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Children Discard a Resource to Avoid Inequity

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Elucidating how inequity aversion (a tendency to dislike and correct unequal outcomes) functions as one develops is important to understanding more complex fairness considerations in adulthood. Although previous research has demonstrated that adults and children reduce inequity, it is unclear if people are actually responding negatively to inequity or if people dislike others getting more than them (motivated by social comparison) and like to share maximal resources, especially with those who have few resources (motivated by social welfare preferences). In order to evaluate if children are truly averse to inequity, we had 3- to 8-year-old children distribute resources to 3rd parties and found that 6- to 8-year-old children would rather throw a resource in the trash than distribute unequally, suggesting that concerns with equity can trump concerns with maximal sharing. We also demonstrated that children's reactions were not based on wanting to avoid upsetting the recipients or based on a preference for visual symmetry and that children will even throw away a resource that could have gone to themselves in order to avoid inequity. These results demonstrate the existence of inequity aversion in children, provide a new method for studying inequity aversion specifically, and suggest the need for new models to explain why inequity aversion may have evolved.

Keywords: social cognitive development, inequity aversion, fairness, evolution

Fairness is an important concept that influences many aspects of human society, from how people share food in hunter–gatherer societies to how people think the income tax system should work to how children decide if, when, and how to share with classmates. In economics and psychology, several research programs have focused primarily on one type of fairness concern: inequity aversion (Adams, 1965; Bolton & Ockenfels, 2000). Inequity aversion refers to individuals' tendency to respond negatively to being given too much (advantageous inequity aversion) or too little (disadvantageous inequity aversion) of a reward and therefore attempt to correct inequity (Fehr & Schmidt, 1999). These models argue that people object to inequity—being paid too little or too much for doing the same amount of work as others (Fehr & Schmidt, 1999).

Research on inequity aversion has demonstrated that people react negatively to inequity and take steps to reduce it by giving resources to others or taking resources from them (Cooper & Kagel, in press; Damon, 1977; Dawes, Fowler, Johnson, McElreath, & Smirnov, 2007; Eriksson & Simpson, 2011; Fehr & Schmidt, 2006; Pritchard, 1969; Schmitt & Marwell, 1972; Sweeney, 1990). In order to understand human inequity aversion while minimizing the potential influences of adults' formal education and socialization, researchers have moved to investigate questions of fairness in young children. Not only do young children have fewer years of exposure to formal education and religious training than adults, but they also are not exposed to complex theories about justice and fairness (e.g., Locke, Rawls), thereby providing a clearer test of humans' basic fairness concerns. Researchers have found that children, like adults, become upset when others receive more than them and reduce inequity by sharing resources with others who have less (Blake & Rand, 2010; Fehr, Bernhard, & Rockenbach, 2008; Hook & Cook, 1979; Sigelman & Waitzman, 1991). But do children and adults value equity per se? Or are actions that lead to equity driven by other social goals, such as helping those in need, preventing exploitation, avoiding disputes, or reducing competitors' advantages?

We examine the empirical support for inequity aversion, focusing specifically on research that has been done with children, to ask whether the work to date has supported the existence of inequity aversion, or if much of what has been termed inequity aversion may actually be several different mental concerns with distinct goals that are not always linked to equity. In doing so, we argue that there are at least three broad concerns that could result in the reduction of inequity: one for social comparison, designed to make individuals want to be better than others; one for social welfare concerns, designed to deliver benefits to others; and one for inequity aversion, whose design features have yet to be clearly established—an additional goal of the current article. Problematically, many past investigations of inequity aversion have confounded these different concerns. If inequity aversion is merely a combination of social comparison and social welfare concerns, then studying it serves no use over and above studying these two

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concerns by themselves. Conversely, if inequity aversion is a distinct cognitive concern, as we predict it is, then investigating it in situations where multiple concerns could motivate behavior will make it difficult to understand how inequity aversion develops, what factors influence its operation, and why such a concern may have evolved. Here we use a novel measure in which inequity aversion is the only plausible reason to avoid inequity. We did this in order to determine if inequity aversion is in fact a singular concern or just an amalgam of other concerns and to examine what factors influence this inequity aversion. Our measure minimizes social comparison and requires that children inhibit their social welfare concerns in order to avoid inequity. Although we discuss results on inequity aversion in terms of the existing developmental literature, we note that the adult studies are subject to these same criticisms—they investigate multiple concerns in most of their designs. Indeed, the engagement of multiple concerns in experimental designs may explain why there is so little within-subject consistency on supposed inequity aversion tasks (Blanco, Engelmann, & Normann, 2011).

In this article we use the term *inequity aversion* to refer to cases in which people want equal resources to be distributed to those who do equal work and cases in which individuals want those who do more work to be paid more than those who do less work. However, we recognize that giving resources equally to those who do equal work is consistent with both inequity aversion and inequality aversion, disliking unequal outcomes regardless of differences in work done.

Evidence for Disadvantageous Inequity Aversion May Be Better Explained by Social Comparison

Developmental research has indicated that, like adults, young children get upset when they get less than others and will attempt to correct these inequalities (Fehr et al., 2008; Harbaugh, Krause, & Vesterlund, 2007; LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011). Investigation of children's objection to having less has primarily involved forced choice scenarios in which children must decide between two possible outcomes for themselves and another person—one in which they receive less than the other person or one in which both get the same amount. As in research with adults, research with children has shown that they prefer situations with equal outcomes rather than those in which they receive less, with the tendency to reject unfair offers increasing with age (Harbaugh, Krause, & Liday, 2003). Although some investigations have found that children do not display robust objections to having less than others until about 7–8 years of age (Fehr et al., 2008), more recent studies have found that even preschoolers (age 4–5) will pay costs to reduce inequity by rejecting unequal offers in which they get less than another person (Blake & McAuliffe, 2011; Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010). Preschoolers, ages 3–5, also display negative facial expressions when they receive fewer stickers than another child does (LoBue et al., 2011). These negative reactions to others having more have been argued to demonstrate inequity aversion because individuals opt for equity over situations in which others get more.

However, there are several plausible reasons why children may dislike others having more than them that are unrelated to equity, such as frustration at getting less than expected or envy toward others based on social comparison. Research has shown that many animals—including humans, rats, monkeys, and pigs—experience what has been termed *the frustration effect*—becoming upset and more aggressive when they receive less of a reward than they expected, even when another agent is not receiving the better reward (for review see Abler, Walter, & Erk, 2005; Papini, 2003; Tinklepaugh, 1928). These negative emotional reactions to getting less than one expected have been suggested as a possible explanation for nonhuman primate objections to having less (inequity aversion)—nonhuman primates display strong negative reactions even if another agent is not present and will not receive the better rewards (Bräuer, Call, & Tomasello, 2006, 2009; Brosnan & de Waal, 2003; Chen & Santos, 2006; Roma, Silberberg, Ruggiero, & Suomi, 2006). To the extent that these negative reactions to getting less than expected are not explained solely by frustration, another reason individuals could object to getting less is social comparison based on a desire to obtain relative advantage. From both a practical and evolutionary point of view, individuals should want to be better than their competitors. Several species will take costs to themselves to make sure that others are worse off relative to them, which can create a selective advantage over competitors (Burt & Trivers, 2006; Clutton-Brock & Parker, 1995; Reynolds, 1994; Williamson & Black, 1981). Sometimes inequity aversion and the desire for relative advantage based on social comparison are used as synonyms (van Leeuwen, Zimmermann, & Ross, 2011), but clearly an aversion to "inequity" necessitates more than just wanting a competitive edge.

Concerns with having less than others exist in areas outside of resource sharing that are not likely to be mediated by an aversion to inequity. We know that human adults dislike being low in status in terms of intelligence, ability, and social recognition (Ellingsen & Johannesson, 2007; Festinger, 1954; Frank, 1985; Kirchsteiger, 1994; Mussweiler, 2003; Veblen, 1899/1922; Weiss & Fershtman, 1998). Children, too, appear to dislike having less than others in areas outside of resource sharing. For example, 6- to 12-month-old infants respond negatively when a parent's attention is diverted to a rival child (Hart, Field, DelValle, & Letourneau, 1998; Miller, Volling, & McElwain, 2000; Volling, Kennedy, & Jackey, 2010), and preschoolers compete with one another for attention and affection from their parents (Leung & Robson, 1991). Given that people have these negative reactions in nonresource domains, it is plausible that people have a generalized dislike for others being better than them based on social comparison that also applies to resource sharing.

Inside resource-sharing domains, social comparison often leads adults and children to be happy having more than, not the same amount as, others (Fershtman, Gneezy, & List, 2009; Frank, 1985; Veblen, 1899/1922). Adults often overspend on positional goods, items that derive most of their value from how much better they are than those owned by others (Frank, 1985; Hirsch, 1976), which is more consistent with social comparison, as these goods derive their value from giving a person a relative advantage over others. More important, individuals are usually much less willing to object to overpayment than underpayment for equal work (Adams, 1965; Sweeney, 1990), which appears consistent with social comparison but not inequity aversion, since the inequity is the same whether one has more or less. Preschoolers also appear to often be happy having more than others while being upset about having less. Although they will pay costs to make sure they do not have less than others (Blake & McAuliffe, 2011), they are considerably less

willing to pay costs to reduce inequity if they have more than others (Birch & Billman, 1986; Blake & McAuliffe, 2011; Fehr et al., 2008). LoBue and colleagues (2011) found a similar asymmetry in children's emotional reactions to inequity. These authors videotaped the emotional reactions of preschooler pairs (3- to 5-year-olds) to getting an unequal amount of stickers—one child received four, and the other received two. They found that while many of the preschoolers displayed negative emotional expressions to receiving less, few were upset at getting more. Because children express negative reactions only when the agent receives more (but not less), these results suggest that children's negative reactions to receiving less are not largely driven by concerns with maintain equity. It is possible that inequity aversion developed partly to prevent negative reactions based on social comparison in cooperative or ingroup encounters, which would explain why inequity aversion attenuates in competitive or outgroup environments (Fershtman et al., 2009; Tajfel, 1970).

It is certainly possible that a concern with equity exacerbates concerns with having less based on social comparison—one can be upset about being lower status than others and also be upset at the overall unfairness of having less. However, it is difficult to know if these equity concerns matter in situations in which frustration, social comparison, and inequity aversion can motivate behavior. Instead, experiments should examine inequity aversion in situations in which these other concerns conflict with inequity aversion.

In the studies reported here, we tried to eliminate the extent to which frustration or social comparison could be responsible for negative reactions to inequity by using a third party design and presenting children with situations in which individuals incur a cost to themselves to avoid inequity. This method allowed us to ask about the principle of inequity aversion in isolation from concerns with social comparison. Previous studies have controlled for social comparison in their investigations of inequality aversion, but their results could be explained by a different concern that also exists outside of concerns with equity: social welfare.

Evidence for Advantageous Inequity Aversion May Be Better Explained by Social Welfare Concerns

The existence of advantageous inequity aversion—being upset at having more than others—has been argued to be supported by two broad classes of studies: those in which individuals distribute resources equally between two recipients (Hook & Cook, 1979; Olson & Spelke, 2008) and those in which individuals share their own resources with someone who has less than them (Blake & Rand, 2010; Fehr et al., 2008). By about age 3, children tend to distribute resources equally when asked to share with two others (Hook & Cook, 1979). As they grow older, they begin to justify these distribution decisions by saying things like "because it's fair," with their justifications becoming more elaborate between the ages of 4 and 8 (Damon, 1977; Peterson, Peterson, & McDonald, 1975). Other research has shown that, like adults, 4- to 8-year-old children will share resources with others who have less than them and that the tendency to incur costs in order to give resources to others increases with age (Blake & Rand, 2010; Fehr et al., 2008; Moore, 2009; Rochat et al., 2009). These results have been argued to be evidence of inequity aversion because when a participant shares resources with a person who has less, the result is that there is less inequity between the participant and the recipient.

Concerns with equity are a plausible, though not exclusive, explanation for why individuals give resources to others who have less. Charness and Rabin (2002) proposed that people are more sensitive to social welfare preferences rather than inequity aversion when they decide when and how to give resources to others. Social welfare preferences are the desire to benefit those who are the least well off and to maximize resources given to others if the costs to do so are small (Charness & Rabin, 2002). We use this term *social welfare preferences*, which is similar to the folk notions of being charitable or generous to others, as well as the biological term *prosociality* to describe these tendencies. These social welfare concerns could be based in concerns with promoting reciprocity and positive relationships with others (Binmore, 2006; Trivers, 1971; West, El Mouden, Gardner, 2011). Giving resources to another person is consistent with both inequity aversion and social welfare preferences—one could give to others to minimize inequity or to help those who are currently not well off. Therefore, it is problematic to study inequity aversion in circumstances where social welfare preferences would lead to identical results. Indeed, research in adults, examining how adults split resources between themselves and two others, has indicated that much of adults' sharing with others is motivated more by social welfare concerns then by inequity aversion (Engelmann & Strobel, 2004; though see Fehr, Naef, & Schmidt, 2006). Also, given that young children and infants promote the welfare of others even in situations that do not involve resources (e.g., engaging in helping behavior and comforting others when they are distressed), such social welfare concerns could also motivate children's sharing behavior (Howes & Farver, 1987; Svetlova, Nichols, & Brownell, 2010; Warneken & Tomasello, 2006).

It is currently difficult to determine if children are really averse to inequity or just have social welfare preferences, because the majority of the experiments on children's sharing that support a dislike for having more than others (advantageous inequity aversion) have been zero-sum, that is, one person's gain necessarily means that another person will lose a resource. This zero-sumness is clearly problematic when one decides to share one's own resources with others (Fehr et al., 2008; Harbaugh & Krause, 2000) but is also a problem when an individual distributes a fixed number of resources to third parties (Hook & Cook, 1979). To see why this is true, imagine a person distributing four resources and she has currently given two to one child and one to the other child. She could decide to give the last one to the child with less because she wants things to be equal (inequity aversion) or because the marginal benefit is higher when helping out those with less (social welfare preference; Engelmann & Strobel, 2004). Additionally, the fact that children explicitly justify their decisions by using the word *fairness* (Damon, 1977) could be a post hoc justification. As countless studies in social and developmental psychology have demonstrated, children and adults are bad at introspecting why they behave the way they do (Haidt, 2001; Munakata & Yerys, 2001; Nisbett & Wilson, 1977; Zelazo, Frye, & Rapus, 1996).

There has been only one study that has controlled for both social comparison and social welfare preferences in order to investigate inequity aversion. Blake and McAuliffe (2011) placed children, ages 4–8, into dyads in which they received rewards distributed by an experimenter. One child (the decider) could accept or reject the

rewards given by the experimenter, and the other child could only observe. If the decider accepted the offer, both children got the rewards offered by the experimenter; if the decider rejected the offer, then both children got nothing. All children participated in an equity condition as a baseline for their rejections. In the equity condition, each child received one piece of candy and the proposer could choose to reject or accept this situation—not surprisingly there were almost no rejections in this condition. Participants were then assigned to either a disadvantageous or an advantageous inequity aversion condition. In the disadvantageous inequity condition, the decider was given one resource and the other child was given four. In the advantageous inequity condition, the decider was given four resources and the other child was given one. Again, the decider could choose to accept or reject the offer. Children participated in six of these trials. Blake and McAuliffe found that even the youngest children (age 4) showed robust disadvantageous inequity aversion, rejecting more often when they received one and the recipient was given four than they had in the equity condition. However, it was not until children were 8 years old that they showed advantageous inequity aversion, rejecting more often when they received four resources and the recipient was given one resource than they had in the equity condition. However, even the 8-year-olds did not reject at above-chance rates (three out of six trials).

Although Blake and McAuliffe (2011) controlled for many of the confounds we have mentioned, they introduced a different but important confound—the experiment included repeated trials and the recipient was present for all decisions, which means that children may have rejected inequality more in order to avoid recipients' negative reactions. We know from previous research that children react negatively to getting less than others (LoBue et al., 2011). Because Blake and McAuliffe presented children with multiple trials and showed the unfair distribution to both children before the proposer made his/her decision on each trial, children could have based their decision to reject advantageous inequity not on inequity but on wanting to avoid the recipients' negative facial expressions and/or scorn. For this reason, the majority of research investigating inequity aversion has been conducted in the absence of the recipient; it is clear that with the presence of the recipient several other motivations could inform one's decision—wanting to avoid conflict, a dislike for negative emotional expressions, trying to ingratiate oneself to a stranger, and so forth (Blake & Rand, 2010; Fehr et al., 2008). During our studies the recipients were not present at the time of decision and the participants made one-shot decisions to avoid these confounds.

Additionally, Blake and McAuliffe (2011) argued that objections to having more and objections to having less emerge at very different times in development, possibly because of differences in the cost of rejection or other self-interest. These authors argued that young children (under age 8) may differ in the extent to which they are willing to incur costs or inhibit self-interest to avoid inequity—in their experiment, rejecting when one had more would cost four resources, while rejecting when one had less would cost only one. To investigate whether this cost explains the age difference, we allowed children to reject inequity per se without cost, to investigate whether we would observe the same age difference when costs were eliminated.

The Current Studies

In a series of experiments, we investigated whether children favored maintaining equity over delivering benefits if doing so meant throwing a resource away, predicting that children would throw the resource away to avoid inequity. This measure is important because it rules out social welfare as a motivation for avoiding inequity, thereby providing a strong test of children's inequity aversion because in order to uphold equity participants had to direct an experimenter to throw away a resource, thus delivering fewer overall benefits (resources). Because previous research has demonstrated that even 3-year-old children respond negatively to others throwing away a third party's resources (Rossano, Rakoczy, & Tomasello, 2011), children's willingness to throw away a resource to avoid inequity provides a strong demonstration of inequity aversion. Additionally, we expected that having children make decisions in such a third party context (or throw away their own resources) would eliminate social comparison based on envy, as has been shown in nonhuman primates (Chang, Winecoff, & Platt, 2011).

In Study 1a we investigated if children would rather throw a resource away than see it distributed unequally, and in Study 1b we investigated the generalizability of the results across a different resource type and culture. In Study 2, we determined whether children avoided inequity to avoid creating conflict between the two recipients. One possibility is that children avoid inequity because they know that others get envious and therefore explicitly reason that it would be nicer to throw away the resource than create a fight between the recipients. We investigated this possibility in Study 2 and also investigated whether children's inequity aversion was based on a nonsocial preference for visual symmetry. In Study 3, we investigated if children would create inequality when one of the recipients worked harder or if they thought resources should be distributed equally regardless of work. This experiment allowed us to determine if children were inequity averse (they would allow unequal outcomes if one person had done more work) or are inequality averse (they wanted equal outcomes, regardless of who did more work). Finally, in Study 4, we determined whether children would even throw away their own resource to avoid inequity.

Study 1a

As a conservative test of inequity aversion in children, in Study 1a we asked children whether they would prefer to maintain equity by throwing away a resource or to use an equally plausible strategy—delivering an additional cost-free benefit to others. Children were told that two nonpresent strangers had completed the same task and that the children were to decide how many resources (colorful erasers) the strangers would receive as a reward. Participants were shown that each stranger had been given two resources and that one remained. Participants were then given the option of telling the experimenter to either throw away the remaining resource or give it to one of the recipients.

Here we investigated the development of inequity aversion in children ages 3–8. We separated the children into two age groups: 3- to 5-year-olds and 6- to 8-year-olds. We did this for two reasons. First, previous literature has found that children's fairness concerns are limited to a default tendency to place an equal

number of things in two buckets until the age of 6 to 8—not accepting inequality between recipients based on work until later (Sigelman & Waitzman, 1991). Because we assumed that this concern may be an important part of children's developing inequity aversion, we wanted to investigate one group of children who tend not to use work in order to decide how to share (the 3- to 5-year-olds) and another group of children who tend to (6- to 8-year-olds). Second, the age groups were also selected to allow comparison with the 3- to 5-year-old age group used by LoBue and colleagues (2011). As mentioned earlier, LoBue and colleagues had found that 3- to 5-year-olds object to having less but not to having more. We wanted to use our measure with a group of children who should not object to having more (3- to 5-year-olds) and also wanted to test older children, who might be developing an objection to having more. We expected that these 3- to 5-year-olds might have social comparison but not inequity aversion, so we thought it was worth testing these two different groups. Therefore, we expected to observe a difference at about age 6, but it is unclear why this age shift might take place.

Method

Participants. Participants included 20 children ages 6–8 (M = 7 years, 2 months; SD = 11 months; seven female) and 24 children ages 3–5 (M = 4 years, 6 months; SD = 10 months; 14 female).

Procedure. Children were read two brief scenarios (the inequity condition and the equity condition) in a within-subject design (counterbalanced for order). Children were first told

> Thanks for playing this game with me. Earlier today two kids named Mark (Ned) and Dan (Kyle) did a great job cleaning up their room, and we want to give them erasers as a prize. The problem is I don't know how many erasers to give them. Can you help me with that? Great.

In the inequity condition, participants were read

> You get to decide how many erasers Mark and Dan will get. We have these five erasers. We have one for Mark, one for Dan, one for Mark, and one for Dan. Uh oh! We have one left over.

The erasers were placed into small boxes (flat squares drawn in with a black marker) labeled with the letters *M* and *D* (to signify the names *Mark* and *Dan*) as the corresponding statements (e.g., one for Mark) were read by the experimenter. Children were then asked, "Should I give it to Dan, or should I throw it away?"

Children also participated in an equity condition. In the equity condition children were read the following:

> Two (other) kids named Ned and Kyle (also) did a great job cleaning up their room, and we also want to give them erasers as a prize. We have these four erasers. One for Ned and one for Kyle. Uh oh! We have two erasers left over.

Again, the erasers were placed into flat boxes (labeled *N* and *K*) as the experimenter read the script. The children were then asked, "Should I give one to Kyle and one to Ned, or should I throw them away?" In this condition participants were shown that the two recipients had each been given one resource as a reward and that the participants could distribute two additional resources, by either throwing them both away or giving one to each recipient—effectively having participants choose between both children getting one reward or both children getting two rewards. If participants were being driven by social comparison in the inequity condition—not wanting others to have more than them—or were merely intrigued by the option of throwing the erasers away, then they should prefer to throw the erasers away. If instead participants' preference in the inequity condition were being driven by inequity aversion, then we would expect them to give one eraser to each person in this equity condition.

Results

There were no gender differences in this or any of our subsequent studies, or even collapsed across all subsequent studies, so we collapse across genders for the remainder of this article. A binomial test on the inequity condition revealed that while the 3- to 5-year-olds showed no preference to throw a resource away (14 out of 24, $p = .54$), the 6- to 8-year-old participants preferred to throw away a resource than see it distributed unequally (20 out of 20, $p < .0001$). This result suggests that 6- to 8-year-olds are averse to inequity, even when it is pitted against an equally plausible alternate strategy of sharing more overall resources (at no cost to Mark—he received two resources irrespective of whether Dan received two or three resources). A binomial test on the equity condition revealed that both the 3- to 5-year-olds and 6- to 8-year-olds preferred to give two erasers rather than throw them away—3- to 5-year-olds (20 out of 24 gave the erasers, $p = .002$) and 6- to 8-year-olds (20 out of 20 gave the erasers, $p < .0001$). The fact that in this case the 3- to 5-year-olds performed like older children demonstrates that they are not unable to do the task. For the 6- to 8-year-olds, this equity condition militates against an explanation based on children being envious about not getting a reward themselves or simply liking the idea of throwing something away and supports the suggestion that children can and do display a tendency to share additional resources with others.

We then conducted a Yates-corrected chi-square test on the inequity and equity conditions, which revealed that children were more likely to throw the eraser away in the inequity condition than in the equity condition at the 3- to 5-year age group, $\chi^2(2, N = 48) = 7.20$, $p = .007$, and the 6- to 8-year age group, $\chi^2(2, N = 40) = 40.00$, $p < .0001$. This indicated that even 3- to 5-year-olds are willing to throw away resources more often if doing so avoids creating unequal outcomes. However, a Yates-corrected chi square test on the inequity condition in the 3- to 5-year-olds and 6- to 8-year-olds revealed that the 6- to 8-year-olds were more likely to throw the eraser away than the 3- to 5-year-olds, $\chi^2(2, N = 44) = 8.54$, $p = .004$.

Discussion

We found that children ages 3–8 will throw away a resource to avoid inequity but do not throw away resources when things will remain equal. One important finding here is that children are actually opting to throw a resource away so that no one else can use the resource, suggesting this behavior is not motivated by social welfare preferences. In most economic experiments, references to "destroying a resource" simply indicate that participants did not maximize gains for themselves or others (for review see Cooper & Kagel, in press). This is somewhat problematic because,

for example, in Blake and McAuliffe (2011) the children who rejected advantageous inequity could have been using sophisticated utilitarian reasoning, assuming it was better to forgo unfair rewards now so that other children could have the rewards later. Here children are opting to ensure that no one else can use the resource in question, which suggests that this behavior cannot be motivated by wanting to promote utility or social welfare. Instead children's behavior appears best explained by inequity aversion.

We also found a clear developmental trend, with the 6- to 8-year-olds throwing the resource away more than did the 3- to 5-year-olds. The 3- to 5-year-olds clearly like to give benefits to others, but it is unclear if they are strongly inequity-averse. Although these children were more likely to throw the resource away in the inequity condition, they did not throw the resource away at above-chance levels. It is unclear here why the 3- to 5-year-olds did not show the pattern displayed by the older children. One possibility is that they are just confused by the setup; however, their performance in the equity condition speaks against this possibility. Another possibility is that children begin with a strong preference for delivering benefits to others that competes with their developing inequity aversion (Damon, 1977; Peterson et al., 1975; Sigelman & Waitzman, 1991; for a review see Hook & Cook, 1979).

This research adds to the developmental literature by providing converging evidence that 3- to 5-year-olds may not have sophisticated fairness concerns that influence their behavior (aside from not adjusting their distribution behavior in response to recipient effort). Recently, Moore (2009) and Blake and McAuliffe (2011) have suggested that one may observe objections to having less before objections to having more because of the cost involved in objecting to having more—children have the same concerns with inequity, but the costs are prohibitive. However, our results demonstrate that, even without a cost to themselves, 3- to 5-year-old children demonstrate less inequity aversion than do their 6- to 8-year-old counterparts. It is unclear what develops in children during these times. Another possibility is that younger children have a stronger aversion to wasting resources or place a stronger value on being generous to others.

One difference between these two age groups is that 3- to 5-year-olds are usually preschoolers, whereas 6- to 8-year-olds are normally grade-schoolers. Experiences of different school environments could influence children's behavior through explicit socialization or, more interestingly, by exposing children to the demands of having to share limited resources with several different peers. We speculate that children may need to be exposed to several instances of others objecting to their unfairness before they develop their own internal inequity aversion concerns separate from their own objections based on social comparison. This explanation predicts that there may be differences between younger children (ages 3–5) based on whether they attend preschool, with those attending preschool being more likely to throw a resource away to avoid inequity.

Taken together, these results demonstrate that 6- to 8-year-old children are averse to inequity, like to benefit others, and will avoid inequity even if doing so means discarding a resource. When additional sharing resulted in unequal resource distribution, 6- to 8-year-old children threw away the resource to maintain equity. When equity was held constant, however, both groups of children opted to give extra resources to others. For the remainder of this article, we focus on the 6- to 8-year-old children because they clearly demonstrated inequity aversion in this paradigm.

Study 1b

One may question the generalizability of the results from Study 1a both in terms of the resources we used and in terms of the participants included; we address these concerns in Study 1b. In Study 1a, we only tested children in the northeastern United States, so it is unclear if these results generalize beyond the relatively high socioeconomic status (SES) children who attend science museums and schools in the Northeast. If inequity aversion is a primary concern and a part of typical development, then one might expect inequity aversion to exist cross-culturally, not only in wealthy children in the United States (Henrich, Heine, & Norenzayan, 2010). If, instead, inequity aversion is explicitly taught or an aspect of relatively high SES children in the United States's socialization, then one would not expect these results to extend to areas outside the United States or western Europe. To address this concern, we tested a group of lower SES children in South Africa.

Additionally, we wanted to investigate whether children's discarding of a resource to avoid inequity generalized to different types of resources. In order for our result to be theoretically important, children had to place some value on the resource we chose. In our first experiment we used colorful erasers that were shaped like sports balls, animals, and other fun shapes that children appeared to like, because they said things such as "Sweet!" "Yes!" and "Do I really get to keep these?" However, several past studies used candy rather than erasers (Blake & McAuliffe, 2011; Fehr et al., 2008; Moore, 2009), presumably because candy is a particularly highly valued resource to children. Would children still throw a resource away if the resource were a highly valued candy bar? We addressed this question in Study 1b by using full-sized Hershey bars.

Method

Participants. Participants included twenty 6- to 8-year-olds in South Africa (SA) who participated in a replication of Study 1a (M = 7 years, 10 months; SD = 10 months; eight female) and twenty 6- to 8-year-olds in the United States who participated in the candy bar condition (M = 7 years, 0 months; SD = 9.5 months; nine female). The SA sample was tested at a school in the greater Cape Town area. This school catered to students who were from working-class backgrounds and was affordable to most families where at least one parent was working (tuition was about R500, or about US$70, for the year). The school was approximately 65% Black and 35% Coloured (the official racial label in South Africa used to describe individuals who are from multiracial backgrounds).

Procedure. The procedure for the candy bar condition was the same as in Study 1a except that candy bars were used rather than erasers. The inequity SA condition and equity SA condition were the same as in Study 1a except the participants were drawn from a sample in South Africa.

Results and Discussion

Mirroring the U.S. results, a binomial test on the inequity SA condition revealed that the participants preferred to throw away a

resource (an eraser) rather than see it distributed unequally (16 out of 20, $p = .01$), while in the equity SA condition they preferred to give the two resources (erasers) to the recipients rather than throw them away (18 out of 20, $p = .0002$; see Figure 1). These results illustrate that the findings from Study 1a are not entirely restricted to higher SES participants from the United States—low SES children in South Africa demonstrated the same patterns. However, it is worth noting that South Africa is a relatively westernized and industrialized nation, so it is unclear if these results would generalize to societies without these Western values and technology.

A binomial test on the Candy Bar Condition revealed that children were also willing to throw away a candy bar to avoid creating inequity (18 out of 20, $p = .0002$). Thus, the tendency for children to throw away resources in order to avoid inequity is also not restricted to the specific resource we used in Study 1a (See Figure 1). However, we would like to note that although children will throw away a candy bar to avoid inequity, we do expect that resource value will eventually influence children's willingness to throw a resource away to avoid inequity—it is less likely that children would throw away an item of significant value (e.g., a computer) to avoid inequity. Previous research has shown that children share less equitably when the resource is something that they value highly (Blake & Rand, 2010). Whether one thinks about inequity aversion as an emotional reaction or as a social preference that constrains how one shares, there will clearly be trade-offs between satisfying one's emotional reaction or preference for equity and the costs involved (e.g., although one may have a preference for lobster, sometimes the price may preclude one from satisfying that preference).

For the remainder of this article we focus on children from the United States and use erasers as our resource in order to investigate the mechanisms behind inequity aversion and rule out alternative explanations for our findings.

Study 2

While the results from Studies 1a and 1b are consistent with theories of inequity aversion, there are at least two possible explanations for why the 6- to 8-year-old children avoided inequality in the inequity condition not attributable to inequity aversion. One possibility is that children do not really care about things being equitable but are concerned that the disadvantaged child will become upset because of getting fewer resources than someone else for the same work. Therefore, children could throw the resource away to prevent conflict between the children in our previous studies. In Study 1a it was ambiguous whether the children in the scenarios knew one another and/or if they would know how many resources they each had received from the participants. Therefore, since we know that children respond negatively when they receive less than others, participants may have been worried about sparking controversy between the recipients (LoBue et al., 2011). In Study 2 we replicated the method from Study 1a but made it clear that the two children would not know each other's payoffs, by telling participants that the two children did not know each other, had already left, went to different schools, and would receive their erasers in the mail—henceforth, called the inequity unknown condition. If children's responses in the inequity condition of Study 1a were based on a concern about upsetting the recipients, then children should not throw away the resource in this condition, because the two recipients would not know each other's payoffs. If, instead, as we predicted, their response from Study 1 was based on not wanting to create inequity, then children should still throw away the resource in this case.

A second alternative possibility is that children are not inequity averse but instead have a lower level preference for visual symmetry. We know that adults and even young infants prefer visual symmetry (Bornstein, Ferdinandsen, & Gross, 1981), and this preference could explain the results from the previous experiments. Although these nonsocial controls are often implemented in the animal literature in research on inequity aversion (Bräuer et al., 2006), no one to our knowledge has run a nonsocial control on children's inequity aversion. To determine whether a simple preference for visual symmetry might be responsible for these effects, in Study 2 another group of children were presented with a nonsocial version (henceforth the nonsocial control condition) of the inequity condition from Study 1. If a desire for visual symme-

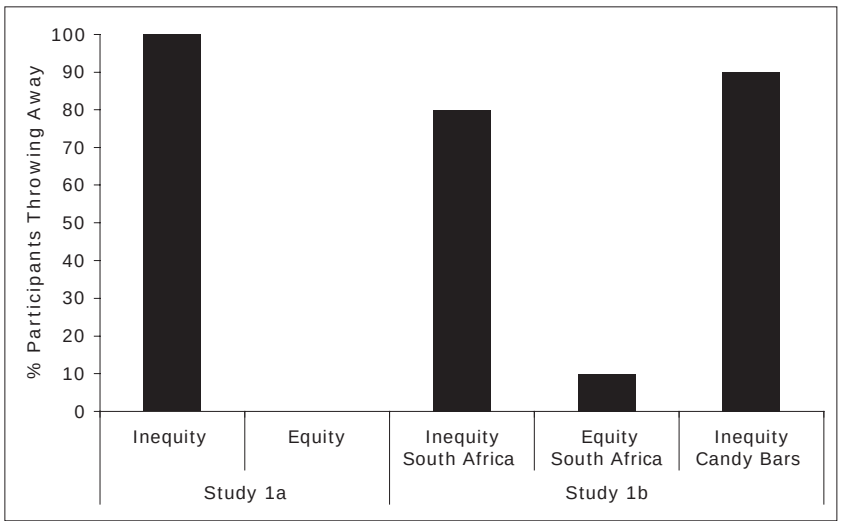

Figure 1. Percentage of participants choosing to throw away a resource in Study 1a and Study 1b.

try caused the results from the previous experiment, then children should still throw the resource away even if one of the squares represented a nonsocial entity.

Method

Participants. Participants included 6- to 8-year-olds: 20 in the inequity unknown condition ($M = 7$ years, 7 months; $SD = 9$ months; 11 female) and 20 in the nonsocial control condition ($M = 7$ years, 3 months; $SD = 11$ months; seven female).

Procedure. The procedure for the inequity unknown condition was the same as in Study 1a except that before the inequity condition children were provided with the following additional information:

> Mark and Dan do not know each other and go to different schools. Both of them left so Mark won't know what Dan gets and Dan won't know what Mark gets. We are going to mail them their erasers.

Children were asked the same question as in Study 1: "Should I give it to Dan, or should I throw it away?" They were also asked, "Do Mark and Dan know each other?" as a manipulation check. Additionally, when the experimenter mentioned throwing the eraser away, he motioned toward a trashcan. If the child opted to throw the eraser away, the experimenter threw the eraser into the trashcan (there were no erasers in the trashcan prior to each child's session).

The procedure for the nonsocial control condition was similar to that for the inequity condition of Study 1 except that now the scenario was framed in a nonsocial context. The experimenter said:

> Thanks for playing this game with me. We are going to put erasers in these boxes. The problem is I don't know how many erasers to place in each box. Can you help me with that? Great.
>
> All of the erasers we place in this box (pointing to the *M* square) will go to a boy named Mark who did a good job cleaning his room. All of the erasers we place in this box (pointing to *D* square) will not go to anyone. They will just sit in this box. You get to decide how many erasers we put in each box. We have these five erasers. We have one for this box and one for this box. One for this box and one for this box. Uh oh! We have one left over.

Children were then asked, "Should I put it in this box (*M* square), or should I throw it away?"

Results and Discussion

A binomial test on the inequity unknown condition revealed that participants again would rather throw away a resource than see it distributed unequally (17 out of 20, $p = .003$), even though it was clear that the potentially disadvantaged recipient would never know about the allocation of resources to the potentially advantaged recipient (19 out of 20 answered correctly that Mark and Dan did not know each other; $p < .0001$). Note that this result is not statistically different from the inequity condition from Study 1a, as revealed by a Yates-corrected chi-square test, $\chi^2(2, N = 40) = 1.44$, $p = .23$. In Study 2 we informed children that the two recipients could not possibly know each other's payoffs, and children still opted to throw away a resource rather than create inequity, as they had in Study 1a, suggesting children want to avoid creating inequity itself. Therefore, this experiment demonstrates that children share equally despite being told that the two recipients of their generosity will not know each other's payoffs, ruling out a slightly less interesting alternative based on children trying to avoid creating conflict between others based on social comparison. Additionally, children were willing to throw the resource away even when it would be placed into a trashcan, suggesting that they understood the resource was actually being wasted.

A binomial test on the nonsocial condition revealed that children preferred to give the eraser to someone rather than throw it away (16 out of 20, $p = .012$). Importantly, a Yates-corrected chi-square test revealed that children in the inequity unknown condition were more likely to throw the resource away than were children in the nonsocial condition, $\chi^2(2, N = 40) = 14.44$, $p < .0001$. When children faced the same decision as in Study 1 but believed that one of the recipients was a square on a piece of paper rather than a person, they switched from a clear preference for equal allocations to a preference for giving unequally, which rules out an explanation based on wanting to maintain visual symmetry (see Figure 2).

Study 3

The studies thus far suggest children have a rather robust desire to see resources distributed evenly; however, previous work has suggested that children do not always expect rewards to be distributed evenly. In cases where one person works harder, children distribute resources unequally (Damon, 1977; Sigelman & Waitzman, 1991). In this experiment we asked whether something about our method was moving children to especially value equality or whether this method was sensitive to different levels of merit. We used the same method as in the inequity condition of Study 1 but inserted a sentence revealing that one of the children had done more work than the other child—we called this the hard worker condition. We expected that if our method were tapping children's intuitions about equity and fairness, children should give more resources to the hard worker, rather than throw away the additional eraser, as they had in the previous studies (Damon, 1977). We also added a control condition in which we told participants that Dan was the experimenter's best friend in order to see if any piece of information about one of the recipients would make children more accepting of inequity (henceforth called the best friend condition).

Method

Participants. Participants included children ages 6 to 8 years old: 20 in the hard worker condition ($M = 7$ years, 2 months; $SD = 12$ months; seven female) and 20 in the best friend condition ($M = 7$ years, 3 months; $SD = 10$; 12 female).

Procedure. The procedure was the same as in the inequity condition in Study 1, but we added the sentence "Dan did more work than Mark" (hard worker condition) or "Dan is my best friend; Mark is not my friend" (best friend condition) immediately before stating, "You get to decide how many erasers Mark and Dan will get."

Results

A binomial test on the hard worker condition revealed that children preferred to give the additional resource to the recipient

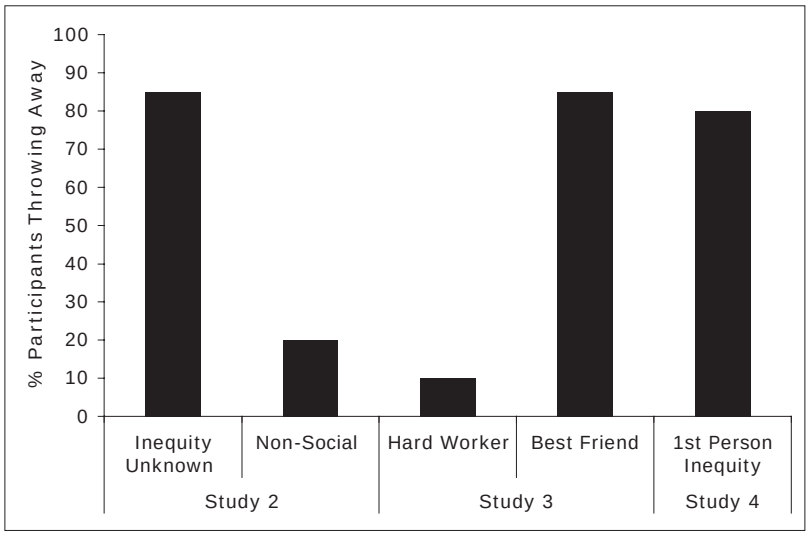

Figure 2. Percentage of participants choosing to throw away a resource in Studies 2–4.

who had done more work rather than throw away the resource (18 out of 20, $p = .0002$). A binomial test on the best friend condition revealed that children preferred to throw away the resource than give the additional resource to the recipient described as the experimenter's best friend (17 out of 20, $p = .002$). A Yates-corrected chi-square test revealed that children were more likely to throw away the resource in the best friend condition than in the hard worker condition, $\chi^2(2, N = 40) = 19.65$, $p < .0001$ (see Figure 2).

Discussion

Consistent with previous work (Damon, 1977; Hook & Cook, 1979; Leventhal, Popp, & Sawyer, 1973), children were able to use equity in their distributions—giving more to the person who did more work. We also added a control piece of information to ensure that children's fairness considerations were somewhat discriminating; children were not more inclined to allow inequity based on the fact that one of the recipients was the experimenter's best friend. These results suggest that children do not blindly apply equality but can use their more sophisticated equity concerns in our experimental paradigm.

Study 4

Thus far we have established that children are willing to throw away others' resources in order to maintain equity, but we have not demonstrated that children will take personal costs to themselves to avoid inequity in this way. Would children throw away a resource that could go to themselves? In Study 4 we presented children with the same dilemma as in Study 1a, but now children had to throw away their own resource in order to uphold equity.

Method

Participants. Participants included 20 children ages 6 to 8 years old ($M = 7$ years, 9 months; $SD = 10$ months; eight female).

Procedure. The first person inequity condition was similar to the inequity condition in Study 1a except that, in addition to first completing a nonrelated survey task, the participant in this study was assigned to be one of the recipients. In this study the participants were told

> Thanks for playing this game with me. We want to give you some erasers for doing such a good job answering questions. We want to give some erasers to you and to another little boy (girl) named Mark (Mary). The problem is I don't know how many erasers to give to both of you. Can you help me with that? Great.
>
> You get to decide how many erasers you and Mark (Mary) will get. We have these five erasers. We have one for you, one for Mark (Mary), one for you, and one for Mark (Mary). Uh oh! We have one left over.

Then children were asked, "Should I give this eraser to you, or should I throw it away?"

Results and Discussion

A binomial test on the first person inequity condition revealed that participants would rather throw away their own resource than see it distributed unequally (17 out of 20, $p = .003$; see Figure 2). That is, even when the resource could potentially go to the participant and the other child is absent, children were in favor of throwing away the resource to avoid inequity. Additionally, they were willing to sacrifice a resource that they knew would be wasted by being thrown in the trash. This is the first demonstration of children taking a cost to themselves in order to reduce inequity that cannot be explained by social welfare preferences or wanting to avoid upsetting another present child (Blake & McAuliffe, 2011).

General Discussion

By removing social comparison and pitting social welfare concerns against concerns with inequity, the studies reported here

provide an unambiguous demonstration of inequity aversion in children. Studies 1a and 1b demonstrated that children will throw away a resource in order to maintain equity. Study 1a found that children become more willing to throw away a resource to avoid inequity as they get older. Study 1b demonstrated that this destruction of a resource to avoid inequity is not restricted to children from fairly wealthy backgrounds in the United States or to the specific resource that we used. In Study 2, we found that children will still throw away a resource even if the two recipients do not know each other and will never know one another's payoffs, suggesting that children's decisions are not motivated simply by wanting to avoid upsetting the recipients. Study 2 further illustrated that children's decisions to throw resources away are based on the recipients' being social agents rather than on nonsocial concerns with visual symmetry. Study 3 demonstrated that children do not throw away a resource in order to maintain equity if one person deserves more of a resource as a result of doing more work, but they will still throw a resource away to maintain equity if the reason is illegitimate (based on partiality to one's friends). This latter finding also supports the claim that our method alone did not create the inequity aversion response observed in Studies 1 and 2. Finally, Study 4 provided the first demonstration that a child will take a cost (throw away their own resource) in order to avoid inequity.

We hope that our method can be used in a way similar to the now standard nonsocial controls in nonhuman research to ensure a further focus specifically on inequity aversion rather than a mixture of inequity aversion and other cognitive processes (e.g., frustration, social comparison, social welfare preferences). As we mentioned in the introduction, researchers who study nonhuman primates have long recognized that frustration based on expectation exists in the absence of equity concerns, and thus part of individuals' negative reaction to inequity could be motivated by frustration at seeing a better reward (Bräuer et al., 2006, 2009; Roma et al., 2006). Researchers interested in inequity aversion now routinely run nonsocial control conditions for these types of experiments and have found that in some species objections to getting less exist above and beyond this frustration effect (Range, Horn, Viranyi, & Huber, 2008; Takimoto, Kuroshima, & Fujita, 2010) and that in other species such negative reactions may be mostly explained by a frustration effect (Bräuer et al., 2006, 2009). The importance of these controls underlines the fact that including a broad class of negative reactions to getting less than one expects based on frustration is misleading because such a broad definition would include behaviors (e.g., the frustration effect) that are nonsocial (Papini, 2003) and not believed to connect to inequity aversion. Similar to the nonsocial frustration effect, we know people do in fact care about social welfare (Batson, 1991; Engelmann & Strobel, 2004) and are concerned with others getting more than them based on social comparison (Festinger, 1954; Mussweiler, 2003) in domains where equity is unlikely to motivate behavior. Therefore, just as researchers now use a nonsocial control condition in order to rule out concerns with frustration, methods similar to ours should be used to rule our concerns with social comparison and welfare.

Although we have found that inequity aversion exists in the absence of these other concerns, it is still difficult to know how to interpret previous results, because they confound these different cognitive processes. For example, experiments have found that canines and capuchins become upset at having less than others (Brosnan & de Waal, 2003; Range et al., 2008; Takimoto et al., 2010), but no research that we are aware of has shown any type of concern with equity per se (e.g., objections to getting more) in nonhuman animals. The current research could help to clarify the existent debate in the nonhuman animal literature because many of these articles have couched their research in terms of having demonstrated a concern for fairness or inequity aversion when in fact it seems more likely that they have demonstrated social comparison—being upset that another has more. It is less difficult to understand why an organism would be upset by having less than it is to understand why an organism would object to having more. Many organisms appear willing to take costs in order to gain relative advantage (Clutton-Brock & Parker, 1995), and understanding the cognitive underpinning of social comparison certainly will be linked to this desire for relative advantage. Social comparison is a large part of not only human life but other animal life as well (Festinger, 1954; Range et al., 2008; van Leeuwen, et al., 2011). However, lumping social comparison and inequity aversion together will make it difficult to understand either of these putative concerns in isolation.

An open question from this research is how inequity aversion develops in children. One possibility is that children are explicitly socialized and instructed to make outcomes equitable between recipients. While we do not deny that such socialization happens, this explanation alone is somewhat unsatisfactory, since children are often explicitly taught not to throw resources in the trash as well. Another possible way that children could develop inequity aversion is by recognizing that others get upset when they have less than others based on social comparison. Then children could later develop inequity aversion as a specific strategy for avoiding these negative reactions from others and occasionally generalize this reaction to other contexts when this strategy is unhelpful (when the two parties will not know the decision, as in Study 2). A final possibility is that inequity aversion was naturally selected for some purpose and that certain relevant experiences are necessary for these inequity aversion reactions to become instantiated. We favor this final possibility and spend the remainder of the discussion suggesting why inequity aversion may have evolved.

The present study offers results that demand new answers to the ultimate questions about why inequity aversion may have evolved. Our studies demonstrate that inequity aversion can result in the destruction of resources (in the absence of social comparison), suggesting that these concerns likely did not evolve solely for the purpose of gaining relative advantage or for the purpose of promoting cooperation, social welfare, or prosociality (Brosnan & de Waal, 2003; Fehr et al., 2008; Fehr & Fischbacher, 2004; Richerson & Boyd, 2005). Because this research nicely articulates the costliness of inequity aversion to individuals, it prompts one to look for benefits that one could obtain from such reactions. Social comparison cannot explain this behavior, since individuals are willing to throw away their own resource, which would prevent them from gaining a relative advantage; nor can social welfare concerns explain it, because discarding resources that could go to others appears counter to being generous or promoting overall utility. Unlike social comparison, which has a relatively straightforward evolutionary rationale (gaining/keeping relative advantage over others), it is unclear what benefits inequity aversion grants that would outweigh the potential costs. Individuals' tendency to

sacrifice their own resources to maintain equality is clearly costly in the first person case, but there are also costs in the third person case. By not giving an extra resource to another individual, one is potentially passing up the opportunity to create a new ally by showing preferential treatment to one individual at no cost to the other—which also means that an account based on reciprocity (Binmore, 2006; West et al., 2011) will fail to explain inequity aversion.

The question then is, what possible benefit does this apparently costly and socially disadvantageous behavior convey to an individual? One answer is that inequity aversion could potentially be advantageous if it signaled positive traits (i.e., I'm a fair guy) to others. Signaling is useful and important in situations in which one must convey an underlying trait that is not easily observable or would be too costly to investigate (Guilford & Dawkins, 1991). One problem with signals of unobservable qualities is that they can be easily faked if they are cost-free (Zahavi, 1975)—for example, anyone can say "I love you," but saying so does not make it true. One way to make a signal less likely to be faked is to make it costly, so that only individuals who actually have the underlying trait will be willing or able to pay the cost (Bird & Smith, 2005). One feature of such signaling models is that these costly signals should be displayed more prominently when other agents can observe these behaviors (Gintis, Smith, & Bowles, 2001). Therefore, if inequity aversion is for signaling, people should be more likely to value equity when others can observe their behavior. This appears at least partially true in adults; they will often act much less fairly (i.e., favor equity less) if they are not observed or if they are given some moral wiggle room in which they can be unfair without appearing unfair (Andreoni & Bernheim, 2009; Broberg, Ellingsen, & Johannesson, 2007; Dana, Cain, & Dawes, 2006; Dana, Weber, & Kuang, 2007; Levitt & List, 2007; Pillutla, & Murnighan, 1995; Reis & Gruzen, 1976). Whether children adjust their behavior in order to signal to others is an open question. Though our results demonstrate that children are inequity averse in the absence of the recipient, they may have still been signaling to an audience—the experimenter.

If these concerns with equity did evolve for the purpose of signaling, then the natural question is what trait does inequity aversion signal to others? Some possible explanations are that inequity aversion is selected in order signal to others that one is prosocial or to signal that one wants to promote social welfare. Our results seem to refute these possibilities because if this inequity aversion were about delivering benefits to others, then children should have given away the additional resource in order to demonstrate their prosociality. Another possibility is that inequity aversion evolved for the purpose of signaling that one is impartial to others, which does fit our results. DeScioli and Kurzban (2009b) argued that one oddity of human beings is that they value impartiality—unlike most species humans do not automatically side with their allies or kin. Clearly the world is full of cronyism and nepotism, but the shocking thing is that people ever act impartial, claiming to other concerns (e.g., morality, justice) rather than letting their allegiances decide who is right. Impartiality is an important part of justice, and people appear to highly value impartiality from both individuals and organizations (Rawls, 1971; Tyler, 1994). Impartiality thus appears to be an appropriate candidate for a behavior that one should signal, as it is clearly an unobservable trait that other human beings want to be able to assess. Impartiality also fits the other features of signaling. As outlined by Bird and Smith (2005), signaling should be favored when members of a social group vary in some underlying attribute or motivation (impartiality); observers can gain from accurate information about this motivation (they can selectively associate with individuals who are impartial), and signalers have a reason to deceive others. Specifically, if people can trick others into thinking they care about impartiality but do not, they can then create allies by giving resources to those they favor without inciting scorn for being partial.

People's potential desire to signal impartiality would suggest that it is not inequity itself but actually partiality that people are trying to avoid, with inequity being a proxy for this concern with appearing partial. Adults are more likely to accept outcomes, even those that go against their material interest, if the decision was reached using a fair procedure, such as a neutral third party (Tyler & Lind, 1992). Recent behavioral research has confirmed these self-report data; adults are more accepting of unequal outcomes if the outcomes were arrived at in a fair manner, in these cases via lottery (Bolton, Brandts, & Ockenfels, 2005). We know that children (by at least age 6) understand the difference between partial and impartial judges in terms of their objectivity (Mills, Al-Jabari, & Archacki, in press; Mills & Keil, 2008). However, there has been no research that has examined whether children are more accepting of unequal distributions, as adults are, if impartial procedures are used (e.g., flipping a coin). Additionally, this model predicts that children will use resource distribution as a cue to partiality, so that if an individual gives more to one person, then children should infer that the individual likes that person more. We know that adults engage in friendship masking, attempting to conceal how they rank their friends from others (DeScioli & Kurzban, 2009a). It is unclear if children too attempt to mask their allegiances as well. Future research should examine these possibilities, whether children's concerns are rooted in signaling, what their behavior is intended to signal, and, if it is intended to signal impartiality, what features lead others to think that an actor is impartial.

One important next step will be for research to determine if children's inequity aversion is influenced by concerns with signaling to others (i.e., do children want to be fair, or to merely appear fair). To do this, one could run experiments similar to those previously described except manipulate what the children think the experimenter knows. When the children think that the experimenter knows how many erasers everyone has (as they have in the previous experiments), children will likely be fair—throwing away the eraser away rather than giving it to themselves—as they did in the experiments described earlier. However, if children were led to believe that the experimenter thinks they have fewer resources than another child does, despite actually having the same number, it is unclear how the children would act. In these cases, one could clearly distinguish the desire to actually be fair (choosing to discard the eraser, as they did when they and the experimenter knew everything was equal already) from the desire to appear fair but not be (choosing to keep the extra resource so that they have more resources than the other child but appear to the experimenter to be equal). Finding that children are influenced by manipulations of the experimenter's knowledge would support an account based on children wanting to merely appear fair to others. Additionally these experiments would allow one to investigate an important

difference between social comparison and inequity aversion. Although negative reactions to getting more based on inequity aversion may go away when the experimenter has mistaken knowledge, one might predict fairly robust negative reactions to getting less based on social comparison even when the experimenter has mistaken knowledge. Future research will be needed to determine if these predictions are correct.

Additionally, future research should also investigate how the type of inequity aversion we have found here influences adult decision making. Although we did not test adults here, we expect that adults too would be willing to discard a resource to avoid inequity. However, we expect that adults who make judgments quickly would be more likely to throw a resource away to avoid inequity because of negative emotional reactions to inequity than would adults who make their decisions slowly and deliberately (Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008). That is, adults may override their negative emotional reactions to inequity and refuse to discard a resource to avoid inequity in an experimental context by using utilitarian reasoning. Greene and colleagues (2008) found that introducing cognitive load disrupted utilitarian judgments of morality, so it is possible that placing adult participants under cognitive load would similarly increase their likelihood of discarding a resource to avoid inequity.

While this research may generate more questions than it answers, it clearly indicates that, at least under some conditions, children will take drastic measures (throwing away a resource) to keep distributions equitable. We have provided an unambiguous demonstration that inequity aversion exists in children and demonstrated that many current theories for why inequity aversion exists may be incomplete. We have also provided one possible explanation as to why these concerns with inequity may have evolved. Finally, we have introduced a method to directly investigate inequity aversion specifically, in order to determine if the answer we have provided (inequity aversion is for signaling that one is impartial) or some other explanation can elucidate why inequity aversion evolved and how it works.

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