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How does social essentialism affect the development of inter-group relations?

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Research Highlights

- Essentialism has been proposed to have negative social ramifications
- Three studies experimentally tested this proposal among young children
- Essentialism led children to withhold resources from out-group members
- Essentialism did not lead to out-group dislike

Abstract

Psychological essentialism is a pervasive conceptual bias to view categories as reflecting something deep, stable, and informative about their members. Scholars from diverse disciplines have long theorized that psychological essentialism has negative ramifications for inter-group relations, yet little previous empirical work has experimentally tested the social implications of essentialist beliefs. Three studies ($N = 127$, ages 4.5-6) found that experimentally inducing essentialist beliefs about a novel social category led children to share fewer resources with category members, but did not lead to the out-group dislike that defines social prejudice. These findings indicate that essentialism negatively influences some key components of inter-group relations, but does not lead directly to the development of prejudice.

How does social essentialism affect the development of inter-group relations?

Expecting a gentle baby tiger to inevitably grow up to be ferocious, an apple seed to develop into an apple tree even if planted in an olive grove, or a young girl growing up in a household of boys to prefer princesses to trucks, all reflect a conceptual commitment to psychological essentialism (Medin & Ortony, 1989). Psychological essentialism is a pervasive conceptual bias to view categories (e.g., tigers, apple trees, girls) as reflecting something deep, stable, and informative about their members, as highly predictive of individual development regardless of other influences, and as marking fundamental similarities among members and differences between kinds (Gelman, 2004). Essentialist beliefs shape how people represent and reason about many types of categories from at least the early preschool years onward (Gelman, 2003).

Essentialism has most often been studied in the case of biological categories, such as animal species. For example, essentialist beliefs about *tigers* entail thinking that whether an animal is a tiger is stable and determined by birth, that tigers are fundamentally similar to each other and different from non-tigers, and that an animal—once born to tiger parents—will inevitably grow up to be ferocious, even if it looks different from other tigers (e.g., is white instead of orange) or is raised in an unusual environment (e.g., in a zoo, where it has few opportunities to learn or practice ferocious behaviors; Gelman, 2004; Medin & Ortony, 1989; Prentice & Miller, 2007). By at least age four, children make inferences in line with each of these beliefs (Gelman & Markman, 1986, 1987; Gelman & Wellman, 1991; Waxman, Medin, & Ross, 2007; for review see Gelman, 2003).

In the case of animal categories, psychological essentialism may help get conceptual development off the ground and facilitate knowledge acquisition by allowing children to

overlook superficial differences (e.g., between orange and white tigers) and focus on the properties that category members all share (Gelman & Kalish, 2006). Yet, essentialism reflects a biased, inaccurate picture of the world; most categories have no real essences (Leslie, 2013; Mayr, 1991), species change over time in ways that essentialist thinking does not allow (Gelman & Rhodes, 2012; Shtulman & Schulz, 2008), and category members often vary more widely from each other than essentialism implies. Indeed, essentialist thought—particularly its emphasis on within-category homogeneity and stability over time—interferes with people’s understanding of the mechanisms that drive evolutionary change (Shtulman & Schulz, 2008) as well as with normative reasoning regarding how properties are distributed across categories (Rhodes & Brickman, 2010; Rhodes & Liebenson, 2015).

The negative consequences of essentialist beliefs are even clearer in the social domain. By ages 4 or 5, children hold essentialist beliefs not only about biological species categories, but about certain types of human social categories as well. For example, in the United States, preschool-age children hold essentialist beliefs about gender; they expect girls to be fundamentally similar to each other and different from boys (Gelman, Collman, & Maccoby, 1986); that being born a girl means that a baby will inevitably grow up to prefer tea sets to toy trucks (Taylor, 1996; Taylor, Rhodes, & Gelman, 2009), and that gender categories reflect natural, objective structure in the world (Rhodes & Gelman, 2009; Rhodes, Gelman & Karuza, 2014). By emphasizing within-category homogeneity, essentialism contributes to stereotyping among young children and adults (Bastian & Haslam, 2006; Hoffman & Hurst, 1990; Levy & Dweck, 1999; Martin & Parker, 1995; Pauker, Ambady, & Apfelbaum, 2010; Plaks, Stroessner, Dweck, & Sherman, 2001; Prentice & Miller, 2007). Essentialist beliefs also lead people to attribute group differences (e.g., men outperforming women in higher-level mathematics;

African Americans being convicted of crimes at higher rates than whites) to natural, biological causes instead of to flexible, societal factors (Leslie, in press; Martin & Parker, 1995; Salomon & Cimpian, 2014), thus making people more accepting of social differences and social hierarchies (Cimpian & Salomon, 2014; Hussak & Cimpian, 2015; Jayaratne et al., 2006).

Beyond contributing to social stereotyping and attribution, social essentialism has also been theorized to contribute to other components of inter-group relations, including prejudice and discrimination (Allport, 1954). Prejudice and discrimination differ from social stereotyping in that they involve negative *feelings* towards (in the case of prejudice) and negative *behavior* towards (in the case of discrimination) a group, instead of, or addition to, expectations of within-category similarity (Brewer & Brown, 1998). Consistent with Allport's theorizing, explicitly essentialist beliefs, such as beliefs that membership in a religious or ethnic group is determined by genes, or that social categories have sharp boundaries that cannot be crossed, have played central roles in some of the most pernicious instances of social prejudice throughout human history (e.g., Hitler's Aryanism; the white power movement in the United States; Holtz & Wagner, 2009; Yzerbyt, Judd, & Corneille, 2004). In addition to contributing to the out-group dislike that defines prejudice, social essentialism has also been proposed to negatively influence inter-group relations by leading people to view category boundaries as discrete and inflexible, thus decreasing the likelihood that people will choose to interact with members of other groups (Bernstein, Sacco, Young, Hugenberg, & Cook, 2010; Levy & Dweck, 1999; No et al., 2008; Williams & Eberhardt, 2008; Zagefka, Nigbur, Gonzalez, & Tip, 2012).

The proposal that essentialism leads to these negative social consequences has the potential to address interesting developmental questions about the origins of inter-group relations. By early childhood, and perhaps even early in infancy (Kinzler, Dopoux, & Spelke,

2007), children are highly sensitive to in-groups and out-groups, and show robust preferences for their in-groups based on even trivial and arbitrary distinctions (e.g., randomly assigned shirt colors; Dunham, Baron & Carey, 2011; Patterson & Bigler, 2006). Yet, not all in-group preferences imply social prejudice or lead to discriminatory behaviors. Much of the time, children show increased positive feelings for their in-group members in these paradigms, but do not hold more negative feelings towards the out-group, or engage in more negative behaviors towards out-group members (rather, they respond to out-group members neutrally, Bigler, Jones, & Lobliner, 1997; Dunham et al., 2011, Patterson & Bigler, 2006; see also Aboud, 1988, 2003; Brewer, 1999; Nesdale, 2004 for discussion of the distinctions between in-group positivity and out-group dislike). Something else is needed to move from in-group preferences to more virulent dislike and negative treatment of the out-group.

Based on the theorizing of Allport (1954) and others (Bigler & Liben, 2007; Hirschfeld, 1996; Leslie, in press; Prentice & Miller, 2007; Rothbart & Taylor, 1992), perhaps psychological essentialism is a key factor that moves people from mild preferences for in-groups towards the development of negative attitudes and behaviors towards out-groups. Although young children and adults can readily learn new criteria for social categories, people hold essentialist beliefs regarding only a subset of social categories that they encounter. For example, children can readily learn to group people based on shirt colors and will show some social preferences based on this distinction (Dunham et al., 2011), but do not form essentialist beliefs about such categories unless they are given additional information—that is, they will not expect color-based groups to be determined by birth or stable, to imply similarities across group members and differences between groups, or to reflect fundamental causally-powerful features of an individual's identity (Rhodes & Brickman, 2011; Rhodes, Leslie, & Tworek, 2012; see also

Kalish, 2012). There is also variation in the extent to which children hold essentialist beliefs about particular social categories that they encounter in their everyday lives; for example, white children in the United States hold more essentialist beliefs about gender and language-based groups than about race (Kinzler & Dautel, 2012; Rhodes & Gelman, 2009), and Israeli children hold more essentialist beliefs about religious-ethnic categories than those based on personality traits (Diesendruck & haLevi, 2006). Whether children develop essentialist beliefs about particular social groupings varies based on features of their cultural context, including exposure to certain forms of language (Gelman & Heyman, 1999; Rhodes et al., 2012; Segall, Birnbaum, Deeb, & Diesendruck, 2014), experiences with social diversity (Deeb, Segall, Birnbaum, Ben-Eliyahu, & Diesendruck, 2011), and the nature of existing social hierarchies (Mahalingam, 2007; Mahalingam & Rodriguez, 2006). In short, whether people within a community hold essentialist beliefs about particular groupings develops and changes across childhood (Astuti, Solomon, & Carey, 2004; Birnbaum, Deeb, Segall, Ben-Eliyahu, & Diesendruck, 2010; Diesendruck & Haber, 2009; Kinzler & Dautel, 2012; Rhodes & Gelman, 2009; Taylor, 1996). Thus, one possibility is that variation in essentialist beliefs explains which social groups become the targets of social prejudice and discrimination; in line with Allport and others, perhaps the development of essentialist beliefs about particular groups fosters the development of more virulent dislike of essentialized out-groups.

There are several mechanisms by which essentialism could negatively influence intergroup relations. For example, because essentialism implies that differences between groups are the result of stable and inherent factors, perhaps essentialism leads people to view the out-group as differing more dramatically from the in-group (No et al., 2008). Seeing a group as very different from one's own in-group has been well documented to contribute to prejudiced

attitudes (Brewer, 1999). Along the same lines, as essentialism indicates that social groups reflect fundamentally distinct *kinds* of entities (e.g., in the prototypical case of animal categories—different *species*), such beliefs could lead people to think of out-groups as somehow less human than their own group, a *dehumanization* process that also contributes to prejudice in adult populations (Haslam, Bastian, Bain, & Kashima, 2006; Leyens et al., 2001). Another pathway by which essentialism could lead to prejudice involves influencing how people respond to negative information about individual group members; for example, essentialism could make people more likely to draw conclusions about the inherent nature of a group based on the negative actions of single individuals (Andreychick & Gill, 2014; Leslie, in press; Prentice & Miller, 2007).

Alternately (or additionally), essentialism could negatively influence inter-group relations, but not directly via the processes that Allport and others have proposed. Rather, essentialism could have negative consequences for inter-group relations by leading people to view group boundaries as discrete and inflexible, and thus to view out-group members as less worthy of attention and effort (Bernstein, Sacco, Young, Hugenberg, & Cook, 2010; Chao, Hong, & Chiu, 2013; Levy & Dweck, 1999; No et al., 2008; Williams & Eberhardt, 2008; Zagefka et al., 2012). If so, essentialism would decrease the likelihood of intergroup interactions or cooperation (Chao et al., 2013; No et al., 2008), with possible downstream consequences for prejudice.

Despite the long history of theorizing regarding the implications of essentialism for inter-group relations, however, empirical work on this issue has been limited and yielded mixed results. A major limitation of prior research on this topic is that it has been conducted almost entirely among adult populations; there is very little previous empirical work examining the

implications of essentialism for inter-group relations in early childhood. Essentialism does appear to play a role in the development of social stereotyping in childhood; for example, Pauker et al. (2010) found among children ages 3-10 that essentialist beliefs about race predicted children's use of negative racial stereotypes (see also Levy & Dweck, 1999). Also, Diesendruck and Menahem (2015) found that increasing the salience of Israeli children's (age 6) essentialist beliefs about ethnicity led them to draw members of different groups farther apart (indicating perhaps that they perceived more social distance between groups) and to draw in-group members with more positive affect than out-group members. These findings are suggestive of an early emerging link between essentialism and inter-group relations. Because this study used known groups about which children already had essentialist beliefs and other related group-relevant knowledge and experience (Deeb, Segall, Birnbaum, Ben-Eliyahu, & Diesendruck, 2011; Diesendruck, Goldfein-Elbas, Rhodes, Gelman, & Neumark, 2013), however, it leaves open the question of whether the formation of essentialist beliefs—alone—causally influences how children feel and behave towards members of other groups. Experimentally testing whether the formation of essentialist beliefs in early childhood holds negative ramifications for inter-group attitudes and behaviors can reveal whether such beliefs have causal implications for the development of inter-group relations.

Although there is more work on this issue in adult populations, this body of work has yielded a mixed pattern of findings. Most of this work has examined the relation between essentialist beliefs and prejudice regarding salient social categories that people encounter in their daily lives—testing whether essentialist beliefs about race, for example, correlate with increased prejudice towards racial out-groups. Some studies taking that approach have found weak or no relations between measures of essentialism and prejudice (Haslam, Rothschild, & Ernst, 2002;

Haslam & Levy, 2006; Hodson & Skorska, 2014), whereas others have indeed found support for such relations (Jayaratne et al., 2006; Keller, 2005). Experimental work on this issue has also predominantly focused on familiar social categories such as race (e.g., seeking to increase or decrease the salience of people's essentialist beliefs about race prior to completing measures of inter-group attitudes or behavior) and has also revealed a mixed picture of findings (Andreychik & Gill, 2014; Chao et al., 2013; Diesendruck & Menahem, 2015; Hong et al., 2004; Keller, 2005; Levy, Stroessner, & Dweck, 1998; Rangel & Keller, 2011; Williams & Eberhardt, 2008).

To interpret these mixed patterns, some theorists have proposed that essentialist beliefs do not causally influence inter-group relations per se, but instead are used to justify existing social attitudes or practices (Haslam & Whelan, 2008; Pettigrew, 1979; Verkyuten, 2003; Rangel & Keller, 2011). For example, Morton, Hornsey, and Postmes (2009) found that whether people endorsed essentialist beliefs about particular categories (e.g., ethnic differences) depended on whether essentialism was being used as a justification for excluding an in-group member or an out-group member, suggesting that people adopt essentialist beliefs strategically to justify their already-held beliefs or attitudes. In a similar vein, Mahalingam (2003) found that higher caste Indians were more likely to endorse essentialist interpretations of caste than were lower caste Indians, presumably because that interpretation validated their own higher status.

In sum, prior work leaves open questions regarding whether essentialist beliefs play a causal role in the development of negative inter-group phenomena, whether essentialism alone is sufficient to cause negative social outcomes (or whether it does so only when it interacts with other knowledge and experience), and whether the negative consequences of essentialism for inter-group relations in children extend beyond increased stereotyping. To address these questions, we adopted an experimental approach using novel groups for the present studies. By

adopting such an approach among young children, we can provide a clear test of how essentialism influences inter-group relations, during the developmental period when both essentialist beliefs and prejudiced attitudes begin to emerge. We focused on the early childhood years (ages 4.5-7) and created a novel social group, about which children have no prior knowledge, stereotypes, or attitudes. We then experimentally induced some children (and not others) to hold essentialist beliefs about the group, and tested for effects on children's feelings and behavior towards out-group members. This paradigm thus allows for a strong, direct test of whether essentialism causally influences inter-group relations.

Given the paucity of previous developmental research on this topic, as well as the mixed findings from studies among adult populations, we noted that there were several patterns of findings that we could obtain. In line with Allport and others (e.g., Hirschfeld, 1996), we could find that inducing essentialism in young children has far-reaching negative consequences for inter-group relations, including leading to the development of more negative feelings towards out-group members. Alternately, we could find that essentialism alone is not sufficient to initiate these processes, and therefore, that our manipulation induces essentialism but has no consequences for children's inter-group attitudes.

A third possibility is that essentialism holds implications for inter-group relations, but in a more limited manner and not via the activation of out-group dislike. As described above, among adults, essentialist beliefs increase the extent to which people perceive group boundaries as strict, absolute, and inflexible (No et al., 2008) and thus decrease expectations of inter-group interactions (Bernstein et al., 2010; Williams & Eberhardt, 2008; Zagefka et al., 2012). At least some of these effects occur independent of associations between essentialism and prejudice (Williams & Eberhardt, 2008). Thus, in addition to measures of children's feelings towards out-

group members, we also included a measure of inter-group relations that relies less on social preferences, and more on expectations of inter-group interactions—resource allocation decisions. Resource allocation decisions often depend more on people’s expectations of social reciprocity than on feelings regarding potential recipients among both children (Renno & Shutts, 2015) and adults (Yamagishi, Jim, & Kiyonari, 1999). For example, Renno and Shutts (2015) found that preschool-age children’s tendency to give more resources to racial in-group than out-group members was predicted by their expectations of social reciprocity; that is, the more that children believed that a racial in-group member would be more likely to help them than a racial out-group member, the more likely they were to distribute more resources to racial in-group members. In contrast, children’s giving behavior was not predicted by their social preferences; children who said they preferred white over black children were no more likely to show bias in their giving behavior. Also, Paulus and Moore (2014) found that, by age 5, children’s sharing behavior is strongly related to their expectations of the extent to which they expect others to share with them. Thus, essentialism could reduce children’s willingness to share resources with out-group members because it decreases their expectations of reciprocity among members of different groups, perhaps without actually leading to out-group dislike.

STUDY 1

The aim of Study 1 was to provide an initial test of whether inducing essentialist beliefs towards a novel out-group leads to the development of more negative attitudes and behaviors towards members of that group. To do so, we used a language manipulation to induce essentialist beliefs about a novel group in some children and not others, and then tested their attitudes towards members of the group. To test whether essentialism leads directly to more negative attitudes or does so via the generalization of negative information about individual group

members (as described above, see Andreychick & Gill, 2014; Leslie, in press; Prentice & Miller, 2007), we assessed inter-group attitudes two times—once before children were exposed to negative actions committed by individual group members, and once after exposure to such information.

Methods

Participants included 42 children (M age = 5.8 years, range = 5.0-6.9 years; 16 male, 26 female; 36% White, 19% multi-ethnic or multi-racial, 7% Black, 7% Latino, 2% Asian, remainder did not provide this information) recruited from and tested at the Children's Museum of Manhattan. An additional 13 children began testing but were not included in analyses (5 because they did not complete the research session, 5 for experimenter errors, and 3 for parental interference). To induce essentialism in some participants and not others, children were randomly assigned to the Generic ($n = 21$) or Specific ($n = 21$) conditions. Based on effect sizes from previous work using similar manipulations of essentialism and related beliefs (e.g., Cimpian, Arce, Markman, & Dweck, 2007; Gelman & Heyman, 2000; Gelman, Ware, & Kleinberg, 2010; Rhodes et al., 2012), we aimed to include at least 14 children per condition in all studies. Because we anticipated that some participants would need to be excluded, however, we over-sampled beyond this number to ensure that we would have sufficient sample sizes in our final analyses. Stopping rules for data collection were decided based on calendar dates that were selected a priori to meet or exceed the minimum sample size of 14 children per condition. Exclusion decisions were made after all data were collected and coded from videos, but before data analysis. We report all usable data, and note the numbers and reasons for exclusions for each study.

Manipulation of Essentialist Beliefs

To experimentally induce essentialist beliefs for the novel social category, we built on prior work showing that *generic language*—language that refers to abstract kinds (e.g., “tigers have stripes”)—causes children to apply essentialist beliefs to new categories that they encounter (Rhodes et al., 2012; also Gelman et al., 2010). This previous work does not indicate that generic language *creates* essentialist thought. Essentialist beliefs reflect basic conceptual biases that go far beyond the content of generic language itself. For example, there is no explicit content in the sentence “tigers have stripes” that communicates that being a tiger is a matter of innate and immutable category membership. Yet children conclude that new categories have those features after fairly limited exposure to such generics (Gelman et al., 2010; Rhodes et al., 2012). From this perspective, children have abstract expectations that *certain* categories in their environment reflect essential kinds and rely on linguistic cues to determine *which* categories have this structure. Because generic language communicates regularities regarding abstract kinds, children assume that categories described with generic language are the kinds of categories that are coherent and causally powerful enough to support such generalizations (Cimpian & Markman, 2011; Gelman et al., 2010; Gelman & Heyman, 1999; Leslie 2008; Rhodes et al., 2012). In the present context, generic language provides a useful way to induce essentialist thinking for a novel category without manipulating any other aspect of inter-group relations.

In the present study, first, an experimenter read an illustrated book that presented a novel category (“Zarpies”). The books were identical to those used in Rhodes et al. (2012, Study 1) and presented 16 individual pictures of Zarpies, one per page, each displaying a unique property. The 16 Zarpies were diverse with respect to race, sex, and age, so that children could not map the category onto any group for which they might already hold essentialist beliefs. By condition, children heard the property on each page described either with generic language (e.g., “Look at

this Zarpie! Zarpies climb fences”) or non-generic language (e.g., “Look at this Zarpie! This Zarpie climbs fences”). None of the properties involved any negative qualities. The experimenter read the book twice to the child.

Using these materials, Rhodes et al. (2012) found that, in the Specific condition, children did not hold essentialist beliefs about Zarpies after exposure to the book. That is, although they learned the category “Zarpie”, they did not expect Zarpie properties to be determined by birth, they did not expect individuals to do certain behaviors *because* they are Zarpies, and they did not expect all Zarpies to share either the properties mentioned in the book or other new properties. In contrast, the Generic condition significantly increased the likelihood of these essentialist beliefs among preschool-age children, with effects persisting for at least several days after exposure to the generic language. Follow-up control studies confirmed that it was the genericity of the target sentences—not simply their syntactic plurality—that elicited these effects.

Measures of Essentialist Beliefs

After the book-reading, children completed two measures of essentialist beliefs used by Rhodes et al. (2012) and Gelman et al. (2010). These included three *explanation* items, in which children were asked to explain why individual Zarpies performed specific behaviors that had been shown in the book (e.g., “Look at this Zarpie. Why is this Zarpie climbing a tall fence?”). Responses were transcribed verbatim from video and coded by two independent raters (agreement = 93% across both studies, with disagreements resolved by a third coder). Following Cimpian and Markman (2009, 2011), Gelman et al. (2010), and Rhodes et al. (2012), responses were scored along two dimensions: (a) whether they referred to intrinsic (e.g., “because he loves to climb”, scored “1”) or extrinsic (e.g., “because it is nice outside”, scored “0”) causal factors and whether they referred to the category (e.g., “because *Zarpies* love to climb”, scored “1”) or

not (e.g., “because *he* loves to climb”, scored “0”) to explain the behavior. Thus, scores for each explanation item could range from 0-2 essentialist responses.

Next, children completed two *inheritance* items, in which they were told that a baby was born to a Zarpie mom but raised by a non-Zarpie mom (Gelman & Wellman, 1991; Hirschfeld, 1995; Taylor, 1996; Waxman et al., 2007). Children were asked to predict whether the grown-up child would exhibit a property held by the Zarpie mom (e.g., “flaps her arms when she is happy”, scored “1”) or the non-Zarpie mom (e.g., “claps her hands when she is happy”, scored “0”). These items test whether children think that properties exhibited by Zarpies are determined by birth and stable (consistent with essentialist thought) or determined by the environment (inconsistent with essentialist thought). Following Rhodes et al. (2012), scores for all of the essentialism items were totaled to create one composite (number of essentialist responses out of 8 total possible). We analyzed these data using binomial regression models and report average probabilities of essentialist responses, accompanied by Wald 95% Confidence Intervals (CIs), with Odds Ratios (and accompanying CIs) as indicators of effect size.

First Measure of Inter-group Attitudes

After the essentialism measures, children’s attitudes towards Zarpies were assessed with four questions. For each, children were shown a new individual Zarpie, and asked a question about whether they would want to affiliate with the Zarpie (“Do you want to invite this Zarpie to your birthday party?” “Do you want to play with this Zarpie?” “Do you want to share your toys with this Zarpie?” “Do you want to sit next to this Zarpie at school?”). For each, children responded with “yes” or “no” and were then asked a follow-up question. For example, if they responded affirmatively, they were asked, “do you sort of want to or really want to”? Each item received a score ranging from 0-3, with higher numbers indicating more negative attitudes (0 =

really want to, 1 = sort of want to, 2 = sort of don't want to, 3 = really don't want to). The four individuals that were shown were matched to the participating child's gender and varied by race across the four questions. Responses to these items were averaged and analyzed via standard analyses of variance.

Exposure to Negative Information

Subsequently, children were shown a series of four negative actions completed by new individual Zarpies. For example, children were shown an individual Zarpie stealing a cookie. To avoid providing either generic or specific language regarding the action, children were asked to describe the behavior themselves (e.g., "Look, a Zarpie! Look what's happening here. What's going on here?") If the child responded with "stealing a cookie", the experimenter responded, "Yes, that's stealing a cookie". The experimenter described only the behavior; the experimenter did not repeat any references to the agent. If the child responded with a different action, the experimenter said, "Right, that looks like [child's response]. You know what else? That's stealing a cookie. Remind me, what is that? Right, that's stealing a cookie." Children correctly responded with "stealing a cookie", for example, on 87% of trials either before or after this prompting (this rate did not vary by condition, $p > .20$). This procedure was repeated for four behaviors (each displayed by a different individual Zarpie): stealing a cookie, teasing, pushing someone, calling someone a mean name. After children were shown all four behaviors once, they were reviewed a second time. For each, the experimenter said, "Remind me, what is that? Right that's stealing a cookie". On this second run through, children gave the intended descriptions on 92% of trials (this rate did not vary by condition, $p > .70$). Exploratory analyses revealed that the number of accurate behavioral descriptions given by children during this phase did not predict

any of the dependent measures; responses to these comprehension questions were not considered further.

Second Measure of Inter-group Attitudes

After the negative actions, children completed the measure assessing their attitudes towards Zarpies a second time. They were asked the same four questions as in the first measure of inter-group attitudes, but with different individual Zarpies pictured (whether a specific picture was shown before or after the negative information was counter-balanced across participants).

Resource Allocation

Finally, participants completed a resource allocation task. Children were shown a picture of a new, individual Zarpie (not one seen before in either the book, measures of inter-group attitudes, or exposure to the negative information), given four stickers, and told, “Now you get to give some stickers to a Zarpie. You have four stickers to give. You can give as many stickers as you want.” Children then decided whether to give each sticker. Any remaining stickers were simply removed from the table; they were not given to the children themselves. Thus, giving to the Zarpie was a non-costly decision on the part of the child. We selected this approach because previous research on children’s group-based giving behavior also used non-costly situations (Dunham et al., 2011; Renno & Shutts, 2015). These data were analyzed with binomial regression models, with the dependent variable being the number of decisions to withhold a sticker out of four possible. To be consistent with the measure of inter-group attitudes, which was scored such that higher numbers reflect more negative attitudes, resource allocations are reported as probabilities of *withholding* resources from the Zarpie, such that higher numbers indicate more negative treatment of the Zarpie.

Results

Essentialism

Confirming that our manipulation successfully induced essentialist beliefs, children in the Generic condition gave more essentialist responses (probabilities of essentialist responses, $M = .43$, $CI = .36, .50$) than children in the Specific condition ($M = .27$, $CI = .21, .35$), Wald $\chi^2(1) = 8.72$, $p = .003$, $OR = 1.99$, $CI = 1.26-3.14$. This finding replicates Rhodes et al. (2012).

Attitudes

There were no main or interactive effects of condition (Generic, Specific) or time (before the negative information, after the negative information) on children's attitudes towards Zarpies, $ps > .30$. Overall, children felt relatively positively towards Zarpies ($M = 1.38$, $SE = .16$; possible range 0-3, with higher numbers indicating more negative attitudes; Generic condition, before the negative information, $M = 1.30$, $SE = .24$; After, $M = 1.16$, $SE = .23$; Specific condition, before, $M = 1.55$, $SE = .24$; After, $M = 1.54$, $SE = .23$).

Resource Allocation

Children in the Generic condition, however, withheld more resources from the Zarpies (Probabilities of withholding resources, M generic = $.45$, $CI = .35-.56$; M specific = $.30$, $CI = .21-.40$), Wald $\chi^2(1) = 4.25$, $p = .04$. The odds of withholding in the Generic condition were 1.95 times as high as those in the Specific condition ($CI = 1.03-3.68$).

We conducted further analyses with the Process Procedure in SPSS to test whether essentialism mediated the effect of condition on the proportion of resources withheld from Zarpies. Indeed, this analysis confirmed that there was a significant indirect effect of condition on the proportion of resources withheld through essentialism (standardized indirect effect = $.12$, Bootstrapped 95% $CI = .02-.29$). The mediator accounted for roughly half of the total effect of condition on the proportion of resources withheld from Zarpies (ratio of indirect to total effect =

.52). Children's decisions to withhold resources were not correlated with their responses on the attitude measure either before, $r(40) = .24, p = .13$, or after, $r(40) = .23, p = .14$, the negative information.

Discussion

In Study 1, we successfully manipulated children's essentialist beliefs about a novel out-group. Yet we found that increasing essentialist beliefs towards the group did not lead children to have more negative attitudes towards group members. Providing negative information about individual group members also did not lead to more negative feelings in either condition, suggesting that children—even in the essentialism condition—did not generalize negative actions committed by individuals to the group as a whole. Nevertheless, children induced via generic language to hold essentialist beliefs were less likely to allocate resources to members of the essentialized out-group. Because the resource allocation task was always administered after exposure to the negative information, however, it remains unclear whether essentialism led directly to these effects, or whether it did so only once children were exposed to information about the negative actions of individual group members. This issue is addressed in Study 2.

STUDY 2

Study 2 had two main aims. The first was to replicate the effect of condition on children's resource allocation decisions found in Study 1, and to test if this effect held even if children were not exposed to negative information about any individual group members. The second was to test if essentialism might indeed influence children's inter-group attitudes (not only their resource allocation decisions) if children receive more exposure to generic language over a longer period of time and attitudes are assessed using a wider range of measures.

Methods

Participants included 52 children (M age = 5.09, range = 4.5-5.5; 23 male, 29 female; 69% White, 16% Asian, 13% Latino, 5% Black, remainder chose not to report this information). Consistent with our goal of examining the implications of essentialism for inter-group attitudes at the age at which essentialist beliefs about social categories have been found to emerge, we sampled a slightly younger group of children in Study 2. The lower bound was set at 4.5 years, however, because pilot work conducted for Rhodes et al. (2012) found that younger children had difficulty with both the length of the research session and the verbal demands of the test questions. An additional five children began testing but were excluded (four because their parents reported that they had not completed the assigned book reading at home prior to the research session, see below, and 1 because they did not complete the research session in the lab). Children were recruited from a database of families who had signed up to participate in research in developmental laboratories at New York University.

Families were contacted by phone or email and asked if they would be interested in participating in a parent-child book reading study. If parents expressed interest in the study, they were randomly assigned to a Generic ($n = 27$) or Specific condition ($n = 25$; as in Study 1) and the Zarpie book specified by condition was sent to them via mail. They were asked to read it 8 times in the 10 days prior to their visit to the laboratory and given a diary to record their book-readings; all families included in analyses reported having completed the assigned number of readings. Families then visited an on-campus laboratory to complete measures of essentialism and inter-group attitudes.

This “read at home” procedure was also used by Gelman et al. (2010). One possible concern with this approach was that parents would form their own attitudes about Zarpies and then communicate those attitudes to children; if children then adopted their parents’ attitudes,

this could perhaps make it more difficult to find effects of condition on the measures of inter-group attitudes. To address this possibility, parents were also asked to complete measures of their attitudes towards Zarpies during the family's visit to the lab; we found no correlation between parents' and children's attitudes towards Zarpies on any measure ($ps > .50$). We discuss this issue further below.

Essentialism

Children completed the same measures of essentialist beliefs used in Study 1. The research assistant who administered these measures was blind to which book the family had read at home (and thus was blind to the child's condition). The child completed the session with the researcher in one room while the parent completed measures on a computer in an adjoining room.

Inter-group attitudes

Children completed three measures of inter-group attitudes. These included two questions about liking (e.g., "Look at this Zarpie! Let's pretend you are going to the park. Do you want to invite this Zarpie to come to the park with you?"; scored "0" for "yes", "1" for "no"; the other item asked whether the child would like to play with a Zarpie at recess; items were totaled and analyzed with binomial regression models); two questions about proximity (children were shown an array of chairs with a Zarpie seated at one of them and told: "Let's pretend you're at the movies. Oh look, a Zarpie! Let's pick a seat. Where do you want to sit?" These items were scored as the number of seats away from the target character and totaled; right next to the Zarpie = 0, farthest seat away = 4; the other item was structurally identical and asked the child to pick a seat in a school setting; items were analyzed with Poisson regression models); 2 outcome attributions, in which children were asked to guess whether a Zarpie or non-Zarpie achieved a

positive outcome (e.g., “He is a Zarpie. He is not a Zarpie. Look – someone built the best sandcastle! It was either this one, or this one! Who do you think built the best sandcastle?”); scored 1 = non-Zarpie, 0 = Zarpie; analyzed with binomial regression models). All items were scored so that higher numbers indicate more negative attitudes towards Zarpies.

Resource Allocation

Children also completed two resource allocation trials, one where they were asked to allocate up to four stickers (e.g., “Look at this Zarpie. Go ahead and give as many stickers as you want to the Zarpie”) and the other where they were asked to allocate up to six toy boats. Data from the two trials were totaled and analyzed as in Study 1. As in Study 1, these are reported as probabilities of withholding resources from Zarpies.

Memory

At the conclusion of the study, children were shown a book containing the Zarpie illustrations, but with no accompanying text, and were asked to tell the story that they read at home back to the experimenter. Children’s descriptions of each page were scored as “1” for correctly describing the intended property and “0” for failing to do so. For example, for the item in which children heard “Zarpies love to sing” or “This Zarpie loves to sing”, children received credit for remembering the page if they mentioned singing (e.g., “she loves to sing” “she likes to sing” “she sings”) but not if they mentioned a different behavior (e.g., “she’s yelling really loud”). This measure allowed us to confirm that children remembered the book equally well in both conditions. Memory for the described properties was excellent (above 98% correct) and did not vary by condition.

Results

Essentialism

As in Study 1, children in the generic language condition gave more essentialist responses ($M = .55$, $CI = .48, .62$) than children in the specific language condition ($M = .40$, $CI = .33, .47$), Wald $\chi^2(1) = 9.41$, $p = .002$, $OR = 1.84$, $CI = 1.25-2.72$. These findings are very similar to Study 1 and to Rhodes et al. (2012), suggesting that although the procedure here differed somewhat (as parents, instead of an experimenter, read the book to children), the manipulation influenced children's beliefs in the manner intended.

Inter-group attitudes and Resource Allocation

Children's responses to the three measures of inter-group attitudes and the resource allocation task are in Table 1. Children's feelings towards Zarpies did not differ by condition as assessed by any attitude measure (invitations, proximity, or outcome attribution, $ps > .20$). Yet, as in Study 1, children gave fewer resources to the Zarpies in the Generic condition than in the Specific condition; Wald $\chi^2(1) = 25.54$, $p < .001$, $OR = 3.95$, $CI = 2.32-6.73$. As shown in Table 2, the three measures of inter-group attitudes (the invitations measure, proximity measure, and outcome measure) were all inter-correlated with one another, but none were correlated with children's resource allocation decisions.

Participant Variables

To consider the role of participant gender and age, we combined data across Studies 1 and 2 to increase our power to detect effects of these variables. Even in the combined data set, there was not sufficient power to examine effects of child race or ethnicity; this is an important area for future work. Although the procedures differed somewhat across the two studies, both yielded very similar findings. In both studies, exposure to generic language increased children's essentialist beliefs and decreased their willingness to allocate resources across group boundaries, but influenced no other measure of inter-group attitudes. Here we combined these data to test

whether the effect of the manipulation on these two variables (essentialism and resource allocation) differed by participant age or gender.

We first tested for effects of participant gender on children's essentialist responses and resource allocation decisions. There were no main or interactive effects of gender on children's essentialism scores ($ps > .15$). However, girls ($M = .24, CI = .20, .29$) withheld more resources than boys ($M = .16, CI = .12, .20$), Wald $\chi^2(1) = 7.31, p = .007$. The effect of condition remained significant in this analysis, Wald $\chi^2(1) = 21.16, p < .001$ (Generic, $M = .28, CI = .23, .33$; Specific, $M = .13, CI = .10, .17$), with no interaction between gender and condition, $p = .4$. Further, the effect of condition was significant for both boys and girls examined separately, $ps < .05$.

In the combined data set, we also tested for effects of participant age (younger children, $n = 47, M \text{ age} = 5.0, SD = .20$ years; older children, $n = 47, M = 5.8$ years, $SD = .52$ years; for ease of interpretation, we did a median-split on age, but examining age as a continuous predictor revealed a very similar pattern of results). Younger children ($M = .46, CI = .41, .51$) gave more essentialist responses than older children ($M = .38, CI = .33, .43$), Wald $\chi^2(1) = 4.47, p = .04$. The effect of condition remained significant in this analysis, Wald $\chi^2(1) = 19.84, p < .001$ (Generic, $M = .50, CI = .45, .55$; Specific, $M = .34, CI = .29, .39$). Age did not interact with condition, $p > .7$, and the effect of condition was significant within each age group examined separately, $ps < .01$.

For resource allocations, older children ($M = .27, CI = .21, .32$) withheld more resources than younger children ($M = .17, CI = .13, .21$), Wald $\chi^2(1) = 8.62, p = .003$. The effect of condition remained significant in this analysis, Wald $\chi^2(1) = 23.14, p < .001$ (Generic, $M = .30, CI = .26, .35$; Specific, $M = .14, CI = .11, .19$). Age did not interact with condition, $p > .50$, and

the effect of condition was significant within each age group examined separately, $ps < .05$.

Overall, although these analyses revealed some baseline differences in children's essentialist beliefs and resource allocation decisions by gender and age, the effects of condition on children's essentialist beliefs and resource allocation decisions did not differ by these participant variables.

Further examination of children's explanations

In the combined data set, we also used the explanations generated by children to consider an alternate mechanism by which our condition manipulation could have influenced resource allocation decisions. In particular, we considered that children in the Specific condition might have been more likely to focus on the Zarpies as individual agents. If so, perhaps children are more likely to share with people they think of as individual agents. As a preliminary test of this possibility, we recoded the explanations that children generated as part of our essentialism measures to obtain an indicator of the extent to which children thought of the characters as individual agents.

As described earlier, on these items, children were shown a picture of a Zarpie and were asked to explain the Zarpie's behavior (e.g., "Why is this Zarpie climbing a tall fence?"). In our main coding (as reported above), the "scope" score focused on the extent to which children referenced the *category* as exerting a causal force (e.g., "Because Zarpies love to climb"). In that scheme, everything that did not reference the category received a score of "0" for "scope"; this included explanations that referenced the individual agent (e.g., "because he loves to climb") and those that did not (e.g., "because it is a nice day") together. Thus, to get a measure of the extent to which children were thinking of the characters as individual actors, we recoded these data for whether children referenced the individual agent as causal. Children were indeed more likely to do so in the Specific condition than the Generic condition, Wald $\chi^2(1) = 30.34, p < .001$

(Generic, $M = .48$, $CI = .40, .56$; Specific, $M = .80$, $CI = .73, .86$). However, this score did not correlate with their resource allocation decisions, $r(93) = -.10$, *ns*. Though a preliminary test of this issue, we think these data are consistent with the account that the reported effects on resource allocation are driven more by increased essentialism in the Generic condition than in increased individual-thinking in the Specific condition.

Discussion

Study 2 replicated several key findings of Study 1. We once again found that exposure to generic language about a novel social category (a) increases essentialist beliefs and (b) decreases children's willingness to allocate resources to members of that group. Further, the effect of condition on children's resource allocation decisions held up even when children were not exposed to any negative information about group members. Yet, even with more exposure to generic language over a longer period of time and a wider range of measures of children's inter-group attitudes, we consistently found that children in the Generic condition did not hold more negative attitudes towards Zarpies. Further, we found that while our three measures of children's attitudes towards Zarpies were correlated with one another, none correlated with their resource allocation decisions. These findings support the proposal that resource allocation decisions and children's social attitudes depend on different underlying processes, with the process underlying children's resource allocation decisions being particularly susceptible to essentialist beliefs.

For Study 2, we asked parents to read the book to children at home prior to the testing session, as was done by Gelman et al. (2010). Although this method differed from Study 1 (and Rhodes et al., 2012), we found similar effects of language condition on essentialist beliefs as in Study 1 and Rhodes et al. (2012), suggesting that parents administered the manipulation with sufficient fidelity to produce the intended effects. The very similar patterns across Studies 1 and

2, as well as the lack of correlations between children's and parents' attitudes towards Zarpies (as discussed above), indicate that the read-at-home procedure did not bias children's responses in a problematic manner. Further, the read-at-home procedure had the added benefit that the experimenter in Study 2 was blind to the child's condition while administering the dependent measures (which was one limitation of Study 1).

Study 3

In Studies 1 and 2, we manipulated children's essentialist beliefs about a novel group of people—Zarpies. Zarpies were presented as an out-group (as presumably children would realize that they themselves are not Zarpies), but we did not highlight this out-group status. Thus, one open possibility is that essentialist beliefs would lead to more negative attitudes towards a novel group if the out-group status of that group were made more salient to children. In Study 3, we tested this possibility by highlighting the out-group status of Zarpies in both specific and generic language conditions, by assigning children to their own, different novel in-group—Gorps. Children received the same generic or specific input about Zarpies as in Studies 1-2; thus we manipulated essentialist beliefs about the out-group only (not about the in-group). Children then completed measures of inter-group attitudes and behavior similar to those in Studies 1-2.

Consistent with prior work, we expected children to hold biased attitudes in favor of their own groups in both conditions of this study; that is, we expected them to prefer to invite members of their own group, to say they would sit closer to members of their own group, and to share more resources with their own group members. Previous work has shown that children of these ages readily show such biases based on new, arbitrary group memberships to which they are assigned in experimental settings (Dunham et al., 2011; Patterson & Bigler, 2007). Our key

question was whether essentialist beliefs—induced by generic language—would accentuate these group biases.

In Study 3, we also aimed to pinpoint more precisely the component of essentialist beliefs that leads children to withhold resources from out-group members. In particular, we focused on the component of essentialist beliefs that entails viewing the boundaries between social groups as strict, absolute, and inflexible (No et al., 2008; Rhodes & Gelman, 2009). Among adults, this component of essentialism is thought to decrease expectations of inter-group interactions (Zagefka et al., 2012). Similarly, among somewhat older children (age 11), the tendency to view personalities as fixed (similar to an essentialist belief) was associated with less desire to interact with out-group members (Levy & Dweck, 1999). As resource allocation decisions often depend on expectations of social reciprocity (Dunham et al., 2011; Renno & Shutts, 2015; Yamagishi, Jim, & Kiyonari, 1999), we hypothesized that this component of essentialism—viewing boundaries as strict, absolute, and inflexible—would be particularly important for explaining the relation between essentialism and resource allocation behavior observed in Studies 1 and 2. From this perspective, essentialism makes people more likely to view the boundary between their own group and an essentialized out-group as absolute, and thus decreases expectations of future opportunities for reciprocity, and consequently, decreases willingness to allocate resources across group boundaries.

In Studies 1 and 2, however, only one of three essentialism measures—the “scope” score derived from the explanation measure—directly taps this component of essentialism (as described by Gelman et al. 2010). The other two measures (the “cause” score derived from the explanation measure and the inheritance questions) instead assess aspects of essentialist beliefs that relate to viewing category-linked properties as caused by intrinsic, innate qualities. Thus, in

Study 3, we added an additional measure of children's beliefs about category boundaries, so that we could statistically test which component of essentialist beliefs best explains the relation between essentialism and resource allocation decisions.

Methods

Participants included 33 children (10 male, 23 female; *M* age = 5.16, range = 4.5-6.0; 58% White, 12% Black, 9% Hispanic, the remainder did not provide this information) recruited from and tested at the Children's Museum of Manhattan or a private preschool.

Group Introduction

First, children were introduced to two novel groups and given their group assignment, as follows:

Today we are going to talk about two groups of kids called Zarpies and Gorps. Here are some Zarpies – they are wearing yellow. Here are some Gorps – they are wearing green. First we have to figure out which group you should go in. Let me ask you some questions to see which group you should go in. Which do you like better, cookies or cupcakes? (Regardless of answer): Okay, great, these kids who are Gorps like (child's answer) better too. I think you should be in the Gorp group, but let me ask you one more question to be sure. Which do you like better, swimming or playing outside? (Regardless of answer): Okay, great, these kids who are Gorps like (child's answer) better too. You are definitely in the Gorp group. Here, take this green sticker to show that you are in the Gorp group. And let me give you this green scarf to remind us that you are in the Gorp group too. Here are some Zarpies and here are some Gorps. Can you point to someone who is in your group? And how about someone who is not in your group?

If children failed to accurately point to an in-group or out-group member, the experimenter reminded the child, “You are in the Gorp group. Here are some Zarpies and here are some Gorps” and re-asked these questions. Subsequently, the experimenter said, “Now we are going to read a story about some Zarpies. Remind me, are you a Zarpie? That’s right, you are not a Zarpie, you are a Gorp. Let’s read this book about some Zarpies then we’ll answer some questions about some Zarpies and some Gorps.” The experimenter then read the Zarpie book used in Studies 1-2 twice to the child (as specified by the child’s condition, $n = 19$ Generic, $n = 14$ Specific). After the book reading, the experimenter said, “Now we’re going to answer some questions about some Zarpies and some Gorps. Remind me, are you a Zarpie or a Gorp? That’s right, you are a Gorp.”

Essentialism Measures

Children completed the measures of essentialist beliefs used in Studies 1-2. Also, to begin to pinpoint the features of essentialist beliefs that might shape children’s resource allocation decisions, we included an additional measure of children’s beliefs that the boundaries between categories are discrete and objective. In particular, children were asked an additional follow-up question after each inheritance item, asking whether they would also endorse the alternate offered property. For example, if the child responded that the grown-up child would flap its arm when it is happy, like the Zarpie mom, the follow-up question would be, “Do you think the child might also clap its hands when it is happy, like the Gorp mom?” Rejecting the alternate property on these items (scored “1”) indicates that children reject the possibility that the grown-up child in the vignette might display the properties of *both* groups, and thus that they believe the boundaries between groups are discrete and absolute (Taylor et al., 2009). To increase our power to detect effects of these judgments, we increased the number of inheritance

items for this study from 2 to 3. For analyses, we first examined the essentialism composite used in Studies 1-2, including the explanation items and initial responses to the inheritance questions, in order to facilitate comparisons across studies. Subsequently, we test the extent to which a composite score measuring children's beliefs about category boundaries (consisting of the sum of the scope score and the new measure of beliefs about the discreteness of categories) and a composite score measuring children's beliefs about intrinsic causes (consisting of the sum of the cause score and the inheritance measure) account for the effect of condition on children's behavior.

Inter-group attitudes and Resource Allocation Measures

Next, children completed adapted versions of two of the inter-group attitudes measures used in Study 2—the invitations measure and the proximity measure—along with a measure of their resource allocation decisions. Children were asked about two items each for all three measures, and for each one, were asked to choose between an in-group member and an out-group member (e.g., Invitations: “Do you want to invite this Gorp to go to the circus with you, or do you want to invite this Zarpie to go to the circus with you?”; Resource allocation: “Look at this Gorp, and look at this Zarpie. Go ahead and give as many trains as you want to the Gorp and as many trains as you want to the Zarpie.” Seat distance: “Let's pretend you're outside. Oh look, a Gorp and a Zarpie! Let's pick a seat. Where do you want to sit?” For the resource allocation task, children completed two trials, one where they were asked to distribute four resources (e.g., toy boats) and one in which they were asked to distribute six resources (e.g., toy trains). Although children were not required to distribute all resources to one group or the other, they chose to do so in practice. These items are reported as probabilities of items withheld from the out-group (as

in previous studies); in this case, then, higher probabilities withheld from the out-group means that more items were given to the in-group.

Results

Essentialism

As in Studies 1-2, children in the Generic condition gave more essentialist responses ($M = .60$, $CI = .53, .67$) than children in the Specific condition ($M = .33$, $CI = .25, .41$), Wald $\chi^2(1) = 21.62$, $p < .001$, $OR = 3.14$, $CI = 1.94-5.09$.

Intergroup Attitudes

Children showed in-group biases on both measures of inter-group attitudes, but the extent of these biases did not vary by language condition. Children reliably invited their in-group member over their out-group member ($M = .78$, $CI = .66, .87$), Wald $\chi^2(1) = 15.74$, $p < .001$ ($OR = 3.13$, $CI = 1.78, 5.49$); responses did not vary by condition, Wald $\chi^2(1) = 2.51$, $p = .11$, Generic, $M = .68$, $CI = .52, .81$; Specific, $M = .86$, $CI = .68, .95$). They also chose to sit farther away from the out-group member (and thus closer to the in-group member) than expected by chance ($M = 1.35$, $SD = .59$, $t(32) = 3.38$, $p < .002$; again, responses did not vary by condition, $t(31) = 1.44$, $p = .16$; Generic, $M = 1.47$, $SD = .49$; Specific, $M = 1.18$, $SD = .70$).

Resource Allocation

Overall, children gave fewer resources to the out-group (and therefore designated more to the in-group) than expected by chance ($M = .39$, $CI = .34, .45$), Wald $\chi^2(1) = 14.62$, $p < .001$. Consistent with Studies 1 and 2, however, children's resource allocations differed by condition. Children gave fewer resources to the Zarpie (and thus more to the Gorp) in the Generic condition ($M = .35$, $CI = .28, .42$) than in the Specific condition ($M = .46$, $CI = .38, .54$), Wald $\chi^2(1) = 4.05$, $p = .04$. ($OR = 1.58$, $CI = 1.01, 2.47$).

Further, analyses using the Process Procedure in SPSS confirmed that children's beliefs about the discreteness of category boundaries mediated the effect of condition on the proportion of resources withheld from Zarpies, whereas their beliefs about the innate or intrinsic nature of category-linked properties did not. In particular, these analyses confirmed a significant indirect effect of condition on withholding resources from Zarpies via the category-boundaries measure (standardized indirect effect = .17, $CI = .0003, .48$), with category-boundaries accounting for approximately 70% of the variance (ratio of indirect effect to total effect = .71). In contrast, the indirect effect via beliefs about the innate nature of category properties was not significant (standardized indirect effect = -.06, $CI = -.25, .03$).

Discussion

Study 3 replicated the findings of Studies 1-2 indicating that exposure to generic language increases essentialist beliefs about a new social category (as evidenced by increased essentialism in the Generic than Specific condition), extending this finding to instances when the out-group status of this group is made more salient to children. We also replicated the finding that inducing essentialist beliefs leads children to share fewer resources with out-group members. Further, we conceptually replicated the findings of Dunham et al. (2011) and others, who have found that children rapidly develop in-group preferences, even for novel social groups—children in this study preferred to affiliate with members of their own groups (on the “invitations” measure), sat closer to their in-group members than out-group members (on the “proximity” measure), and also designated more resources to their in-group members when asked to choose between allocating to in-group and out-group members. That we found in-group bias on all of the measures, including two of the measures of social preference used in Study 2, shows that all of the measures used here were indeed sensitive to variation in children's beliefs. Nevertheless,

essentialism influenced only responses on the resource allocation task—we once again replicated the null results from Studies 1 and 2 regarding the effect of essentialism on children’s inter-group attitudes, even when the out-group status of Zarpies was highlighted. Study 3 also revealed that variation in the extent to which children perceived the boundaries between Zarpies and Gorps as absolute and discrete accounted for the relation between their assigned condition and their resource allocation decisions.

General Discussion

These studies examined how essentialist beliefs influence children’s inter-group attitudes and behaviors. In three studies, essentialist beliefs related to children’s resource allocation decisions. In Study 1, children induced to hold essentialist beliefs about a novel group shared fewer resources with group members after hearing about instances of negative behavior on the part of specific individual group members. In Study 2, children induced to hold essentialist beliefs withheld resources even though they had not been exposed to such instances of negative behavior. In Study 3, children with essentialist beliefs again withheld more resources when the group in question was presented as an explicit out-group. Yet, in no study did children seem to feel more negatively towards Zarpies as a function of essentialism. This pattern is consistent with the possibility that essentialism influences inter-group behavior by increasing beliefs about the discreteness of category boundaries (see Gaither et al., 2014), thus making children more likely to consider a person’s out-group status when making judgments about social reciprocity (see Dunham et al., 2011; Paulus & Moore, 2014; Yamagishi et al., 1999).

These data are the first to reveal that the development of essentialist beliefs about an entirely novel group has immediate negative consequences for children’s inter-group behavior. Previous research has documented correlations between children’s essentialist beliefs about

familiar social categories and some other aspects of inter-group cognition (e.g., correlations between racial essentialism and endorsing racial stereotypes; Levy & Dweck, 1999; Pauker et al., 2010), and Diesendruck & Menahem (2015) found that increasing children's essentialist beliefs about familiar groups influenced their implicit attitudes in some cases. While very informative, this prior work leaves open questions regarding whether essentialist beliefs play a *causal role* in the development of these negative features of social cognition, whether essentialism *alone* is sufficient to cause negative social outcomes (or whether it does so only when it interacts with other aspects of children's knowledge and experiences with familiar categories), and whether the negative consequences of essentialism for inter-group relations extend beyond increased stereotyping. Our experimental approach with novel groups allowed us to address these questions. We found that inducing essentialist beliefs in children—even if they were provided with no negative information about a new group—immediately led children to be less willing to share resources across group boundaries. Thus, we provide the first evidence that essentialism plays a causal role in the development of some negative inter-group phenomena, that such phenomena extend beyond stereotyping to influence resource allocation decisions, and that essentialism *alone* is sufficient to produce these effects.

These data also reveal, however, that essentialism might play a more limited role in the development of some inter-group phenomena than suggested by previous theorizing (Allport, 1956). In particular, across three studies and multiple measures, we found no evidence that essentialism led children to hold negative attitudes towards members of essentialized out-groups. Thus, essentialism alone does not seem sufficient to lead to social prejudice, at least in early childhood. These findings do not preclude the possibility, however, that essentialism plays a causal role in the development of prejudiced attitudes via more complex social or developmental

phenomena than we considered here. For example, essentialism could contribute to prejudice in the context of status differences between groups, once children accumulate personal experience with in-group and out-group members, or if children are explicitly exposed to negative stereotypes (Bigler & Liben, 2007; Cimpian & Salomon, 2014; Birnbaum et al., 2010; see also Rutland, Killen, & Abrams, 2010). Our findings only suggest that essentialist beliefs—on their own—do not immediately lead to the development of negative feelings towards out-group members; they do not preclude the possibility that essentialism contributes to social prejudice in the context of children’s broader experiences (see Leslie, in press). Experimentally testing how essentialism interacts with other types of information (e.g., information about status differences, negative stereotypes, and so on) is an important direction for future research.

Revealing that essentialist beliefs—alone—influence resource allocation decisions but do not elicit negative feelings towards out-group members provides some insight into the mechanisms underlying these various inter-group phenomena. In particular, these findings are consistent with proposals that resource allocation decisions in inter-group contexts do not reflect simple social preferences (Renno & Shutts, 2015; Yamagishi et al., 1999). In three studies, our essentialism manipulation consistently affected resource allocation decisions but not social preferences, suggesting that different processes underlie these phenomena. More directly, although our multiple measures of social preferences (e.g., choices about proximity, decisions to issue invitations, and outcome predictions) were correlated with one another, in no study did any of these attitude measures correlate with children’s allocation decisions. Rather, we propose that essentialism influences such decisions by increasing the extent to which children view the boundaries between groups as discrete and absolute, and therefore the likelihood that they incorporate such boundaries into their expectations of social reciprocity.

Further, these data may help to distinguish various theoretical models of why essentialism often correlates with prejudice among adult populations. One perspective in adult social psychology has suggested that essentialism leads to prejudice because it increases perceptions of group differences, perhaps leading people to view in-group and out-group members as fundamentally distinct kinds of people and thus to dehumanize out-groups (Leyens et al., 2001) and attribute group differences to biological or immutable factors (Keller, 2005). Although we did not directly measure perceptions of group differences here, the present data are difficult to reconcile with this perspective, which predicts that essentialism should lead directly to prejudice. Children in the present studies who were induced to hold essentialist beliefs viewed category-linked properties as innately determined and immutable, expected such properties to be shared across group members, and viewed intrinsic factors as responsible for category-typical behaviors. Yet, these beliefs, alone, did not lead them to feel more negatively towards members of the essentialized group. Thus, essentialism does not appear to lead directly to prejudice via mechanisms that relate solely to emphasizing group difference or attributing such differences to immutable or biological causes. Alternate perspectives on why essentialism might relate to social prejudice among adult populations depend more on how essentialism relates to other features of social experience, or on how essentialism might be used to explain status differences or other features of the social environment, and are more commensurate with the present data (Morton, Hornsey, & Postmes, 2009; Pettigrew, 1979; Rangel & Keller, 2011; Verkyuten, 2003). Here too, though, the present data suggest a more complex story than might have been assumed. Even when children essentialized a social outgroup *and* were presented with evidence that members of that group engage in negative behaviors such as stealing, essentialism still did not predict increased prejudice. While not yet definitive, this suggests that children do not assume that all

behaviors associated with an essentialized group are deep properties of the group such that they would be expected to generalize broadly.

The present research suggests several key directions for future work. For example, no prior work has examined how essentialist beliefs relate to children's social attitudes (e.g., prejudice) or inter-group behavior (e.g., resource allocations) for categories that they encounter in their daily lives (prior work in this area has instead focused on stereotyping; Levy & Dweck, 1999; Pauker et al., 2010). In future work, it would be useful to combine experimental studies—like those performed here—with studies examining how children's pre-existing essentialist beliefs about particular groups (e.g., their levels of racial essentialism) predict similar behaviors. Such an approach, combined with more detailed examination of the underlying processes than was conducted here, could eventually reveal the mechanisms that contribute to the development of the most virulent forms of social prejudice. Further, it would be useful to expand the age ranges included, to consider how the processes that underlie inter-group attitudes and behaviors change across age. Finally, it will be very helpful to include more diverse subject populations, as the relation of essentialist beliefs to various inter-group phenomena likely depends on children's own experiences in essentialized groups (see Kinzler & Dautel, 2011; No et al., 2008).

References

- About, F. E. (1988). *Children and prejudice*. Cambridge: Basic Blackwell.
- About, F. E. (2003). The formation of in-group favoritism and out-group prejudice in young children: Are they distinct attitudes? *Developmental Psychology*, *39*, 48-69.
doi:10.1037/0012-1649.39.1.48
- Allport, G. (1954). *The nature of prejudice*. Cambridge: Addison-Wesley.
- Andreychik, M., & Gill, M. (2014). Do natural kind beliefs about social groups contribute to prejudice? Distinguishing bio-somatic essentialism from bio-behavioral essentialism, and both of these from entitativity. *Group Processes & Intergroup Relations*, 1-21.
doi:10.1177/13684430214550341
- Astuti, R., Solomon, G.E., & Carey, S. (2004). Constraints on conceptual development. *Monographs of the Society for Research in Child Development*, *69*, vii – 135.
<http://www.jstor.org/stable/370140>.
- Bastian, B., & Haslam, N. (2006). Psychological essentialism and stereotype endorsement. *Journal of Experimental Social Psychology*, *42*, 228-235. doi:10.1016/j.jesp.2005.03.003
- Bernstein, M., Sacco, D., Young, S., Hugenberg, K., & Cook, E. (2010). Being “in” with the in-crowd: The effects of social exclusion and inclusion are enhanced by the perceived essentialism of ingroups and outgroups. *Personality and Social Psychology Bulletin*, *36*, 999-1009. doi:10.1177/0146167210376059
- Bigler, R. S., Jones, L. C., & Lobliner, D. B. (1997). Social categorization and the formation of intergroup attitudes in children. *Child Development*, *68*, 530–543. doi:10.1111/j.1467-8624.1997.tb01956.x

- Bigler, R.S., & Liben, L.S. (2007), Developmental intergroup theory: Explaining and reducing children's social stereotyping and prejudice. *Current Directions in Psychological Science* 16, 162-166. doi:10.1111/j.1467-8721.2007.00496.x
- Birnbaum, D., Deeb, I., Segall, G., Ben-Eliyahu, A., & Diesendruck, G. (2010). The development of social essentialism: the case of Israeli children's inferences about Jews and Arabs. *Child Development*, 81, 757–777. doi:10.1111/j.1467-8624.2010.01432.x
- Brewer, M. B. (1999). The psychology of prejudice: Ingroup love or outgroup hate? *Journal of Social Issues*, 55, 429–444. doi:10.1111/0022-4537.00126
- Brewer, M., & Brown, R. (1998). Intergroup Relations. In D. Gilbert, S. Fiske, & G. Lindzey, Eds. *The Handbook of Social Psychology, Vol. 1* (4th Edition) (pp. 554-594). New York: McGraw-Hill.
- Chau, M., Chen, J., Roisman, G., & Hong, Y. (2007). Essentializing race: Implications for bicultural individuals' cognition and physiological reactivity. *Psychological Science*, 18, 341-348. doi:10.1111/j.1467-9280.2007.01901.x
- Cimpian, A., Arce, H. C., Markman, E. M., & Dweck, C. S. (2007). Subtle linguistic cues affect children's motivation. *Psychological Science*, 18(4), 314–316. doi: 10.1111/j.1467-9280.2007.01896.x
- Cimpian, A., & Markman, E.M. (2009) Information learned from generic language becomes central to children's biological concepts: Evidence from their open-ended explanations. *Cognition*, 113, 14-25. doi:10.1016/j.cognition.2009.07.004
- Cimpian, A., & Markman, E.M. (2011). The generic/nongeneric distinction influences how children interpret new information about social others. *Child Development*, 82, 471-492. doi:10.1111/j.1467-8624.2010.01525.x

- Cimpian, A., & Salomon, E. (2014). The inherence heuristic: An intuitive means of making sense of the world, and a potential precursor to psychological essentialism. *Behavioral and Brain Sciences*, *37*, 461–480. doi:10.1017/S0140525X13002197
- Deeb, I., Segall, G., Birnbaum, D., Ben-Eliyahu, A., & Diesendruck, G. (2011) Seeing isn't believing: The effect of intergroup exposure on children's essentialist beliefs about ethnic categories. *Journal of Personality and Social Psychology*, *101*, 1139-1156. doi:10.1037/a0026107
- Diesendruck, G., & Haber, L. (2009). God's categories: The effect of religiosity on children's teleological and essentialist beliefs about categories. *Cognition*, *110*, 100-114. doi:10.1016/j.cognition.2008.11.001
- Diesendruck, G., & haLevi, H. (2006) The role of language, appearance, and culture in children's social category-based induction. *Child Development*, *77*, 539-753. doi:10.1111/j.1467-8624.2006.00889.x
- Diesendruck, G., & Menahem, R. (2015). Essentialism promotes children's inter-ethnic bias. *Frontiers in Psychology*, *6*, 1180 10.3389/fpsyg.2015.01180
- Dunham, Y., Baron, A.S., & Carey, S. (2011). Consequences of "minimal" group affiliations in children. *Child Development*, *82*, 793-811. doi:10.1111/j.1467-8624.2011.01577.x
- Gaither, S., Schulz, J., Pauker, K., Sommers, S., Maddox, K., & Ambady, N. (2014). Essentialist thinking predicts decrements in children's memory for racially ambiguous faces. *Developmental Psychology*, *50*, 482-488. doi:10.1037/a0033493
- Gelman, S.A. (2003). *The essential child: Origins of essentialism in everyday thought*. New York: Oxford University Press.
- Gelman, S.A. (2004). Psychological essentialism in children. *Trends in Cognitive Sciences*, *8*,

404-409. doi:10.1016/j.tics.2004.07.001

Gelman, S.A., Collman, P., & Maccoby, E.E. (1986). Inferring properties from categories versus inferring categories from properties: The case of gender. *Child Development*, *57*, 396-404. <http://www.jstor.org/stable/1130595>

Gelman, S.A. and Heyman, G.D. (1999) Carrot-eaters and creature-believers: The effects of lexicalization on children's inferences about social categories. *Psychological Science*, *10*, 489–493. doi:10.1111/1467-9280.00194

Gelman, S. A., & Kalish, C. W. (2006). Conceptual development. In D. Kuhn & R. Siegler (Eds.), *Handbook of child psychology, Vol. 2: Cognition, perception and language* (pp. 687-733). New York: Wiley. doi:10.1002/9780470147658.chpsy0216

Gelman, S.A. and Markman, E.M. (1986) Categories and induction in young children. *Cognition*, *23*, 183–209. doi:10.1016/0010-0277(86)90034-X

Gelman, S.A., & Markman, E.M. (1987) Young children's inductions from natural kinds: The role of categories and appearances. *Child Development*, *58*, 1532-1541. <http://www.jstor.org/stable/1130693>

Gelman, S.A., & Rhodes, M. (2012). “Two-thousand years of stasis”: How psychological essentialism impedes evolutionary understanding. In K.R. Rosengren, S. Brem, E.M. Evans, & G. Sinartra (Eds.), *Evolution challenges: Integrating research and practice in teaching and learning about evolution* (pp. 3-21). New York: Oxford University Press.

Gelman, S.A., Ware, E.A., & Kleinberg, F. (2010) Effects of generic language on category content and structure. *Cognitive Psychology*, *61*, 273-301.

doi:10.1016/j.cogpsych.2010.06.001

Gelman, S.A., & Wellman, H.M. (1991). Insides and essences: Early understandings of the

- nonobvious. *Cognition*, 38, 213-244. doi:10.1016/0010-0277(91)90007-Q
- Haslam, N., Bastian, B., Bain, P., & Kashima, Y. (2006). Psychological essentialism, implicit theories, and intergroup relations. *Group Processes and Intergroup Relations*, 9, 63-76. doi:10.1177/1368430206059861
- Haslam, N., & Levy, S.R. (2006) Essentialist beliefs about homosexuality: Structure and implications for prejudice. *Personality and Social Psychology Bulletin*, 32, 471-485. doi:10.1177/0146167205276516
- Haslam, N., Rothschild, L., & Ernst, D. (2002) Are essentialist beliefs associated with prejudice? *British Journal of Social Psychology*, 4, 87-100. doi:10.1348/014466602165072
- Haslam, N., & Whelan, J. (2008). Human natures: Psychological essentialism in thinking about differences between people. *Social and Personality Psychology Compass*, 2, 1297-1312. doi:10.1111/j.1751-9004.2008.00112.x
- Hirschfeld, L. (1995) Do children have a theory of race? *Cognition*, 54, 209-252. doi:10.1016/0010-0277(95)91425-R
- Hirschfeld, L.A. (1996). *Race in the making*. Cambridge: MIT Press.
- Hodson, G., & Skorska, M. (2014). Tapping generalized essentialism to predict outgroup prejudice. *British Journal of Social Psychology*. doi:10.1111/bjso.12083
- Hoffman, C., & Hurst, N. (1990). Gender stereotypes: Perception or rationalizations? *Journal of Personality and Social Psychology*, 58, 197-208. doi:10.1037/0022-3514.58.2.197
- Holtz, P., & Wagner, W. (2009). Essentialism and attribution of monstrosity in racist discourse: Right-wing internet postings about Africans and Jews. *Journal of Community & Applied Social Psychology*, 19, 411-425. doi:10.1002/casp.1005.

- Hussak, L. J., & Cimpian, A. (2015). An early-emerging explanatory heuristic promotes support for the status quo. *Journal of Personality and Social Psychology*, *109*(5), 739–752.
- Jayaratne, T.E., Ybarra, O., Sheldon, J.P., Brown, T.N., Feldbaum, M., Pfeffer, C.A., Petty, E.M. (2006). White Americans' genetic lay theories of race differences and sexual orientation: Their relationship with prejudice towards Blacks, gay men, and lesbians. *Group Processes and Intergroup Relations*, *9*, 77-94. doi:10.1177/1368430206059863
- Kalish, C. (2012). Generalizing norms and preferences within social categories and individuals. *Developmental Psychology*, *48*, 1133-1143. doi:10.1037/a0026344
- Keller, J. (2005) In genes we trust: The biological component of psychological essentialism and its relationship to mechanisms of motivated social cognition. *Journal of Personality and Social Psychology*, *88*, 686-702. doi:10.1037/0022-3514.88.4.686
- Kinzler, K., & Dautel, J. (2012). Children's essentialist reasoning about language and race. *Developmental Science*, *15*, 131-138. doi:10.1111/j.1467-7687.2011.01101.x
- Kinzler, K., Dupoux, E., & Spelke, E. (2007). The native language of social cognition. *Proceedings of the National Academy of Sciences of the United States of America*, *104*, 12577-12580. doi:10.1073/pnas.0705345104
- Leslie, S.J. (2008). Generics: Cognition and acquisition. *Philosophical Review*, *117*, 1-47. doi:10.1215/00318108-2007-023
- Leslie, S.J. (in press) The original sin of cognition: Fear, prejudice, and generalization. *Journal of Philosophy*.
- Leslie, S.J. (2013). Essence and Natural Kinds: When Science Meets Preschooler Intuition. *Oxford Studies in Epistemology*, *4*, 108-165. doi:10.1093/acprof:oso/9780199672707.003.0005

- Levy, S.R., & Dweck, C.S. (1999). The impact of children's static versus dynamic conceptions of people on stereotype formation. *Child Development, 70*, 1163-1180. doi:10.1111/1467-8624.00085
- Leyens, J. P., Rodriguez-Perez, A., Rodriguez-Torres, R., Gaunt, R., Paladino, P.M., Vaes, J. & Demoulin, S. (2001). Psychological essentialism and the differential attribution of uniquely human emotions to ingroups and outgroups. *European Journal of Social Psychology, 31*, 395-411. doi:10.1002/ejsp.50
- Mahalingam, R. (2003). Essentialism, Culture, and Power: Representations of social class. *Journal of Social Issues, 59*, 733-749. doi: 10.1046/j.0022-4537.2003.00087.x
- Mahalingam, R. (2007). Essentialism, power, and the representation of social categories: A folk sociology perspective. *Human Development, 50*, 300-319. doi:10.1159/000109832
- Mahalingam, R., & Rodriguez, J. (2006). Culture, brain transplants and implicit theories of identity. *Journal of Cognition and Culture, 6*, 453-462. doi:10.1163/156853706778554968
- Martin, C., & Parker, S. (1995). Folk theories of sex and race differences. *Personality and Social Psychology Bulletin, 21*, 45-57. doi:10.1177/0146167295211006
- Mayr, E. (1991) *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought*. Cambridge: Harvard University Press.
- Medin, D. & Ortony, A. (1989). Psychological essentialism. In S. Vosniadou & A., Ortony (Eds.) *Similarity and Analogical Reasoning* (pp. 179-195). New York: Cambridge University Press.
- Morton, T., Hornsey, M., & Postmes, T. (2009). Shifting ground: The variable use of

- essentialism in contexts of inclusion and exclusion. *British Journal of Social Psychology*, 48, 35-59. doi:10.1348/014466607X270287
- Nesdale, D. (2004). Social identity processes and children's ethnic prejudice. In M. Bennett & F. Sani (Eds.), *The development of the social self* (pp. 219–246). London: Psychology Press.
- No, S., Hong, Y., Liao, H., Lee, K., Wood, D., & Chao, M. (2008). Lay theory of race affects and moderates Asian Americans' responses towards American culture. *Journal of Personality and Social Psychology*, 95, 991-1004. doi:10.1037/a0012978
- Patterson, M. M., & Bigler, R. S. (2006). Preschool children's attention to environmental messages about groups: Social categorization and the origins of intergroup bias. *Child Development*, 77, 847–860. doi:0.1111/j.1467-8624.2006.00906.x
- Paulus, M., & Moore, C. (2014) The development of recipient-dependent sharing behavior and sharing expectations in preschool children. *Developmental Psychology*, 50, 914-921. <http://dx.doi.org/10.1037/a00341694>
- Pauker, K., Ambady, N., & Apfelbaum, E. (2010). Race salience and essentialist thinking in racial stereotype development. *Child Development*, 81, 1799-1813. doi:10.1111/j.1467-8624.2010.01511.x
- Pettigrew, T. F. (1979). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin*, 5, 461–476. doi:10.1177/014616727900500407
- Plaks, J., Stroessner, S., Dweck, C., & Sherman, J. (2001). Person theories and attention allocation: Preferences for stereotypic versus counterstereotypic information. *Journal of Personality and Social Psychology*, 80, 876-893. doi:10.1037/0022-3514.80.6.876
- Prentice, D.A., & Miller, D.T. (2007) Psychological essentialism of human categories. *Current*

- Directions in Psychological Science*, 16, 202-206. doi:10.1111/j.1467-8721.2007.00504.x
- Rangel, U., & Keller, J. (2011). Essentialism goes social: Belief in social determinism as a component of psychological essentialism. *Journal of Personality and Social Psychology*, 100, 1056-1078. doi:10.1037/a0022401
- Renno, M., & Shutts, K. (in press). Children's social category-based giving and its correlates: Expectations and preferences. *Developmental Psychology*. doi:10.1037/a0038819
- Rothbart, M., & Taylor, M. (1992). Category labels and social reality: Do we view social categories as natural kinds? In G. Semin & K. Fiedler (Eds). *Language, interaction and social cognition* (pp. 11-36). Thousand Oaks, CA: Sage Publications.
- Rhodes, M., & Brickman, D. (2010). The role of within-category variability in category-based induction: A developmental study. *Cognitive Science*, 34, 1561-1573. doi:10.1111/j.1551-6709.2010.01137.x
- Rhodes, M., & Brickman, D. (2011). The influence of competition on children's social categories. *Journal of Cognition and Development*, 12, 194-221. doi:10.1080/15248372.2010.535230
- Rhodes, M., & Gelman, S.A. (2009). A developmental examination of the conceptual structure of animal, artifact, and human social categories across two cultural contexts. *Cognitive Psychology*, 59, 244-274. doi:10.1016/j.cogpsych.2009.05.001
- Rhodes, M., Gelman, S.A., & Karuza, J.C. (2014). Preschool ontology: The role of beliefs about category boundaries in early categorization. *Journal of Cognition and Development*. 15, 78-93. doi:10.1080/15248372.2012.713875
- Rhodes, M., Leslie, S.J., & Tworek, C. (2012). Cultural transmission of social essentialism. *Proceedings of the National Academy of Sciences*, 109, 13526-13531. doi:10.1073

/pnas.1208951109

- Rutland, A., Killen, M., & Abrams, D. (2010). A new social-cognitive developmental perspective on prejudice: The interplay between morality and group identity. *Perspectives on Psychological Science*, 5, 279-291. DOI: 10.1177/1745691610369468
- Salomon, E., & Cimpian, A. (2014). The inherence heuristic as a source of essentialist thought. *Personality and Social Psychology Bulletin*, 40, 1297–1315. doi:10.1177/0146167214541659
- Segall, G., Birnbaum, D., Deeb, I., & Diesendruck, G. (2014). The intergenerational transmission of ethnic essentialism: *How parents talk counts the most*. *Developmental Science*. DOI: 10.1111/desc.12235
- Shtulman, A., & Schulz, L. (2008). The relation between essentialist beliefs and evolutionary reasoning. *Cognitive Science*, 32, 1049-1062. doi:10.1080/03640210801897864
- Taylor, M.G. (1996). The development of children's beliefs about social and biological aspects of gender differences. *Child Development*, 67, 1555-1571. doi:10.1111/j.1467-8624.1996.tb01814.x
- Taylor, M.G., Rhodes, M., & Gelman, S.A. (2009). Boys will be boys, cows will be cows: Children's essentialist reasoning about gender and animal development. *Child Development*, 80, 461-481. doi:10.1111/j.1467-8624.2009.01272.x
- Verkuyten, M. (2003). Discourses about ethnic group (de-)essentialism: Oppressive and progressive aspects. *British Journal of Social Psychology*, 42, 371–391. doi:10.1348/014466603322438215
- Waxman, S.R., Medin, D., & Ross, N. (2007). Folkbiological reasoning from a cross-cultural

developmental perspective: Early essentialist notions are shaped by cultural beliefs.

Developmental Psychology, 43, 294-308. doi:10.1037/0012-1649.43.2.294

Williams, M., & Eberhardt, J. (2008). Biological conceptions of race and the motivation to cross racial boundaries. *Journal of Personality and Social Psychology*, 94, 1033-1047.

doi:10.1037/0022-3514.94.6.1033

Yamagishi, T., Jin, N., & Kiyonari, T. (1999). Bounded generalized reciprocity: Ingroup boasting and ingroup favoritism. *Advances in Group Processes*, 16, 161–197.

Yzerbyt, V., Judd, C., & Corneille, O. (2004). *The psychology of group perception: Perceived variability, entitativity, and essentialism*. New York: Psychology Press.

Zagefka, H., Nigbur, D., Gonzalez, R., & Tip, L. (2012). Why does ingroup essentialism increase prejudice against minority members? *International Journal of Psychology*, 1-9.

doi:10.1080/00207594.2012.729841

Tables

Table 1. Children's inter-group attitudes and behaviors by condition, Study 2.

	Generic Condition	Specific Condition
Probabilities of withholding invitations from Zarpies	$M = .48$ ($CI = .35-.61$)	$M = .46$ ($CI = .33-.60$)
Average number of seats away from Zarpie (out of 4 possible)	$M = 1.46$ ($CI = 1.14-1.87$)	$M = 1.74$ ($CI = 1.39-2.18$)
Probabilities of attributing the positive outcome to a non-Zarpie	$M = .61$ ($CI = .48-.73$)	$M = .70$ ($CI = .56-.81$)
Probabilities of withholding resources from Zarpies*	$M = .26$ ($CI = .21-.31$)	$M = .08$ ($CI = .05-.12$)

*Probabilities of withholding resources from Zarpies differed by condition, $p < .001$

Table 2. Correlations among measures of inter-group attitudes and behaviors, Study 2.

	Invitations	Proximity	Outcomes	Resources
Invitations	1	.48**	.36**	.02
Proximity	.48**	1	.25 ^m	-.08
Outcomes	.36**	.25 ^m	1	-.09
Resources	.02	-.08	-.09	1

** $p < .01$; ^m $p = .07$