Procedural (in)justice in children:

Children choose procedures that favor their ingroup

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Acknowledgments

We would like to thank the International Centre for Life in Newcastle, Eureka! The National Children's Museum in Halifax, the families who participated and Bethany Fisher for second coding the data.

Funding

Harriet Over was supported by a Philip Leverhulme Prize. The Leverhulme trust was not involved in decisions about study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

Data availability

The data that support the findings of this study are openly available at Open Science Framework (https://osf.io/2t9cu/?view_only=6be8a5d010b948d78142862637dcf7b8).

Ethics and Integrity

Declarations of interest: none.

The research presented in this paper was approved by the ethics committee of the Department of Psychology, University of York.

Abstract

Research has shown that ingroup bias and concern for procedural justice both emerge early in development; however, these concerns can conflict. We investigated whether 6- to 8-year-old children are more influenced by procedural justice versus ingroup favoritism in a resource allocation task. In our first study, children played a novel spinner game in which they chose between fair, ingroup favoring and outgroup favoring procedures to decide if a resource would go to an unfamiliar ingroup or outgroup recipient. We found that 6- to 8-year-olds overall chose ingroup favoring procedures. However, this tendency decreased with age – whereas younger children were more likely to select procedures that were advantageous to their ingroup, older children (7- and 8-year-olds) mostly chose fair procedures. Our second study investigated the motivations underpinning children's choices by testing whether children's fair procedure choices were in part driven by a desire to appear fair. Here we varied whether children made procedure choices in public, allowing them to manage their reputation, versus in private, where reputational concerns should not guide their choices. We found that between ages 6 and 8, children chose ingroup favoring procedures, and that this tendency was slightly stronger when choosing in private. Taken together, our research suggests that ingroup favoritism often trumps procedural justice in resource allocation tasks, especially for younger children and especially when reputation is not in play.

Keywords: fairness, intergroup bias, ingroup favoritism, resource allocation, procedural justice, reputation management.

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Successful cooperation within a group relies on individuals being able to agree on how to distribute resources (Grocke, Rossano, & Tomasello, 2015). A fair distribution of resources can be achieved in one of two fundamental ways (Dunham, Durkin, & Tyler, 2018; Grocke et al., 2015). In distributive justice, the focus is on outcome - individuals are directly allocated the resources they deserve. In procedural justice, the focus is on process. A procedure is typically thought to be fair if each individual has an equal chance of receiving resources (i.e., the procedure is *impartial*), even if using the procedure produces unequal outcomes (Grocke et al., 2015; Shaw & Olson, 2014). Using *fair* procedures is thought to demonstrate equal respect and can therefore contribute to conflict avoidance and higher satisfaction with unfavorable allocation outcomes by those affected (Engelmann & Tomasello, 2019; Grocke et al., 2015; Tyler, 2000). Procedural justice is an integral component of contemporary Western society. Principles of procedural fairness are codified in national constitutions and international conventions, and people's judgments about procedural fairness influence their satisfaction and compliance with legal authorities, court proceedings, and police interactions, as well as their evaluations of leaders and political candidates (e.g., Rasinski & Tyler, 1988; Sunshine & Tyler, 2003; Thibaut & Walker, 1975; Tyler, 2003; Tyler, Rasinski, & Spodick, 1985).

However, in adult society, concerns for procedural justice are often undermined by intergroup bias. For example, many Republicans believe that established election procedures were not applied fairly in the 2020 US presidential election, while Democrats typically affirm that the election process was fair (Pennycook & Rand, 2021). Importantly, having voted for a losing candidate has been found to relate to lower levels of trust in the political system and the government, as well as lower satisfaction with democracy and perceived legitimacy of the elected leader (Craig, Martinez, Gainous, & Kane, 2006). The fair application of criminal justice procedures is also often

undermined by intergroup biases including systemic racism (e.g., Blair, Judd, & Chaplean, 2004; Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006). The influence of intergroup bias on procedural justice can thus have grave social consequences. To date, the majority of developmental research has focused on children's emerging sense of distributive justice but increasingly research attention is turning to the development of procedural justice as well (Dunham et al., 2018). Following a brief review of important findings from this work, we explore how children weigh concerns for procedural justice and ingroup favoritism.

Distributive justice in development

Developmental research has shown that, all else being equal, children have a strong preference for equal distribution outcomes. For example, young children tend to allocate the same number of resources to all potential third-party recipients (e.g., Chernyak & Sobel, 2016; Kenward & Dahl, 2011; Olson & Spelke, 2008). Indeed, by age 6, children will discard a resource in order to ensure an equal outcome between two third parties (Shaw & Olson, 2012; but see Paulus, 2015). Even infants expect equal others to receive the same amount of resources and prefer distributors who share fairly (Geraci & Surian, 2011; Schmidt & Sommerville, 2011; Sloane, Baillargeon, & Premack, 2012), and 3-year-olds respond negatively to observing unequal allocations (LoBue, Nishida, Chiong, Deloache, & Haidt, 2011).

At least by the age of 5, ingroup favoritism competes with a desire for fair outcomes (Killen, Elenbaas, & Rizzo, 2018; Killen, Elenbaas, Rizzo, & Rutland, 2017; Killen & Stangor, 2001; Theimer, Killen, & Stangor, 2001). Children are often more generous toward members of their own social groups, especially when sharing is costly or resources are scarce (Dunham, 2018; Dunham, Baron, & Carey, 2011; Fehr, Bernhard, & Rockenbach, 2008; Olson & Spelke, 2008; Yazdi, Heyman, & Barner, 2020). Eighteen-month-old infants already expect distributors to give more to ingroup than outgroup members when resources can't be shared equally (Bian, Sloane, & Baillargeon, 2018). By

two-and-a-half years of age, children have been found to offer a toy to a native speaker much more frequently than to a foreign speaker (Kinzler, Dupoux, & Spelke, 2012). Race- and gender-based sharing preferences emerge a bit later (Kinzler & Spelke, 2011) but have been documented as early as age 3 (e.g., Dunham et al., 2011; Renno & Shutts, 2015; Shutts, 2015; Zinser, Rich, & Bailey, 1981). Fehr and colleagues (2008) further found that between ages 3 and 8 children were increasingly willing to give up a resource in order to share fairly with a child from their kindergarten or school, while this willingness decreased slightly for outgroup peers. It thus seems that older children make increasingly prosocial choices for ingroup members but not for outgroup members, leading to strong intergroup bias in sharing at age 7 or 8.

Even membership in novel and minimal groups has been found to bias children's sharing behavior (e.g., Dunham et al., 2011; Sparks, Schinkel, & Moore, 2017; Vaughan, Tajfel, & Williams, 1981). This research has shown that, at times, children will even harm outgroup members by giving them resources they don't want (Benozio & Diesendruck, 2015), giving them undesirable resources (such as spiders) even though they could have relinquished them to a box (Buttelmann & Böhm, 2014), and by preventing them, at a cost, from accumulating resources (Sparks et al., 2017). Following a similar developmental trajectory to children's sensitivity to real world groups, ingroup favoritism in children's sharing in minimal group contexts seems to increase in middle childhood (Buttelmann & Böhm, 2014; Fehr et al., 2008).

Procedural justice in development

Recent research has shown that, like adults, children not only care about outcomes, but also about how these outcomes are brought about. For example, children are more willing to accept distribution outcomes they dislike when they believe the allocation procedure was fair (Grocke et al., 2015), and they choose fair over unfair procedures for third-party allocations when both recipients are equally deserving (Dunham et al., 2018; Shaw & Olson, 2014). What is more, when concerns for distributive and for procedural justice conflict, children aged between 4 and 8 years old often

prioritize procedural justice. Shaw and Olson (2014) found that 5- to 8-year-olds were willing to create unequal outcomes by allocating a single resource to one of two parties when the procedure for deciding who received it was fair. Dunham and colleagues (2018) similarly found that 4- to 6-year-olds preferred allocating a resource between third parties by coin flip, thus creating distributional inequality, over discarding the resource to maintain equality. These are important findings as they suggest that concerns for procedural justice may be stronger than concerns for distributive justice in this age range.

The present research

Here, we investigate how children respond when opportunities for procedural justice and ingroup favoritism are placed in conflict with each other. This is an important question to address because children frequently face resource sharing decisions in their everyday lives. For example, deciding who gets to play with which toys or who first gets access to treasured parts of a playground can lead to conflict and frustration. Importantly, many interactions in childhood take place in intergroup contexts. Children not only form friendship groups from an early age, which often leads to favoritism (Engelmann, Zhang, Zeidler, Dunham, & Herrmann, 2021; Lu & Chang, 2016; Moore, 2009; Paulus & Moore, 2014), but friendship groups are often influenced by social category membership such as gender and race (Aboud, Mendelson, & Purdy, 2003; Nesdale, 2017). Children are therefore likely to experience intergroup conflict about resources.

Based on this overview of the literature, two distinct hypotheses emerge regarding children's approach to procedural justice. First, a hypothesis derived from work demonstrating children's preference for procedural justice in interpersonal contexts might predict that children will reliably choose fair procedures even in intergroup contexts. A desire to be (or at least appear) impartial has recently been suggested to lie at the heart of people's willingness to share fairly, even at a cost (Shaw, 2013; Shaw & Olson, 2014). Cultural messages may further reinforce a preference for impartial procedures. While there are many reasons to distribute resources unequally (for

example, based on merit or need), explicit endorsement of unequal procedures may be less common in Western culture (although affirmative action is one notable and important exception) (Schmidt, Svetlova, Johe, & Tomasello, 2016). A hypothesis derived from research providing evidence of partiality in children's distribution choices (e.g., Dunham et al., 2011; Fehr et al., 2008) and of children's strong preferences for their own groups (Dunham et al., 2011) would predict that children will instead choose procedures that are advantageous for their ingroup. Our first study pits these two hypotheses against each other by investigating whether children choose ingroup favoring procedures or fair ones and whether their preferences change with age.

In our second study, we start to address the question of why children choose the procedures that they do. Specifically, we investigate whether reputational concerns influence children's choices of particular procedures. A theory based on the importance of appearing impartial would predict that, when asked to choose between contrasting procedures in public, children will seek a reputation as fair by choosing impartial procedures (Shaw, 2013; Shaw et al., 2014; Shaw & Olson, 2014). Sharing in accordance with fairness norms when being observed allows children (and adults) to signal to others that they are desirable cooperation partners, a reputation that is thought to be helpful in building and maintaining cooperative relationships, and in avoiding scorn from others (Engelmann, Herrmann, & Tomasello, 2012; Engelmann, Over, Herrmann, & Tomasello, 2013; Engelmann & Rapp, 2018; Shaw et al., 2014). In private, reputational concerns should be less influential in the decision-making process and therefore being impartial may be less important (Shaw, 2013; Shaw et al., 2014). A substantial body of work supports this hypothesis, for example children are often more willing to take a cost in order to share fairly when their fair choices will be known to the experimenter (Shaw et al., 2014) or the affected recipient (McAuliffe, Blake, & Warneken, 2020), compared to when sharing in private.

An interesting alternative hypothesis is that children may seek a reputation as ingroup favoring when asked to choose between procedures in public. We know from previous research that children are loyal to their groups and that they value group loyalty in others (e.g., Misch, Over, &

Carpenter, 2014). Indeed loyalty to the ingroup is viewed as a fundamental domain of moral intuition in some influential theoretical perspectives, such as Moral Foundations Theory (Graham et al., 2013, 2018). At least from the age of 5, children believe that individuals who remain with their group are nicer, more trustworthy and more moral than individuals who change groups (Misch et al., 2014). Children also sometimes evaluate distributors who share their resources with ingroup members as nicer than those who share generously with outgroup members (Yazdi et al., 2020; but see DeJesus, Rhodes, & Kinzler, 2014). What is more, children expect ingroup members to behave more prosocially towards them and towards other members of their group (DeJesus et al., 2014; Dunham et al., 2011; Elenbaas & Killen, 2016b; Yazdi et al., 2020). It is thus possible that children will be more ingroup favoring in public than they are in private. A third hypothesis, consistent with theories postulating the importance of procedural justice in childhood (and adulthood), is that children's procedure choices will be largely driven by internal motivation rather than by reputational concerns. If this is the case, then children will act in a similar way in public and private. We distinguish between these competing hypotheses by asking children to choose between a range of procedures that vary from outgroup favoring to ingroup favoring in public and in private.

We investigate these questions with children aged between 6 and 8 living in Britain. Previous research has shown that this is a crucial age for the development of adherence to fairness norms, but also of ingroup favoritism in resource sharing. Between the ages of 6 and 8, children have been found to increasingly share, even when it is costly, for the sake of fairness (Blake & McAuliffe, 2011; Shaw & Olson, 2012), but they may also increasingly favor ingroup members in their sharing (Fehr et al., 2008; Yazdi et al., 2020). In accordance with other research in the field, we use minimal groups, which do not convey information about shared values, competition, or status, which could influence children's choices (Dunham, 2018; Dunham et al., 2011).

The data for both studies are available at the Open Science Framework (OSF, https://osf.io/2t9cu/?view_only=6be8a5d010b948d78142862637dcf7b8).

Study 1

In our first study, we tested the hypothesis that ingroup bias would influence children's use of procedural justice. Specifically, we investigated whether children would choose ingroup favoring procedures to allocate a resource to one of two potential recipients, an ingroup and an outgroup child. To offer children procedure options ranging from fully ingroup favoring (i.e., certainty that one's own group will get the resource) via fair (equal chances for both groups) to fully outgroup favoring (i.e., certainty that the outgroup will get the resource), we created spinners with different color proportions (yellow and green). Using the minimal groups paradigm, children were then allocated to one of the color groups (the Yellow or the Green group) represented on the spinners. As pre-registered on AsPredicted (https://aspredicted.org/g2ar2.pdf), we hypothesized that when asked to indicate which resource allocation procedures should be used, children would choose procedures which are advantageous to their own group (i.e., afford their ingroup a better chance of receiving the resource than their outgroup) more often than fair and outgroup advantageous procedures.

Method

Participants

Seventy-two 6- to 8-year-olds were included in the study (age range: 6 years, 0 months to 8 years, 11 months). Eight additional children were tested but excluded from the final analyses because of technical error (1), experimenter error (1), or because they did not meet our pre-registered inclusion criteria: two due to distractions (parental interference), one due to missing data, and three failed comprehension checks. The final sample of 72 participants consisted of 25 6-year-olds, 23 7-year-

olds, and 24 8-year-olds, with 12 males per age group[1]. Participants were recruited at a science museum in northern England, were fluent in English, and of the participants included in the analyses, most were described by their parents as being of White British background (n = 62). Sample size was decided in advance based on related previous research on children's procedure choices (see Experiment 1, Shaw & Olson, 2014) and was pre-registered. [2]

Materials

Throughout the experiment, we used color wheels with arrows (spinners) showing different proportions of two colors. For spinner practice, children used a fair blue and red spinner (equal color proportions). For the test of partiality understanding, we used two pairs of red and blue spinners, one with two color sections (one red and one blue) and one with four (two red and two blue).

For the main measure, we used eight sets of spinners, one set per trial (see OSF https://osf.io/2t9cu/?view_only=6be8a5d010b948d78142862637dcf7b8). We did this to ensure that children could not directly remember and reproduce their choices across trials. Each set consisted of seven spinners ranging from all yellow to all green in equal increments, arranged in order. The middle spinner was therefore always fair. Across the eight spinner sets, four different spinner designs were used: two sets with four color sections of equal sizes, two sets with four color sections of unequal sizes, two sets with six color sections of equal sizes, and two sets with six color sections of unequal sizes (see Figure 1 for an example).

[1] Due to experimenter error, the final sample did not include exactly 24 children per age group, as pre-registered on AsPredicted.

[2] We performed sensitivity analyses in G*Power 3.1.9.4 (Faul, Erdfelder, Lang, & Buchner, 2007) for our pre-registered analyses (power = .80, α = .05, two-tailed). These indicated that we were powered to reliably detect a minimum effect size of Cohen's *d* = 0.67 in our independent samples *t*-test comparing Yellow and Green group participants' mean spinner choice scores, and of Cohen's *d* = 0.33 in our one-sample *t*-test comparing participants' mean spinner choice scores, collapsed across color and age groups, to a fair spinner choice score of 4.

Design

The main measure was children's spinner choice, assessed using a forced-choice task with seven options, which we compared for children in the Green and Yellow group (between subjects) (pre-registered) and between age groups (exploratory). To explore children's explicit reasoning for their spinner choices, we also asked them why they chose that spinner following every choice trial.

Procedure

Testing took place in a screened-off area in museums, and only the participant and the experimenter (E) were present during testing. Participants were seated at a table next to E in front of a display (an example of a spinner choice trial display is depicted in Figure 1).

Training/familiarization phase

First, children practiced using a spinner to allocate resources. E placed a bowl of stickers in front of the child and said "We have some stickers that we want to give to other children today, and we would like your help with deciding who gets them. We can use this spinner [placing a fair red and blue training spinner in front of the participant] to decide which child gets a sticker. If the spinner lands on red, then Sasha gets a sticker [placing a red envelope saying 'Sasha' in front of the participant]. If the spinner lands on blue, then Charlie gets a sticker [placing a blue envelope saying 'Charlie' in front of the participant]. Let's spin the spinner and see who gets a sticker." E then waited for the participant to spin the spinner. Once the arrow stopped moving, E asked "So who gets the sticker, Sasha or Charlie?" and then provided feedback: "Yes, it landed on red/blue, that means Sasha/Charlie gets the sticker" or "No it landed on blue/red, that means Sasha/Charlie gets the sticker." The participant was then instructed to place the sticker in the recipient's envelope. E repeated this procedure ("Here's another sticker. Let's spin the spinner again and see who gets it.")

at least three more times, until each recipient had received at least one sticker, and then put away the fair spinner.

Following spinner practice, in order to ensure that children understood that spinners could be fair or biased, E tested children's understanding of partiality. E introduced two spinners, one favoring the red group and one favoring the blue group. E then reminded the child that Charlie gets a sticker when the spinner lands on blue, and Sasha gets a sticker when it lands on red, before asking "Which spinner gives Sasha a better chance of winning the sticker, this one or this one?", pointing at the spinners in turn. E provided feedback for the child's response, and then put the spinner pair away. This was repeated with another pair of spinners.

Minimal Groups

E explained that there were two groups, the Yellow group and the Green group, and that children in the Yellow group get yellow scarves to wear and children in the Green group get green scarves to wear. The participant was then instructed to reach inside a bag and pull out one token, and was told that if the token was yellow, they would be in the Yellow group, and if the token was green, they would be in the Green group. After drawing a token, E asked what color they got and checked children's understanding of their group membership by asking what color group they are in. E also checked whether children could visually identify their group by asking them to pick up the appropriate scarf (yellow or green) from the table in front of them and put it on.

Spinner Choice

E told the participant that they would give away more stickers now, placing a bowl of stickers in front of them. E then introduced the potential recipients, one as an ingroup member and the other as an outgroup member (e.g., "Mark is in the same group as you, the Green group, and Dan is in the other group from you, the Yellow group"). When introducing each recipient, E put down an envelope in their group color with their name on it (see Figure 1). E then placed a set of seven yellow/green

spinners in front of the participant, explaining that they will use one these spinners to decide who gets the sticker, the child in the Green group or the child in the Yellow group. E then asked "Which spinner do you think we should use to decide who gets the sticker?" and pointed at each spinner in turn, left to right, asking "this one?" When the participant had chosen a spinner by pointing at or describing it, E asked "Why do you think we should use that spinner?" Following the participant's response, E put away the spinner set and envelopes. E then put down another sticker and repeated the procedure above with two new recipient names and a different spinner set. This procedure was repeated for a total of eight spinner choice trials per participant. Finally, E thanked the children for their participation and told them that the groups did not matter anymore now, and that they could take off their scarves.

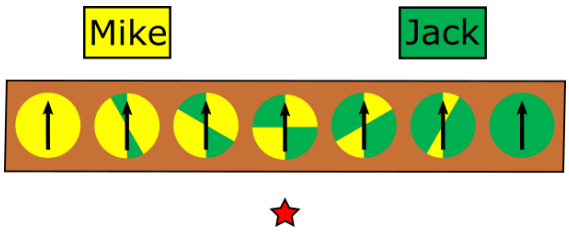

Figure 1. Experimental set-up for spinner choice trials. The red star represents the sticker. The child and the experimenter sat side by side in front of the display.

Counterbalancing and Randomization

When assigning participants to minimal groups, group allocation was made to appear random to participants, but was actually fixed and counterbalanced for each age group.

On spinner choice trials, the order of the spinner sets was randomized for every participant by shuffling them before each testing session. Following a fixed order that was counterbalanced between participants, half of all spinner sets were presented ranging from yellow to green left to right, the other half as ranging from green to yellow left to right. To aid children's understanding, the

yellow envelope was always placed close to the yellow spinner and the green envelope close to the green spinner. On each trial, whichever recipient's envelope was on the left was introduced first, therefore the ingroup recipient was introduced first on half of the trials, while the other trials began with the outgroup recipient. Recipients' names were always gender matched and alternated between boys' and girls' names.

Coding

Children's responses were coded from video by E. Children's responses to the comprehension checks for partiality understanding and minimal group membership were coded as pass/fail. For each trial of the main measure, children's chosen spinner was assigned a score based on its group representation (i.e., color composition). Scores ranged from 1 (all green) to 7 (all yellow). Children rarely changed their spinner choice, but when they did, their last choice was recorded.

Participants were asked to justify each spinner choice, and all explanations provided were included in the analysis. Children's explanations were coded as referencing (1) fairness, (2) ingroup advantage, (3) outgroup advantage, or (4) personal advantage; when responses referenced none of these concepts or were uninterpretable they were coded as (5) other. Where responses referenced more than one of the concepts of interest (1-4) they were coded into both categories. Examples for each category are provided in Table 1.

Table 1

Coding Category Examples from Children's Justifications

Category	Example
Fairness	"because it gives each group a fair chance"
	"because they've both got a good chance of getting the sticker"
	"because that one's equal"
Ingroup advantage	"because it has all yellow and I'm in the Yellow group "
	"so that my team can get it "
	"cause the Green group's got more chance than the Yellow group" (GG)
Outgroup advantage	"because maybe the Green team will have another chance of getting the sticker" (YG)
	"just so the other team get one"
	"it's got more yellow" (GG)
Personal interest	"cause probably I would then get it"
	"because if I spin, I'm still gonna win"
	"cause I'm more likely to win"
Other	"I don't know"
	"cause it looks colorful"
	"cause they're both triangles"

Note. "GG" = quote from a Green group participant, "YG" = quote from a Yellow group participant.

Twenty-five percent of the data (n = 18) from the comprehension checks, the main spinner choice trials, and of children's justifications were second coded by a coder who was unaware of the hypothesis of the study. Interrater agreement was perfect for comprehension checks (Cohen's Kappa = 1). It was also perfect for the main measure of spinner choice (Cohen's Kappa = 1). Agreement for the justifications was very good (Cohen's Kappa = 0.83).[3] All analyses were based on the first coding.

Results

All children included in the analyses accurately reported their assigned group membership and correctly identified the appropriate yellow or green scarf. For each child, we calculated a mean

[3] For interrater agreement analysis, justifications that were coded as referencing more than one concept of interest (i.e., given more than one score) were scored as (6) 'double coded'. There were four examples of mismatches in this category. In all four cases, both coders agreed on one coding score while one of the coders additionally assigned another score.

spinner choice score across the eight trials of the main measure. In both studies, all reported *t*-test *p*-values are two-tailed, and α = .05 unless otherwise stated. Preliminary analysis revealed no effect of gender, therefore gender was excluded from further analyses.

Pre-registered Analyses

Following our pre-registered analysis plan (https://aspredicted.org/g2ar2.pdf), an independent-samples *t*-test comparing mean spinner choice scores for participants in the Green group and the Yellow group revealed a significant difference, $t(70) = 4.82$ $p < .001$, Hedge's $g = 1.14$. Participants in the Green group on average chose spinners with more green than yellow (i.e., spinners with scores below 4; $M = 3.57$, $SD = 0.79$), while participants in the Yellow group on average chose spinners with more yellow than green (i.e., spinners with scores above 4; $M = 4.33$, $SD = 0.53$). To increase power, we then reverse-scored spinner choice scores for all participants in the Green group and collapsed across color groups for all further analyses. In a one-sample *t*-test, we compared mean spinner choice scores ($M = 4.38$, $SD = 0.67$) to the scale midpoint (4) (Figure 2), which represents fair spinner choices. Participants' mean scores differed significantly from fair, $t(71) = 4.83$, $p < .001$, and this reflected a medium-sized effect, Cohen's $d = 0.57$. A further breakdown of children's performance by age and spinner choice score can be seen in Figure 3.

Additional Analyses

To investigate the effect of age on participants' mean spinner choice scores, we conducted a one-way between-subjects ANOVA (Age: 6 vs 7 vs 8), which revealed a significant effect ($F(2, 69) = 8.31$, $p < .001$, $\eta^2 = .19$). Post-hoc comparisons (Bonferroni-corrected independent samples *t*-tests with adjusted α-values) revealed significant differences between mean spinner choice scores of 6-year-olds and 7-year-olds ($t(43) = 2.85$, $p < .01$, Hedges' $g = 0.81$), and between 6-year-olds and 8-year-olds ($t(35) = 3.68$, $p < .001$, Hedges' $g = 1.04$), but not between 7-year-olds and 8-year-olds ($t(45) =$

0.62, p = .538, Hedges' g = 0.18). To further explore the age differences indicated by these findings, we compared each age group's mean spinner choice score to fair (i.e., spinner score of 4) in Bonferroni-corrected one-sample t-tests (α-values adjusted; Figure 2). We found that 6-year-olds' ($t(24) = 4.88$, $p < .001$, Cohen's d = 0.98), but not 7-year-olds' ($t(22) = 1.81$, p = .084, Cohen's d = 0.38) and 8-year-olds' choices ($t(23) = 1.64$, p = .115, Cohen's d = 0.33) differed significantly from fair.

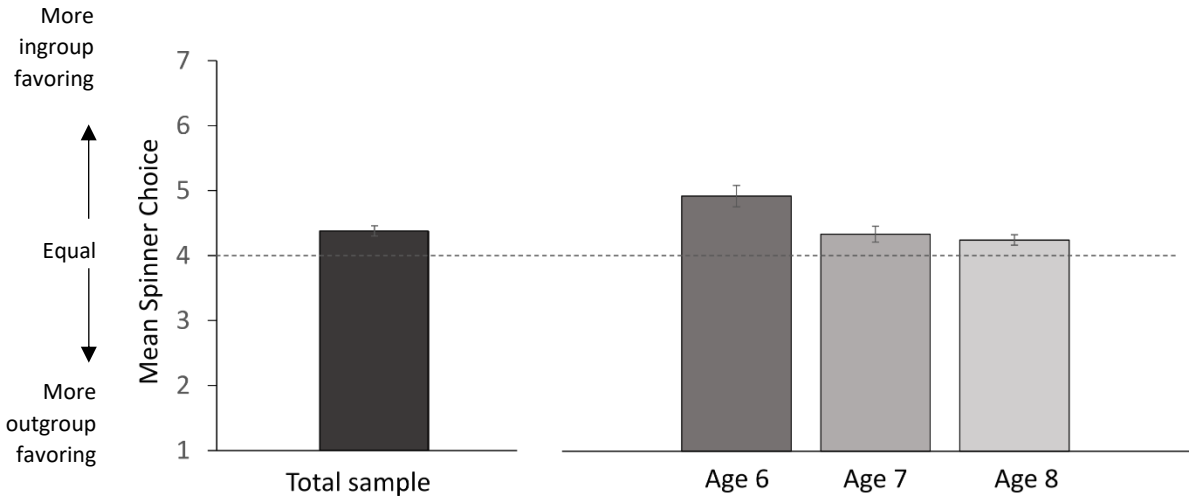

Figure 2. Mean spinner choice scores for the total sample (left) and each age group (right), collapsed across color groups, compared to a fair choice, represented by the dashed line. Error bars represent the standard error of the mean.

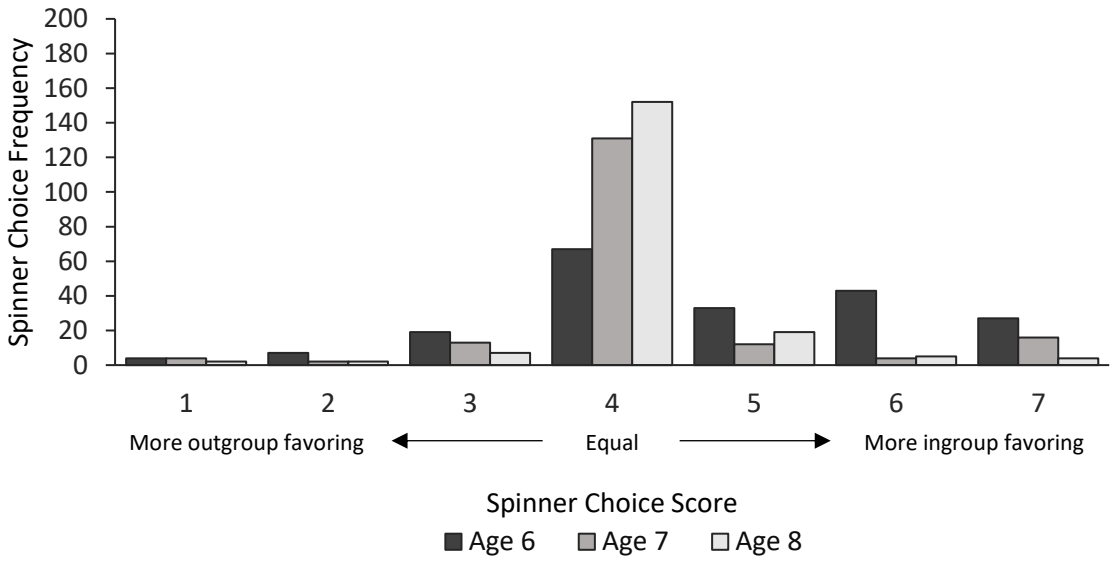

Figure 3. Frequencies of children's spinner choice scores by age, collapsed across color groups. Higher spinner scores indicate more ingroup favoring spinner choices; a response of 4 indicates a fair spinner choice.

To further explore the association between age and children's spinner choices, we conducted a Pearson correlation analysis. This indicated a significant negative correlation between children's age in months and their mean spinner choice scores ($r(70) = -.39$, $p = .001$). Further exploration of children's spinner choices by trial and by spinner design is provided in the supplementary materials.

To explore whether children's explanations were related to their spinner choices, we examined the frequency of references to fairness, ingroup advantage, outgroup advantage, and personal advantage for fair, ingroup favoring, and outgroup favoring spinner choices (Table 2). Results revealed that across ages, children mostly explained fair spinner choices with reference to fairness concerns (6-year-olds 78% of the time, 7- and 8-year-olds 88% of the time). Occasionally, children referenced either ingroup or outgroup advantage when explaining fair spinner choices. Children's explanations suggest that on these rare occasions, they sometimes mistook fair spinners for unequal spinners (e.g., "because I think it's got slightly a bit more yellow"; "because it's the green group's").

Six-year-olds, who chose ingroup favoring spinners more often than older children, frequently referenced ingroup advantage when justifying their ingroup favoring spinner choices (51% of the time). When explaining ingroup favoring spinner choices, 7-year-olds referenced ingroup advantage 44% of the time, but 8-year-olds only referenced ingroup advantage 3% of the time. When describing ingroup favoring choices, children sometimes also referenced fairness concerns. Six-year-olds did this 15% of the time, 7-year-olds did this 16% of the time and 8-year-olds did this 31% of the time. Although it is important to be extremely cautious when interpreting these descriptive results, one possible explanation is that children recognized the importance of appearing fair even while choosing ingroup favoring spinners. Across ages, children only occasionally referenced personal advantage when explaining ingroup advantageous spinner choices; they never referenced personal advantage when making either fair or outgroup favoring choices.

On the rare occasions when children made outgroup favoring choices, they often referenced outgroup advantage. When making outgroup favoring choices, 6-year-olds referenced outgroup

advantage 37% of the time, 7-year-olds referenced outgroup advantage 32% of the time and 8-year-olds referenced outgroup advantage 25% of the time. Explanations for outgroup favoring spinner choices also often alluded to fairness, saying things like “cause they'll get a random of yellow or green” and “because it's nearly half of each”. When explaining outgroup favoring spinner choices, fairness was referenced 23% of the time by 6-year-olds, 37% of the time by 7-year-olds, and 33% of the time by 8-year-olds.

Overall, these descriptions suggest that children had explicit awareness of their reasons for choosing the spinners that they did. However, given very small cell numbers for many of these categories (e.g., 7- and 8-year-olds mostly chose fair spinners), these findings should be interpreted with caution.

Table 2

Frequencies (and Percentages, Rounded to the Nearest Percent) of Responses Falling Into Each Justification Category as a Function of Spinner Choice and Age

		Justification				
	Spinner choice	Fairness	Ingroup advantage	Outgroup advantage	Personal advantage	Other
Age 6	Fair	53 (78%)	2 (3%)	3 (4%)	0 (0%)	10 (15%)
	Ingroup advantage	16 (15%)	53 (51%)	0 (0%)	3 (3%)	32 (31%)
	Outgroup advantage	7 (23%)	0 (0%)	11 (37%)	0 (0%)	12 (40%)
Age 7	Fair	116 (88%)	1 (1%)	2 (2%)	0 (0%)	13 (10%)
	Ingroup advantage	5 (16%)	14 (44%)	0 (0%)	5 (16%)	8 (25%)
	Outgroup advantage	7 (37%)	0 (0%)	6 (32%)	0 (0%)	6 (32%)
Age 8	Fair	134 (88%)	3 (2%)	1 (1%)	0 (0%)	15 (10%)
	Ingroup advantage	9 (31%)	1 (3%)	0 (0%)	8 (28%)	11 (38%)
	Outgroup advantage	4 (33%)	0 (0%)	3 (25%)	0 (0%)	5 (42%)

Discussion

In Study 1, we investigated how children balance concerns for fairness and ingroup favoritism in the context of procedural justice. When given a choice of resource allocation procedures ranging from ingroup favoring through fair to outgroup favoring, collapsed across age, 6- to 8-year-olds on average chose procedures that were advantageous for their ingroup. Notably, further analyses

showed that this effect was driven by the youngest participants' choices. Specifically, only 6-year-olds' average spinner choices differed significantly from fair, whereas by age 7, children mostly chose fair procedures. Children's explanations suggest that they were explicitly aware of the implications of their choices for each recipient's chances of getting a desirable resource. In other words, the observed spinner choices appeared to be deliberate across ages, rather than younger children having made different choices due to a lack of understanding, compared to older children.

Study 2

In Study 1, we investigated how children weigh concerns for fairness and ingroup favoritism. We found the majority of children's responses were either fair or ingroup favoring and that fair choices increased with age. In Study 2, we build on the results of Study 1 by investigating why 6- to 8-year-old children choose the procedures that they do. We were particularly interested in testing the hypothesis that children's reputational concerns may influence their procedure choices. In order to investigate this, we compared the procedures children choose in public and in private. A theory based on the importance of reputation management to children would predict that children will be more likely to choose ingroup favoring procedures in private than in public (Engelmann & Rapp, 2018; Shaw et al., 2014). Alternatively, a theory based on the importance of a genuine concern for fairness among children may predict that children will be equally likely to make fair choices in public and in private (Dunham et al., 2018). A third hypothesis is that children's ingroup favoring choices are driven by reputational concerns and that children seek a reputation as ingroup favoring (Misch et al., 2014). If this is the case, then children will choose ingroup favoring procedures more often in public than in private.

Our second study also addresses an additional question arising from Study 1. It is possible that older children did not choose ingroup favoring spinners in Study 1 because these children did not actually favor their minimal ingroup and therefore were not motivated to treat ingroup members preferentially. Explicit ingroup favoritism has sometimes been found to peak in middle

childhood and then decline (e.g., Raabe & Beelmann, 2011). To test whether levels of ingroup favoritism differ between the age groups investigated here, our second study also included a measure of ingroup favoritism. Our pre-registration for this study is available at AsPredicted (https://aspredicted.org/pt8fu.pdf).

Method

Participants

One hundred and eighteen 6- to 8-year-olds were included in the study (age range: 6 years, 0 months to 8 years, 11 months). The sample size was based on an a priori power analysis, conducted in G*Power 3.1.9.4 (Faul et al., 2007). This indicated that 117 participants would be required to detect an effect size of Cohen's f = 0.22 for the 2 (within-subjects) x 3 (between-subjects) interaction with power = .95, α = .05, and a correlation of 0.3 among repeated measures. The effect size estimate is based on an existing study on reputation management in procedural justice among 6- to 8-year-olds (see Experiment 3, Shaw et al., 2014). We pre-registered a sample size of 120 participants to allow for counterbalancing; however, due to unexpected circumstances (i.e., the Covid-19 pandemic), data collection had to be terminated just before reaching this mark. The final sample consists of 40 6-year-olds, 39 7-year-olds, and 39 8-year-olds, with 20 males per age group. An additional sixteen children participated but were excluded from the final analyses because they did not meet our pre-registered inclusion criteria (https://aspredicted.org/pt8fu.pdf): twelve failed comprehension and/or manipulation checks, one failed to follow instructions, one due to missing data, and two because they were tested in the wrong condition. Participants were recruited at two museums in northern England, were fluent in English, and of the participants included in the analyses, most were described by their parents as being of White British background (n = 102).

Materials

The same red and blue spinners as in Study 1 were used for spinner practice and testing partiality understanding.

The public/private manipulation training trials employed seven stylized images of land animals presented in clear pouches on a large (A2 format) cardboard sheet, and another sheet of cardboard with seven stylized images of sea animals.

Group attitudes were measured on a 5-point Likert scale, with each point represented by a line drawing of a face with an expression ranging from smiling to frowning.

A total of twelve spinner sets, each consisting of seven spinners, were used for the main measure, one set for each trial. Of these, there were three sets with each of the four designs used in Study 1 (i.e., 3 x 2 color sections of equal size, 3 x 2 color sections of different sizes, 3 x 3 color sections of equal size, and 3 x 3 color sections of different sizes, see OSF https://osf.io/2t9cu/?view_only=6be8a5d010b948d78142862637dcf7b8). For each spinner choice trial (main measure), the spinners were placed in clear pouches on a large cardboard sheet, making them easily removable. In order to fit them on the cardboard sheets, the spinners were arranged in two rows, one with three spinners and one with four, and spinners were arranged in color order, starting with either all yellow or all green on the left. Both layout features were varied systematically across spinner boards (for an example, see Figure 4).

Design

As in Study 1, the main measure was children's spinner choice. The study employed a 2 (Condition: public vs private spinner choice) x 3 (Age: 6 vs 7 vs 8) design, with Condition as a within-subjects manipulation. Additionally, we measured children's ingroup and outgroup attitudes in a 2 (Attitude: ingroup vs outgroup) x 3 (Age: 6 vs 7 vs 8) design.

Procedure

Testing took place in a screened-off area in museums, and only the participant and E were present during testing. Participants were seated at a table across from E. As in Study 1, we employed a forced-choice task as our main experimental measure. On each trial, children were asked to choose which of the seven available spinners they thought we should use to decide who gets a sticker. To compare children's private to their public choices, the spinners were presented in a way that the participant knew E could see what they were choosing on half of the trials (public condition, Figure 4, panel A), and on the other trials, the participant knew E could not observe their choice (private condition, Figure 4, panel B).

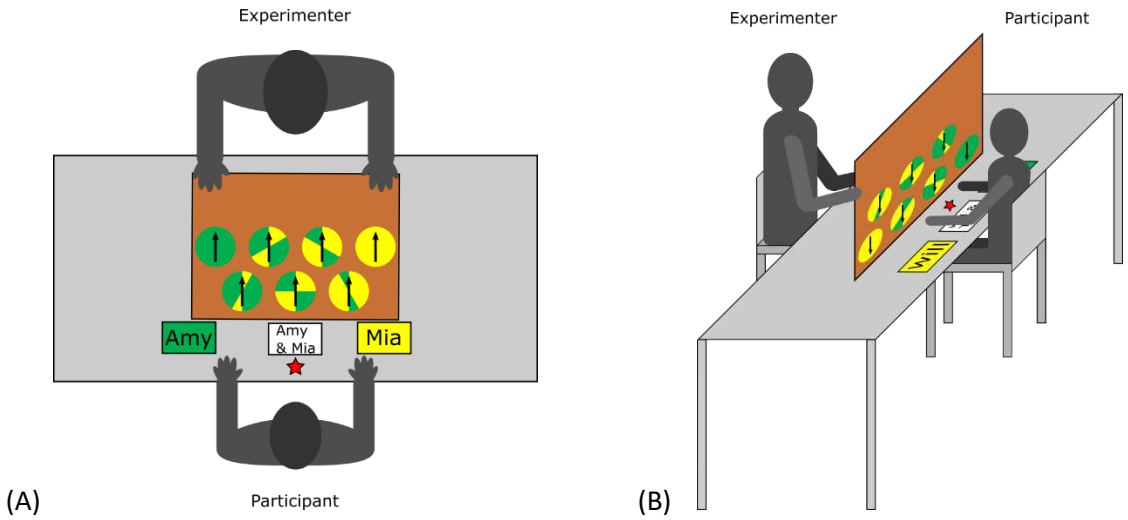

Figure 4. Trial set-up during public trials, shown from above (panel A). Trial set-up during private trials, shown from the side (panel B). The red star represents the sticker.

Training and Familiarization Phase

Children first completed the same spinner training and test of partiality understanding as in Study 1. Then children were presented with the same set-up as during the spinner choice task and familiarized with the public/private condition differences. On the first familiarization trial (private condition), E placed an envelope saying 'Favorite Land Animal' in front of the participant. The

participant was then presented with an opaque board featuring seven removable pictures of land animals. The board was held upright by E such that the participant could see the pictures but E could not, as the board created a visual barrier between the participant and E. The participant was asked to pick their favorite animal, take the picture off the board, put it into an envelope, and then place the envelope in a box. The box already contained other envelopes so that participants' envelopes were not clearly identifiable. The experimenter told the participant that she would sometimes be able to see what they are choosing, and sometimes not, and then asked the child whether they think she knew which animal they picked now. E then provided feedback for the participant's response ("Yes that's right./No, when the board is like this I can't see what you're choosing, so can you let me know when you're done?"). When the participant informed E that they were done, E put away the board without seeing the pictures. On the second familiarization trial (public condition), E put down a 'Favorite Sea Animal' envelope and placed a board with seven pictures of sea animals flat on the table in front of the child, allowing E to freely observe the participant's actions. E then repeated the instructions from the previous trial, prompting the participant to choose their favorite animal. E then asked "How about this time, can I see what you're choosing?", and provided feedback ("Yes that's right./No, when the board is like this I can see what you're choosing."). E put away the board when the participant was done. This was then repeated for another private (third) and public (fourth) familiarization trial.

Minimal Groups and Group Attitude

Participants were introduced to the Yellow and Green group as in Study 1 and made to believe they would be randomly allocated; however, all participants were assigned to the Green group. Then, children were asked to rate their ingroup and outgroup liking. E asked "How much do you like your group, the Green group? Do you really like them, kind of like them, think they're okay, kind of don't like them, or really don't like them?" and then repeated this procedure for "the other group, the Yellow group".

Spinner Choice

Participants completed twelve spinner choice trials. Each trial began with E placing three envelopes in front of the participant: A yellow one with the Yellow group recipient's name, a green one with the Green group recipient's name, and in the middle, a white one with both recipients' names (half of all white envelopes stated the Green group recipient's name first). As in Study 1, E introduced the (fictitious) recipients while putting down the colored envelopes. E then placed a sticker in front of the participant. Then, E presented a spinner board and told the participant that "we'll use one of these spinners to decide who gets the sticker, the child in the Green group or the child in the Yellow group". E then asked the child to think about which spinner we should use, and when they know which one to use, to take the spinner off the board, put it inside the white envelope and then put the envelope in the box. While saying this, E pointed at the previously used box which also contained decoy spinner choice envelopes to make the child's envelopes less easily identifiable. On all public trials, the board was presented flat on the table (see Figure 4, panel A), and E ended the trial after observing the child place the envelope into the box. On private trials, the spinner board was presented upright (see Figure 4, panel B), and E said "remember I can't see you now, so let me know when you're done" after asking the child to choose a spinner. Private trials ended when the child informed E that they were finished, prompting E to put away the spinner board. A shortened version of this script was repeated on subsequent trials.

After 12 trials, E thanked the children for their participation and told them that the groups did not matter anymore now, and that they could take off their scarves.

Counterbalancing and Randomization

For the spinner choice measure, trials were blocked by condition (public/private), with two blocks (3 trials each) per condition presented in alternating order; the block order was counterbalanced across participants. The order of the spinner sets was randomized by shuffling them anew for each participant. Half of all spinner sets ranged from yellow to green left to right, the other half from

green to yellow left to right. As in Study 1, the colored envelopes were always placed near the color-matching side of the spinner board, the ingroup recipient was introduced first on half of the trials, and recipients' names were gender matched and alternated between boys' and girls' names.
For the group attitude measure, children were always asked to rate their ingroup attitude before their outgroup attitude.

Coding

To make the privacy manipulation more convincing, the testing sessions were not video recorded. Once a participant had left the testing area, E removed the participant's envelopes containing spinners from the box which also held the (empty) decoy envelopes and photographed each chosen spinner next to the envelope, which stated the recipients' names. The order of recipients was fixed, therefore the trial number could be identified by the recipient names. Children's responses were coded from these photographs.

For the main measure, children's spinner choice on each trial was assigned a score from 1 (all yellow) to 7 (all green). A score of four represents a fair choice. Responses to the ingroup and outgroup attitude measure were each scored on a 5-point scale ranging from a strongly positive (scored as 5) to a strongly negative (scored as 1) group attitude.

Twenty-five percent of the comprehension checks (n=30) for participants' understanding of partiality and public versus private choices, as well as of the group attitude scores and the main spinner choice trials, were second coded by a coder who was unaware of the hypotheses of the study. Interrater agreement was perfect for comprehension checks (Cohen's Kappa = 1), and near perfect for group attitudes (Cohen's Kappa = 0.95) and spinner choices (Cohen's Kappa = 0.99). All analyses are based on first coding.

Results

Preliminary analyses

Preliminary analysis revealed no effect of gender, therefore gender was not included in further analyses. To check whether children were on average ingroup favoring (as pre-registered, https://aspredicted.org/pt8fu.pdf), we analyzed children's group attitude scores in a 2 (Attitude: ingroup vs outgroup) x 3 (Age: 6 vs 7 vs 8) mixed-design factorial ANOVA.[4] This showed a significant main effect of Attitude ($F(1, 114) = 17.23$, $p < .001$, $\eta p^2 = .13$). On average, participants' ingroup attitude scores ($M = 4.15$ $SD = 1.08$) were higher than their outgroup attitude scores ($M = 3.43$, $SD = 1.23$). We did not find a main effect of Age ($F(2, 114) = 1.29$, $p = .278$, $\eta p^2 = .02$) nor an interaction ($F(2, 114) = 1.04$, $p = .358$, $\eta p^2 = .02$). This confirms that our minimal group membership manipulation was effective for all age groups.

Main analyses

Main analyses are pre-registered on AsPredicted (https://aspredicted.org/pt8fu.pdf) unless otherwise stated. To investigate the effects of condition and age on children's spinner choices, we conducted a 2 (Condition: private vs public) x 3 (Age: 6 vs 7 vs 8) mixed-design factorial ANOVA on participants' mean spinner choice scores. We found a small but significant main effect of Condition, $F(1, 115) = 4.93$, $p = .028$, $\eta p^2 = .04$, with lower average spinner choice scores in the public ($M = 5.05$, $SD = 1.31$) than private condition ($M = 5.17$, $SD = 1.35$). There was no main effect of Age ($F(2, 115) = 1.63$, $p = .201$, $\eta p^2 = .03$), and no interaction ($F(2, 115) = 1.43$, $p = .244$, $\eta p^2 = .02$).

Given the modest effect size of Condition observed here, it is possible that we were not powered to detect an interaction between Condition and Age. We therefore further investigated the

[4] All group attitude analyses exclude one participant for whom intergroup attitude scores were not recorded due to experimenter error.

effect of the interaction term by conducting an exploratory two factor (within subjects: Condition, between subjects: Age) Bayesian mixed design factorial ANOVA on children's mean spinner choice scores, with the main factors Condition and Age added to the null model for comparison with a model featuring the Condition x Age interaction. There was moderate evidence (Wagenmakers et al., 2018) against the interaction model (BF_{01} = 3.17), compared to the model with only main effects.

Returning to our pre-registered analysis plan, we then compared each age group's mean spinner choice score per condition to the scale midpoint (4), which represents a fair spinner choice, using one-sample *t*-tests. These showed that children tended to choose ingroup favoring spinners across age groups and conditions, with all means differing significantly from fair (see Figure 5; all *p*s < .01, Cohen's *d*s between 0.51 and 1.06). A further breakdown of children's spinner choice scores by age and condition can be seen in Figure 6.

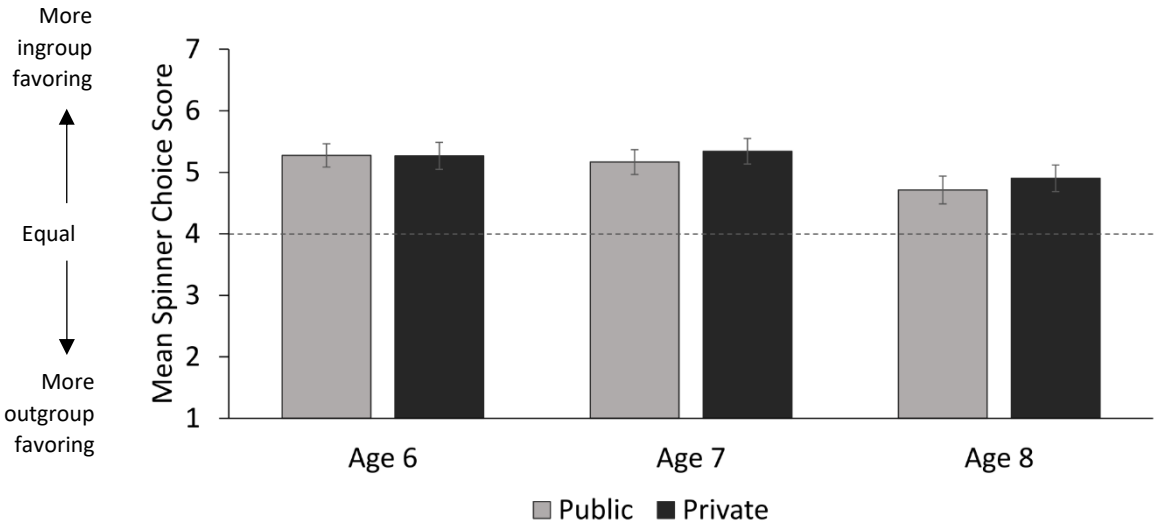

Figure 5. Mean spinner choice scores for each age group in the public and private condition. The dashed line represents fair spinner choices. Error bars represent standard errors of the mean.

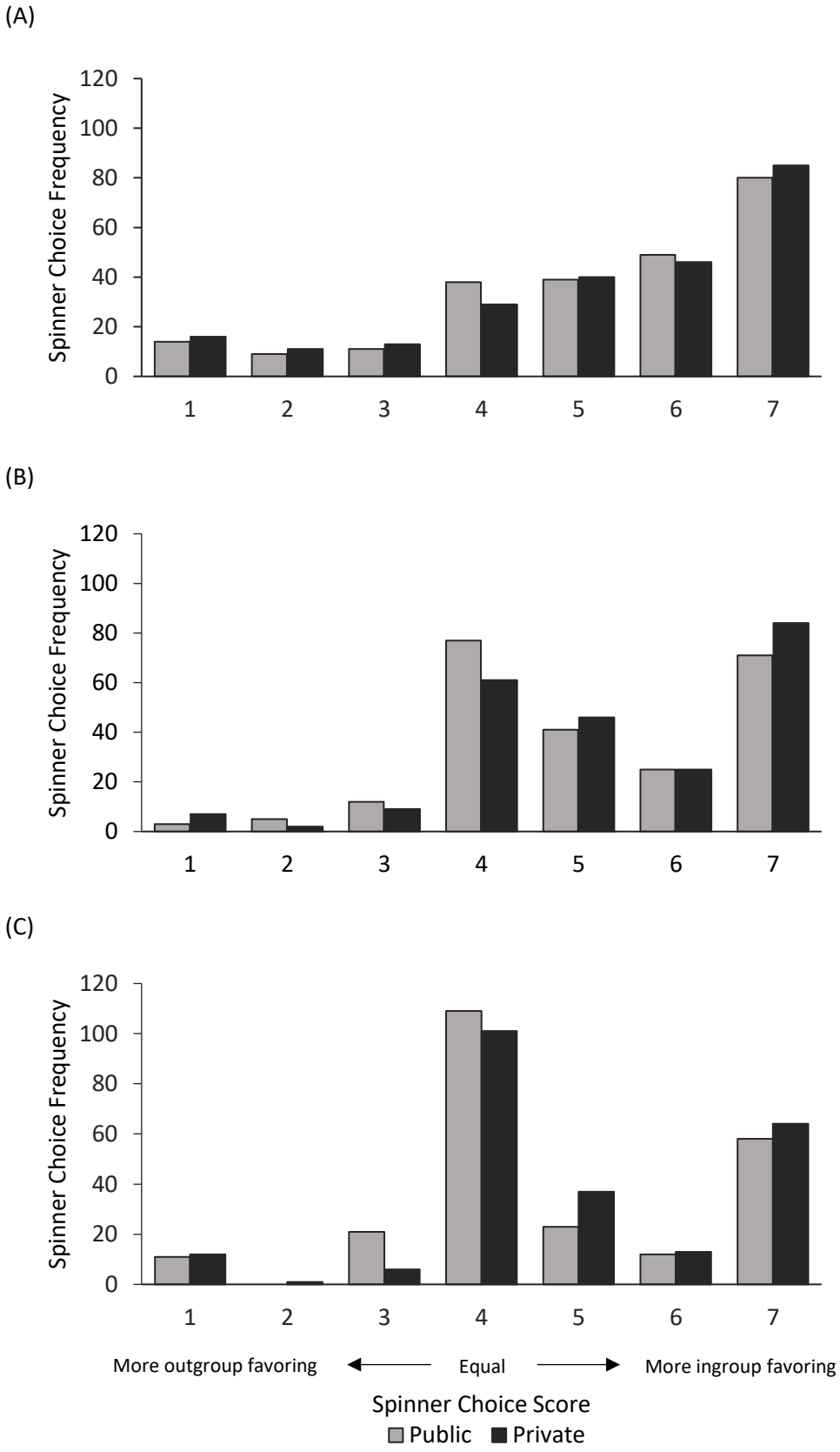

Figure 6. Frequencies of children's spinner choices scores by condition for (A) 6-year-olds, (B) 7-year-olds, and (C) 8-year-olds. Higher spinner scores indicate more ingroup favoring spinner choices; a response of 4 indicates a fair spinner choice.

Additional exploratory analyses

To explore the relationship between children's ingroup favoritism and their spinner choices, we first calculated an intergroup bias score for each participant by subtracting their outgroup attitude score from their ingroup attitude score. We then conducted two Pearson correlation analyses, one per condition. Children's intergroup bias scores were significantly positively associated with their mean spinner choice scores in the public ($r(115) = .29$, $p = .001$) as well as the private ($r(115) = .31$, $p = .001$) condition, and the strength of these two correlations did not differ ($z = -.15$, $p = .884$).

To further explore the association between age and children's spinner choices, we conducted Pearson correlation analyses between children's age in months and their mean spinner choice scores in the public and private conditions. Two participants were excluded from these analyses because we did not have precise age information for them. The analyses indicated a small but significant negative association between age and public spinner choice scores ($r(114) = -.19$, $p = .045$), as well as a very weak negative correlation between age and private spinner choice scores, but this did not reach statistical significance, ($r(114) = -.13$, $p = .17$). Further exploration of children's spinner choices by trial and by spinner design is provided in the supplementary materials.

Discussion

Results from Study 2 show that 6- to 8-year-olds often choose ingroup favoring spinners and do this regardless of whether the decision is made in public or private. These results suggest that children are internally motivated to favor their ingroup. We also found modest support for the hypothesis that children would seek a reputation as fair. Children chose somewhat more ingroup favoring spinners in private than in public. Although the size of the observed effect is modest, it nonetheless suggests a motivation to appear fair is one factor influencing children's choices. Taken together, the findings from Study 2 suggest that in middle childhood, children prefer their ingroup but also show at least some tendency to manage their reputation in order to appear fairer than they would

otherwise be. This also suggests that the form of reputation management that they engage in has more to do with appearing impartial rather than appearing to favor their ingroup.

General Discussion

A collective commitment to procedural justice is crucial for the successful functioning of democracy as well as for ensuring fairness in the judicial system and economy (Tyler, 2000, 2003). As the large body of literature on prejudice reduction suggests (Paluck, Porat, Clark, & Green, 2021), in adults, a commitment to fairness can often be undermined by ingroup favoritism (e.g., Tajfel, Billig, Bundy, & Flament, 1971). We investigated how children weigh their concerns for procedural justice and for their ingroup when choosing resource allocation procedures. Across two studies and collapsed across age, children aged 6 to 8 on average chose ingroup favoring procedures when allocating resources between an ingroup and an outgroup child. Existing research shows that by age 6, children have a strong preference for impartial over partial procedures in third party allocation tasks (Shaw & Olson, 2014), and by age 8, they even choose fair procedures over ones that would advantage them personally in first-party allocation tasks (Dunham et al., 2018), thus prioritizing fairness over self-interest. However, in the current studies, ingroup favoritism outweighed children's preference for impartial procedures. This favoritism was particularly consistent for six-year-olds, who aided their ingroup in both studies. This finding extends research on children's distribution choices, which suggests that they tend to allocate more resources to members of their own group than to outgroup members (e.g., Fehr et al., 2008). Taken together, these studies provide strong evidence of ingroup favoritism in children's procedure choices in middle childhood.

In our second study, we further explored why children sometimes choose fair procedures in addition to ingroup favoring ones. Our findings suggest that 6- to 8-year-old children may be somewhat more likely to choose fair procedures when their decision is visible to the experimenter. The observed effect is very small and does not allow for strong conclusions, but we consider two possible explanations for this effect which future research could helpfully investigate. On the one

hand, it is possible that children's procedure choices are not strongly affected by reputational concerns. However, it is also possible that reputational concerns could be enhanced by modifying certain aspects of the procedure. In contrast to other studies in this field (e.g., Yazdi et al., 2020), we did not emphasize that the experimenter observing children's choices was evaluating their sharing or their character; emphasizing this may have led to stronger reputation management effects in the public condition (Dutra et al., 2018; Yazdi et al., 2020). Our privacy manipulation may have also been less likely to elicit reputation management effects than other set-ups, such as those that allow multiple paths to maintaining a prosocial reputation in public while prioritizing other motives in private. For example, Shaw at al. (2014) asked participants to choose between directly assigning or flipping a coin to allocate two prizes, a nicer and a less nice prize, between themselves and an absent recipient. Children who chose to use the fair procedure then flipped the coin entirely in private and self-reported the outcome. Here, participants could appear fair by choosing to flip the coin, but could then cheat by not flipping the coin at all and simply reporting that they won the better prize, or they could flip the coin but still misreport the outcome. The study found that children who chose to flip the coin reported winning the better prize more often than can be expected by chance, thus managing their reputation while using impartial procedures unfairly. Lastly, despite precautions (e.g., reminding children on every private trial that the experimenter cannot see them) and manipulation checks, our privacy manipulation may not have been entirely convincing to all children.

An outstanding question is why we found an age difference in Study 1 but not Study 2. In Study 1, collapsed across age, children on average chose ingroup advantageous procedures but this effect was primarily driven by 6-year-olds' ingroup favoring choices. This shift from frequently choosing ingroup favoring procedures at age 6 to mostly fair procedures at ages 7 and 8 in Study 1 could have been driven by an increase in fairness concerns with age, or a decrease in ingroup favoritism in older children. While the latter explanation cannot be ruled out, results from Study 2 show that favoritism for a minimal ingroup can easily be induced in children in middle childhood, and ingroup favoritism is associated with ingroup favoring procedure choices. In Study 2, all age

groups chose ingroup favoring procedures. Although other differences between the studies preclude firm conclusions, one reasonable explanation for this difference is that 7- and 8-year-olds made more ingroup favoring choices in Study 2, compared to Study 1, because group membership was more salient in Study 2. In Study 2, we explicitly asked children about their preferences towards the two groups, which could have strengthened children's ingroup preference across ages. This suggested explanation fits well with propositions that using group labels to structure the environment increases the psychological salience of the grouping criterion (in this case, minimal group membership) which, in turn, is thought to contribute to the formation of intergroup bias (Bigler & Liben, 2007).

Other interesting questions for future research arise from our findings. One particularly fruitful direction for future work would be to directly compare how children's concerns for procedural justice relate to their concerns for distributive justice. For example, it will be important to investigate whether children are equally ingroup favoring in both situations, or whether children may show a greater concern for fairness in the case of procedural justice. Procedural justice can serve to avoid conflict even when distributive justice is not possible (Tyler, 2000), and children and adults tend to prioritize procedural over distributive justice when they conflict (Dunham et al., 2018). This may be particularly important to examine in contexts where distributors are likely to be biased, such as during intergroup conflict and resource scarcity. Here, impartial procedures can prevent favoritism from guiding the decision process, making this an important arena for the application of procedural justice. Developmental research shows that by 8 years of age, children understand that partiality can influence people's judgments and decision-making in a way that threatens fairness (Mills, Al-Jabari, & Archacki, 2012; Mills & Grant, 2009; Mills & Keil, 2008). However, children may struggle to recognize their own biases (Elashi & Mills, 2015). With age, children appear to grow increasingly skeptical of others' impartiality but maintain a 'bias blind spot' for their own favoritism (Elashi & Mills, 2015). How to encourage the use of fair procedures in intergroup contexts is therefore another important question for future research.

Relatedly, future research should directly investigate how intergroup competition, threat and status influence concerns for procedural justice. In our study, we investigated how children weigh concerns for fairness and ingroup preference in minimal group settings. A considerable body of previous research has shown that intergroup biases are exacerbated in contexts marked by competition and threat (Chang, Krosch, & Cikara, 2016; Dunham et al., 2011; Riek, Mania, & Gaertner, 2006; Spielman, 2000). It would be interesting for future research to investigate whether these social factors would increase endorsement of ingroup favoring procedures among children. Other research has shown that status differences between groups impact the extent of intergroup biases (Bigler, Brown, & Markell, 2001; Shutts, 2015). Whereas members of high status groups often demonstrate high levels of ingroup preference, these effects are often reduced or sometimes even reversed among members of low status groups (Horwitz, Shutts, & Olson, 2014; Newheiser, Dunham, Merrill, Hoosain, & Olson, 2014; Newheiser & Olson, 2012; Shutts, Kinzler, Katz, Tredoux, & Spelke, 2011). It would be interesting for future research to investigate whether children are more likely to endorse impartial procedures, rather than ingroup favoring procedures, when they belong to low status groups. It would also be important to explore the procedure choices of members of high status groups, as those in power are likely to decide upon procedures. Understanding how such structural variables affect children's commitment to procedural justice can yield insights that inform research with real world groups (Cikara & Van Bavel, 2014).

Future research should also investigate how concerns for procedural justice play out in real world intergroup contexts directly, including those that may entail pre-existing inequalities such as those based on race and gender. Research on resource distributions demonstrates that children sometimes perpetuate and sometimes rectify intergroup inequalities, depending on who has been disadvantaged (Elenbaas, Rizzo, Cooley, & Killen, 2016; Olson, Dweck, Spelke, & Banaji, 2011). This research has further shown that intergroup contexts can not only lead children to distribute less fairly by giving more to ingroup members, but especially older children can also use their increasing knowledge of societal intergroup inequalities to make *fairer* allocation decisions, particularly when

others' welfare is at stake (Killen et al., 2018, 2017). For example, Elenbaas and Killen (2016a) found that after witnessing an unequal allocation of medical supplies, with age, American children systematically preferred to rectify (rather than perpetuate) the inequality when hospitals serving African Americans, but not when hospitals serving European American children had been disadvantaged. This developmental shift was mediated by older children's greater awareness of wealth disparities between African Americans and European Americans in their society and more negative evaluations of medical supply disparities. It is not yet known how children's concerns about procedural justice will be influenced by their knowledge of real world groups and pre-existing inequalities, as well as by the importance of the resource for recipients' welfare.

Exploring procedural justice is especially important because, even more so than one-off unequal distributions, biased procedures can continually perpetuate inequality. This is because, once established, they may often remain in place for multiple interactions. An unfair hiring practice, for example, has the potential to affect many individuals while it is in operation. The potential long-term impact of unfair procedures raises the question of whether children will retain, or even enhance, a tendency to choose ingroup favoring procedures when they believe that the procedure will be used repeatedly or whether the high stakes will increase a concern for fairness.

Taken together, these studies demonstrate that children are concerned about fairness and ingroup advantage but, when faced with the choice, often choose ingroup favoring procedures over fair procedures, and that this tendency may be slightly stronger when choosing in private. Our research thus suggests that ingroup favoritism often trumps procedural justice in resource allocation tasks, especially for younger children and especially when reputation is not in play.

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