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RESEARCH ARTICLE

Children Demand an Equal Share of Worthless Objects

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ABSTRACT

A key milestone in the development of fairness is *disadvantageous inequity aversion*: a willingness to sacrifice valuable rewards to avoid receiving less than a peer. The equal respect hypothesis suggests that, in addition to material concerns, children are also motivated to reject disadvantageous inequity due to interpersonal concerns. To test this prediction, we investigated how young children ($N = 184$, ages 4–7) respond to receiving less of the objects they explicitly do not desire across three pre-registered experiments. We found that, from 4 years old, children are averse to receiving unequal offers of undesirable objects (Experiment 1) and are even willing to sacrifice a high-value reward to reject inequality of undesirable objects (Experiment 2). Children are less likely to refuse unequal offers of undesirable objects when the distributor provides a reason for giving them less (Experiment 3). Together, these studies demonstrate that interpersonal concerns play a key role in motivating the costly rejection of inequity.

1 | Introduction

From the ancient codes of Hammurabi and Ma'at, to modern-day concerns over growing economic inequality, humans across time and culture are deeply motivated to enact fairness (Johnston 2011). At the core of this legacy is a psychological aversion to being treated unfairly. This aversion manifests across many levels of behavior: from neural processing of reward inequity (Fliessbach et al. 2012) and evaluative preferences for resource distributions (Amir et al. 2023), to broader intuitions around equity in a society (Starmans et al. 2017). Similarly, the object of concern for our fairness intuitions varies across levels of abstraction. In addition to being concerned with immediate material outcomes (i.e., ensuring I get a fair split of a reward), we are also concerned with more enduring characteristics or principles that extend beyond a single outcome. For example, we consider whether someone's behavior signals they are appropriately impartial (Shaw 2013); whether they place equal weight on our welfare (Tooby and Cosmides 2008); and whether they respect us as an equal (Engelmann and Tomasello 2019). Broad intuitions about how one ought to be treated, in addition to intuitions about outcomes, allow for a flexible application of fairness concepts across a range of social contexts.

Given the importance of fairness for our collective success, it is not surprising that research on the ontogeny of fairness has uncovered early emerging intuitions about the distribution of resources (reviewed in Surian et al. 2025). By 4 months old, infants demonstrate a nascent expectation that agents distribute two items equally between two recipients (Buyukozer Dawkins et al. 2019). This expectation does not seem to be perceptually based, but demonstrates the beginning of a nuanced social expectation to treat parties equally: 4-month-old infants expect distributors to demonstrate fair intentions, regardless of whether the distribution is achieved or not (Geraci and Surian 2023a). Yet, these early fairness expectations are also limited, breaking down when the divided quantities differ in degree (how much each recipient gets) rather than quality (getting something versus getting nothing). In the subsequent year of life, infants' sense of fairness continues to become more flexible, extending to quantitative, relative differences in reward distributions, as well as differences in each recipient's deservedness (Buyukozer

Summary

- 4–7-year-olds reject unequal allocations of worthless objects despite not liking them (Experiment 1).
- Children even sacrifice a high-value reward to reject unequal allocations of worthless objects (Experiment 2).
- Children reject unequal allocations less often when given a reason for the unequal distribution by the distributor (Experiment 3).
- This suggests that interpersonal concerns play a key role in motivating the costly rejection of inequity, independent of material consequences.

Dawkins et al. 2019; Sloane et al. 2012). Importantly, infants' fairness intuitions are not mere expectations formed by observed regularities, but also valenced judgements of fair and unfair distributors. Infants preferentially reach for fair over unfair distributors (Burns and Sommerville 2014; Lucca et al. 2018); they associate verbal praise with fair actors and admonishment with unfair actors (DesChamps et al. 2016); and they selectively reward fair distributors and punish unfair ones (Geraci and Surian 2023b; Ziv et al. 2021). The child's social environment also shapes these early fairness expectations: infants' expectation of equality varies by whether or not they have siblings (Ziv and Sommerville 2017), and even flips to an expectation of inequality for infants raised in a small-scale, hierarchical pastoral society (Meristo and Zeidler 2022). Within the earliest years of human life, infants rapidly develop expectations for how others ought to be treated based on the social interactions surrounding them and judge actors who violate these expectations accordingly.

A key milestone in the development of fairness is not just forming expectations or judgements as a third-party, but a willingness to personally sacrifice in order to insist upon fair behavior. A widely used paradigm to evaluate if children have reached this milestone is called the inequity game (Blake and McAuliffe 2011). In this game, the experimenter "proposes" a division of rewards by splitting a pre-determined quantity of desirable goods in front of two children (e.g., cookies, candies, stickers). One child then chooses whether to accept or reject this offer. If they accept, both children receive the rewards in front of them. If they reject, neither child receives any of the rewards that were offered. Thus, when children reject unfair offers, they are paying a cost to insist upon fairness: they are sacrificing the rewards they could have received in order to protest unfair treatment. Children begin to make such costly sacrifices to avoid inequality that puts them at a disadvantage around the age of four (though age of onset varies by culture, Blake et al. 2015). This tendency has been referred to as *inequity aversion*, where both adults and children respond negatively to "being paid too little or too much for doing the same amount of work as others," (Shaw and Olson 2012, 1; Fehr and Schmidt 1999). Specifically, children's rejection of inequitable reward distributions that put them at a relative disadvantage has been labelled *disadvantageous inequity aversion*, or *DIA* (note that *DIA* is also influenced by cultural values around waste aversion, Zhang and Benozio 2021).

However, preschool-aged children do not always reject getting fewer rewards than others. First, children are sensitive to how a distribution is decided (often referred to as *procedural justice*). Children are less likely to protest against unequal outcomes created by a procedure that gives each person an equal chance, compared to outcomes created by a procedure that is rigged to always favor one recipient (Grocke et al. 2015). Second, children care whether they have agency or a voice in creating the outcome. When children themselves choose to create inequality that puts them at a disadvantage, they show no dissatisfaction with the outcome (Gordon-Hecker et al. 2022). Further, when a distributor gives a reason for their unequal distribution and asks children whether they agree, they are less likely to protest (Grocke et al. 2018). Importantly, the "reason" given is not a moral justification, but an idiosyncratic expression (i.e., "It's my birthday"), indicating it is more about acknowledging the child and providing a reason than the quality of justification given (Schmidt et al. 2016). Altogether, these findings suggest that children's sense of fairness is richer than a simple aversion against inequality or a preference for equality. Rather, this evidence suggests that children are sensitive to how another social actor considers them within a given context, going beyond preferences for fair procedures or fair outcomes.

In light of this evidence, Engelmann and Tomasello (2019) proposed that children's sense of fairness is motivated by a desire to be treated with equal respect. The so-called *equal respect hypothesis* proposes that children's responses to unfair behavior are grounded in a psychological mechanism concerned with equal interpersonal respect, rather than just a given distribution of material rewards (Darwall 1977). Specifically applied to the context of *DIA*, the *equal respect hypothesis* suggests that 4-year-old children are motivated to reject distributions in which they receive less than a peer because this distribution fails to communicate equal respect. In other words, children's objection to receiving less is motivated by the communicative content of the allocation (how the act of distribution reveals a lack of respect for the other), in addition to the material content of the allocation (how the distribution has resulted in getting less of a resource).

If the communicative content of an allocation plays a role in motivating children's objection to inequity, this makes at least two predictions. First, someone distributing objects unequally should cause children to reject even when the objects are not seen as resources or rewards. Though the items are worthless (i.e., the objects are not a "resource"), the act of giving one person less than another should still send a similar interpersonal message: that you are not considered equal to the other recipient. In contrast, if children are only motivated to reject "inequitable payoff distributions," within allocations (McAuliffe et al. 2013, 1), then a distribution of objects that holds no payoff to the recipient may not trigger costly rejection of inequity. We test this prediction in Experiments 1 and 2.

Second, children should consider how a distributor behaves toward them holistically when interpreting what a distribution communicates. If the distributor explicitly shows that they do in fact consider the child (e.g., by offering them an explanation), then children should be less motivated to reject unequal allocations. We test this prediction in Experiment 3.

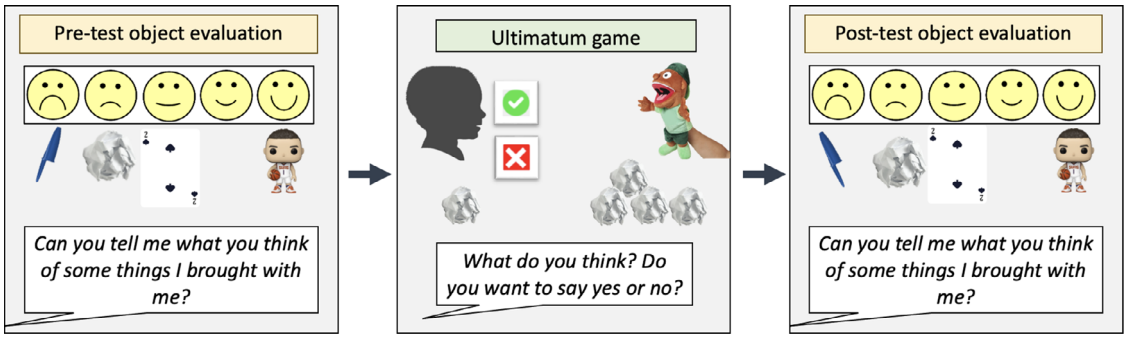

FIGURE 1 | Procedure of Experiments 1–3. *Pre-test object evaluation*: Children initially evaluated four objects, including the paper ball (to determine whether the paper ball was actually undesirable). *Ultimatum Game*: Next, children played an ultimatum game with a puppet, who, across six trials, offered three equal splits (1–1) in the equal offer condition, and three unequal splits (1–4) in the unequal offer condition. The middle box depicts the unequal offer condition. In Experiments 1 and 3, children could freely accept or reject the offered distribution. In Experiment 2, children had to sacrifice one of their stickers to reject. *Post-test object evaluation*: Finally, all participants repeated the object evaluation (to ensure that the act of distribution did not imbue the paper balls newfound value).

More specifically, across three pre-registered studies, we investigate 4–7-year-old children's responses to offers of crumpled-up paper balls from a recycling bin. Children were offered either a fair split of the trash balls (1–1, equal condition) or significantly less than the distributor (1–4, unequal condition) in a mini-ultimatum game. Experiment 1 tests if children reject unequal offers more frequently than equal offers, despite their lack of desire for the objects being distributed. Experiment 2 evaluates the strength of this motivation by increasing the cost of rejection. Experiment 3 tests whether children reject inequality less when the distributor explains that they know the child does not like the objects being distributed.

2 | Experiment 1

In Experiment 1, we investigated whether 4–7-year-old children are averse to inequality when the objects are undesirable to them. All participants completed the same general procedure (Figure 1). Condition (equal or unequal offer) was manipulated within-subjects, with three trials of each condition. Anonymized versions of recorded data, all analyses scripts, detailed procedures, and pre-registrations are available online at: https://osf.io/ntpdw/?view_only=e89c367f428a4fdd956965629da59ab5

2.1 | Methods

2.1.1 | Participants

Sixty-four 4–7-year-olds were recruited and tested at local museums and schools in the Bay Area, California. Participants were split roughly evenly across the age range (mean = 5.94, range = 4.10–7.96). An additional 15 participants were recruited but not included because of experimenter error ($n = 6$), they did not fit our target age range ($n = 2$), they refused to complete the warm-up task ($n = 5$), or lack of fluency in the experimenter's language (disclosed after the fact by the parent; $n = 1$).

Participant demographics were collected on a voluntary basis, reported by the parent of the participant using a Qualtrics questionnaire. Sixty-two of the 64 participants offered some portion of demographic information. Of the collected responses: 38% of the children identified as female ($n = 24$), 53% identified as male ($n = 33$), and 8% declined to answer this particular question ($n = 5$). From parent-reported ethnicity/race: 41% of the children were White ($n = 26$), 19% were Asian ($n = 12$), 11% were both Asian and White ($n = 7$), 6% were Hispanic or Latino ($n = 4$), 4% were Hispanic or Latino and African or African American ($n = 3$), 3% were African or African American ($n = 2$), 1% was Hispanic or Latino and White ($n = 1$), 1% was Pacific Islander ($n = 1$), and 9% preferred not to specify ($n = 6$). These parent-reported demographics can be found in the OSF repository under "raw data files."

Our target sample was decided through a power analysis on pilot data ($N = 25$) using the R package "simr" (Green et al. 2016). We used the PowerSim function to estimate the power to detect a main effect of trial type (fair/unfair) on participant response (accept/reject). This analysis yielded an estimated power of 95% at $n = 25$ participants to detect a main effect of trial type on children's rejection (95% CI: 90%–97%). To investigate whether children distinguish between fair and unfair trials, we set a target sample size of 64 participants, roughly evenly divided throughout our age range.

2.1.2 | Materials

Materials for this study consisted of: an illustrated 5-point Likert scale, 22 crumpled balls of white printer paper, a small blue recycling bin, 6 different puppets (varied in skin tone and gender characteristics), a small plastic yellow token, two small rectangular cardboard boxes, one rectangular piece of paper with a large blue check mark on it, one matched in size with a red X mark on it, a pen cap, a playing card, two toy figurines and a broken leaf.

2.1.3 | Procedure

To begin our pre-test object evaluation, the main experimenter (E1) led the participant to a table with a jumble of four objects, and our 5-point Likert scale. E1 explained that they wanted to "know what you think of some of the stuff they brought with them," and

proceeded to explain what each option on the scale indicated (e.g., "If you put something here, it means you really like it. Here means that you like it a little," and so on). E1 clarified by showing their own judgments of a dirty, broken leaf (placed below really do not like), and a toy alien (placed above really like). They then asked the child to place each object, one after another, in a pseudo-randomized order (four counterbalances, made so the paper ball appeared in each possible position within the order). If children placed any item in between two options, the experimenter asked for clarification (e.g. "Hm, did you want this to go here or here?").

After our pre-test object evaluation, E1 brought the evaluated objects and the child to a different table, where a second experimenter (E2) sat with a puppet and some colored blocks. E1 placed the objects from the object evaluation on the side of the table, so that they were not in the way of the main task, but also remained visible at all times. The puppet was introduced as Michael or Michelle and was matched in race and gender to the participant. To familiarize the child with the puppet, E1 explained that they were going to build blocks together.

The purpose of the block-building task was to allow the child to get comfortable responding to the puppet and to introduce the puppet as a child-like agent, rather than a source of authority (similar to prior studies examining spontaneous protest in children; Hardecker et al. 2016). The participant was told by E1 that the blocks had to go in a "super special order," and demonstrated that they had to alternate between the two colors. They then gave all of the blocks in one color to the puppet and the other color to the child, explaining that they "had to work together to build the tallest tower." The task then proceeded with the puppet and the child taking turns placing blocks. On the puppet's second and fourth turns, they made a minor mistake: either placing two blocks in a row of the same color, or taking the child's block off before placing their own. If the child did not spontaneously correct them, E1 would prompt them with "Oops, is that right? Can you help [Micheal/Michelle] fix it?" When all the blocks were placed, E1 cheered and congratulated them on building the tallest tower, then removed the blocks from the table.

The ultimatum game began with E1 giving one small box to both the child and the puppet, explaining, "this will be your box, and this is Michael/Michelle's." They then placed two rectangular pieces of paper in front of the child, one with a large red "X" mark on it, the other with a large blue "check" mark on it. They also placed a small yellow token directly in between the two rectangular pieces of paper. E1 explained that "for this part of our game, we are going to be splitting up these pieces of paper," and showed a small blue recycling bin to the child with 21 crumpled balls of paper inside of it. E1 then explained, "each time, you can use this special coin [holds up yellow token] to either say yes or no. If you put it here, [places token on check mark], that means yes. When you say yes, you get the pieces of paper in front of you, and Michael gets the pieces of paper in front of him. If you put the coin here [places token on X mark], that means no. When you say no, I'll take back the pieces of paper in front of both of you, so that neither of you get any that time."

The participant then went through 2–3 familiarization trials, mirroring prior inequity game designs (Blake and McAuliffe 2011). The experimenter told the child, "Let's practice, just to see how it works," and placed one piece of paper in front of both recipients, and asked the child to say yes or no. After they responded, E1 verbally described the choice and its corresponding outcome, for example, "Ok so when you put the coin there, that means yes. When you say yes, you get the pieces of paper in front of you [places the piece of paper in their box], and Michael gets the paper in front of him [places the piece of paper into Michael's box]." Then, E1 placed one paper ball in front of the puppet for the puppet, and none in front of the participant on the table. E1 again asked for their decision and demonstrated the corresponding outcome. After the second warm-up trial, if the child selected just one option for both of the first two warm-up trials (either both yes, or both no), then the experimenter placed a 1–1 split on the table and asked the child to select the unselected option "just to see what happens." Thus, before any test trials, the child had direct experience selecting both the accept and reject options and understood the outcome of both decisions. Finally, E1 reclaimed all the paper in both boxes, exclaiming, "Ok, now that we know how the game works, let's play for real this time."

The test trials then proceeded in blocks of three trials per condition (equal or unequal), with order counterbalanced between subjects. For the equal condition, E1 handed two pieces of paper to the puppet, and said "Look, I have two pieces of paper. Michael, I'll let you decide how to split these up between the two of you." The puppet said "Hm. I'll take this one, and you take this one, so I have one and you have one." For the unequal condition, E1 handed five pieces of paper to the puppet, and again explained they would let them split these up. The puppet said "Hm. I'll take this one, you take this one, and I'll take this one, this one, and this one. So I have four, and you have one." E1 looked away and appeared occupied while the puppet distributed the pieces of paper, and while the child selected a response. If the child did not respond spontaneously after the distribution, E1 would eventually prompt them with "What do you think? Do you want to say yes, or no?"

To mitigate negative feelings after being treated unfairly, the child was again given the blocks they used to build before. They were told that this time, they could build anything they wanted to. The experimenter and puppet both asked the child friendly questions like what their favorite animals were, and helped them build whatever they wanted to build. After about a minute or two playing with blocks, the child was once again taken over to the object evaluation table with our Likert scale. The procedure was the exact same as the pre-test object evaluation, except that E1 asked if they remembered how they used the scale to "how we felt about the things I brought with me." If they said no, E1 repeated a verbal description of each Likert scale option. If they said yes, then E1 would simply ask them to begin rating the objects again.

2.1.4 | Results

To evaluate the effect of trial type and age on children's rejection behaviors, we fit linear mixed effects models with a random slope of trial type and random intercept for participant ID. We then perform an LRT between models with and without a predictor term of interest to evaluate its effect on our outcome variable (e.g., a contrast between models with and without trial type as a predictor indicates the effect of trial type on children's decision to reject or accept an offer).

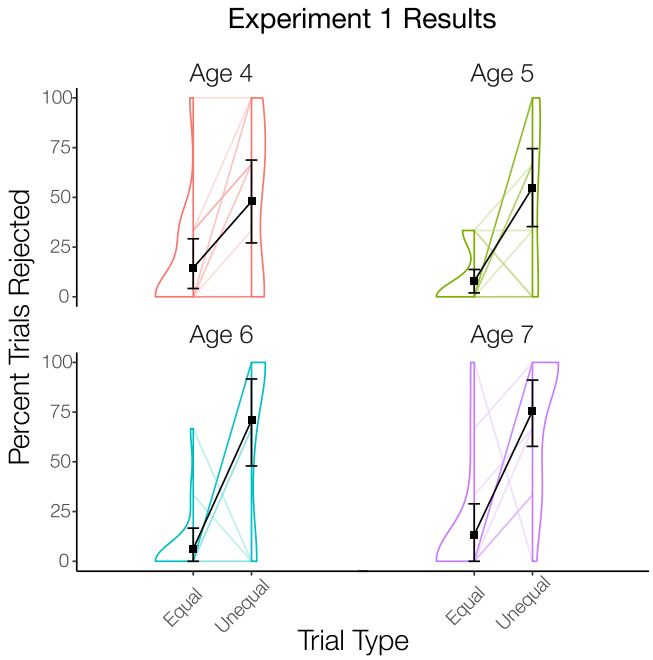

FIGURE 2 | Corset plots of Experiment 1 by age. The Y-axis shows the percent of trials rejected for each participant; the X-axis separates out responses by condition. Black squares represent mean rejections for each subgroup, with black bars showing bootstrapped 95% CIs around the mean. Colored density plots show the distribution of average responses, with faint colored lines indicating changes in average response for each particular child. Darker lines indicate overlap between changes in average response across children.

As predicted, children showed a strong tendency to reject unequal offers relative to equal offers ($\beta = -3.06$, $\chi^2(2) = 39.98$, $p < 0.01$; see Figure 2). This tendency became stronger with age (Age x Trial Type interaction: $\beta = 1.47$, $\chi^2(1) = 4.13$, $p = 0.04$), but even the 4-year-olds significantly differentiated between equal and unequal offers ($\beta = 2.98$, $\chi^2(1) = 20.35$, $p < 0.01$).

Children's pre-test object evaluations showed a low initial evaluation of the paper ball (mean = −1.00, SD = 1.20), which corresponds to "don't like it a little," on our scale. This rating did not systematically differ between pre-test and post-test as indicated by a Wilcoxon signed-rank test ($V = 146$, $p = 0.114$). Moreover, exploratory model analyses revealed that a significant effect of condition holds when excluding all children who evaluated the paper ball above the neutral point on the scale or when including initial object evaluations as a control predictor, and that the difference score between object evaluations did not predict children's propensity to reject an offer (see Supporting Information).

3 | Experiment 2

The results from Experiment 1 demonstrate that children are averse to receiving less of objects that they do not like or want. But how strong is this motivation? We test this in Experiment 2 by increasing the cost of rejection.

We investigated whether 4–7-year-olds are willing to sacrifice high-value rewards to reject unequal distributions of undesirable objects. At the beginning of our ultimatum game, children are given six valuable stickers. Children must sacrifice one of those stickers for each time they wish to reject an allocation. Anonymized versions of recorded data, all analyses scripts, detailed procedures, and pre-registrations are available online at: https://osf.io/ntpdw/?view_only=e89c367f428a4fdd956965629da59ab5

3.1 | Methods

3.1.1 | Participants

Forty-eight 4–7-year-olds were recruited and tested at local museums and schools in the Bay Area, California. Participants were again split roughly evenly across the age range (mean = 5.91, range = 4.12–7.98). An additional six participants were recruited but not included because they did not fit our target age range ($n = 4$) or they refused to complete the warm-up task ($n = 2$). Voluntary, parent-reported demographics can be found in the OSF repository under "raw data files."

Participant demographics were collected on a voluntary basis, reported by the parent of the participant using a Qualtrics questionnaire. Forty-two of the 48 participants offered some portion of demographic information. Of the collected responses: 45% of the children identified as female ($n = 19$), and 54% identified as male ($n = 23$). From parent-reported ethnicity/race: 48% of the children were white ($n = 20$), 21% were Asian ($n = 9$), 12% were Hispanic or Latino ($n = 5$), 4% were both Asian and White ($n = 2$), 4% were both Hispanic or Latino and Asian ($n = 2$), 2% were African American ($n = 1$), 2% were both Hispanic or Latino and "Other," ($n = 1$), 2% were both Hispanic or Latino and White ($n = 1$), and 2% chose not to answer this particular question ($n = 1$). These parent-reported demographics can be found in the OSF repository under "raw data files."

Our target sample was decided through a power analysis on pilot data ($n = 8$) using the R package "simr." We used the PowerSim function to estimate the power to detect a main effect of trial type (fair/unfair) on participant response (accept/reject). This analysis indicated that, with only eight participants, our model had an estimated power of detecting an effect of trial type to be 96.1% (95% CI: 94.71%–97.21%). In light of this power analysis, and the large effect of trial type in Experiment 1, we set a target sample size of 48 participants, roughly evenly divided throughout our age range.

3.1.2 | Materials

Materials for Experiment 2 were identical to Experiment 1, with the addition of six colorful, cute stickers of cats.

3.1.3 | Procedure

The procedure for Experiment 2's ultimatum game was nearly identical to Experiment 1, with a few key differences during the

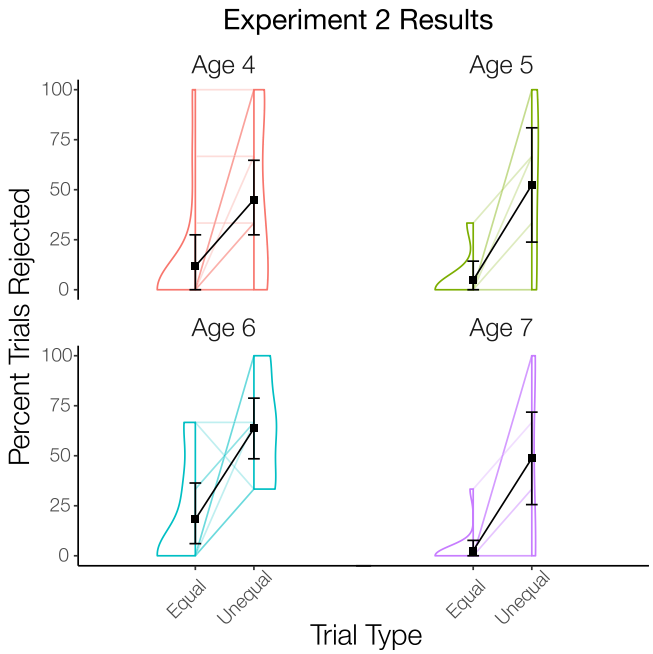

FIGURE 3 | Corset plots of Experiment 2 by age. The Y-axis shows the percent of trials rejected for each participant; the X-axis separates out responses by condition. Black squares represent mean rejections for each subgroup, with black bars showing bootstrapped 95% CIs around the mean. Colored density plots show the distribution of average responses, with faint colored lines indicating changes in average response for each particular child. Darker lines indicate overlap between changes in average response across children.

Ultimatum Game. First, after E1 handed out the boxes during setup for the game, they also handed the child six cute cat stickers, explaining that "Here! These are your stickers now." Second, while explaining the two response options, the child was told that "If you want to say no, you have to take one of your stickers and place it here [X mark]. When you say no, I'll take back the pieces of paper in front of both of you, and I'll also take the sticker [mimes taking the sticker away]." Third, at the end of the warm-up trials, the experimenter clarified that "just because this is practice, I'll give you this sticker back, but I'm going to keep it next time you say no."

3.1.4 | Results

Data for Experiment 2 were analyzed using identical methods to Experiment 1: mixed effects model contrasts between models with and without a predictor of interest.

As predicted, children again displayed a strong tendency to reject unequal offers relative to equal offers, even though rejection was costly ($\beta = 4.74$, $\chi^2(2) = 33.64$, $p < 0.01$; see Figure 3). There was no significant interaction of condition and age ($\beta = 0.37$, $\chi^2(1) = 0.96$, $p = 0.33$), though this may be a result of reduced sample size within this experiment rather than a true absence of developmental differences (Figure 3).

Results from children's object evaluations again indicate that they do not find the paper balls desirable, and that playing the inequity game does not reliably change their object evaluations. On average, children's initial rating of the paper ball was again "don't like it a little" (mean = −1.13, SD = 1.18). This rating again did not differ systematically during the post-game object evaluation ($V = 85$, $p = 0.71$). Further, as in Experiment 1, exploratory model analyses revealed that a significant effect of condition holds when excluding all children who evaluate the paper ball above the neutral point on the scale or when including initial object evaluations as a control predictor, and that the difference score between both object evaluations had no effect on predicting children's decision to reject an offer (see Supporting Information).

4 | Experiment 3

Experiment 3 tests if children reject inequality less when the puppet communicates that they know the child does not like the paper balls. If children reject only based on outcome or an automatic response to inequity learned from prior experience, then the puppet's explanation should not affect their response. On the other hand, if children's rejection is motivated by an opposition to what the distribution reveals about interpersonal consideration, then being offered this justification should decrease their rate of rejection. Anonymized versions of recorded data, all analyses scripts, detailed procedures and preregistrations are available online at: https://osf.io/ntpdw/?view_only=e89c367f428a4fdd956965629da59ab5.

4.1 | Methods

4.1.1 | Participants

We recruited and tested seventy-two 4–7-year-olds from local schools and museums in the Bay Area, California. An additional 19 participants were recruited but not included because they did not fit our age range ($n = 3$), they did not want to finish the game ($n = 9$), they refused to complete the warm-up task ($n = 2$), or because of experimenter error ($n = 5$).

Participant demographics were collected on a voluntary basis, reported by the parent of the participant using a Qualtrics questionnaire. Sixty-nine of the 72 participants offered some portion of demographic information. Of the collected responses: 46% of the children identified as female ($n = 31$), 51% identified as male ($n = 34$), and one parent declined to specify. From parent-reported ethnicity/race: 21% of the children were White ($n = 13$), 35% were Asian ($n = 22$), 15% were Hispanic or Latino ($n = 9$), 8% were both Asian and White ($n = 5$), 3% were both Hispanic or Latino and White ($n = 2$), 3% were African American ($n = 2$), 3% were Pacific Islander ($n = 2$), 2% were Pacific Islander and White ($n = 1$), 2% were Hispanic or Latino and African or African American ($n = 1$), 2% were Hispanic or Latino and Pacific Islander ($n = 1$), 3% identified as "other" ($n = 2$), and 3% identified as three or more races ($n = 2$). These parent-reported demographics can be found in the OSF repository under "raw data files."

We used the R package "simr" to run a power analysis based on pilot data ($n = 10$ piloted in the reason condition, compared to a random 10 participant sample from Experiment 1). We used

the powerCurve function to estimate the power to detect an interaction of trial type (whether an offer was equal or unequal) and reason (if children are given a reason or no reason), with a target power of >0.9. This analysis resulted in a target sample size of $n = 72$ participants in this study to detect an interaction of reason and trial type ($n = 36$ in each condition), with participants evenly distributed across our age range.

4.1.2 | Materials

Materials for Experiment 3 were identical to Experiment 1.

4.1.3 | Procedure

The procedure for Experiment 3 was again nearly identical to Experiment 1, with two key changes. First, the puppet was present during the pre-test object evaluation to note the child's evaluation of each object. After being briefly introduced to the puppet, pre-test object evaluation proceeded with the addition of the puppet repeating each evaluation verbally (e.g., "Oh, so you really like the card… Oh, so you don't like the piece of paper,").

Then, during the mini-ultimatum game, the puppet either offered a reason for their unequal offers (reason condition) or did not offer a reason for their unequal offers (no reason condition). When the puppet created unequal offers in the reason condition, they said, "Hm. Well, I know you don't like these at all. I'll take this one, and you take this one, and I'll take this one and this one and this one. So, I have four and you have one, because I know you don't like these at all." Meanwhile, the no reason condition and equal trials proceeded identically to Experiment 1. Although making unequal offers in the no reason condition, the puppet simply said, "Hm. Well, I'll take this one, and you take this one, and I'll take this one and this one and this one. So, I have four and you have one."

4.1.4 | Results

Data for Experiment 3 were analyzed using identical methods to Experiment 1 and 2: mixed effects model contrasts between models with and without a predictor of interest.

First, we found that a full model with trial type (whether the offer was unequal or equal) significantly outperforms a reduced model without trial type, indicating that the inequality of an offer largely predicts children's propensity to reject ($\chi^2(3) = 3.13$, $p < 0.01$). Similar to our results from Experiment 1, we also found that children become significantly more sensitive to unequal offers with age ($\beta = 0.51$, $\chi^2(1) = 3.91$, $p = 0.04$).

Children who were given a reason were less likely to reject unequal offers than children who were not given a reason, although this effect was only marginally significant in our pre-registered analysis ($\beta = -0.97$, $\chi^2(1) = 3.13$, $p = 0.07$). To evaluate whether this result reflects chance variation or a smaller effect size than we had anticipated, we performed an exploratory analysis combining the data from Experiments 1 and 3. Please note that the procedure for test trials in the no reason condition is the exact same between Experiments 1 and 3. This exploratory analysis indicated a significant effect of reason on children's sensitivity to unequal offers ($\beta = 1.05$, $\chi^2(1) = 5.16$, $p = 0.02$; *see* Figure 4). We found no evidence that children's sensitivity to the puppet giving a reason changes with age, evaluated through a three-way interaction between trial type, age, and reason ($\beta = -0.11$, $\chi^2(2) = 0.61$, $p = 0.73$).

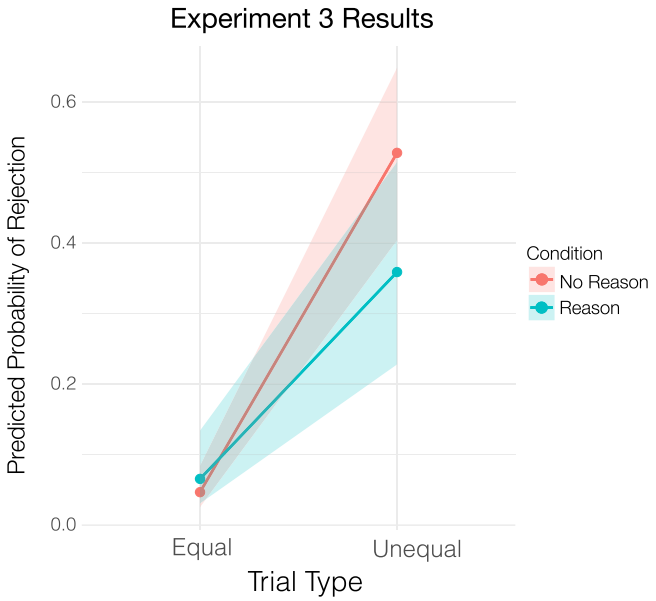

FIGURE 4 | The predicted probability of rejecting a trial based on trial type and reason using the combined dataset from Experiments 1 and 3. The Y-axis indicates the mixed effects model estimates for the probability of a child rejecting a trial. The X-axis indicates whether the trial is an equal or unequal offer from the distributing puppet. Color indicates whether the puppet gives a reason for distributing unequally on the unequal trials.

Results from children's object evaluations again confirmed that they found the pieces of paper to be neutral or below on our Likert scale at pre-test object evaluation (mean = −1.08, SD = 1.18). Children's evaluation of the pieces of paper did increase between pre-test and post-test (mean difference = 0.38), and this was marginally significant ($V = 262.5$, p value = 0.06). This trend is likely an unintended result of the puppet using the child's object evaluation as a reason to distribute unfairly. When children are given unfair offers in this experiment, half are told by the puppet that it is because they did not like the pieces of paper. Some children may adjust their object evaluations to avoid being treated this way in the future, or interpret this reason as an indication that they should have rated it higher.

5 | Discussion

The present study investigated children's motivation for rejecting inequitable allocations. In contrast to previous work, which used resources or rewards, we created inequity of worthless objects, distributing objects that the children explicitly did not like. We found that children continue to object to inequity in this context, and are even willing to sacrifice valuable stickers to do so. We

also found that children reject unequal outcomes less when given a reason for the distribution (i.e., "I know you don't like these"), indicating a sensitivity to how the agent treats them interpersonally. Our results build upon prior literature showing that a sense of fairness goes beyond fair outcomes (Dunham et al. 2018; Engelmann and Tomasello 2019; Gordon-Hecker et al. 2022; Geraci and Cancellieri 2024; Grocke et al. 2015, 2018; Jacobs et al. 2022; Shaw and Olson 2014), and provides evidence that children's aversion to inequitable outcomes is motivated by the communicative content of the distribution, not just the resulting material inequity.

Our findings emphasize the importance of interpersonal signals in understanding children's sense of fairness and lend support to the suggestion by Bliege Bird and colleagues that "the information conveyed through a prosocial act may be more important than the material content of the exchange" (Bliege Bird et al. 2018). A failure to center what is inferred socially, rather than salient task outcomes, may lead us to misrepresent the underlying computations guiding children's decisions in the context of fairness. Our results suggest that formalizations that take quantitative, relative payoffs as their exclusive inputs may fail to comprehensively capture children's sense of fairness. In our study, children place neutral or no utility upon the objects being distributed, yet still object to being offered less than someone else. This is an important point, as a quantitative reward division seems to lend itself directly to utility calculations, which are often used in computational models of moral emotion (Tooby and Cosmides 2008; Sell et al. 2017). Our results suggest that this may be a misleading parallel or, at the very least, that calculations of utility in psychological theories of fairness must account for more than how much reward the recipient derives from their end of the allocation.

On the same note, our results suggest that children are sensitive to signals that the distributor considers them. In Experiment 3, the puppet demonstrates that treating the child unfairly requires justification (e.g., saying "I know you don't like these"). Offering the child a reason indicates that the distributor takes the child into account, that is, respects them; otherwise, they would have no motivation to offer an explanation for unfair behavior. In other words, while the puppet ultimately still creates an unfair outcome, the act of giving a reason signals a degree of consideration for the child. Similar to other work where the distributor offers children a justification (Grocke et al. 2018; Schmidt et al. 2016), we found that children reject unequal offers less when given this form of recognition. Additionally, this finding aligns with research done outside of fairness, showing that inferred consideration of other parties influences children's social evaluations (Zhao et al. 2021). Our study leaves open whether the content of a distributor's reason matters for demonstrating consideration of the child. We do not know if it is important that the distributor specifically acknowledges the child's low evaluation of the object in Experiment 3, or if other reasons would have a similar effect. On the one hand, it is possible that the simple act of giving a reason signals some degree of respect for the recipient, and young children may be relatively insensitive to the quality of the reason given (Schmidt et al. 2016). On the other hand, it seems likely that there are some reasons that signal the exact opposite of equal respect, and thus may increase rates of rejection even in young children—such as saying "I get four and you get one, because you are bad and I don't like you." We hope to explore this direction in future research. Finally, we wish to highlight that the effect of a distributor giving a reason was marginally significant in our preregistered analysis. Although our exploratory analysis indicates that the effect is not a result of chance variation (see Experiment 3 Results), more research is needed to understand the degree to which reason-giving modulates children's rejection of inequity.

Our study also opens up questions about what features of a social context trigger children's sense of fairness. In part due to historical ties with behavioral economics and evolutionary theory, research on children's fairness has nearly exclusively focused on how children respond to the distribution of resources, translating money and food to child-friendly parallels. Although prior research has manipulated how much children value the rewards that are being distributed (Blake and Rand 2010; Carpenter et al. 2005; Sheskin et al. 2016), the "lower value" items used in these studies are still desirable to the child. Meanwhile, we found that children show similar rejection of inequity when the objects are not resources nor rewards: they are crumpled balls of paper which the child does not like. This raises questions about whether early fairness intuitions specially apply to resources (items-of-use or value), or if any form of differential treatment between two parties may trigger 4-year-old's early sense of fairness. In support of the latter possibility, a recent study by Huff et al. (2025) demonstrated that 5-year-old children condemn inconsistency in norm enforcement. Their results show that children approved of blanket forgiveness or consistent punishment for transgressors, but disapproved of unequal enforcement without valid justification. This provides additional evidence that preschool age children's sense of fairness applies beyond object distribution, and that a concern for equal respect or impartiality may underlie children's fairness intuitions across a range of social contexts. However, more research is needed to determine if fairness concerns are guided by a single shared mechanism across domains, or by distinct psychological processes, and precisely what features of a context such a mechanism may be sensitive to.

The interpretation of our results crucially depends on children's neutral or negative evaluation of the paper balls being distributed. It is possible that children nevertheless view the paper balls as "resources," despite these evaluations. This explanation begs the question of what defines a resource outside of the object's value to the recipient. One plausible explanation might be the act of distribution between social agents: even from infancy, children distinguish between giving and taking actions when directed at animate agents, showing a special ability to represent the social exchange of objects (Tatone et al. 2015; Tatone and Csibra 2024). Further, infants understand these giving actions as indicative of an equality-based relationship between the two individuals (Thomas 2024). In the same way, preschool-aged children may possess specialized intuitions about "things which are passed out by person to person," independent from their own evaluation of the objects or what the objects communicate about social attitudes. From this perspective, disadvantageous inequity may be an automatic response to an unequal number of objects given to two social agents. Applied to our results, this view provides a reasonable alternative account of children's behavior in Experiments 1 and 2, but not in Experiment 3. This account also leads to an interesting prediction. If young children apply disadvantageous inequity aversion to any objects passed out by a

social agent, they ought to reject receiving less of the objects that they see as highly aversive (e.g., something they think is really gross or bad). Meanwhile, if children are actively interpreting the communicative signal revealed by a distribution, they may understand the distribution of aversive objects as a punishment and no longer reject receiving less. We hope to explore this possibility in future research.

We do not want to claim that object value or material outcomes do not matter to children. Children often care about the value of the material being distributed and consider material circumstances when evaluating the fairness of an action. For example, preschoolers show a baseline aversion to receiving less of a valuable reward than they wanted (McAuliffe et al. 2013). Additionally, when presented with various different toys to distribute, children will distribute equal amounts to appear fair, but keep the best toys for themselves (Sheskin et al. 2016). Moreover, as children grow into middle childhood, they increasingly consider a giver's pre-existing wealth and whether the recipient needs, or simply wants, the resource being distributed (Acar and Sivis 2023; Elenbaas 2019; McCrink et al. 2010; Rizzo et al. 2016). Here, we investigated whether young children's insistence upon fairness continues when the objects allocated are worthless to them, as it offers a test for their underlying motivations. Our results suggest that the lack of respect demonstrated by giving less is sufficient to cause costly rejection of inequity, but they do not speak against material consequences and outcomes being important to children in a broader sense.

We also want to emphasize the importance of social norms in children's response to unfairness. Experiment 3 demonstrates that the rejections in our study are not motivated by norms of equality alone, as children reject less often when given a reason for the unequal offer. Moreover, several studies suggest that children's response to unequal offers is sensitive to social factors that are orthogonal to whether or not the outcome fits expected norms (Dunham et al. 2018; Gordon-Hecker et al. 2022; Grocke et al. 2015, 2018). However, adherence to normative moral standards is one of the primary ways in which we demonstrate respect for one another. Respect in this context entails giving appropriate consideration to the equality of persons; what is appropriate is culturally and normatively defined (Morasse et al. 2022; Meristo and Zeidler 2022; Schafer et al., 2015). Norms are crucial to forming expectations of how you ought to be treated and informing our objections when others fail to live up to these standards.

Finally, although our findings are in line with the *equal respect hypothesis*, there are alternative theoretical interpretations that we wish to address here. First, children's responses in the present study are also consistent with an aversion to impartiality (Shaw 2013). A disposition to protest against impartial actors may result in rejection of worthless objects, similar to what we observe in the present study. Thus, while our results emphasize the importance of the social signal revealed by a distribution, they do not adjudicate between different mechanisms describing the precise content of this social signal (Engelmann and Tomasello 2019; Shaw 2013). Relatedly, there is a version of inequity aversion which is compatible with these theoretical perspectives and our current results. If inequity aversion refers to an aversion to inequitable consideration or inequitable interpersonal treatment more broadly, this goes well with the *mutual respect hypothesis* and with an aversion to impartiality.

Altogether, our results demonstrate that children are averse to inequity of worthless objects (Experiments 1 and 2), and that this aversion is moderated by being given an explanation by the distributor (Experiment 3). We suggest that these findings indicate that preschool-aged children's sense of fairness is grounded in a demand to be considered as an equal, not just a demand for equal resources. This perspective explains why children are so dedicated to saying no to receiving less of an object they do not desire, and it also accounts for why other task features such as agency, justification, and procedure influence their fairness responses (Dunham et al. 2018; Gordon-Hecker et al. 2022; Grocke et al. 2015, 2018; Shaw and Olson 2014). The present study sheds light on the psychological mechanism underlying children's sense of fairness and represents a first step toward broadening research on the development of fairness. By doing so, we hope to better account for the breadth of experiences in which we insist upon fair treatment from those around us.

Author Contributions

Colin Jacobs: conceptualization, methodology, investigation, writing – original draft, writing - review & editing, visualization, formal analysis. **Sebastian Grueneisen**: conceptualization, writing - review & editing, methodology. **Harriet Over**: conceptualization, writing – review and editing, methodology. **Jan M. Engelmann**: conceptualization, writing – review and editing, methodology, supervision.

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Ethics Statement

The following research was appropriately reviewed and approved by the UC Berkeley Committee for Protection of Human Subjects (CPHS): #2019-10-12605.

Conflicts of Interest

The authors declare no conflicts of interest

Data Availability Statement

All pre-registrations, procedures, supplemental information, data analyses, and de-identified raw data are available on OSF at: https://osf.io/ntpdw/?view_only=e89c367f428a4fdd956965629da59ab5

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.

Supporting File 1: desc70062-sup-0001-SuppMat.docx