to wait 10 seconds, and then had to find the animal. The locations of the animals were changed with each trial, so the child also had to update their memory. Results found that simple working memory seemed to increase quickly in the earlier preschool ages, while the more complex abilities took longer to develop. Research has found that children can hold representations in their mind before 6 months of age and that this number of seconds increases in the latter half of their first year. By 1 year of age, memory can span over 10 seconds. Between the ages of 3- and 5-years-old, children continue to grow in their ability to manipulate and update information (Garon et al., 2008).

Response inhibition refers to a child's ability to control their automatic or learned responses (Garon et al., 2008). This component of cool EF can also be split into simple and complex tasks. Simple response inhibition develops in the first year of life

and continues to improve during the preschool years. A common measure is the “go, no go” task, in which a child must inhibit a response until the experimenter says “go” (Garon et al., 2008). Complex tasks involve using a given rule by overcoming their automatic response to conform to this rule. Generally, research has found that this ability increases significantly during the preschool years.

Shifting (also known as set shifting or attention shifting) involves two different stages: forming a mental set by connecting a stimulus and a response, then shifting to a new mental set that disagrees with the initial one (Garon et al., 2008; Miyake et al, 2000). By 1 year of age, children have been found to be able to shift from an initial mental set to a new one, and can handle more complex shifts as they get older. An example of a set shifting task is the A-not-B task. In this task, children retrieve an object from hiding place A and after a few trials of this, the experimenter hides the object under a new place, hiding place B. This skill requires children to overcome previous priming to complete a new task.

In summary, cool EF involves cognitive functions that begin in the first year of life and continue to significantly develop between 3 and 5 years of age. There are various tasks to measure the different components of cool EF, however, attention is an important factor to the development all of these skills. The three components are all correlated with each other, suggesting that they build upon each other. This is particularly true for shifting, as it uses both working memory and inhibition to shift from one mental set to another (Garon et al., 2008).

Hot Executive Functioning

Research on hot EF has increased over the past decade, however, it is still lacking in the literature. Children's outcomes on hot EF tasks are reliant on both hot and cool EF skills (Garon, 2016); however, success on cool EF measures does not mean success on hot EF measures, suggesting a hierarchical relationship between hot and cool EF (Semenov & Zelazo, 2018). Hot EF consists of motivational and emotional components; affective decision-making is an example of this.

Decision-making, particularly in social situations, relies on a person's ability to place value on various items and behave accordingly (Garon, 2016; José et al., 2020). This requires individuals to understand and integrate new information into their choices. Variants of the Iowa Gambling Task (IGT; Bechara et al., 1994), a decision-making skill measure for adults, have been used to study this in children. The IGT consists of four decks of cards in which participants select and either gain or lose money depending on the amount on the card. Unbeknownst to the participants, two of the decks are advantageous, while two are disadvantageous (net gain over trials compared to net loss, respectively). The task is performed for 100 trials. It has been found that patients with damage to their VMPFC continuously choose the disadvantageous deck, more than would be expected by chance. Kerr and Zelazo (2004) found a pattern of choice in 3-year-olds in their simplified version of the IGT that was similar to the results of the VMPFC patients in the IGT. In contrast, 4-year-olds were able to choose advantageously. The Preschool Gambling Task (PGT; Garon, 2016) is a version of the IGT that has been also been simplified to be performed with children. The PGT is very similar, but contains only two decks, one advantageous and one disadvantageous, uses

stickers as rewards, and only 40 trials are performed. Preschool decision-making seems to develop around 4 years of age. As with cool EF abilities, attention seems to play a large role in successful decision-making, particularly to improve motivation (Semenov & Zelazo, 2018).

Another hot EF task in the literature is the delay of gratification task (Garon, 2016). This task involves choosing to wait for a larger reward later or taking a smaller reward now. Results show that younger preschoolers usually choose immediate gratification compared to older preschoolers (Zelazo & Muller, 2010). Explanations of this suggest that older preschoolers are able to distance themselves from the current situation and evaluate the possible outcomes.

Executive Functioning and Morality

In the research mentioned above, there are many clear links between EF and morality. Kochanska and Askan (2006) found a link between effortful control, or, response inhibition (cool EF), and morality. Children with a greater response inhibition ability show more control over their moral conduct and ability to understand moral transgressions. Since response inhibition is a measure of EF (Garon et al., 2008), one could argue that the development of this specific EF skill is relevant to moral development. As mentioned previously, this develops in the preschool years, around the same time as EF begins to develop.

Furthering the link between EF and the development of morality, Kochanska (2002) found that young children who complied to their mothers' requests and values willingly with no need for intense maternal control, internalized these values, creating an autonomous, positive 'moral self'. This was measured using "do" and "don't" tasks

in which a child either had to help clean up toys or were told not to touch a certain toy, respectively. The “don’t” task is very similar to the delay of gratification task, which is a measure of hot EF. In this task, only the “don’t” condition was linked to this creation of a ‘moral self’, suggesting a link between hot EF and the development of morality. The authors suggested that this was because children attribute engaging voluntarily in moral demands as important to their own agenda. Given the results of this research, hot EF should be associated with morality in preschoolers.

Both EF and morality rely on the PFC for normal functioning. The relationship between the VMPFC and morality (Greene, 2014), as well as between the VMPFC and hot EF (Bechara et al., 1994), suggests that the development of morality overlaps with the development of hot EF. The VMPFC is related to emotional processing and decision-making, both of which are components of hot EF and play a role in moral reasoning (José et al., 2020).

Overall, a similar developmental trend can be found with both EF and morality. Both develop within a similar timeframe (Smetana & Zelazo, 2013; Garon et al., 2008), and elements of EF are associated with moral development (i.e., response inhibition and delay of gratification; Kochanska & Askan, 2006; Kochanska, 2002).

General Conclusion

Morality, which is concerned with ideas of human rights and justice, develops in early childhood (Semenov & Zelazo, 2013). Social domain theory suggests that moral development is just one part of a child’s social development and relies on both innate traits and environmental factors. Parental socialization and response inhibition have been found to predict a child’s moral conduct (Kochanska & Askan, 2006). Evidence

has found that even infants have some grasp of morality (Dunn, 2006; Geraci & Surian, 2011). At 3 years of age, children begin to comprehend a difference between moral and conventional norms in regard to generalizability, but do not differentiate these concepts in terms of seriousness or reliance on authority or rules until 4 and 5 years of age (Smetana & Zelazo, 2013). Moral understanding continues to develop into adolescence (Jambon & Smetana, 2014). The VMPFC has been found to play a role in moral development, specifically in relation to moral emotion and decision-making (Taber-Thomas et al., 2014; José et al., 2020).

The developmental trajectory of morality is similar to the development of EF skills. Cool EF (working memory, response inhibition, and shifting) and hot EF (emotional and motivational skills) abilities make great developmental strides between the third and fifth years (Garon, 2016). Kochanska (2002) found a link between hot EF (such as delay of gratification tasks) and morality in preschoolers. Morality and hot EF have also been found to rely on the same brain areas (José et al., 2020); these areas are related to emotion and decision-making, both of which are aspects that play a role in morality and hot EF. As past research has found that children usually reason about conventional transgressions using societal rules rather than emotional or empathetic responses, it is less likely that hot EF will be related understanding conventional norms. Cool EF, on the other hand, may be beneficial in understanding both moral and conventional norms, as it is related to cognition. As well, cool EF skills have been found to contribute to hot EF outcomes. However, few studies have directly tested the development of morality and hot EF together.

Present Study

The goal of the present study is to investigate the age at which morality develops, as well as relationship between morality and EF. Three tasks will be used to test children on their understanding of morality (moral/conventional stories; Smetana, 1985), their cool EF skills (working memory task; Garon et al., 2014), and their hot EF skills (PGT; Garon & English, 2021). Similar to past moral development research (Smetana & Braeges, 1990; Smetana et al., 2014), we will ask children to rate the actions of moral and conventional transgressions.

The current study proposes three hypotheses. First, it is predicted that children will rate stories about moral transgressions as significantly worse than those about conventional (social) transgressions. Second, it is hypothesized that there will be an age difference in how children rate the stories, with older children having a more pronounced rating between moral and conventional stories. Finally, it is predicted that scores on both the hot and cool EF tasks will be positively associated with scores on the moral stories, while only scores on the cool EF task will be positively associated with scores on the conventional stories.

Method

Participants

Two-hundred-and-four participants were recruited from daycares in Moncton and Sackville, New Brunswick, and Amherst, Nova Scotia. The mean age was 3.59 years old (*SD* = .49), with the majority of the sample being 4-year-olds (58.8%). Daycares were asked for permission to complete the study and consent forms were

distributed to parents (see Appendix A). Participation was voluntary and incentives were provided to the children.

Materials

Scoring sheets (see Appendix B) were used to code each of the tasks. Rewards consisted of toys and stickers.

Moral/Conventional Stories

For the moral/conventional story task, a book with six illustrated stories (three moral and three conventional) was used. There were two sets of these stories, one with 'boy' characters and one with 'girl' characters. Unisex character names were used. A card that had varying emoticons on it representing the Likert scale of "Ok", "A little bit bad", and "Very bad" was used to measure children's responses (see Appendix C).

Working Memory Task

In the working memory task, three "houses" (boards covered in a cloth material with flaps or 'doors' on each side of the boards) were used to hide felt animals. Each side of the boards had an increasing number of doors. Velcro pictures of animals were given to the child to place on the doors, while matching felt animals were hidden behind the doors. These animals changed as the task increased in difficulty.

Preschool Gambling Task

The preschool gambling task (PGT) consisted of a magnetic board depicting the image of a house with 40 numbered steps, a magnetic marker (shaped like a car) that the children attempted to move up the steps of the board, as well as two decks of cards, one represented by a zebra and one by a giraffe. The zebra deck contained the advantageous set of cards, while the giraffe contained the disadvantageous set.

Procedure

This study was part of a larger experiment of 11 tasks. The tasks relevant for the present thesis are described below.

Moral/Conventional Stories

This task was adapted from Smetana (1985). The moral task was started by telling the child that the experimenter was going to read them some stories (e.g., a child kicking another child), and that they would have to answer questions about what happens in the story (see Appendix C). The child was presented with a card that has a 3-point Likert scale of emoticons representing "Ok", "A little bit bad", or "Very bad". The child was asked to point to each one to ensure their understanding. Each story was read (three moral and three conventional) and the child was asked if what the antagonist in the story did was okay, a little bit bad, or very bad (Likert scale and instructions in Appendix C). If the child pointed to "A little bit bad" or "Very bad", they were then asked why they thought it was a little bit/very bad, and if the antagonist should get in trouble (yes/no). There were six stories in total. A second experimenter coded the child's choices and justifications. Children's reasoning was divided into three sections: reasons that had to do with identifying a victim ("it hurts them"), rules ("it's not allowed"), and value ("it's bad").

Working Memory Task

In the task assessing cool EF, children were told that they are going to play a 'hiding game' (see Appendix D). After demonstrating how to play, a practice trial was done. The child was given a laminated picture of an animal and the experimenter hid a matching felt animal behind one of the flaps on the board. A 'blanket' (cloth cover) was

used to cover the board as the experimenter counted to 10. The cover was lifted, and the child was told to put their animal on top of the flap that they thought the animal was hidden behind. The experimenter then revealed if the child was correct or not. If the child continued to pass each level, the game increased in difficulty, with more flaps added every two trials and occasionally more animals added. If the child failed two or more consecutive trials, the game was stopped. A second experimenter observed and coded the child's guesses.

Preschool Gambling Task

The child was presented with a game board with steps that they could 'climb', two decks of cards (one with a zebra character and one with a giraffe character to differentiate them), and 10 stickers (see Appendix E). They were told that the goal of the task was to get to the top of the steps, as well as gain as many stickers as they could by choosing from each of the decks. To do this, they were told that every time they got a bunny, they would go up one step and get one sticker, but every time they got a monster, they would go down one step and lose one sticker. They were then asked to choose from either the giraffe deck or the zebra deck for 40 trials. After 30 trials, the game was paused and the experimenter asked the child which deck they thought was the best and why, and which they thought was the worst and why. The game continued for the last 10 trials, and the same questions were asked again. The children were given however many stickers they collected. A second experimenter coded each child's choices of what deck they chose and gave/took away stickers depending on their choices.

Results

The average scores for the PGT and working memory task, as well as severity and punishment ratings for the moral and conventional domains on the morality task are presented in Table 1. Preliminary analyses showed differences in results between older and younger children. In general, 4-year-olds scored higher than 3-year-olds on the two EF tasks. Older children rated moral transgressions as more severe and deserving of punishment, but rated conventional transgressions similarly to younger children.

Table 1

Mean (Standard Deviation) for All Variables by Age

Age	Moral		Conventional		PGT	Working Memory
	Severity	No Punishment	Severity	No Punishment		
3-year-olds	1.40(.65)	.36(.38)	1.18(.70)	.44(.41)	21.33(8.64)	.36(.23)
4-year-olds	1.66(.48)	.26(.34)	1.18(.55)	.42(.39)	24.86(7.80)	.40(.21)
Total	1.56(.57)	.30(.35)	1.18(.61)	.45(.40)	23.43(8.31)	.38(.22)

Domain and Age Effects on Severity Rating of Transgressions

A 2(Age) x 2(Story Type) mixed analysis of variance (ANOVA) was carried out to test the first hypothesis that children will rate stories about moral transgressions as worse than stories about conventional transgressions. The dependent variable was the

children's rating of severity (okay (0), a little bad (1), very bad (2)). Age was the between-subjects variable and Story Type was the within-subjects variable. The hypothesis was supported, with a significant main effect of Story Type, $F(1,179) = 64.22$, $p < .001$, *partial* $\eta_p^2 = 0.26$. Children rated moral transgressions as worse than conventional transgressions (see Table 1).

The 2(Age) x 2(Story Type) mixed ANOVA also tested the second hypothesis that 4-year-olds differentiate more between moral and conventional stories than 3-year-olds. There was no significant main effect of age, $F(1, 179) = 2.89$, $p = .091$, therefore the hypothesis was not supported. There was a significant interaction between Story Type and Age, $F(1, 179) = 7.99$, $p = .005$, *partial* $\eta_p^2 = 0.04$. Follow-up analyses were conducted with the use of paired *t*-tests. Results show that both 3-year-olds, $t(71) = 3.14$, $p = .002$, $d = .37$, and 4-year-olds, $t(108) = 8.99$, $p < .001$, $d = .86$, differ significantly between moral and conventional domains on severity ratings. Both age groups rated moral transgressions as more severe than conventional transgressions. Mean ratings can be found in Table 1.

Domain and Age Effects on Punishment Recommendation

A second 2(Age) x 2(Story Type) mixed ANOVA was carried out, with the dependent variable being if the child thought there should be no punishment for the transgression (yes/no). The results showed that there was a main effect of Story Type, $F(1, 179) = 27.50$, $p < .001$, *partial* $\eta_p^2 = 0.13$, meaning that children thought moral transgressions should be punished significantly more than conventional transgressions (see Table 1). There was no significant interaction between Story Type and Age, $F(1, 179) = 3.14$, $p = .078$.

Domain and Age Effects on Types of Reasoning

Children's reasoning was split into three categories: rule (e.g., it's not allowed), victim (e.g., it hurts them), and value (e.g., it's bad/wrong). A 2(Age) x 2(Story Type) x 3(Reason; Rule, Victim, Value) mixed ANOVA was done, with the dependent variable as the reason children gave for why the transgression was wrong (victim, rule, or value). This revealed a significant main effect of Age $F(1,178) = 8.46$. $p = .004$, *partial* $\eta_p^2 = 0.05$, in that children's reasoning was related to their age. There was also a main effect of Story Type, $F(1, 178) = 12.49$, $p = .001$, *partial* $\eta_p^2 = 0.07$, such that children's reasons differed based on domain type. There was no main effect of Reason, $F(2, 356)$, $p = .063$. Results revealed a significant Story Type x Reason interaction, $F(2, 356) = 59.64$, $p < .001$, *partial* $\eta_p^2 = 0.25$, such that Reason depended on whether the story was in the moral or conventional domain. There was also significant Story Type x Reason x Age interaction, $F(2, 356) = 7.364$, $p = .001$, *partial* $\eta_p^2 = 0.04$. Follow-up analyses were conducted with the use of a 2(Age) x 3(Reason) mixed ANOVA for the moral story type and a 2(Age) x 3(Reason) mixed ANOVA for the conventional story type, with the dependent variable being what reason the children gave for why the transgression was wrong (victim, rule, or value).

Moral Domain

Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the moral domain, $\chi^2(2) = 0.71$, $p < .001$, and was corrected with the Greenhouse-Geisser estimate. Results show that there was a significant main effect of age in the moral domain, $F(1, 179) = 8.01$, $p = .005$, *partial* $\eta_p^2 = 0.04$, meaning that children's explanations differed based on their age (see Table 2), with 4-year-olds

providing a higher proportion of reasons compared to 3-year-olds. There was also a significant main effect of Reason for the moral domain, $F(1.54, 276.76) = 13.28$, $p < .001$, *partial* $\eta_p^2 = 0.07$. There was no significant Age x Reason interaction, $F(1.54, 276.44) = 1.42$, $p = .242$.

Follow-up analyses on the main effect of Reason were performed using a paired *t*-test and showed that for the moral domain, victim was used as a reason more significantly than rule, $t(180) = -5.85$, $p < .001$, $d = -.43$, and value judgements were used significantly more than rule, $t(180) = -5.32$, $p < .001$, $d = -.40$ (see Figure 1). There was no significant difference between the use of victim and value judgments, $t(180) = 0.06$, $p = .955$.

Table 2

Estimated Marginal Means (Standard Error) of Reasoning in the Moral Domain by Age

Age	Rule	Victim	Value
3-year-olds	.11(.037)	.33(.079)	.44(.101)
4-year-olds	.17(.036)	.65(.085)	.57(.089)

Conventional Domain

Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the conventional domain, $\chi^2(2) = 0.42$, $p < .001$, and was corrected with the Greenhouse-Geisser estimate. Results showed that there was a significant main effect of age for conventional domain, $F(1, 178) = 6.28$, $p = .013$, *partial* $\eta_p^2 = 0.03$, meaning that children's explanations differed based on age for the conventional domain, with older children using 'rule' as a reason more than younger children (see Figure 2).

There was also a significant main effect of Reason for the conventional domain, $F(1.27, 356) = 49.08$, $p < .001$, *partial* $\eta_p^2 = 0.22$, meaning that children's explanations differed within the conventional domain. For the conventional domain, rule was used as a reason significantly more than victim, $t(179) = 8.30$, $p < .001$, $d = .62$, and value judgements, $t(170) = 7.56$, $p < .001$, $d = .56$ (see Figure 1).

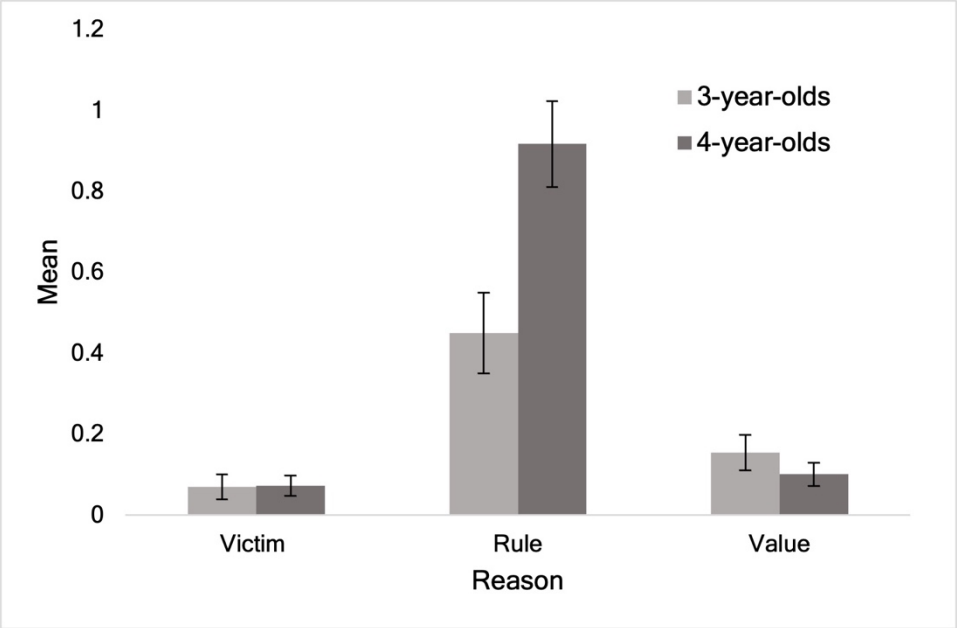
Figure 1

Mean Reasons in Moral and Conventional Domains

There was a significant interaction of Age x Reason for the conventional domain, $F(1.27, 356) = 5.53$, $p = .002$, *partial* $\eta_p^2 = 0.05$. Paired *t*-tests were used for follow-up analysis. Three-year-olds used rule as a reason for the conventional domain significantly more than either victim, $t(70) = 3.62$, $p = .001$, $d = .43$, or value judgements, $t(70) = 2.72$, $p = .008$, $d = .32$, as did 4-year-olds for both victim, $t(108) = 7.73$, $p < .001$, $d = .74$, and value judgements, $t(108) = 7.48$, $p < .001$, $d = .72$. While both were significant, the differences were larger for 4-year-olds than 3-year-olds (see Figure 2).

Figure 2

Means for Reason in Conventional Domain by Age



Executive Functioning and Severity Rating of Transgressions

A 2(Story Type) x 2(Age) mixed analysis of covariance (ANCOVA) was carried out with PGT scores and working memory game scores as covariates. The dependent variable was the preschoolers' rating of severity. There were no significant main effects of the hot and cool EF tasks, however, there was a marginally significant effect of the PGT, $F(1, 167) = 3.04$, $p = .083$, *partial* $\eta_p^2 = 0.02$, meaning that scores on the hot EF task were marginally positively related to ratings of severity.

Scores on Story Type and the hot EF task are associated, as there was a Story Type x PGT score interaction, $F(1, 167) = 4.43$, $p = .037$, *partial* $\eta_p^2 = 0.03$. There was no significant Story Type x working memory game interaction, $F(1, 167) = 0.04$, $p = .843$. Parameter estimates show that the PGT significantly predicts severity ratings in the moral domain, $b = .014$, $SE = .005$, $p = .008$, partially supporting the third hypothesis.

However, the working memory game did not show significance; therefore, the cool EF task did not predict severity ratings in the moral domain. Scores on conventional transgression stories were not significantly related to scores on either hot or cool EF tasks, therefore the third hypothesis was only partially supported.

Executive Functioning and Punishment Recommendation

A second 2(Story Type) x 2(Age) mixed ANCOVA was carried out with PGT scores and working memory game scores as covariates. The dependent variable was whether or not preschoolers' thought that there should be punishment (yes/no). The results only show marginally significant effects for both the PGT, $F(1, 167) = 3.29$, $p = .071$, *partial* $\eta_p^2 = 0.02$, and working memory task, $F(1, 167) = 3.77$, $p = .054$, *partial* $\eta_p^2 = 0.02$. There were no significant interactions. Parameter estimates (see Table 3) showed that deciding not to punish the transgressor on moral transgression stories was approaching significance in relation to hot and cool EF tasks, while only the score on the cool EF task was marginally significant in relation to conventional transgression stories. These results suggest that as PGT scores increased in the moral domain, and PGT and working memory scores increased in the conventional domain, children were marginally less likely to not suggest punishment for transgressions.

Table 3

PGT and Working Memory Game Scores as Predictors for Moral and Conventional Punishment

Condition		*b*	*SE*	*t*	*p*
Moral	PGT	-.006	.003	-1.94	.054
	Working Memory Game	-.226	.126	-1.80	.073
Conventional	Working Memory Game	-.249	.143	-1.74	.085

Executive Functioning and Reasoning about Transgression

A third 2(Story Type) x 2(Age) mixed ANCOVA was carried out with PGT scores and working memory game scores as covariates. The dependent variable was the reason the children gave for why the transgression was wrong (victim, rule, or value). There was a significant main effect for both the PGT, $F(1, 166) = 8.26$, $p = .005$, *partial* $\eta_p^2 = 0.05$, and working memory game, $F(1, 166) = 7.33$, $p = .007$, *partial* $\eta_p^2 = 0.04$. There was also a significant Reason x Working Memory Game, $F(2, 166) = 2.16$, $p = .015$, *partial* $\eta_p^2 = 0.03$. Parameter estimates showed that as working memory game scores increased, participants were more likely to explain a transgression as 'bad' (value judgement) in both the moral, $b = 1.026$, $SE = .317$, $p = .001$, and conventional, $b = .418$, $SE = .112$, $p < .001$ domains. There was a significant Story Type x Reason x PGT Score interaction, $F(2, 332) = 3.54$, $p = .030$, *partial* $\eta_p^2 = 0.02$, but there was no significant interaction of Story Type x Reason x Working Memory Game, $F(2, 332) = 1.77$, $p = .171$. Parameter estimates can be found in Table 4. As scores on the hot EF task increased, preschoolers' likelihood of reasoning about moral transgressions in terms of 'badness' significantly increased. As scores on the hot EF task increased, children

were also significantly more likely to use ‘rule’ as a reason for explaining why conventional transgressions are bad and marginally significantly more likely when it comes to moral transgressions.

Table 4

PGT as a Predictor for Moral and Conventional Reasoning

Domain	Reason	*b*	*SE*	*t*	*p*
Moral	Rule	.006	.003	1.83	.069
	Value	.019	.008	3.24	.023
Conventional	Rule	.021	.009	2.27	.025

Discussion

The present study investigated the development of morality in relation to age and EF in preschoolers. Three hypotheses were tested. First, it was hypothesized that children would rate stories about moral transgressions as significantly worse than stories about conventional transgressions. Children were read stories about moral (e.g., kicking someone) and conventional (e.g., yelling in class) transgressions, and answered questions about their opinions of the stories. Second, it was hypothesized that there would be an age difference in how children rated the stories, with older children having a more pronounced differential rating of moral versus conventional stories. Finally, it was hypothesized that scores on both the hot and cool EF tasks (PGT and working memory task, respectively) would be associated with scores on the moral stories, while only scores on the cool EF task would be associated with scores on the conventional stories.

Ratings and Punishment of Moral and Conventional Stories

The first hypothesis was supported, in that preschoolers rated stories about moral transgressions as significantly worse than stories about conventional transgressions. These results suggest that children are able to differentiate between moral and conventional norms, which is consistent with previous research, such as social domain theory (e.g., Smetana & Zelazo, 2013; Smetana et al, 2014). Social domain theory states that the developmental trajectory of a child's understanding of moral norms is distinguishable from conventional norms. Moral transgressions are those that pertain to actions that are intrinsically harmful (Turiel, 1983), while social/conventional transgressions are not necessarily harmful, but rather are based on cultural values. Similar to Smetana (2013), the results show that moral transgressions were determined as wrong for reasons such as "they're hurting them" or "it's mean". Conventional transgressions, on the other hand, were wrong for reasons that have to do with rule violations significantly more than those that had to do with hurting a victim or value-based judgements (e.g., badness). It is important to look at a child's reasoning when studying morality, as it becomes clear when children start to understand and justify these differences in norms.

The present study also found that children were significantly more likely to think that an offender should be punished if they committed a moral transgression rather than a conventional one. This is in agreement with past literature (e.g., Smetana, 1981; Smetana & Braeges, 1990), as it was found that children generally thought of moral transgressions as more punishable than conventional transgressions. This is in accordance with ratings of severity.

Age Differences in Story Ratings

The second hypothesis, that there would be an age difference in how children rate the stories, was not supported. Four-year-olds did not rate moral stories as significantly worse than 3-year-olds. This is surprising, as previous studies have found that older children rate moral transgressions as significantly worse than younger children (Smetana et al., 2014). However, it has also been found that ratings of seriousness do not always change significantly between the ages of 2.5- and 4.5-years-old, rather there is an increase in children's understanding of moral rules in relation to their independence from authority. For example, Smetana (1981) found that moral transgressions, unlike conventional ones, were considered wrong even when there were no rules in place. This finding was more prevalent in 4-year-olds. In the present study, a significant difference in age for reasoning was found. Four-year-olds were more likely than 3-year-olds to discuss moral transgressions in regard to seriousness (value-based judgements) and identify a victim rather than discuss the violation of a rule. This suggests that while children may not show a significant age difference in their differential rating of severity between moral and conventional transgressions, their understanding of why each type of norm violation is bad has matured.

These results mirror those of Smetana (1981), who found that there was no significant difference in age on ratings of severity between moral and conventional transgressions from the ages of 3- to 5-years-old, only that children rated moral transgressions as worse than conventional ones overall. Similar to this, both Smetana (1981) and the present study did not find any significant age differences in regard to

whether children thought that the transgressor should be punished. Again, this follow the same trend as age and severity ratings.

Overall, both severity and punishment results were in the expected direction, with older preschoolers having a more pronounced rating than younger preschoolers, but neither achieved significance. While actual ratings may not be significant, there are significant age differences in children's reasoning behind their explanations for severity and punishment choices. The lack of significance for age differences could be due to the sample that was used. The majority of 3-year-olds were closer to 4 years of age (with the average age being 3.59 years). A sample with a larger amount of young 3-year-olds may distinguish a significant age difference.

Executive Functioning and Morality

The final goal of the study was to determine how performance on hot and cool EF tasks would be related to preschoolers' understanding of moral and conventional norms. Specifically, we wanted to investigate if scores on both hot and cool EF tasks would be associated with understanding moral norms, and if cool EF tasks would be associated with an understanding of conventional norms. The hot EF task used was the Preschool Gambling Task (PGT), measuring affective decision-making, and the cool EF task was the 'hiding game', which tested working memory. While hot EF scores significantly predicted participants' ratings of severity of moral stories, cool EF scores did not. This suggests that only hot EF skills are related to morality in children. The significance of hot EF scores to moral stories could be a product of a better understanding of rule contingency. Moral norms do not change across most contexts; the outcomes of a transgression would be the same even if the 'rules' were changed.

Conventional norms, on the other hand, are subject to change, and with that, the outcomes change as well. Preschoolers who are able to understand the rules of the PGT and make advantageous choices may also better understand this difference between moral and conventional norms.

Association between hot EF and morality has been supported in previous literature. Hot EF tasks, such as delay of gratification tasks, have been linked to the development of morality (Kochanska, 2002; Kochanska & Askan, 2006). Specifically, variations of the PGT have been used to find association between the VMPFC and hot EF (e.g., decision-making; Bechara et al., 1994), an area also associated with moral development (Greene, 2014). While cool EF and moral understanding do follow a similar developmental trajectory (Garon et al., 2008), there is insufficient of literature investigating their association. This study suggests that cool EF is not as significant to understanding morality as initially hypothesized. However, the cool EF task that was used only tested working memory. Other cool EF skills, such as inhibition and shifting, have been associated more with moral comprehension (Vera-Estay et al., 2016). Future research should measure the connection between cool EF and morality using other cool EF tasks.

However, scores on whether or not transgressors in moral situations should be punished was marginally significant for both hot and cool EF tasks. Cool EF scores were also marginally significant for decisions of punishment on conventional norm violations. Again, other hot and cool EF tasks may produce a more significant result. Hot EF tasks, such as delay of gratification tasks (Kochanska, 2002), and cool EF tasks,

such as inhibition tasks, may be more successful in regard to relating EF to preschoolers' understanding of differences between moral and conventional norms.

While the results were not always significant in regard to ratings of severity on the morality task and EF tasks, there were quite a number of significant results regarding children's reasoning and EF tasks. Children who performed well on the PGT were more likely to explain the moral transgressors' behaviour as 'bad' and the conventional transgressors as 'rule violators', while children who performed well on the working memory game were more likely to describe both moral and conventional transgressions as 'bad'. This suggests that increased function of both hot and cool EF can lead to a better comprehension of why a violation is wrong, and can allow children to be more specific about their reasoning. However, performance on hot EF shows more differential reasoning (value judgements versus rule judgements for moral and conventional domains, respectively), while working memory game scores predicted the same reason for both domains, only predicting that children would reason that both transgressions were 'bad' (value judgements). This suggests that hot EF skills may be more beneficial to children's understanding of moral reasoning, as they can differentiate more between domains. Again, this could be due to a better understanding of rule contingency.

These results are in agreement with past literature. Decety and Howard (2013) discussed that control over emotional processing, an aspect of hot EF, was related to children's understanding of morality as it allowed children to understand others' emotions, as well as their own. Cool EF skills have been linked to better moral reasoning in children between 6 to 12 years of age (Vera-Estay et al., 2016). Research has suggested that this is because the ability to focus one's attention on the situation and

process emotions, whether they be one's own or someone else's, is essential to reasoning about morality.

Limitations

While significant results were found, there are some limitations that should be taken into account when interpreting the results of this study. First, it should be noted that all participants were recruited from similar areas, therefore most are from a similar socioeconomic background. This limits the external validity of the experiment and future research should include a larger and more diverse sample. There is also the issue of which children decided to participate. For example, while parents may have consented to their child participating, some children refused to perform the tasks anyway. Therefore, the present sample only includes results from children who were willing to play, and were often more outgoing and extraverted, influencing the results.

Despite the daycares and preschools being accommodating, it was difficult to find a place to test that was free from noise and distractions. Often, teachers and other students were present during the testing, which could have influenced participants' performance. Given more time, a quieter testing room away from the main area would be ideal. As well, despite each researcher being trained exactly the same on each task, there is still a possibility that there was variability between experimenters. Tasks could have been explained slightly differently by each individual. This could be partly rectified by fixing the previous limitation and having a quieter, more controlled environment, as experimenters would not have to adapt to different conditions.

One issue with the PGT is that it is a relatively complex task, which is potentially independent of the development of hot and cool EF (Kerr & Zelazo, 2004).

Garon and English (2021) suggest that this could be investigated by creating versions of the task with different complexities and measuring the differences between each version. A second issue with the PGT is the length. Some children would get bored or tired and want to stop halfway through. This fatigue could cause changes in performance.

Applications

Based on the results of the present study, hot EF underlies moral development, and both hot and cool EF underlie moral reasoning. To encourage a child's understanding of morality, tasks related to EF may be beneficial to include in preschool education programs. Furthermore, it has been found that sharpening EF skills in adolescence is related to an increased understanding of moral reasoning (Vera-Estay et al., 2014). Not only would this develop children's sense of morality, but EF has also been found to benefit children in other ways. For example, Diamond et al. (2007) found that integrating cool EF skills into a classroom of low socioeconomic status 4- and 5-year-olds resulted in the participants performing significantly better on an academic measure than children who had learned from an academic-based curriculum. Research has also found that implementing EF skills earlier is more beneficial, as it allows children to build on them and create more complex skills (Gunzenhauser & Nuckles, 2021).

Detection and intervention of behavioural dysfunction in children is another possible application of moral development and EF research. Dempsey et al. (2022) found that children with autism spectrum disorder (ASD) were more likely to punish conventional norm violations than children without autism. Past research has also found that children with autism use rules to justify why a moral transgression is wrong more

often than children without autism. Children who show callous and unemotional traits, meaning they are more at risk for later psychopathy, also show this lack of emotional understanding (Dadds et al., 2012). These patterns of developmental differences can be used to identify dysfunction in children. This is also true for EF tasks. Children with ASD have long been known to show deficits in EF skills (Bednarz et al., 2020). They found that EF components like working memory and shifting can predict various social issues. Fong and Iarocci (2020) found that targeting specific EF skills that focus on emotion and cognitive regulation can help children with autism spectrum disorder learn to adapt better socially. Hot EF training that focuses on emotion recognition has been found to improve conduct issues and emotional processing in children high in callousness, as well as children with ASD.

Poor moral reasoning has been linked to increased risk of juvenile delinquency and aggression (Stams et al., 2006). Based on the results of the present study, curricula that includes hot EF skills and discussion about morality could benefit children who may have low moral reasoning. Spawton-Rice and Walker (2020) also found that children who had gone through negative experiences and participated in a computerized training on EF skills showed positive cognitive outcomes, suggesting that teaching EF skills to young children who are more at risk for dysfunction has beneficial outcomes.

Overall, both morality and EF can contribute greatly to education and the detection and intervention of behavioural issues.

Conclusions and Future Directions

The present study suggests that children's understanding of moral and conventional norms do follow different trajectories, as stated by social domain theory,

and that EF, especially hot EF is related to this development. Children tend to rate stories about moral transgressions as significantly worse and more punishable than those about conventional transgressions. While only hot EF appears to predict ratings of moral severity, both hot and cool EF appear to be significantly associated with moral reasoning. As hot EF scores increase, preschoolers' likelihood of using value-based judgements (e.g., saying "it's bad") and rule-based judgements as reasons increases in the moral and conventional domains, respectively. As scores on the working memory game increase, the likelihood of using value-based judgements as a reason increases for both the moral and conventional domains.

The lack of age differences in severity ratings between moral and social domains could be reevaluated with a sample that has a wider age range, as age differences have been found in the past. Future research in the area should also include a longitudinal approach, as it would reveal more individual differences, determine temporal order, and increase the statistical power of the study. If investigating possible influence on education outcomes, a preschool curriculum, including both hot and cool EF skills, should be implemented over a period of time and children's understanding of morality should be evaluated throughout. Furthermore, future research could extend the morality task by placing children in a position of personal decision-making. Instead of unfamiliar characters, the experimenter could ask children about hypothetical scenarios related to them, such as if the moral/conventional transgressions happened to the child's friend or to the child themselves.

In conclusion, this study suggests that children can differentiate between moral and conventional norms, with no significant age difference in the present sample. Hot

and cool EF scores appear to be significant in moral reasoning, but only hot EF scores were significant in regard to moral domain severity ratings. This research is important for creating education programs that benefit children, as well as detection and intervention in various behavioural issues. Future research should utilize longitudinal studies and investigate the effect of EF skill training on moral development in the preschool environment.

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Appendix A: Informed Consent Form

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1
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Study Title: Abilities Underlying Moral Judgments and Caring Behaviour
Researchers: Bronwyn Inness, Elka Sheinin, Molly Savoy, Pascale Lacroix and Nancy Garon

Our names are Bronwyn Inness, Elka Sheinin, Molly Savoy and Pascale Lacroix. Bronwyn, Elka and Molly are students doing an honours' project being supervised by Dr. Nancy Garon. Pascale is doing an independent studies project and is also being supervised by Dr. Garon. **We are inviting you to participate in our study. Below is a summary of the study. If you agree to participate, please fill out the form on the back of this sheet and return to your daycare provider.**

Purpose of the Study: In the first five years of life, there is a lot of changes in the way children behave and think about others. Caregivers are often surprised at how early caring behaviour (i.e., comforting parent) develops. Another change is how children reason about social and moral situations (e.g, fairness). In this study, we are looking at abilities that underlie these important developmental milestones. One key ability related to social development is self-regulation. Self-regulation is made up a variety of abilities. One example is the ability to hold things in mind. For instance, if you tell your preschooler to brush their teeth, put their pajama on and wash their hands, you probably will find that they may miss at least one of those things. Another example is the ability to wait for rewards. You probably have noticed that this is very difficult for your preschooler to do. Since preschoolers are just beginning to acquire some self-regulation, this makes them an ideal population to study.

What will my child do? To look at these things, our study involves 11 short tasks that are presented in a game-like format to make it fun for children. In one game, children will say whether the main character was doing something bad (e.g., child teasing another). Another game will involve helping to take care of an electronic baby. This task will be video-taped. Two tasks will involve retrieving animals from behind a door in a house while two others will involve finding an animal hidden behind two flaps. The waiting game will consist of a series of choices. For example, in one task, children will choose whether to wait for a larger reward (2 bouncing balls) versus take a small reward immediately (e.g., bouncing ball). Four of the tasks will consist of a series of simple choices. For Zebra & Giraffe game, children will choose cards from two animals that will let them go up and down stairs. The Favourite Toy game will involve choosing between pairs of toys. We will divide the tasks into 2 sessions and each session will take about 20 minutes. It will be done *at the daycare* during a time that does not conflict with important activities such as naptime and snack. At the end of the session, children will receive a small gift and all the stickers accumulated during the tasks.

Potential Harms: Although there are no known risks, it is possible that some of the children will become tired or frustrated during the sessions. If your child indicates that he or she is tired, the examiner will take a break and only return to the task when your child is ready. Every effort will be taken to make this an enjoyable experience for your child. As well, during the activities, a member of the daycare staff will be present to insure an enjoyable experience.

Possible Benefits: Although we don't expect your child to benefit directly from participating in this research, we do expect the games to be interesting and the experience of interacting with the experimenter to be enjoyable for him or her. This study also gives you and your child the opportunity to benefit others in that the results of this study may provide useful information about how children's social abilities develop.

Termination: Your participation and that of your child is completely voluntary. You and your child may withdraw from this study at any time without penalty.

Confidentiality: *All information obtained in this study will be kept strictly confidential. Additionally,* assigning each child a code rather than name will protect the confidentiality of you and your child at all times. Written records of your child's performance will be stored in a locked cabinet for 5 years after publication of this study. Whereas average group results from this project may be published, no individual children will be identified. Please note that at the end of the study, we will send parents a summary of group results, but the results of any individual child's performance will not be provided.

Study title: Abilities Underlying Moral Judgments and Caring Behaviour

Participant ID: _____

Parental or Guardian Authorization I have read or had read to me this information and authorization form and have had the chance to ask questions that have been answered to my satisfaction before signing my name. I understand the nature of the study. I understand that I have the right to withdraw my child from the study at any time without affecting my child's care in any way. I freely agree to have my child participate in this research study.

Child's Name_____ Child Date of Birth _____

Parent Name _____ Parent signature_____

(please print)

If you would like a copy of the group findings sent via email or mail:

Please fill out this part

If you have any questions about this study, please contact *[Dr. Nancy Garon, 506-364-2457, ngaron@mta.ca]*.

This research has been reviewed and approved by the Mount Allison University Research Ethics Board. If you have any questions or concerns about this study, you may contact the Mount Allison University Research Ethics Board, by phone (506-364-2618) or by e-mail at reb@mta.ca.

Appendix B: Scoring Sheets

Moral/Conventional Stories Score Sheet

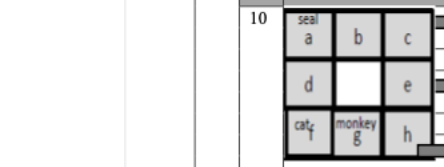
2. Moral & Conventional Stories			
ID:	Age:	Daycare:	
Moral Story	a. Ok /little/ very bad	b. Why?	d. trouble
1. Kicking	Ok/ little bad/ vb		Yes/ no
2. Pajamas	Ok/ little bad/ vb		Yes/ no
3. Teasing	Ok/ little bad/ vb		Yes/ no
4. Standing in line	Ok/ little bad/ vb		Yes/ no
5. Not sharing	Ok/ little bad/ vb		Yes/ no
6. Circle time	Ok/ little bad/ vb		Yes/ no

Working Memory Task Score Sheet

1. Hiding Game Score Sheet

Participant ID_____ Age_____

Board #	Trial	Place ✓if correct If incorrect, write letter		For Office Use Only – **Do not fill** out this section													
					a	b	c	d	c	f	g	h	Hold tot	Hold err	Up tot	up_ np	Up perr
				Hold1													
B1	1		B | PIG	Totpig	0	2	0	0						**Hd1**			
				Errpig	1	0	1	1							**H1err**		
				Up2	a	b	c	d	e	f	g	h					
	2		A | PIG	Totpig	2	0	0	0						**Up2**			
				Errpig	0	0	1	1							**Up2np**		
				perrpig	0	1	0	0								**Up2perr**	
				Hold3	a	b	c	d	e	f	g	h					
B2	3		B | MOUSE	Totmouse	0	2	0	1	0					**Hd3a**			
				Errmouse	1	0	1	1	1						**Hd3a_err**		
			D | BUG	Totbug	0	1	0	2	0					**Hd3b**			
				Errbug	1	1	1	0	1						**Hd3b_err**		
				Up4	a	b	c	d	e	f	g	h					
	4		C | MOUSE	Totmouse	0	1	2	0	0					**Up4a**			
				Errmouse	1	0	0	.5	1						**Up4a_np**		
			B | BUG	Perrmouse	0	1	0	.5	0						**Up4a_perr**		
				Totbug	0	2	1	0	0					**Up4b**			
				Errbug	1	0	1	0	1						**Up4b_np**		
				perrbug	0	0	0	1	0							**Up4b_perr**	
				Hold5	a	b	c	d	e	f	g	h					
B3	5		C | LAMB	Totlamb	0	0	2	0	1	0				**Hd5a**			
				Errlamb	1	1	0	1	1	1					**Hd5a_err**		
			E | HORSE	Tothorse	0	0	1	0	2	0				**Hd5b**			
				Errhorse	1	1	1	1	0	1					**Hd5b_err**		
				Up6	a	b	c	d	e	f	g	h					
	6		F | LAMB	Totlamb	1	0	0	0	0	2				**Up6a**			
				Errlamb	1	1	0	1	.5	0					**Up6a_np**		
				Perrlamb	0	0	1	0	.5	0					**Up6a_perr**		
			A | HORSE	Tothorse	2	0	0	0	0	1				**Up6b**			
				Errhorse	0	1	.5	0	1	1					**Up6b_np**		
				Perrhorse	0	0	.5	0	1	0						**Up6b_perr**	
				Hold7	a	b	c	d	e	f	g	h					
B4	7		C | TURTLE	Totturtle	0	1	2	0	0	1	0			**Hd7a**			
				Errturtle	1	1	0	1	1	1	1				**Hd7a_err**		
			B | OCTOPUS	Totoctopus	0	2	1	0	0	1	0			**Hd7b**			
				Erroctopus	1	0	1	1	1	1	1				**Hd7b_err**		
			F | STAR	Totstar	0	1	1	0	0	2	0			**Hd7c**			
				Errstar	1	1	1	1	1	0	1				**Hd7c_err**		
				Up8	a	b	c	d	e	f	g	h					
	8		A | TURTLE	Totturtle	2	1	0	0	0	0	1			**Up8a**			
				Errturtle	0	.5	0	1	1	.5	1				**Up8a_np**		
				Perrturtle	0	.5	1	0	0	.5	0				**Up8a_perr**		
			G | OCTOPUS	Totoctopus	1	1	0	0	0	0	2			**Up8b**			
				Erroctopus	.5	0	1	1	1	.5	0				**Up8b_np**		
				Perroctopus	.5	1	0	0	0	.5	0					**Up8b_perr**	
			B | STAR	Totstar	1	2	0	0	0	0	1			**Up8c**			
				Errstar	1	0	.5	1	1	0	1				**Up8c_np**		
				Perrstar	0	0	.5	0	0	1	0					**Up8c_perr**	

				Hold9	a	b	c	d	e	f	g	h					
B 5	9		B | CAT	Totcat	0	2	0	1	1	0	0	0		**Hd9a**			
				Errcat	1	0	1	1	1	1	1	1			**Hd9a_err**		
			D | MONKEY	Totmonkey	0	1	0	2	1	0	0	0		**Hd9b**			
				Errmonkey	1	1	1	0	1	1	1	1			**Hd9b_err**		
			E | SEAL	Totseal	0	1	0	1	2	0	0	0		**Hd9c**			
				Errseal	1	1	1	1	0	1	1	1			**Hd9c_err**		
				Up10	a	b	c	d	e	f	g	h					
	10		F | CAT	Totcat	1	0	0	0	0	2	1	0		**Up10a**			
				Errcat	1	0	1	.5	.5	0	1	1		**Up10a_np**			
				perrcat	0	1	0	.5	.5	0	0	0		**Up10a_perr**			
			G | MONKEY	Totmonkey	1	0	0	0	0	1	2	0		**Up10b**			
				Errmonkey	1	.5	1	0	.5	1	0	1		**Up10b_np**			
				perrmonkey	0	.5	0	1	.5	0	0	0		**Up10b_perr**			
			A | SEAL	Totseal	2	0	0	0	0	1	1	0		**Up10c**			
				Errseal	0	.5	1	.5	0	1	1	1		**Up10c_np**			
				perrseal	0	.5	0	.5	1	0	0	0		**Up10c_perr**			
													Hd tot	**Hd err**	**Up tot**	**Up np**	**Up-perr**

Preschool Gambling Task Score Sheet

8. Preschool Decision Making Task (Hot EF: Decisions under Ambiguity)

ID_____ M/F Age____ Daycare_____

Card	Deck				Card				
1	Zebra		Giraffe		21	Zebra		Giraffe	
2	Zebra		Giraffe		22	Zebra		Giraffe	
3	Zebra		Giraffe		23	Zebra		Giraffe	
4	Zebra		Giraffe		24	Zebra		Giraffe	
5	Zebra		Giraffe		25	Zebra		Giraffe	
6	Zebra		Giraffe		26	Zebra		Giraffe	
7	Zebra		Giraffe		27	Zebra		Giraffe	
8	Zebra		Giraffe		28	Zebra		Giraffe	
9	Zebra		Giraffe		29	Zebra		Giraffe	
10	Zebra		Giraffe		30	Zebra		Giraffe	
11	Zebra		Giraffe		First Awareness test				
12	Zebra		Giraffe		31	Zebra		Giraffe	
13	Zebra		Giraffe		32	Zebra		Giraffe	
14	Zebra		Giraffe		33	Zebra		Giraffe	
15	Zebra		Giraffe		34	Zebra		Giraffe	
16	Zebra		Giraffe		35	Zebra		Giraffe	
17	Zebra		Giraffe		36	Zebra		Giraffe	
18	Zebra		Giraffe		37	Zebra		Giraffe	
19	Zebra		Giraffe		38	Zebra		Giraffe	
20	Zebra		Giraffe		39	Zebra		Giraffe	
					40	Zebra		Giraffe	
					Second Awareness test				

Awareness tests

1. Which is best? Zebra Giraffe	2. Which is best? Zebra Giraffe
Why is it best?	Why is it best?
Which is worse? Zebra Giraffe	Which is worse? Zebra Giraffe
Why is it worse?	Why is it worse?

Appendix C: Moral/Conventional Stories Instructions

Moral Domain

Alex has got some great new shoes. Alex decides to try out these new shoes by kicking Sam in the leg.

Is this ok, a little bit bad, or very bad?
Why?
Should Alex get in trouble?

Conventional Domain

Sam comes in with their dad, and Sam is wearing their pajamas. All the other kids are wearing their regular clothes.

Is this ok, a little bit bad, or very bad?
Why?
Should Sam get in trouble?

Appendix D: Working Memory Task Instructions

Start: 3 y – House 1, 4 y– House 2 – if fail 1 of the two trials, go back to House 1

Stop: 2 or more errors within 2 sequential trials (e.g., could be 1 error in House 2 holding and 1 error in House 2 updating or 1 error in House 2 updating and 1 error House 3 holding trial)

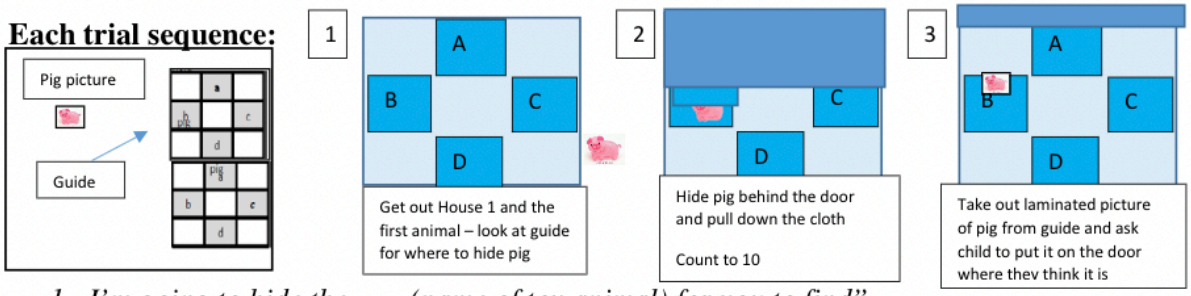
Demonstration: *"We are going to play a hiding game!"*

"*Here is a house (point to the whole house) and here are the rooms of the house (open doors to rooms). I am going to hide animals in the rooms of the house and then we're going to try and find them.*

For the practice trial, the first board should be taken out and felt pig placed next to it.

"Here's the pig! I'm going to hide the pig in this room, and now see if you can put the picture of the pig on the door of the room where you think the pig is hiding" Once child has put the picture on the door say, "*Good job, now open the door and see if you're right.*" Make sure that the child understands that you open the door after putting the picture on first.

Each trial sequence:



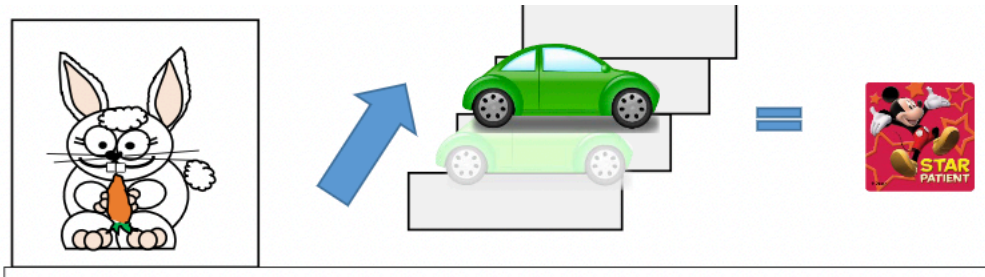
1. *I'm going to hide the ___ (name of toy animal) for you to find"*
2. Place the _____ toy in the appropriate 'hiding place' (under the flap in the well or 'room'; see scoring sheet or guide for location). Ensure that the child is paying attention when the toy is hidden. By moving the toy in front of the child's face, en route to placing the toy in well, makes the children visually focus on the animal.

   Then say, "*This time before you find the pig, I'm going to put this magic blanket over the house and I'm going to count to 10.*"

3. Ask the child, "*Now, can you put the pictures of the animals on the room where you think they are hiding?*"

If the child successfully finds the toy on the first try say, "*Good job, you found the ____ (name of animal).*" If the child does not place the picture on the correct hiding place or flap then say, "*Nice try, or those animals are really tricky*"

Appendix E: Preschool Gambling Task Instructions

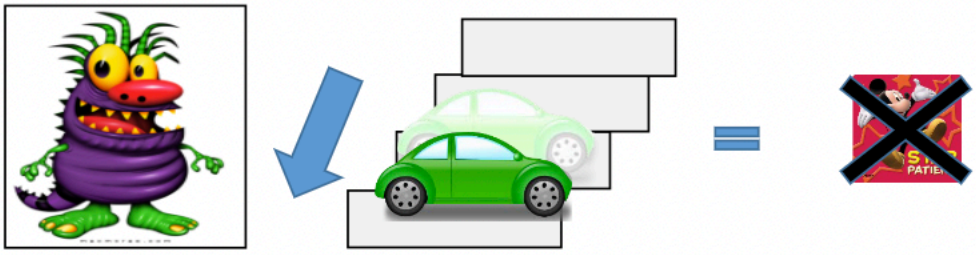


This is Giraffe and Chick/Zebra. They are going to help us with this game. Giraffe and Chick/Zebra have cards that will tell you what to do in this game.

Point to bunny on demonstration card

Sometimes you are going to see a bunny on the cards. Bunnies are good! They make you win a sticker and go up the stairs. Watch me.

Make the magnet bunny go up on the game board



Point to the monster

Sometimes you are going to see a monster. Monsters are not good – no way. Every time you see the monster, you have to go down one step on the stair and you lose a sticker

The stairs tell you how many stickers you have. I will give you the stickers

Check understanding:

Can you tell me what happens when you see a bunny? Can you tell me what happens when you see a monster?

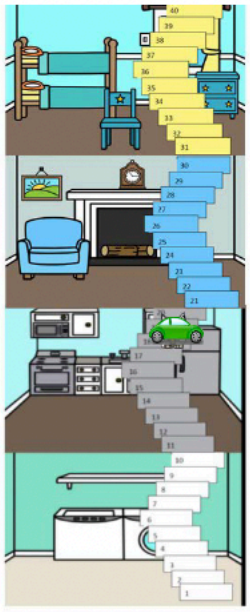
Explain further if necessary

Your bunny will start here in this room. Try to stay out of the basement

OK, let's begin then. Which animal do you want to pick from first?

Give verbal reinforcement when they win stickers such as, *Good for you. There are X Bunnies so you won X stickers.*

When children pick a card that contains a loss, the experimenter will say, *There are X Bunnies so you win X stickers, but oh no, there are X mean monsters so you lost X stickers. Those monsters are not nice.*



******If the child has chosen from only 1 deck after 10 cards, encourage the child to choose from the other deck – it is necessary to get at least 2 cards from the other deck to have a valid assessment (i.e., need to experience win & loss from that deck)

Why don't we try [animal]?

After Trial 30 and at the end of game -Awareness Test

Which animal did you think was the best to pick from? Why do you think that it was the best? Which animal was the worst to pick from? Why do you think it was the worst to pick from?