Why do children punish? Fair outcomes matter more than intent in children's second- and third-party punishment

*Regan M. Bernhard^a, Justin W. Martin^{a,1}, Felix Warneken^{a,2}

^aHarvard University, Department of Psychology, 33 Kirkland St. Cambridge, MA 01238

¹Present address: Boston College, Department of Psychology, 140 Commonwealth Ave, Chestnut Hill, MA 02467

²Present address: University of Michigan, Ann Arbor Department of Psychology, 530 Church Street, Ann Arbor. MI 48109

*Corresponding Author: regan.bernhard@gmail.com

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Abstract

Humans punish fairness violations both as victims and impartial third parties, which can maintain cooperative behavior. However, it is unknown whether similar motivations underlie punishment of unfairness in these two contexts. Here, we approach this question by focusing on how both types of punishment develop in children, asking: What motivates young children to punish in response to fairness norm violations? We explore two potential factors: The direct experience of unfair outcomes, and a partner's fair vs. unfair intentions. Five- and seven-year-olds were given the chance to engage in both 2nd- and 3rd-party punishment in response to either intended or unintended fairness norm violations in a single paradigm. In both age groups, children were more likely to punish when they were directly affected by the allocation (2nd-party punishment) than when they were an uninvolved third party (3rd-party punishment). Reliable 3rd-party punishment was shown only in the older age-group. Moreover, children's punishment was driven by outcome rather than intent, with equal rates of punishment when unequal outcomes were either the result of chance or the intentional act of another child. These findings suggest that younger children may be mainly motivated to create equal outcomes between themselves and others, while older children are motivated to enforce fairness norms as a general principle.

Keywords

2nd-party punishment, 3rd-party punishment, development, fairness, inequity, intention

Introduction

Fairness is central to the emergence and maintenance of human cooperative behavior, especially with unknown others. Punishment can maintain adherence to fairness norms (Fehr & Gächter, 2002), and people are often willing to pay a cost to avoid inequity (Fehr & Fischbacher, 2004; Fehr & Gächter, 2003). Experimental studies operationalize costly punishment as a participant paying a cost to levy a cost on another individual (Clutton-Brock & Parker, 1995; Raihani & McAuliffe, 2012; Raihani, Thornton, & Bshary, 2012). Using this approach, a large body of work has shown that adults will pay a cost to punish when they themselves receive less than others (Güth, Schmittberger, & Schwarze, 1982; Thaler, 1988), and will also pay a cost to punish those who are unfair to others, even when they are in the role of an unaffected third party (Fehr & Fischbacher, 2004; Henrich et al., 2010; Henrich et al., 2006; Mathew & Boyd, 2011; Raihani et al., 2012).

In recent years, studies have begun to adapt fairness tests from adult research to gain insight into the origins of human fairness in children. Specifically, whereas infants already differentiate between unequal and equal sharing events (Sloane, Baillargeon, & Premack, 2012), children's own sharing behavior is only gradually governed by fairness principles—such as equality and merit—during middle childhood and school-age (Gummerum, Hanoch & Keller, 2008; Blake, McAuliffe, & Warneken, 2014; Warneken, 2018). Here we focus on two types of behaviors that have been discussed as being particularly informative regarding the human sense of fairness: inequity aversion and 3rd-party punishment (McAuliffe et al., 2017). Inequity aversion is the idea that one may be averse to unequal distributions of resources. Indeed, experiments with samples from the

US and Europe show that children will pay a cost to prevent unequal distributions that disadvantage the self (Blake et al., 2015) and will reject unfair offers at a cost to the self (Bueno-Guerra, Leiva, Colell, & Call, 2016; Castelli, Massaro, Sanfey, & Marchetti, 2014; Gummerum & Chu, 2014; Güroğlu, van den Bos, & Crone, 2009; Sutter, 2007; Wittig, Jensen, & Tomasello, 2013). Tests of 3rd-party punishment show that children will also pay to punish as a disinterested third party, when they observe somebody else being treated unfairly (Jordan, McAuliffe, & Warneken, 2014; McAuliffe, Jordan, & Warneken, 2015; Yang, Choi, Misch, Yang, & Dunham, 2018). These findings have been taken as evidence that a strong sense of fairness emerges around school-age, with children applying an equality principle to both themselves and others when valuable resources are at stake (McAuliffe et al., 2017; Shaw & Olson, 2012).

Despite the fact that all punishment in response to fairness norm violations, whether one is the victim or not, seeks to produce similar outcomes (correcting a wrong, restoring equality, or deterring future inequality), we propose that the motivations underlying 2nd and 3rd-party punishment may be different. Whereas punishing as a victim carries immediate direct personal deterrent value (Clutton-Brock & Parker, 1995; Raihani, Thornton & Bshary, 2012; Trivers, 1971), the same is not true for punishing as an impartial observer. Various theories accord 3rd-party punishment special motivations. Group norm maintenance theories suggest that 3rd-party punishment seeks to maintain norms for the future benefit of the group in general (Boyd, Gintis, Bowles, & Richerson, 2003; Gintis, Bowles, Boyd, & Fehr, 2003; Fehr & Fischbacher, 2004). Social exchange theories suggest that 3rd-party punishment serves to signal to group members that the punisher would make a good cooperative partner in future interactions (Jordan, Hoffman,

Bloom & Rand, 2016; Krasnow, Cosmides, Pedersen, & Tooby, 2012). While these theories differ in many respects, they both propose that punishing as a 3rd party may be relatively more other-oriented (concerned with preventing future harm or unfairness to others or with signaling the punisher's cooperative value to group members) when compared to punishing as the victim (concerned with preventing more harm to the self).

In order to further investigate the relationship between 2nd and 3rd-party punishment, we seek to answer two questions: First, when do different forms of costly punishment behavior emerge in early childhood? Specifying the relative ontogeny and developmental trajectories of 2nd- and 3rd-party punishment behavior in response to unfairness would provide a clearer understanding of whether these two types of punishment share motivating factors or are driven by distinct concerns. However, no single study has allowed children between the ages of 4 and 7 years—the critical age-range in which consistent engagement in both of these behaviors emerges—to make costly punishment decisions in *both* 2nd- and 3rd-party contexts, leaving the relative age of emergence of these two types of behaviors ambiguous.

Second, how children in this critical age range incorporate intent into their 2nd- and 3rd- party punishment judgments remains unclear. Adults consider both the severity of an outcome *and* the intent driving an agent's behavior when making moral judgments and ascribing punishment (Berg-Cross, 1975; Cushman, 2008; Cushman, Dreber, Wang, & Costa, 2009; Gino, Shu, & Bazerman, 2010; Martin & Cushman, 2015). Do young children use information about intentionality when punishing in the same manner as adults? Research on children's moral evaluations and hypothetical punishment judgments in response to accidental versus intentional personal harm or property damage, suggests

that they may (Baird & Astington, 2004; Cushman, Sheketoff, Wharton, & Carey, 2013; Darby & Schlenker, 1989; Helwig, Zelazo, & Wilson, 2001; Nobes, Panagiotaki, & Bartholomew, 2016; Zelazo, Helwig, & Lau, 1996). However, research on children's responses to intended vs. unintended unfairness provides a less clear picture. Recently, Engelmann and Tomasello (2019) proposed that young children are strongly motivated to punish in response to intended unfairness because they feel disrespected when treated unfairly. Yet prior research on children's actual punishment behavior in response to unfairness suggests that they don't seem to be taking intent into account (e.g. Sutter, 2007). Here, we address this paradox by providing a clear and direct test of the role of intent in young children's 2nd- and 3rd- party punishment judgments.

We now address both of these critical questions in detail.

2nd- vs. 3rd-Party Punishment in Children

Identifying the age at which children begin engaging in costly 3rd-party punishment relative to 2nd-party punishment would allow us to better specify whether these two types of punishment behaviors share motivating factors or are driven by distinct concerns. If children's concern for fairness norms were the sole motivator of both 2nd- and 3rd- party punishment, both behaviors are more likely to emerge at approximately the same point in development. However, research in adults and children finds that in cases where individuals are the direct victims of unfairness, their decisions to punish are primarily motivated by a strong emotional response to being treated unfairly, rather than purely normative concerns (LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011; McAuliffe, Blake, & Warneken, 2014; Pillutla & Murnighan, 1996; Steinbeis & Singer, 2013). These findings suggest that negative emotional responses to personal experiences

of being treated unfairly may motivate subsequent 2nd-party punishment above and beyond concern for enforcing fairness norms.

The role of affective motivators, particularly in response to direct unfair treatment, may facilitate the early emergence of 2nd-party punishment behavior (McAuliffe et al., 2017). In fact, initial evidence suggests that children may begin engaging in costly 2nd-party punishment at an earlier age than costly 3rd-party punishment. Children as young as four or five years old will reject unequal windfall allocations that disadvantage them (Blake & McAuliffe, 2011) and six- or seven-year-olds will reject unfair offers made by another child in the ultimatum game (Bereby-Meyer & Fiks, 2013). As children get older, they increasingly reject disadvantageous allocations, so that by seven or eight they do so almost always (Bereby-Meyer & Fiks, 2013; Blake & McAuliffe, 2011; Bueno-Guerra et al., 2016). Importantly, at age eight, children also begin rejecting advantageous allocations (those in which they receive more than the other child; Blake & McAuliffe, 2011), indicating a shift from pure inequity aversion to an increased concern for enforcing fairness norms as they age (McAuliffe et al., 2017).

Young children will also engage in 3rd-party punishment that does not incur a direct cost (Hamlin, Wynn, Bloom, & Mahajan, 2011; Heyman, Loke, & Lee, 2016; Rakoczy, Kaufmann, & Lohse, 2016; Riedl, Jensen, Call, & Tomasello, 2015; Rossano, Rakoczy, & Tomasello, 2011; Vaish, Missana, & Tomasello, 2011). However, punishment in the adult and animal literature is presumed to involve some direct cost to the punisher (Clutton-Brock & Parker, 1995; Raihani, et al., 2012). Several studies have found that children do not begin engaging in *costly* 3rd-party punishment in response to

fairness norm violations until age six (Jordan et al., 2014; McAuliffe et al., 2015). Costly 3rd-party punishment rates seem to increase as children age, with eight-year-olds beginning to punish at adult-like rates (Gummerum & Chu, 2014).

While existing evidence indicates that costly 2nd-party punishment in response to fairness norm violations appears to emerge before costly 3rd-party punishment, these data were gathered from distinct studies using different paradigms and samples, often including norm-violations other than fairness. Therefore, drawing clear conclusions about the relative emergence of these two types of punishment behavior is difficult. Only one study has examined both 2nd- and 3rd-party punishment behaviors using the same paradigm in a single set of children. Gummerum and Chu (2014) found that eight-year-old children do engage in both 2nd- and 3rd-party punishment at comparable rates, but they did not test children at the critical age of onset of these behaviors, which is likely between four and seven years old. Currently, no single study has compared costly 2nd- and 3rd-party punishment rates in children in this critical age-range.

The present study addresses this gap in the existing literature by having children between the ages of 4.5 and 7.5 years old play both 2nd- and 3rd-party punishment games. Using a within-subject design, children decide whether or not to pay a cost to punish another child who divided candy unequally between him/herself and the subject (2nd-party condition) or a third child (3rd-party condition). In this way, we are able to assess whether costly 2nd- and 3rd-party punishment co-emerge in development or whether one type of punishment emerges before the other.

The Roles of Intent vs. Outcome in Children's Punishment Behavior

A second factor that may motivate people to punish is whether or not a fairness norm was violated intentionally. Adult's judgments reflect a strong influence of intentionality, both when making 2nd- (Blount, 1995; Falk, Fehr, & Fischbacher, 2008; Nelson, 2002) and 3rd-party punishment judgments (Buckholtz et al., 2008; Gummerum & Chu, 2014; Treadway et al., 2014). Only a few studies have looked at the role of intent in children's decision to punish in response to fairness norm violations. In general, these studies suggest that children under twelve do not take intent into account when making punishment decisions in response to fairness norm violations (Bueno-Guerra et al., 2016; Gummerum & Chu, 2014; Güroğlu et al., 2009; Sutter, 2007). These findings are in stark contrast to research on the role of intent in children's punishment in other domains. Research on children's decisions to punish an agent who has caused physical harm or property damage has found that children begin to take intent into account between five and seven years old (Baird & Astington, 2004; Cushman et al., 2013; Helwig et al., 2001; Nobes et al., 2016; Nobes et al., 2009; Shultz et al., 1986; Zelazo et al., 1996).

Thus, these results present a puzzle: Why are punishment judgments in property damage or harm cases sensitive to intentionality at age 6, whereas decisions in the ultimatum game only show intent sensitivity around age 10 or 12? We propose that processing the divider's intent, as it has been implemented in prior versions of the ultimatum game, may be too taxing for young children. In these studies, children must *infer* the agent's intent by comparing the chosen allocation against another available but un-chosen alternative (e.g. Sutter, 2007). In contrast, in moral judgment tasks the actor's intent is *explicitly* referenced (e.g. "He wanted to..."). Therefore, we may find that younger children are able to incorporate intent when punishing unfair allocations as long

as the divider's intent is explicitly stated and need not be inferred. Consistent with this hypothesis, children as young as 6 years old take intent into account when making moral evaluations of free-riders, reporting that fictional characters who intentionally free-ride are morally worse and less likable than those who do so accidentally (Yang et al., 2018).

Theoretical Debates on the Role of Mutual Respect and Inequity Aversion on Fairness

Recently, Engelmann and Tomasello (2019) proposed a theory that views mutual respect as the driver of fairness concerns. Specifically, this theory argues that children's preference for fairness arises not merely from aversion to inequity, but out of a desire to be treated with respect by other social agents. From this perspective, intent should matter especially strongly to children who have been treated unfairly. If a desire to feel respected is the primary underlying motivator of punishment in response to unfairness, then the children in our study should only punish in response to intended unfairness and not when it occurs by chance. Moreover, children should be particularly concerned about whether or not the allocation was intended in the 2nd-party condition (and less concerned about intentions in the 3rd-party condition). According to Engelmann and Tomasello's theory, as children develop they care first about whether or not they, personally, are treated with respect, and then later whether or not others are treated with respect as well (Engelmann & Tomasello, 2019).

Alternatively, children may also be motivated to punish by an aversion to the inequity itself, rather than concerns about respect in particular (McAuliffe, Warneken, & Blake, 2019). If this is the case, the importance of intent when punishing in response to fairness norm violations may be overridden by an aversion to inequity, whether intended or not, and a desire to create equity whenever possible. Moreover, this view predicts no

relationship between intent and punishment perspective, as children are focusing only on the outcome of the allocation in both 2nd- and 3rd-party contexts, not how the allocation was created. Under this hypothesis, punishment serves not necessarily as a reaction to being disrespected, or even to deter future norm violations, but rather to create a more equitable allocation of resources.

The present study allows us to investigate predictions of these competing hypotheses by testing the role of intent in 4.5- to 7.5-year-old children's punishment behavior in response to fairness norm violations when the divider's intent is directly stated. The children in our study were randomly assigned to one of two conditions. In the *Intent* condition, children were told that they were playing with another child who decided how candy would be split up between him/herself and the subject or third child. By contrast, in the *Windfall* condition, children were told that the candy would be split up by randomly drawing a card out of a stack that specified how the candy should be divided. Prior research has indicated that young children likely do understand that windfall allocations, like the ones described here, occur because of chance rather than because of an agent's decision (Shaw & Olson, 2014).

As described above, children in both the Intent and Windfall conditions played both the 2nd- and 3rd-party punishment games. In this way, we were able to systematically evaluate the effect of intent on both 2nd- and 3rd-party punishment behavior and examine whether or not there is an interaction between a perpetrator's intent and the child's punishment perspective.

Methods

Children were invited to play both a 2nd- and 3rd-party punishment game with absent peer children. Participants were led to believe that these absent peers were real children who had played their part of the game before and would be returning the next day to collect their reward. Comprehension check questions revealed that all participants did believe that their partners were real children (see supplementary materials for details on all comprehension and manipulation check questions used in this study).

In the Intent condition, children were told that one of the absent children (who we will call “the divider” here) split up some candy between herself and “the recipient” – either the participant (in the 2nd-party punishment game) or another absent child (in the 3rd-party punishment game). In the Windfall condition, children were told that the candy was divided by chance (see details below). In both conditions, after the candy was divided the participant could choose whether or not to pay one piece of candy to punish the divider. If the participant chose to punish the divider, the divider would lose all of her allocation of candy but the recipient would keep her allocation of candy. Critically, this is different from many similar studies in which “punishment” constitutes a complete rejection of the resource division, where both the divider and the recipient lose their allocation of the resources (e.g. McAuliffe et al., 2015). In the present study we used genuine punishment, where only the divider’s allocation is affected. If the participant chose not to punish, both the divider and recipient would receive all of their skittles as allocated.

All measures, manipulations, and exclusions used in this study are described in the sections below.

Participants

We tested 32 4.5 to 5.5-year-olds ($M = 59.96$ months, range = 54.2 – 65.9 months, 15 females) and 33 6.5 to 7.5-year-olds ($M = 83.7$ months, range = 79 – 89.8 months, 16 females). Participants were recruited from a database of children from mixed socioeconomic backgrounds in a major US city.

Sample sizes were selected to reflect the sample sizes used in similar prior research (e.g. McAuliffe, Jordan, & Warneken, 2015). Sample sizes were established *a priori* and data collection was stopped after reaching that point. We conducted a sensitivity power analysis to determine the effect sizes our study would have 80% power to detect, given our design and sample size. Using the package *simr* (Green & MacLeod, 2016) in R, we ran a series of 1000 sample bootstrap tests in which we manipulated the desired effect size until we found our model had ~80% power to detect it. This analysis found that given our sample size, we had 80% power to detect a small to medium effect (log odds ratio of approximately 1 or an odds ratio of approximately 2.7) for our three main effects (effects of fairness, punishment perspective, and intent) and three of our primary two-way interactions (age x intent, age x punishment perspective and age x fairness; see supplementary materials – SI Table 1 – for full sensitivity analysis results; Chen, Chohen, & Chen, 2010)¹.

Design

Participants were randomly assigned to either the Intent or Windfall condition (between subject) and presented with a total of 10 trials, half played in the context of a

¹ An odds ratio of 1.5 is considered a small effect (equivalent to Cohen's $d=0.2$), an odds ratio of 3.5 is a medium effect (equivalent to Cohen's $d=0.5$), and an odds ratio of 9 is a large effect (equivalent to Cohen's $d=.8$; Chen, Cohen, & Chen, 2010)

2nd-party punishment game and half in the context of a 3rd-party punishment game. The order of the 2nd- and 3rd-party punishment games was counterbalanced across participants, so that approximately half played the 2nd-party punishment game first and half played the 3rd-party punishment game first. On each trial, participants decided whether or not to punish a divider based on a specific distribution of candy (skittles). Distributions were either unequal (5-1, 5 for divider and 1 for recipient) or equal (3-3). In each game (consisting of 5 trials), participants saw 3 unequal and 2 equal distributions, presented in pseudo-random order such that no more than two trials of the same allocation type were presented consecutively. This 3:2 ratio of unequal to equal distributions was selected in order to maximize the number of unequal trials while keeping the total number of trials as low as possible.

Procedure

Children first played a game designed to orient them to the Intent and Windfall manipulations (see supplementary materials for details). Participants did not begin the main experiment until they could correctly answer a series of questions that verified that they were able to distinguish between the Intent and Windfall manipulations and that they understood the difference between an intended outcome and one that happened by chance.

Before the main test, children were given 25 skittles in what we called their skittle bags. Participants were then given the instructions for either the 2nd- or 3rd-party punishment game. For both games, participants were told they would be playing with other children who were of their age and gender. In the 2nd-party game participants played the role of the recipient and played with one other child who was the divider. For

the 3rd-party game participants observed two other children playing (one who was the divider and the other who was the recipient). Participants were told that all of the other children had played their parts of the game “yesterday” because they were not able to come to play today. The experimenter produced skittle bags with names and faces on them, ostensibly drawn by the absent children, and explained to participants that the other children were returning later to get their skittle bags.

Participants were informed that because the other children could not be present today, skittle cards would be used to divide up the skittles. The face of each skittle card was divided in half, one side for the divider and the other for the recipient. For unfair allocations, 5 skittles were drawn on the divider’s half and 1 skittle was drawn on the recipient’s half. For fair allocations, 3 skittles were drawn on each half of the card. Five cards were used for each game, three with unfair (5-1) allocations and two with fair (3-3) allocations.

In the Windfall condition, the experimenter stated that there were six skittles that needed to be split up between the participant and the divider and in order to do that the experimenter was going to use the skittle cards. Children watched the experimenter mix up the cards and place them into a card box. The card box had been pre-loaded with a set of identical cards that were in a predetermined pseudo-random order. The experimenter said that the cards would be drawn from the box one at a time to indicate how the skittles would be divided for that trial. The cards were loaded into the box in such a way that it appeared that only a single set of cards was being used, and the cards that the participants had seen being mixed up were the same cards being drawn for each trial of the game.

In the Intent condition, the experimenter stated that it was the divider's job to split up six skittles between herself and the recipient, however she wanted. Further, the divider had drawn how she wanted to split up the skittles on the cards. Once it was clear that the divider had drawn her decisions on the cards, the cards were loaded into the card box as described above. Importantly, on every trial in the Intent condition, the skittles were described as being split up by the divider based on how she wanted the skittles divided (e.g. "Let's see how Sarah wanted to split up the skittles." or "Sarah wanted to keep 5 skittles for herself and give 1 skittle to you."), while in the Windfall condition the skittles were described as being split up based on the cards with no input from the divider whatsoever (e.g. "This card says that 5 skittles should go to Sarah and 1 skittle should go to you.").

After the cards were put in the card box, participants were introduced to a red and a green box, which were to be used to indicate their decisions in the game. On each trial, after learning how the skittles were to be allocated, participants were told they had the option of doing one of two things: If they took a skittle out of their skittle bags and put it in the green box, the skittles that had been allocated for the participants would be put into their skittle bags to take home. The skittles that had been allocated for the divider would be put in the divider's skittle bag. Then, at the end of the game, all of the skittles in the green box would be put back in the participants' skittle bags to take home. Therefore, choosing not to punish still required that children make an active decision by placing a skittle in the box, but the skittles were ultimately returned to them. If children took a skittle out of their skittle bags and put it in the red box, the skittles that had been allocated for them would still be put in their skittle bags to take home. However, the skittles that

had been allocated for the divider would be put in the red box. Children were told that all of the skittles in the red box would be thrown away at the end of the game. Therefore, choosing to punish resulted in the participants' loss of the skittle they used to indicate their choice, and the divider's loss of her skittle allocation. However, even when choosing to punish, participants kept their allocation of skittles (see Figure 1).

Figure 1. The experimental environment. Participants (shown here as the child with a visible face) play with either one other (quadrants A & C) or two other (quadrants B & D) absent children (shown here as grey silhouettes). Allocations are indicated by the blue and yellow skittle cards, with skittles on the blue side going to the divider and those on the yellow side going to the recipient. Participants make their decisions by putting a skittle in either the green box to accept the allocation (quadrants A & B) or the red box to punish the divider (quadrants C & D). If the allocation is accepted, both the divider and the recipient keep their parts of the allocation. If the participant chooses to punish, the recipient keeps her share of the allocation but the divider's share goes into the red box. At the end of the game the participant keeps all of the skittles in the green box and all of the skittles in the red box are thrown away.

Children received instructions twice, once before playing the 2nd-party game and once before playing the 3rd-party game. After each set of instructions, they were asked a number of comprehension check questions (see supplementary materials for a list of questions and breakdown of correct responses by age-group). Children were asked these comprehension check questions twice, once after receiving the instructions for the 2nd-party game and once after receiving the instructions for the 3rd-party game. Participants were excluded from analyses if they incorrectly answered whether the skittles were divided intentionally or by chance both times they were asked. They were also excluded if they answered fewer than two-thirds of the other comprehension check questions correctly. Three participants were excluded for failing to meet these standards (two younger and one older child) and one participant was excluded for failing to complete the entire study (one younger child; see supplementary materials SI Table 2 for a question-by-question breakdown of correct response rates in each age-group).

Each trial began with the experimenter drawing a card out of the box, and then dividing the skittles appropriately as the participants watched. If it was the first trial of the game, children were then asked to verify whether the allocation had been made intentionally by the divider or by chance. Once again, only children who responded correctly to this question were included in our data analysis. Participants then made their decisions by taking a skittle from their skittle bag and placing it into either the red or green box. After the decision was made, the experimenter appropriately distributed the skittles. The study ended once each child completed 5 trials of both games.

In order to directly probe children's explanations for their decisions and gain potential insight into their motivations for these decisions, after children had completed

both games, they were asked why they had decided to put skittles in the red box and why they had decided to put skittles in the green box (more details on children's responses can be found in the supplementary materials). Finally, to test whether participants believed that they were playing with other real children, as they were leaving, a second experimenter re-entered the room and asked if the skittle bags (belonging to the fictional other children) should be saved for kids who were going to come back later or if they were really just for pretend kids. Every child responded that the skittle bags should be saved for the kids who were going to come back later to get them. Participants were then escorted out of the study room and given a prize for their participation.

Data coding and analysis

All sessions were video taped. Children's decisions were live-coded by an observer from an adjacent room over video-feed. Our main variable of interest was whether or not children decided to punish the divider. A randomly selected subset of twelve testing sessions (18.5%) was later recoded by an independent hypothesis-blind video coder. Correspondence between the live-coding of children's decisions and the recoding from video was 100%, therefore no additional sessions were recoded.

Data was analyzed using R statistical software. Binary punishment responses (0 = did not punish, 1 = punished) were analyzed using mixed effects logistic regression, implemented using the package lme4 (Bates, Maechler, Bolker, & Walker, 2014). We included fixed effect categorical predictors for Age (4.5-5.5 years/6.5-7.5 years), Intent/Windfall condition, Punishment Perspective (2nd-party vs. 3rd-party punishment), and Fairness (Fair/Unfair), as well as all possible interactions between these predictors. This model also included a random intercept for each subject, and random slopes and

their interaction for the within-subject factors (Fairness and Punishment Perspective). We used a hypothesis-driven model comparison approach, with statistical significance evaluated using the package *pbkrtest* (Halekoh & Højsgaard, 2014). By using parametric bootstrapping to perform model comparisons, we do not rely on as many assumptions regarding the underlying distribution as traditional methods for assessing significance². Specifically, we compared this full model to a reduced model that did not include the highest-level interaction term (e.g. the 4-way interaction between Age, Intent/Windfall condition, Punishment Perspective, and Fairness). If this interaction term was not significant, we then compared this reduced model to one that did not include the next highest-level interaction term(s) (e.g. all 3-way interactions). Once interactions at a particular level were significant, we then probed these interactions directly. In this way, we minimized the number of tests performed and thus minimized the likelihood of false positive results. In addition to these analyses focused on our research questions, we included several additional exploratory analyses (e.g. first-trial behaviors) that are included in the supplemental online material.

Results

We first examined our data for the presence, in turn, of higher-order interactions. We did not find any four-, three- or two-way interactions (all 5000 sample bootstrap LRT $X^2 < 3.44$, $\beta = -1.36$, $p > 0.32$). However, a model including only main effects did perform better than a null model without any main effects (5000 sample bootstrap LRT

² Note that this also means that the significance value for a particular comparison may not be the same as would be expected from a standard likelihood ratio test (LRT). See the documentation of the *pbkrtest* package for more details.

$X^2(1) = 17.51, p < 0.005$). To determine which predictors were contributing significantly, we compared a model containing all main effects to a model dropping each of the predictors in turn. We found that only Fairness and Punishment Perspective improved model fit (Fairness: 5000 sample LRT $X^2(1) = 11.04, p < 0.005$, Punishment Perspective: LRT $X^2(1) = 9.3, p < 0.005$), therefore our final model contained only these two predictors. We will now discuss each of these effects in detail.

First, as predicted, we found a significant main effect of Fairness on punishment ($\beta = 1.36, SE = 0.47, p < 0.005$). Across age groups and conditions, children were more likely to punish the divider when the skittles were allocated unfairly rather than fairly.

We also found a significant main effect of Punishment Perspective on punishment ($\beta = -1.13, SE = 0.39, p < 0.005$). Across age groups, Fairness, and Intent/Windfall condition, children were more likely to punish a divider when they were direct recipients of an allocation than when they were observers. There were no significant interactions between Age and Punishment Perspective (LRT $X^2(1) = 0.58, \beta = -0.86, p = 0.46$) or between Age, Punishment perspective, and Fairness (LRT $X^2(1) = 0.74, \beta = 1.5, p = 0.12$).

Given that this project builds off of previous work by McAuliffe et al. (2015) on the development of 3rd-party punishment, we did a secondary analysis using their analytic strategy. In particular, McAuliffe and colleagues operationalized punishment as significantly more punishment in response to unfair offers than fair offers. Using this methodology, we found that in the 2nd-party condition, older children punished unfair offers significantly more than fair offers and younger children demonstrated a similar pattern of responses (although the difference was not quite significant for younger

children; Older: LRT $X^2(1) = 5.28$ $p = 0.03$, $\beta = 1.19$, $SE = 0.60$; Younger: LRT $X^2(1) = 3.49$, $p = 0.097$, $\beta = 1.11$, $SE = 0.06$). However, in the third party condition, only older showed this preference for punishing in response to unfair relative to fair offers (Older: LRT $X^2(1) = 6.62$ $p = 0.01$, $\beta = 5.96$, $SE = 2.53$; Younger: LRT $X^2(1) = 0.95$, $p = 0.43$, $\beta = 0.99$, $SE = 1.25$; see Figure 2).

We found no main effects of age or our Intent versus Windfall manipulation on punishment decisions (Age: LRT $X^2(1) = 0.60$, $\beta = 0.21$, $p = 0.49$; Intent: LRT $X^2(1) = 0.02$, $\beta = 0.41$, $p = 0.90$). We also found no interactions between our Intent/Windfall manipulation and any other variable (see Figure 3 and Table S4). These results are consistent with the hypothesis that there is no interaction between a norm violator's intent and 2nd- versus 3rd-party punishment. Rather, children's responses to fairness norm violations appear to be entirely focused on outcome. Specifically, children's punishment behavior depends on (a) whether or not the outcome was fair or unfair, and (b) whether or not they were the victims.

Finally, we found no differences between male and female participants and no order effects (see supplementary materials for details). In other words, children punished at the same rate regardless of which game they played first.

Figure 2. Punishment rates in response to fair versus unfair offers for 4.5-5.5 and 6.5-7.5-year-olds in both the 2nd- and 3rd-party punishment games (error bars represent one standard error; [†] $p < 0.1$, ^{*} $p < 0.05$).

Figure 3. Punishment rates in response to unfair offers only in the intent vs. windfall conditions. Responses are divided by age group (4.5-5.5 and 6.5-7.5-year-olds) and 2nd- vs. 3rd-party punishment games (error bars represent one standard error; all comparisons are not significant).

Discussion

This is the first study to directly compare the development of costly 2nd- and 3rd-party punishment in response to unfairness by requiring young children to make costly punishment decisions in both contexts. We found that both younger (4.5-5.5 years old) and older (6.5-7.5 years old) children's punishment behavior is sensitive to the fairness of an allocation and whether or not they are the direct recipient of that allocation. We also found that whether allocations were made intentionally or by chance does not affect children's punishment behavior in our study. These findings are consistent with the hypothesis that children younger than eight are primarily focused on the outcome of an allocation rather than the intention behind it when punishing in response to fairness norm violations. Moreover, our results highlight that being a victim of unfairness has a major impact on punishment behavior: children will stand up for others, but they are much more likely to stand up for themselves.

Effect of Fairness on Punishment

As expected, we found that across age-group, punishment perspective, and intent/windfall conditions, children punished significantly more often in response to unfair than fair allocations. These findings confirm that children were sensitive to inequity, even in the 3rd-party context.

Effect of 2nd- and 3rd-Party Perspective on Punishment

We found that children, across age group, fairness, and intent/windfall conditions, punished significantly more often in 2nd-party than in 3rd-party contexts: Children were much more likely to punish when they were direct victims of unfairness than when they were merely observing another child being treated unfairly. We did not find a significant

interaction between age, fairness of the allocation, and punishment perspective. However, a post-hoc power analysis revealed that we had insufficient power to detect a three-way interaction given our sample size and observed effect sizes. Despite the lack of an interaction, closer examination of the data revealed that while both younger and older children tended to punish in response to unfair offers more often than fair offers in the 2nd-party punishment game, only older children punished in response to unfair offers significantly more often than fair offers in the 3rd-party punishment game.

Our findings provide new insights into the emergence of children's willingness to pay a cost to intervene against inequality. While 6- to 7-year-olds intervene reliably in response to unfairness in both 2nd- and 3rd-party contexts, 4- to 5-year olds are only starting to engage in these behaviors. This is consistent with findings that children first begin paying a cost to prevent inequality as a 2nd party at around age four or five (e.g. Bereby-Meyer & Fiks, 2013; Blake & McAuliffe, 2011). Moreover, work on costly 3rd-party punishment showed that children from a similar population reliably intervene from age six onwards, but show only a trend at age five (Jordan et al., 2014; McAuliffe et al., 2015). Critically, our work expands on this previous research by showing that this delayed emergence of 3rd-party punishment relative to 2nd-party punishment persists even when the intervention is genuine punishment. In prior research "punishment" constituted a complete rejection of the resource division, where both the divider and the recipient lose their allocation of the resources (Jordan et al., 2014; McAuliffe et al., 2015). Typically, however, punishment is most often directed only towards the transgressor and the cost of punishment is only incurred by the punisher, not the victim (e.g. someone who is robbed does not have to pay the cost of jailing their perpetrator). Thus, prior evidence

of later-emerging 3rd-party punishment may have reflected an unwillingness to impose a cost on an innocent individual, rather than an unwillingness to punish bad behavior. Our findings indicate that even with a more targeted infliction of cost, children seem unwilling or unable to engage in 3rd-party punishment until one or two years after they begin engaging in 2nd-party punishment.

Our results fit well in the broader context of how children's internalization of fairness norms develops as they age. Past research has found that young children are particularly concerned with their own gains and are sensitive primarily to their own inequity, rather than to fairness in general (Benenson, Pascoe, & Radmore, 2007; LoBue et al., 2011; Sheskin et al., 2014). However, as children age, they increasingly value fairness norms until age eight when they will reject unfair offers allocations even when they are the beneficiaries of inequity (Blake & McAuliffe, 2011).

Four- and five-year-olds' singular focus on their own inequity may be driving the effects we see in the present study. By contrast, our older children are more likely to engage in costly 3rd-party punishment that requires greater perspective-taking or a desire to enforce fairness norms more generally (McAuliffe et al., 2017). These older children are concerned less with who the victim is and more with whether or not fairness norms were violated at all. Consistent with these conclusions, a recent study has found that six-year-olds, but not four-year-olds will pay a cost to watch an anti-social agent be punished, suggesting that younger children prioritize their own welfare while older children more strongly value norm enforcement (Mendes, Steinbeis, Bueno-Guerra, Call, & Singer, 2018).

This might reflect a broader developmental trajectory towards increasingly more principle-based decision-making. Specifically, Jordan et al. (2014) found that six-year-olds were more likely to engage in costly 3rd-party punishment when the victim was an ingroup member than outgroup member, but eight-year-olds defended ingroup and outgroup victims alike. This would suggest that young children may be driven to punish by personal motives, but as they age, they shift their focus to norm enforcement in a more impersonal and more principled way. Obviously, for children as for adults, there remains a tension between more self-focused motives and what is expected by fairness norms, and while becoming relatively more fairness-minded, egoistic and parochial tendencies never completely disappear.

Effect of Intent on Punishment

In the present study, we made the divider's intent explicit, telling children directly whether the skittles were divided by another child intentionally, or if the allocations were a result of chance. Despite the directness of the intent manipulation, we found that young children still do not seem to be consistently taking intent into account when punishing in response to fairness norm violations. Our results are commensurate with previous research that has found that children do not consider intent when deciding whether or not to punish an agent who violates fairness norms until around ten or twelve years old (Bueno-Guerra et al., 2016; Gummerum & Chu, 2014; Güroğlu et al., 2009; Sutter, 2007). However, a separate body of research has found that children between three and seven-years old begin taking intent into account when making punishment decisions in response to physical harm or property damage (Baird & Astington, 2004; Cushman et al., 2013; Helwig et al., 2001; Nobes et al., 2016; Nobes et al., 2009; Shultz et al., 1986;

Zelazo et al., 1996). What, then, explains the discrepancy between findings that children under age ten do not care about intent when punishing in response to unfairness, as shown here and by others (Bueno-Guerra et al., 2016; Gummerum & Chu, 2014; Güroğlu et al., 2009; Sutter, 2007), and the literature suggesting that they do consider intent when deciding to punish in response to physical harm?

One possibility is that children in the present study do not comprehend the difference between the Intent and Windfall conditions. However, several features of our procedure show that participants understood the distinction between the two conditions. All participants were trained extensively on the Intent manipulation prior to beginning the task. Children moved to test phase only once they had demonstrated that they understood the difference between an intentional decision and one that is made by chance. Finally, children had to correctly answer a comprehension check question about whether the skittles were divided intentionally or by chance after the first trial of each game. Any child who did not answer this question correctly was excluded from analysis.

Alternatively, it may be that young children punish in response to fairness norm violations for different reasons than they do in response to personal harm. Recently, Engelmann and Tomasello (2019) proposed that children punish unfairness because they feel disrespected and not because they disapprove of inequity per se. Under this hypothesis, children should be especially willing to punish when unfairness is intended rather than a chance outcome. However, in our study children were willing to pay a cost to punish in both the intent *and* windfall conditions. Instead our results are consistent with the alternative – that children’s punishment behavior is in part about trying to rectify disadvantageous inequity, rather than in response to feeling disrespected (McAuliffe,

Warneken & Blake, 2019). Continuing to explore the differences between the motivations to punish in response to harm versus unfairness remains an important area for future research.

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Supplementary Materials

Full Sensitivity Analysis Results

<u>Term</u>	<u>Effect size (log odds ratio)</u>	<u>Power</u>
4-way interaction	-7.2	79.3%
3-way interaction: Age X Intent/Windfall X Fairness condition	-2.5	78.9%
3-way interaction: Age X Intent/Windfall X Punishment Perspective	2	79.4%
3-way interaction: Age X Punishment Perspective X Fairness condition	5.25	79.7%
3-way interaction: Intent/Windfall X Punishment Perspective X Fairness condition	2.85	80.0%
2-way interaction: Punishment Perspective X Fairness condition	4	80.5%
2-way interaction: Intent/Windfall X Punishment Perspective	-2	81.6%
2-way interaction: Age X Punishment Perspective	-0.8	78.2%
2-way interaction: Age X Intent/Windfall	-1.1	82.8%
2-way interaction: Age X Fairness condition	1	80.8%
2-way interaction: Fairness condition X Intent/Windfall	-2.25	80.4%
Main effect of Age	0.55	79.7%
Main effect of Fairness condition	1.1	81.7%
Main effect of Intent/Windfall	1	80.4%
Main effect of Punishment Perspective	-0.95	82.3%

SI Table 1. Results of the sensitivity power analysis. Given our study design, our sample size is sufficient to detect the effect sizes listed at approximately 80% power.

Warm-up and Orientation to the Intent/Windfall Manipulation

Before testing began, participants were told that they were going to play a game in which they could take home some skittles and that in order to play the game they needed to create their own skittle bag. Participants were given a paper bag with their name written on it and a circle drawn on it. They were told that this was their head and they should draw their face and hair and decorate the bag however they would like. The participant then brought their skittle bag into the testing room.

Upon entering the testing area, all children played a brief game to introduce them to the concept of an intentional versus windfall distribution. Participants were randomly assigned to either be familiarized with an intentional distribution first or a windfall distribution first. Note that regardless of which intent condition the child was assigned to, they were familiarized with both intentional and windfall distributions.

In both the intent and windfall familiarization portions, the familiarization period began with the primary experimenter (E1) showing the child four colored buttons, each of which made a different sound, and telling the child that she was going to get to push some of them. In the intent familiarization portion of this game, a second experimenter

(E2) was called into the room and participants were told that E2 was going to decide which buttons the participant could push. E2 was provided with three blank cards and four crayons that matched the color of the buttons. E1 asked E2 to decide which three buttons she wanted the participant to push and to indicate her choice by coloring each of the cards the appropriate color. In view of the participant, E2 stated the color of each button she wanted the participant to push and colored the card that color. E1 then verbally confirmed the E2's choices ("You want [child] to get to push the blue button, the green button, and the purple button. Is that right?"), and thanked E2 who then left the room. E1 then explained to the child that they were going to put the colored cards in the card box (described in detail below). Once the cards were in the box, the experimenter would pull them out one at a time, and that was when the child would get to push the appropriate button.

In the windfall familiarization portion of the game, the child was shown three cards, each a different color to match three of the buttons. The child was told that these were cards that the primary experimenter "had from before." The experimenter explained that the cards were going to be mixed up and then put in the card box. Once the cards were in the box, the experimenter would pull them out one at a time and that was when the child would get to push the appropriate button. The three cards were then mixed while the experimenter verbally repeated that they were getting the cards all mixed up and loaded into the card box.

In both the intent and windfall portions of the game, the cards were then drawn from the card box one-at-a-time and the child got to push the button of the corresponding color to hear its sound. Once the three cards for that portion of the game were pushed the experimenter asked the participant the following comprehension question: "Did you get to push these three buttons because [somebody/E2³] wanted you to, or because we mixed the cards up?" If an incorrect answer was provided, the experimenter asked a clarifying question until the child could freely verbalize that in the intent familiarization the E2 *wanted* the child to push the specific buttons, but in the windfall familiarization the specific buttons were pushed because the cards were mixed up. Once both portions of the game were completed, the buttons were removed from the table and the child was introduced to the main task.

Comprehension and Manipulation Check Questions

After receiving the instructions to introduce the 2nd- and 3rd-party punishment games, but prior to the first trial of each game, the children were asked several comprehension check questions. The table below lists each question and data on the rate of correct responses:

³ When the intent familiarization was done first, the experimenter's name was used. When the windfall familiarization was done first, the child had not yet met the second experimenter. Therefore, in this case, "somebody" was used.

Question	4.5-5.5 Year Old Correct Response Rate	6.5-7.5 Year Old Correct Response Rate
If you want everyone's skittles to go into their bags, do you put a skittle in the green box or the red box?	60/62 (96.8%)	63/66 (95.45%)
If you want [the divider's] skittles to go into the red box and your skittles to go into your bag, do you put a skittle in the green box or the red box?	46/62 (74.2%)	64/66 (97%)
What happens to the skittles in the green box at the end of the game?	48/62 (77.4%)	58/66 (87.9%)
What happens to the skittles in the red box at the end of the game?	58/62 (93.5%)	66/66 (100%)
Who gets the skittles in this bag [pointing to the divider's bag]?	53/62 (85.5%)	65/66% (98.5%)
Who gets the skittles in this bag [pointing to the recipient's bag]?	56/62 (90.3%)	65/66% (98.5%)
Why are the skittles split up like this? Was it because [the divider] wanted it that way, or did we mix up the cards? (Asked after 1 st trial)	55/62 (88.7%)	58/66 (87.8%)

SI Table 2. Correct response rates for each comprehension check question divided by age-group. There were a total of 32 children in the younger group and 33 children in the older group. One child from the younger group is excluded from this table for failing to complete the experiment. Each child was asked each question twice (once at the beginning of the 2nd-party game and once at the beginning of the 3rd-party game).

Once both games were finished, the children were asked the following two questions:

1. While we were playing these games, what made you decide to put a skittle in the green box? And what made you decide put a skittle in the red box?"
2. What should I do with these bags [pointing to the bags belonging to the absent children]? Are these for kids who are going to come back later to get them or are they just for pretend kids?

Responses to Follow-up Questions

At the end of the game, children were asked why they decided to put skittles in the red box and why they decided to put skittles in the green box. A portion of the children failed to answer one or both of these questions but we received 98 responses out of a total of 138 possible responses. Each response was coded by an independent coder who was unfamiliar with the conditions or hypotheses into one of these following categories:

- Fairness – References to being fair, maintaining fairness, or the fairness or unfairness of the allocation (e.g. “I just wanted it to be equal to both of us” “Because James got 5”).
- Personal Maximizing – Reflects child’s concern for maximizing her own number of skittles or desire to keep or take home skittles (e.g. “Because I like skittles a lot” “I would not lose any”).
- Concern for Others – References to other children’s feelings, or concern that the other child would not get skittles (e.g. “I don’t like giving somebody a little” “Because I wanted to give Mary some”)
- Punishment – Reflects child’s desire to take skittles away from the divider (e.g. “Cause I didn’t want Matt to get more” “I didn’t want James to have his skittles in his bag”)
- Agency – References to the divider’s intent (e.g. “They wanted to have skittles in their bag.”)
- Don’t Know/Other – Child responds that they didn’t know, chose randomly, chose merely because they “wanted to”, or gives an answer that doesn’t make sense in the context of the game (e.g. “I just made a decision”)

Category	Proportion of Responses
Fairness	37%
Personal Maximizing	23%
Concern for Others	10%
Punishment	5%
Agency	1%
Don’t Know/Other	22%

SI Table 3. Responses to the questions “While we were playing these games, what made you decide to put a skittle in the green box? And what made you decide put a skittle in the red box?” were coded by a blind independent coder into one of these categories.

Secondary Analyses

SI Table 4. Combined results across all conditions and age-groups. Error bars represent one standard error.

Trial Order Effects

In general, we found no effect of trial order or of each child receiving multiple fair and unfair offers. In addition:

- 75.38% of the children punished at least once
- 30.77% of children punished in response to the *first* unfair trial they received
- Some of the children who did not punishment in the first two trials did punish later (11% of participants), but many more children who punished after the first two trials also punished at least once in the first two trials (57% of participants) as well. Thus, we find evidence of consistency amongst those who punish and those who don't.
- We find no effect of whether or not the previous trial was fair vs. unfair. We find children punished in response to unfair offers 32% of the time when preceded by an unfair trial and 31% of the time when preceded by a fair trial.
- To some extent, children continue punishing in response to unfair offers if they had previously punished in response to an unfair trial. That is, if they received an unfair offer on the prior trial, they were more likely to punish in response to an unfair offer on the current trial if they had punished on the prior trial (43%) than if they had not punished on the prior trial (27%). Note that this is also true if the prior trial was fair: They were more likely to punish in response to an unfair offer on the current trial if they had punished on the most recent unfair trial (46%) than if they had not punished on the most recent unfair trial (25%).

Punishment Consistency

For each child, we investigated the consistency of punishment behavior in the 2nd- and 3rd-party conditions. In particular, for each of our two punishment perspective conditions, we computed a relative punishment rate, defined as the proportion of times they punished in response to an unfair allocation minus the proportion of times they punished in response to a fair allocation. For instance, if a child punished 66% of unfair trials and 20% of fair trials, their relative punishment rate would be 46%. We found that there tended to be a positive correlation between relative punishment rate in the 2nd- and 3rd-party conditions for older children ($r = 0.33$, $p = 0.067$), suggesting that the same children who punish primarily in response to unfair offers in the 2nd-party condition are the ones who punish in response to unfair offers in the 3rd-party condition. However, for younger children, there was actually a weak negative correlation ($r = -0.26$, $p = 0.18$). Using a Fisher r to z transformation, we found that these correlations were significantly different ($z = -2.22$, $p = 0.026$). This provides at least tentative evidence for the possibility that younger and older children are not applying the same fairness principles to their punishment responses when they see somebody else being treated unfairly. Of course, these results should be interpreted with caution, given the exploratory nature of the analyses and relatively weak nature of these effects.