Research Article

Psychological Science
2017, Vol. 28(2) 216–224

Reprints and permissions:
sagepub.com/journalsPermissions.nav
DOI: 10.1177/0956797616678930
www.psychologicalscience.org/PS

"Catching" Social Bias: Exposure to Biased Nonverbal Signals Creates Social Biases in Preschool Children

Allison L. Skinner[1,2], Andrew N. Meltzoff[1,2], and Kristina R. Olson[1]
[1]Department of Psychology and [2]Institute for Learning and Brain Sciences, University of Washington

Abstract
Identifying the origins of social bias is critical to devising strategies to overcome prejudice. In two experiments, we tested the hypothesis that young children can catch novel social biases from brief exposure to biased nonverbal signals demonstrated by adults. Our results are consistent with this hypothesis. In Experiment 1, we found that children who were exposed to a brief video depicting nonverbal bias in favor of one individual over another subsequently explicitly preferred, and were more prone to behave prosocially toward, the target of positive nonverbal signals. Moreover, in Experiment 2, preschoolers generalized such bias to other individuals. The spread of bias observed in these experiments lays a critical foundation for understanding the way that social biases may develop and spread early in childhood.

Keywords
social bias, nonverbal behavior, children, social learning, open data, open materials, preregistered

Received 8/8/16; Revision accepted 10/21/16

In *The Nature of Prejudice*, Allport (1954) suggested that although parents may not explicitly teach social bias (i.e., prejudice) to their children, it may be "caught by the child from an infected atmosphere" (p. 300). Although Allport did not explain what makes an infected atmosphere or discuss the mechanisms through which prejudice is transmitted, more recent research on the leakage of social biases through nonverbal behavior (e.g., Fazio, Jackson, Dunton, & Williams, 1995; Richeson & Shelton, 2005) may provide some insight. This research indicates that social biases can be communicated via nonverbal behaviors that are demonstrated during social interactions. Among adults, for example, greater implicit racial bias predicts lower levels of nonverbal friendliness in interracial interactions (e.g., Dovidio, Kawakami, & Gaertner, 2002; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Richeson & Shelton, 2005). In other words, implicit biases can be communicated through nonverbal signals. We propose that these nonverbal signals may create "an infected atmosphere" from which children *catch* social biases (inclinations in favor of or against an individual or group of individuals). The research we report here was designed to examine whether exposure to biased nonverbal signals creates social biases among children.

Previous research indicates that infants develop a negativity toward or avoidance of an object after observing an actor demonstrate negative emotional responses toward it (e.g., Mumme & Fernald, 2003; Repacholi & Meltzoff, 2007). Yet, to date, no research has examined whether children can learn novel *social* biases simply by observing biased nonverbal signals displayed by adults in their environment. The work closest to addressing this question, done by Castelli, De Dea, and Nesdale (2008), indicated that biased nonverbal signals could exacerbate *existing* social biases in children. White Italian children (3 to 6 years old) who were exposed to a video depicting negative nonverbal signals toward a Black character subsequently expressed stronger anti-Black attitudes than

Corresponding Author:
Allison L. Skinner, Department of Psychology, Guthrie Hall, University of Washington, Seattle, WA 98195-0005
E-mail: allisonlskinner@gmail.com

children who were exposed to a video depicting positive nonverbal signals toward a Black character. Because young White Italian children typically already show bias against Black people (e.g., Castelli, Carraro, Tomelleri, & Amari, 2007; Castelli, Zogmaister, & Tomelleri, 2009), these findings indicate that, among children, brief exposure to negative nonverbal signals can activate and enhance attitudes consistent with those nonverbal signals.

In the current research, we sought to examine whether young children would catch and create new social biases through brief exposure to nonverbal bias demonstrated by adults. Evidence of social bias and prejudice has been observed in children as young as preschool age (e.g., Aboud, 2003; Clark & Clark, 1940; Cvencek, Greenwald, & Meltzoff, 2016; Dunham, Baron, & Carey, 2011; Pahlke, Bigler, & Suizzo, 2012; Rutland, Cameron, Bennett, & Ferrell, 2005). Determining whether biased nonverbal signals can create an atmosphere from which children can catch social biases is particularly critical because nonverbal signals are abundant in social environments and are difficult to control (Weisbuch & Ambady, 2008). Thus, even though many people may strive to avoid expressing social biases, they may still demonstrate biased nonverbal signals, inadvertently passing bias on to children.

Experiment 1

Experiment 1 was designed to examine whether young children will catch social bias from observing other people demonstrate nonverbal bias. Preschool-age children observed an adult actor demonstrate biased nonverbal signals, nonverbally favoring one individual over another. We predicted that the children would show a bias against the target of negative nonverbal signals relative to the target of positive nonverbal signals. Given that this was the first test of nonverbal bias contagion, we used a broad set of dependent measures to assess the effects of the nonverbal message on the children. Our dependent measures included a forced-choice measure of target preference and a measure of prosocial behavior toward the target individuals, modeled on previous work examining social bias against members of racial or linguistic groups (e.g., Castelli et al., 2008; Kinzler, Shutts, & Spelke, 2012). We reasoned that the measure of prosocial behavior would provide some indication of the children's tendency to discriminate against the nonpreferred target.

We also included measures of imitation, which is known to serve a social-affiliative function: Children will imitate or fail to imitate on the basis of their feelings about the individual or group in question (e.g., Over & Carpenter, 2012; Repacholi, Meltzoff, Toub, & Ruba, 2016). Previous work has shown that preschool children are more likely to imitate models who are members of the in-group than models who are members of an out-group (Howard, Henderson, Carrazza, & Woodward, 2015; Kinzler, Corriveau, & Harris, 2011) and are also more likely to imitate models who have more prestige (Chudek, Heller, Birch, & Henrich, 2012). On the basis of this work, we reasoned that imitation may provide a more indirect measure of social bias than verbal report does. We hypothesized that the children would show social biases favoring the target of positive nonverbal signals on all dependent measures.

Method

Participants. Our final sample consisted of 67 preschool children (51% boys; mean age = 59.25 months, *SD* = 6.35 months). Our predetermined target sample size was based on convention. Specifically, we aimed to collect data from 64[1] participants (thirty-two 4-year-olds, thirty-two 5-year-olds; 50% boys) who completed all items and were aware of the target preference depicted in the stimulus video (i.e., passed the manipulation check). Given that the nonverbal-bias manipulation was fairly obvious, we reasoned that children who were unaware of the actors' preference had likely not attended to the video. To reach the target sample size, we recruited 81 children from preschools and the local community. A total of 10 children incorrectly identified the target preference depicted in the stimulus video, and 4 children provided incomplete data, which left a sample of 67.[2] Participants were identified by their parents as White (64%), Asian (18%), multiracial (12%), or another race (6%). Children who were recruited from the community received a small toy in exchange for their participation. Children who were tested at their preschools did not receive prizes themselves; instead, the schools were given gift cards as a thank-you for their participation. The university's institutional review board approved all study procedures.

Materials and procedure. After providing verbal assent, the children were told that they would be watching a video and then answering some questions. To get the children comfortable with pointing to items on-screen, the experimenter asked them to point to a series of four colored shapes on a computer screen. When they failed to correctly identify the items, the experimenter demonstrated the correct response. Once the children had correctly identified the colors in this warm-up task, they moved on to the primary task of interest. First, they were presented with still images of two adult women (hereafter referred to as targets), one in a black shirt and the other in a dark red shirt. The children were informed that they would be watching a video of those two people and that they should pay close attention to see what happened. They were then exposed to a brief video (~30 s) in which a series of two female adult actors demonstrated nonverbal biases toward the adult targets.

In each of two scenes, one of these actors was shown in the middle of the screen with the two targets flanking her on the left and right. In the first scene, one actor greeted each target individually by saying "hi." In the second scene, the other actor said "hi" to the targets, produced two identical toys (colorful eggs), and provided each target with one of those toys. Throughout the video, the actors displayed positive nonverbal signals (e.g., smiling, leaning in, eagerness in distributing the toy, warm tone of voice) toward one of the targets and negative nonverbal signals (e.g., scowling, leaning away, reluctance in distributing the toy, cold tone of voice) toward the other target. Counterbalanced across participants were the location of the preferred target (left or right side of the screen), which target was nonverbally preferred (red-shirt target vs. black-shirt target), and which target was greeted first. The language directed toward the two targets was identical in content (see the Supplemental Material available online for the full transcript), and the targets responded identically (in a slightly positive, nearly neutral manner) whether they received positive or negative nonverbal signals. Each child watched the assigned (counterbalanced) stimulus video twice before moving on to complete the first set of dependent measures.

Target preference. To assess explicit target preferences, we presented the children with still images of the targets from the video and asked them to point to the target they liked better. After indicating their choice, the children were asked whether they liked that target "a little bit better" or "a lot better." In a supplemental analysis, we combined these two items (as has been done in previous developmental studies) to create a scaled score of target preference ranging from 1 (*target of negative nonverbal signals highly preferred*) to 4 (*target of positive nonverbal signals highly preferred*).

Prosocial behavior. Next, to assess prosocial behavior toward the targets, we presented the children with a stuffed toy and asked them to point to the target they thought the experimenter should give the toy to.

Label imitation. The children were then presented with a second brief video (~30 s) depicting the same actors and targets. Again, the actors greeted each target individually by saying "hi," and then one of the actors produced a novel object (a rectangular wooden block with holes in it) and inquired about the name of the object. Each target (order counterbalanced) then provided a novel label for the object ("snegg" or "hoon"). These labels were taken from previous work on children's trust in informants (Harris & Corriveau, 2011). Throughout the video, the actors displayed the same nonverbal signals (toward the same targets) as in the first video. All the children watched the assigned stimulus video twice, and then the experimenter produced the object from the video, reminding them what each of the informants had labeled it ("She said it was a snegg, and she said it was a hoon," pointing to the corresponding adult targets). The experimenter then asked the children whether they thought the object was a snegg or a hoon.

Action imitation. The experimenter then produced another novel object (a small purple cone) and said, "Let's see what the people from the video do with this." The experimenter then played two videos, each showing one of the targets demonstrating a novel action with the cone (either putting it on her own head or turning it over and pretending to drink out of it). The videos were presented side by side on-screen, though they were played sequentially, in counterbalanced order. After playing both action demonstrations twice, the experimenter handed the object to the child and asked him or her to "show me what to do with it." Children who were reticent to demonstrate an action were prompted to provide a verbal response ("Can you tell me what to do with it?"), and if they were still reluctant to respond, they were asked to "point to the person who knows what to do with it." Children who offered responses that had not been demonstrated (e.g., "put it on the field for soccer") were prompted to indicate which of the two demonstrated actions was more appropriate. This task was modeled after those employed by Kinzler et al. (2011).

Manipulation check. Finally, the children were presented with a still image from the initial stimulus video, depicting one of the actors (both of whom had initially demonstrated bias) looking straight ahead, demonstrating no bias, and the two targets. The experimenter pointed to the actor (who had demonstrated nonverbal bias) and asked whom the actor liked better. This question was included to assess the children's awareness of the bias demonstrated by the actor.

Analysis approach. We report the effects of our experimental treatment on each of the four dependent measures individually. In addition, we report results from a test for a general target bias. For this test, we created a summary measure by summing the total number of times children selected the nonverbally preferred target, such that children who chose the nonverbally preferred target every time scored a 4, and children who never chose the nonverbally preferred target scored a 0.

Additional information. We initially recruited 3-year-olds, in addition to the 4- and 5-year-olds whose results are reported here. However, the 3-year-olds had difficulty completing the protocol and picking up on the nonverbal

Table 1. Results From Experiment 1: Percentage of Participants Who Selected the Target of Positive Nonverbal Signals on Each of the Dependent Measures

		Dependent measure			
Age group	*n*	Preference	Prosocial behavior	Label imitation	Action imitation
Children who passed the manipulation check					
4-year-olds	34	64.70	64.70	55.90	61.80
5-year-olds	33	69.70	66.70	69.70	51.50
Children who did not pass the manipulation check					
4-year-olds	9	33.30	33.30	66.70	55.60
5-year-olds	1	0.00	0.00	0.00	0.00

biases in the brief videotaped social encounters, so we stopped recruiting them. The Supplemental Material presents information about their performance. In addition, the Supplemental Material presents the results obtained for 4- and 5-year-olds in analyses that included those children who failed the manipulation check. In general, including those participants led to slightly weakened effects, although the direction of all effects remained the same (see Table 1 for the raw data broken down by age and performance on the manipulation check).

Results

Discrete dependent measures. The children significantly preferred the target of positive nonverbal signals (67%) over the target of negative nonverbal signals (two-tailed binomial sign test, $N = 67$), $p = .007$, $g = .17$. Analysis of the scaled preference score (scale from 1 to 4) also indicated that the children significantly preferred the target of positive nonverbal signals ($M = 2.85$, $SE = 0.15$) over the target of negative nonverbal signals (two-tailed one-sample t test), $t(65) = 2.40$, $p = .019$, $d = 0.30$. They were significantly more likely to give the toy to the target of positive nonverbal signals (66%) than to the target of negative nonverbal signals as well (two-tailed binomial sign test, $N = 67$), $p = .014$, $g = .16$.

Next, we examined our two measures of imitation. Results from the labeling task indicated that the children were more likely to use the label provided by the target of positive nonverbal signals (63%) than the label provided by the target of negative nonverbal signals (two-tailed binomial sign test, $N = 67$), $p = .050$, $g = .13$. Although the pattern of results from the action-imitation task was in the predicted direction, the children were not significantly more likely to imitate the action demonstrated by the target of positive nonverbal signals (57%) than to imitate the action demonstrated by the target of negative nonverbal signals (two-tailed binomial sign test, $N = 67$), $p = .328$, $g = .07$.

Summary dependent measure of bias. A two-tailed one-sample t test on the summary bias measure (range: 0–4) indicated that, overall, the children significantly preferred the target of positive nonverbal signals ($M = 2.52$, $SE = 0.12$) over the target of negative nonverbal signals, $t(66) = 4.25$, $p < .001$, $d = 0.52$, 95% confidence interval (CI) = [0.28, 0.77].

Discussion

Results of Experiment 1 provided initial support for our hypothesis that exposure to nonverbal bias creates social biases in young children. Preschool children who watched a brief demonstration of nonverbal bias on video subsequently showed attitudes and behaviors that generally favored the target of positive nonverbal signals over the target of negative nonverbal signals.

Experiment 2

To determine whether nonverbal signals provide a mechanism through which group bias and prejudice are created, it is necessary to examine whether bias against an individual that is created in this way will be generalized beyond the target. In Experiment 2, we tested whether our findings in Experiment 1 could be replicated and also examined whether biases would generalize beyond the target, to a friend of the target.

Method

Participants. Our final sample consisted of 81 preschool children (49% boys; mean age = 59.31 months, SD = 6.68 months). Our predetermined target sample size was 80 participants (forty 4-year-olds, forty 5-year-olds; 50% boys) who completed all items and were aware of the target preference depicted in the stimulus video. Power analysis, carried out using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007), indicated that in order to

Table 2. Results From Experiment 2: Percentage of Participants Who Selected the Target of Positive Nonverbal Signals on Each of the Dependent Measures

		Dependent measure				
Age group	*n*	Preference	Prosocial behavior	Label imitation	Friend preference	Action imitation
Children who passed the manipulation check						
4-year-olds	41	70.70	65.90	61.00	53.70	63.40
5-year-olds	40	80.00	72.50	62.50	57.50	60.00
Children who did not pass the manipulation check						
4-year-olds	10	40.00	60.00	70.00	50.00	30.00
5-year-olds	7	57.10	28.60	71.40	0.00	71.40

have power of .80 to detect an effect with an effect size (d) of 0.52 (the effect size for the summary bias measure in Experiment 1), using an alpha of .05, a sample of 32 participants per condition would be needed. We chose a larger target number to be in step with recent recommendations indicating that larger samples are necessary to adequately power behavioral studies (e.g., Fraley & Vazire, 2014). Moreover, we reasoned that generalization effects would likely be weaker than the effects observed in Experiment 1, so a larger sample would be necessary to detect generalization of bias to other members of a target's group. To reach our target sample size, we had to recruit 107 children from preschools and the local community. A total of 17 children incorrectly identified the target preference depicted in the stimulus video, and 9 children provided incomplete data, which left a sample of 81.[3] The participants were identified by their parents as White (75%), multiracial (16%), Asian (4%), or another race (5%). Remuneration for participation was the same as in Experiment 1.

Materials and procedure. The materials and procedure for Experiment 2 were very similar to those used in Experiment 1. The children completed the same warm-up task, but before exposure to the experimental treatment, they were introduced to each of the targets individually, and the targets' shirt colors (i.e., color-group membership) were explicitly referenced. For example, when the target in the red shirt appeared on-screen first, the experimenter pointed to her and said, "She is in the dark-red group," and then advanced to the next screen (on which the other target was presented), pointed to the new target, and said, "She is in the black group." This was done to introduce the concept of group memberships for the generalization portion of the experiment and to draw the children's attention to each individual target. Each child was then exposed to one of the videos used in Experiment 1, in which actors displayed positive nonverbal signals toward one target and negative nonverbal signals toward another target. As in Experiment 1, this stimulus video was presented twice. The measures of target preference, prosocial behavior, and label imitation were identical to those in Experiment 1.

After the children completed these three dependent measures of target preference, they completed two dependent measures of bias generalization. First, the experimenter introduced the children to the "best friends" of the targets, who were members of the same color group. Specifically, the experimenter pointed to one best friend and one target and said, "Look *she* is *her* best friend, so they are both in the dark-red/black group, and they are best friends." Then, the experimenter pointed to the other best friend and target and said the same thing, this time substituting the other color name. After both of the best friends had been introduced, the original targets disappeared from the screen, and the children were asked, "Which of the friends do you like the best?" Next, the children completed the action-imitation measure from Experiment 1, but with the best friends demonstrating the actions.

Finally, the children completed the same manipulation-check item used in Experiment 1. Table 2 presents the raw data broken down by age and performance on the manipulation check.

Analysis approach. We report the effects of our experimental treatment on each of the three target-preference measures individually. In addition, we report the results from a test for a general target bias. For this test, we created a summary dependent measure by summing the total number of times children selected the nonverbally preferred target: Children who chose the nonverbally preferred target every time scored a 3, and children who never chose that target scored a 0.

Next, we report the effects of our experimental treatment on each of the two generalization measures. We also report the results from a test for overall generalization of bias. For this test, we created a summary dependent measure by summing the number of times children selected the friend of the nonverbally preferred target, such that children who chose the friend of that target both times (i.e., preference and imitation dependent measures) scored a 2, and children who never chose the friend of that target scored a 0.

Results

Target-preference measures

Discrete dependent measures. The children significantly preferred the target of positive nonverbal signals (75%) to the target of negative nonverbal signals (two-tailed binomial sign test, $N = 81$), $p < .001$, $g = .25$. Analysis of the scaled score indicated that the children significantly preferred the target of positive nonverbal signals ($M = 3.01$, $SE = 0.12$) to the target of negative nonverbal signals (two-tailed one-sample t test), $t(79) = 4.23$, $p < .001$, $d = 0.47$. The children were also significantly more likely to give the toy to the target of positive nonverbal signals (69%) than to the target of negative nonverbal signals (two-tailed binomial sign test, $N = 81$), $p = .001$, $g = .19$. Our measure of label imitation indicated that the children were significantly more likely to use the label provided by the target of positive nonverbal signals (62%) than to use the label provided by the target of negative nonverbal signals (two-tailed binomial sign test, $N = 81$), $p = .045$, $g = .12$.

Summary dependent measure of bias. Analysis of the summary bias measure indicated that the children significantly preferred the target of positive nonverbal signals ($M = 2.06$, $SE = 0.11$) to the target of negative nonverbal signals (two-tailed one-sample t test), $t(80) = 5.30$, $p < .001$, $d = 0.59$, 95% CI = [0.35, 0.77].

Generalization measures

Discrete generalization dependent measures. Analysis of our dependent measure of target-preference generalization to the best friend indicated that, although results were in the predicted direction, the children did not significantly prefer the friend of the target of positive nonverbal signals (56%) to the friend of the target of negative nonverbal signals (two-tailed binomial sign test, $N = 81$), $p = .374$, $g = .06$. However, the children were significantly more likely to imitate the action demonstrated by the friend of the target of positive nonverbal signals (62%) than to imitate the action demonstrated by the friend of the target of negative nonverbal signals (two-tailed binomial sign test, $N = 81$), $p = .045$, $g = .12$.

Summary dependent measure of bias generalization. A two-tailed one-sample t test on the summary measure of bias generalization indicated that the children significantly preferred the friend of the target of positive nonverbal signals ($M = 1.17$, $SE = 0.08$) over the friend of the target of negative nonverbal signals, $t(80) = 2.27$, $p = .026$, $d = 0.25$, 95% CI = [0.02, 0.32].

Discussion

Results of Experiment 2 confirmed our hypotheses and replicated our Experiment 1 findings, demonstrating that exposure to nonverbal bias can result in the development of novel social biases among preschoolers. Moreover, Experiment 2 provided evidence that these biases are generalized to other associates of the target, a guilt- or halo-by-association effect (Banaji & Bhaskar, 2000). Preschool children who watched a brief demonstration of nonverbal bias on video subsequently showed more positive attitudes toward the target of positive nonverbal signals than toward the target of negative nonverbal signals and also showed more positive attitudes toward, and imitation of, the best friend of the target of positive nonverbal signals than toward the best friend of the target of negative nonverbal signals.

General Discussion

In these experiments, we examined whether young children would catch novel social biases from brief exposure to nonverbal bias demonstrated by adults. In other words, we wanted to know whether exposure to nonverbal bias would spread social biases to children. We found that following exposure to biased nonverbal signals, preschool children showed social biases that were consistent with the nonverbal messages they received.

We also found evidence that the children generalized these biases to other individuals, such that they preferred a friend of (and member of the same in-group as) the nonverbally preferred target to a friend of (and member of the same in-group as) the nonverbally nonpreferred target. This finding has important implications for intergroup biases, because children may be exposed to nonverbal bias against a single member or just a few members of a group, which might then generalize to other members of that group. Previous studies have established that exposure to negative nonverbal signals elevates existing out-group biases among children and adults (Castelli, Carraro, Pavan, Murelli, & Carraro, 2012; Castelli et al., 2008; Weisbuch, Pauker, & Ambady, 2009; Willard, Isaac, & Carney, 2015). The current findings demonstrate that exposure to negative nonverbal signals does not just activate existing social biases but can actually create new ones.

We argue that nonverbal messages may play an important role in the development of social biases in childhood. Given that many preschoolers in the United States live in fairly homogeneous communities, they may have limited exposure to out-group members (e.g., religious, racial, and ethnic out-groups), and thus have limited opportunities to observe positive nonverbal signals demonstrated toward such people. Thus, it is possible that brief exposure to biased nonverbal signals against one or two out-group members could result in generalized bias against that group. The current findings provide a critical foundation for future work that can more directly address the development of such group-based biases (e.g., those based on nationality, race, religion, ethnicity, or body weight).

It is worth noting that there was some variability in the discrete dependent measures of bias. We found that bias toward the target of positive nonverbal signals was more evident on the explicit measures of preference and prosocial behavior than on the imitation measures. In contrast, we found the opposite pattern for generalization to a best friend; bias was more evident on the imitation measure than on the explicit preference measure. Although this may suggest that the generalized bias was more implicit, we are hesitant to draw any conclusions from this pattern of results without additional evidence. The variability observed across measures may have been a product of random noise, which is reduced by using summary measures of bias, as we did here.

Limitations and future directions

The current findings immediately generate new questions about the ontogeny of social bias in young children. Given that the children in our experiments were exposed to both positive and negative nonverbal signals, it is unclear whether the observed effects were driven by positive nonverbal signals, negative nonverbal signals, or both. In their everyday lives, children are likely exposed to more positive than negative nonverbal signals. However, prior evidence suggests that negative signals are highly potent in early childhood (e.g., Hamlin, Wynn, & Bloom, 2010; Mumme & Fernald, 2003; Repacholi et al., 2016; Vaish, Grossmann, & Woodward, 2008); thus, even if quite infrequent, they may be salient and have great impact. In future research, it will be important to isolate the effects of positive nonverbal signals and negative nonverbal signals to determine how each affects the development of social biases.

Furthermore, additional research is needed to determine how social biases arising from exposure to nonverbal signals operate outside the research laboratory as children are introduced to new groups. The nonverbal cues presented in our experiments were obvious, yet children are often exposed to nonverbal cues that are subtler, and it remains an open question whether subtle nonverbal signals can spread social biases. Moreover, the current findings do not speak to the question of whether children who are exposed to nonverbal biases go on to demonstrate those nonverbal biases themselves. In other words, our findings indicate that exposure to nonverbal biases creates biased responses among children in our test situation, but it is unknown whether children would subsequently show the same nonverbally biased behavior that was demonstrated to them. Would their bias leak out through their own nonverbal behavior—thus perpetuating and spreading the bias to other people? Future studies should examine whether children catch the biased behaviors they are exposed to.

Conclusions

We argue that the spread of bias observed in these experiments may have implications for development of other kinds of biases (e.g., racial, ethnic, or religious biases) in childhood. Identifying the origins of social bias is critical to the development of strategies to overcome prejudice early in ontogeny and thereby minimize its adverse consequences in society. The current research indicates that, as Allport (1954) suggested, young children can catch bias from an "infected atmosphere"—that is, by observing nonverbal bias exhibited by other people around them. What is more, preschool children generalize this bias to other individuals. Thus, exposure to nonverbal bias could be a mechanism for the spread of social bias throughout the world in the hearts and minds of children and adults.

Action Editor

Brian P. Ackerman served as action editor for this article.

Author Contributions

A. L. Skinner developed the study concept. All the authors contributed to the study design. Data collection, data analysis, and interpretation were performed by A. L. Skinner. A. L. Skinner drafted the manuscript; K. R. Olson and A. N. Meltzoff provided critical revisions. All the authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Funding

Funding for this research was provided by the University of Washington Ready Mind Project Innovative Research Fund.

Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797616678930

Open Practices

All data and materials have been made publicly available via the Open Science Framework. The data can be accessed at https://osf.io/rfc6r (Experiment 1) and https://osf.io/bfefu (Experiment

2). The materials can be accessed at https://osf.io/6bbup (Experiment 1) and https://osf.io/qx7rv (Experiment 2). The design and analysis plans for Experiment 2 were preregistered at the Open Science Framework and can be accessed through the registration form available at https://osf.io/ym45z/. The complete Open Practices Disclosure for this article can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797616678930. This article has received badges for Open Data, Open Materials, and Preregistration. More information about the Open Practices badges can be found at https://osf.io/tvyxz/wiki/1.%20View%20the%20Badges/ and http://pss.sagepub.com/content/25/1/3.full.

Notes

1. Because of an error in counterbalancing, data were mistakenly collected from 3 additional children. We report the results of analyses in which these children were included; excluding them from the analyses did not change the statistical significance of any of the reported effects.
2. Experiment 1 was conducted before it was standard practice to justify sample size. However, power analysis, carried out using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007), indicates that in order to have power of .80 to detect a medium-size effect (d = 0.50) in a one-sample t test with an alpha of .05, a sample of 32 participants would be needed.
3. We mistakenly recruited an extra child into one of the counterbalancing conditions, which resulted in a sample size of 81. In addition, because of an error in counterbalancing, sample sizes were not perfectly equivalent across the counterbalancing conditions: One condition had 13 participants, one condition had 11 participants, three conditions had 10 participants, and three conditions had 9 participants.

References

Aboud, F. E. (2003). The formation of in-group favoritism and out-group prejudice in young children: Are they distinct attitudes? *Developmental Psychology*, *39*, 48–60. doi:10.1037/0012-1649.39.1.48

Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.

Banaji, M. R., & Bhaskar, R. (2000). Implicit stereotypes and memory: The bounded rationality of social beliefs. In D. L. Schacter & E. Scarry (Eds.), *Memory, brain, and belief* (pp. 139–175). Cambridge, MA: Harvard University Press.

Castelli, L., Carraro, L., Pavan, G., Murelli, E., & Carraro, A. (2012). The power of the unsaid: The influence of nonverbal cues on implicit attitudes. *Journal of Applied Social Psychology*, *42*, 1376–1393. doi:10.1111/j.1559-1816.2012.00903.x

Castelli, L., Carraro, L., Tomelleri, S., & Amari, A. (2007). White children's alignment to the perceived racial attitudes of the parents: Closer to the mother than the father. *British Journal of Developmental Psychology*, *25*, 353–357. doi:10.1348/026151006X159851

Castelli, L., De Dea, C., & Nesdale, D. (2008). Learning social attitudes: Children's sensitivity to the nonverbal behaviors of adult models during interracial interactions. *Personality and Social Psychology Bulletin*, *34*, 1504–1513. doi:10.1177/0146167208322769

Castelli, L., Zogmaister, C., & Tomelleri, S. (2009). The transmission of racial attitudes within the family. *Developmental Psychology*, *45*, 586–591. doi:10.1037/a0014619

Chudek, M., Heller, S., Birch, S., & Henrich, J. (2012). Prestige-biased cultural learning: Bystander's differential attention to potential models influences children's learning. *Evolution & Human Behavior*, *33*, 46–56. doi:10.1016/j.evolhumbehav.2011.05.005

Clark, K. B., & Clark, M. K. (1940). Skin color as a factor in racial identification of Negro preschool children. *The Journal of Social Psychology*, *11*, 159–169.

Cvencek, D., Greenwald, A. G., & Meltzoff, A. N. (2016). Implicit measures for preschool children confirm self-esteem's role in maintaining a balanced identity. *Journal of Experimental Social Psychology*, *62*, 50–57. doi:10.1016/j.jesp.2015.09.015

Dovidio, J. F., Kawakami, K., & Gaertner, S. L. (2002). Implicit and explicit prejudice and interracial interaction. *Journal of Personality and Social Psychology*, *82*, 62–68. doi:10.1037//0022-3514.82.1.62

Dovidio, J. F., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). On the nature of prejudice: Automatic and controlled processes. *Journal of Experimental Social Psychology*, *33*, 510–540. doi:10.1006/jesp.1997.1331

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

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavioral Research Methods*, *39*, 175–191.

Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology*, *69*, 1013–1027.

Fraley, R. C., & Vazire, S. (2014). The N-pact factor: Evaluating the quality of empirical journals with respect to sample size and statistical power. *PLoS ONE*, *9*(10), Article e109019. doi:10.1371/journal.pone.0109019

Hamlin, J. K., Wynn, K., & Bloom, P. (2010). Three-month-olds show a negativity bias in their social evaluations. *Developmental Science*, *13*, 923–929. doi:10.1111/j.1467-7687.2010.00951.x

Harris, P. L., & Corriveau, K. H. (2011). Young children's selective trust in informants. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *366*, 1179–1187. doi:10.1098/rstb.2010.0321

Howard, L. H., Henderson, A. M. E., Carrazza, C., & Woodward, A. L. (2015). Infants' and young children's imitation of linguistic in-group and out-group informants. *Child Development*, *86*, 259–275. doi:10.1111/cdev.12299

Kinzler, K. D., Corriveau, K. H., & Harris, P. L. (2011). Children's selective trust in native-accented speakers. *Developmental Science*, *14*, 106–111. doi:10.1111/j.1467-7687.2010.00965.x

Kinzler, K. D., Shutts, K., & Spelke, E. S. (2012). Language-based social preferences among children in South Africa. *Language Learning and Development*, *8*, 215–232. doi:10.1080/15475441.2011.583611

Mumme, D. L., & Fernald, A. (2003). The infant as onlooker: Learning from emotional reactions observed in a television scenario. *Child Development*, *74*, 221–237. doi:10.1111/1467-8624.00532

Over, H., & Carpenter, M. (2012). Putting the social into social learning: Explaining both selectivity and fidelity in children's copying behavior. *Journal of Comparative Psychology*, *126*, 182–192. doi:10.1037/a0024555

Pahlke, E., Bigler, R. S., & Suizzo, M.-A. (2012). Relations between colorblind socialization and children's racial bias: Evidence from European American mothers and their preschool children. *Child Development*, *83*, 1164–1179. doi:10.1111/j.1467-8624.2012.01770.x

Repacholi, B. M., & Meltzoff, A. N. (2007). Emotional eavesdropping: Infants selectively respond to indirect emotional signals. *Child Development*, *78*, 503–521. doi:10.1111/j.1467-8624.2007.01012.x

Repacholi, B. M., Meltzoff, A. N., Toub, T. S., & Ruba, A. L. (2016). Infants' generalizations about other people's emotions: Foundations for trait-like attributions. *Developmental Psychology*, *52*, 364–378. doi:10.1037/dev0000097

Richeson, J. A., & Shelton, J. N. (2005). Brief report: Thin slices of racial bias. *Journal of Nonverbal Behavior*, *29*, 75–86. doi:10.1007/s10919-004-0890-2

Rutland, A., Cameron, L., Bennett, L., & Ferrell, J. (2005). Interracial contact and racial constancy: A multi-site study of racial intergroup bias in 3–5 year old Anglo-British children. *Journal of Applied Developmental Psychology*, *26*, 699–713. doi:10.1016/j.appdev.2005.08.005

Vaish, A., Grossmann, T., & Woodward, A. (2008). Not all emotions are created equal: The negativity bias in social emotional development. *Psychological Bulletin*, *134*, 383–403. doi:10.1037/0033-2909.134.3.383

Weisbuch, M., & Ambady, N. (2008). Non-conscious routes to building culture: Nonverbal components of socialization. *Journal of Consciousness Studies*, *15*(10–11), 159–183.

Weisbuch, M., Pauker, K., & Ambady, N. (2009). The subtle transmission of race bias via televised nonverbal behavior. *Science*, *326*, 1711–1714. doi:10.1126/science.1178358

Willard, G., Isaac, K.-J., & Carney, D. R. (2015). Some evidence for the nonverbal contagion of racial bias. *Organizational Behavior and Human Decision Processes*, *128*, 96–107. doi:10.1016/j.obhdp.2015.04.002