Original Article

Ritual increases children's affiliation with in-group members☆

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A B S T R A C T

This study examined the impact of ritual participation on children's in-group affiliation ($N = 71$, 4–11-year-old children). A novel social group paradigm was used in an afterschool program to test the influence of a ritual versus a control task on a measure of affiliation with in-group versus out-group members. The data support the hypothesis that the experience of participating in a ritual increases in-group affiliation to a greater degree than group activity alone. The results provide insight into the early-developing preference for in-group members and are consistent with the proposal that rituals facilitate in-group cohesion. We propose that humans are psychologically prepared to engage in ritual as a means of in-group affiliation.

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1. Introduction

Recent convergent developments in cognitive science (Legare & Souza, 2012; Rossano, 2012), social psychology (Norton & Gino, 2014; Swann, Jetten, Gómez, Whitehouse, & Bastian, 2012; Vohs, Wang, Gino, & Norton, 2013; Whitehouse, McQuinn, Buhrmester, & Swann, 2014) and evolutionary anthropology (Atkinson & Whitehouse, 2011; Boyer & Liénard, 2006; Ruffle & Sosis, 2007) have opened up new avenues for research on ritual, a psychologically understudied yet pervasive feature of human social group cognition and behavior. Rituals, which we define as conventional, causally opaque procedures, are uninterpretable from the perspective of physical causality because they lack an intuitive or observable causal connection between the specific action performed (e.g., synchronized dancing) and the desired outcome or effect (e.g., making it rain) (Legare & Souza, 2012, 2014; Sørensen, 2007). The dearth of psychological research on this topic is striking given that ritual is a universal cultural phenomenon and has been the focus of extensive anthropological inquiry. Anthropologists have long proposed that rituals demonstrate commitment to in-group members by signaling group member identity, promoting interpersonal bonding, and creating shared beliefs (Humphrey & Laidlaw, 1994; Rappaport, 1999; Whitehouse & Lanman, 2014).

There is substantial evidence that humans have evolved a variety of psychological adaptions for group living (Caporael, 1997; Kurzban & Neuberg, 2005; Richerson, Boyd, & Henrich, 2003; Tooby, Cosmides, & Price, 2006). Social group cognition is a developmentally privileged process that occurs very early in human development (Killen & Rutland, 2011). Young children are well prepared to become social group members (Diesendruck & Markson, 2011; Legare & Watson-Jones, 2015; Rhodes, 2012). Some social categories are highly essentialized by young children (Gelman, Heyman, & Legare, 2007; Hirschfeld, 1996), especially those categories with high evolutionary functionality (Diesendruck, Goldfein-Elbaz, Rhodes, Gelman, & Neumark, 2013).

The early-developing propensity for social categorization is strong. Novel group membership activates in-group biases in adults (Billig & Tajfel, 1973; Diehl, 1990; Tajfel, 1970; Tajfel, Billig, Bundy, & Flament, 1971; Tajfel & Turner, 1985) and children (Abrams & Rutland, 2008; Dunham, Baron, & Banaji, 2008; Nesdale & Flesser, 2001; Rhodes, 2012). Young children placed in novel social groups (i.e., based on t-shirt color) have expectations for in-group reciprocity, positive behavioral attributions for the in-group, and preferences for in- over out-group members (Dunham, Baron, & Carey, 2011). Young infants are also biased to interact more with in-group members (Kinzler, Dupoux, & Spelke, 2007). Infants have expectations that group members will act similarly (Powell & Spelke, 2013) and imitate in-group members more frequently than out-group members (Buttelmann, Zmyj, Daum, & Carpenter, 2013).

Children readily learn and adhere to the conventions of their social groups (Heyes & Frith, 2014; Kalish, 2005). Young children comply with social norms (Diesendruck & Markson, 2011) and engage in normative protest when rules are violated (Rakoczy, Warneken, &

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Tomasello, 2008). By 4-years-old, children attribute conventional knowledge selectively to in-group members (Diesendruck, 2005). Young children also expect group members to behave in conventional ways (customs, traditions, and etiquette) and distinguish between conventional and moral rules (Killen & Rutland, 2011; Smetana, 2006; Turiel, 1998).

Much of cultural learning is motivated by affiliative goals, resulting in the acquisition of conventional behavior. Children are acutely sensitive to relations among individuals (Chudek, Heller, Birch, & Henrich, 2012; Kalish, 2013; Nielsen & Blank, 2011), particularly to whether two or more individuals act or make judgments in the same way (Corriveau, Fusaro, & Harris, 2009; Pasquini, Corriveau, Koenig, & Harris, 2007). Children are sensitive to social pressure to conform with a peer group, even when no instrumental knowledge is gained, and publicly disguise correct judgments to conform to the erroneous consensus (Haun, Rekers, & Tomasello, 2014; Haun & Tomasello, 2011).

Children are precocious social learners, well-equipped to engage in high fidelity imitation, a potential indicator of group affiliation through conformity (Herrmann, Legare, Harris, & Whitehouse, 2013; Over & Carpenter, 2009, 2012). Overimitation may be an adaptive human social learning strategy facilitating the rapid social learning of instrumental skills and may be employed at the expense of efficiency (Flynn & Whiten, 2008; Whiten, McGuigan, Marshall-Pescini, & Hopper, 2009). High fidelity imitation in children has also been linked to social concerns (Nielsen, 2006; Over & Carpenter, 2012), such as encoding normative behavior (Kenward, Karlsson, & Persson, 2011; Nielsen, Kapitány, & Elkins, 2015) and fear of ostracism (Over & Carpenter, 2009; Watson-Jones, Legare, Whitehouse, & Clegg, 2014; Watson-Jones, Whitehouse, & Legare, 2015). This suggests that children's motivation to engage in high fidelity imitation may be inherently motivated by affiliating with social groups (Legare & Watson-Jones, 2015; Over & Carpenter, 2012). Based on these early developing capacities, Chudek and Henrich (2011) and Chudek, Zhao, and Henrich (2013) take a culture-gene coevolved "norm psychology" approach to support early developing reasoning about conventional behavior, which we argue is a prerequisite for ritual learning.

New research on the cognitive developmental foundations of ritual has examined imitative behavior as a means of affiliation with social groups (Clegg & Legare, 2015; Herrmann et al., 2013; Legare & Herrmann, 2013; Legare & Nielsen, 2015; Legare, Wen, Herrmann, & Whitehouse, 2015; Watson-Jones et al., 2014; Watson-Jones et al., 2015). When excluded by an in-group, adults are motivated to affiliate with the in-group by utilizing selective and nonconscious mimicry (Lakin, Chartrand, & Arkin, 2008). This may be because individuals cope with ostracism by engaging in behaviors aimed at reinclusion (see Williams & Nida, 2011 for a review). Adults also engage in higher levels of emotional facial mimicry of in-over out-group members (Bourgeois & Hess, 2008).

We hypothesize that the performance of socially shared rituals amplifies the early developing and empirically documented preference for in-group members over out-group members (Legare & Wen, 2014). This hypothesis is consistent with new research investigating the extent to which rituals function as a mechanism for increasing social group cohesion (Whitehouse & Lanman, 2014). Rituals facilitate high fidelity cultural transmission, by (a) serving as social identity markers (e.g., dressing in a particular way) (Cosmides & Tooby, 2013), (b) demonstrating commitment to the group (e.g., more costly rituals signal commitment to group values) (Henrich, 2009; McElreath, Boyd, & Richerson, 2003), (c) facilitating cooperation with their coalition (e.g. rituals signal group commitment and increase group cooperation) (Ruffle & Sosis, 2007; Sosis & Bressler, 2003; Sosis & Ruffle, 2003), and (d) increasing group cohesion (e.g., rituals serve as mechanisms for social cohesion and foster longevity of social groups) (Atkinson & Whitehouse, 2011; Soler, 2012). Because rituals are resistant to individual innovation and change, they facilitate coordinated and cooperative group action, essential to solving important human adaptive problems

associated with group living (Legare & Watson-Jones, 2015; Watson-Jones & Legare, 2015).

How best to examine the effects of complex social behavior such as ritual on group affiliation? There are several frequently co-occurring features of rituals that we hypothesize make them ideal candidates for amplifying social group affiliation and cohesion. Rituals are socially scripted, are frequently accompanied by normative or conventional language, and involve synchrony (i.e., coordinated movement matched in time (Bernieri & Rosenthal, 1991)) within groups (Hove & Risen, 2009; Kirschner & Tomasello, 2010; Marsh, Richardson, & Schmidt, 2009; Wiltermuth & Heath, 2009). New developmental research has documented that characteristic features of ritual have effects on imitative fidelity, a measure of affiliation. Children engage in higher imitative fidelity after (a) witnessing start- and end-state equivalence in an action sequence (Legare et al., 2015; Watson-Jones et al., 2014), (b) hearing conventional language (e.g., "everyone does it this way") rather than instrumental language (e.g., "she makes a necklace") (Clegg & Legare, 2015; Herrmann et al., 2013; Legare et al., 2015), (c) observing multiple actors engage in the same behavior versus observing one actor engage in the same behavior multiple times (Herrmann et al., 2013), and (d) observing behavior done in synchrony versus in succession (Herrmann et al., 2013). In the current study, rather than attempt to examine the effects of each of these features independently, our objective was to examine their cumulative effects compared to a matched social group experience. Does participating in a ritual increase in-group affiliation to a greater extent than group membership alone?

Despite the large literature on children's reasoning about social groups, this is the first study to our knowledge to examine the role of ritual participation on children's affiliation with in-group members. A novel social group paradigm (Tajfel, 1970) was used to examine the hypothesis that the experience of participating in a ritual may increase preference for in-group members, an effect we predicted to be greater than experiencing social group activity alone. Across conditions, children were first assigned to a novel social group in an afterschool program setting (i.e., yellow or green group). In the ritual condition, children in each group participated in a scripted, synchronous necklace-making task that was demonstrated by a group leader. In the control condition, children in each group participated in a nonscripted necklace-making task that was supervised by a group leader. The language children heard to describe each group and the amount of social experience in a group setting were identical across conditions. We predicted that children in the ritual condition would demonstrate stronger in-group affiliation than children in the control condition.

2. Methods

2.1. Participants

Seventy-one 4–11-year-olds (42% female, 58% male; M_{age} = 7 years, 4 months; range = 4 years, 2 months to 11 years, 6 months) were recruited at two afterschool program locations in the American southwest. Participants were primarily from working-class families (66% of children attending school at the locations tested are economically disadvantaged) based on school district records (i.e., eligible for free or reduced-price lunch or other public assistance). Participants were also ethnically diverse (51% Hispanic, 39% White, 7% African–American, and 3% other ethnicities). Sample size was determined prior to data collection via power analysis using a predicted effect size of $d = 0.80$ based on previous research using similar experimental paradigms. The power analysis suggested a sample size of 26 subjects per group, power $(1 - \beta$ err prob) = .80. We concluded data collection when we ran the study in two schools (one per condition). Our sample size $(N = 71)$ exceeded the suggested sample size $(N = 52)$ because we collected data from all consented individuals, so as not to exclude children that wished to participate.

2.2. Materials

Across conditions, yellow and green wristbands were used to demarcate novel social groups. We provided each child with a plastic bag of materials including a yellow string, a green string, and three colors of beads — yellow (in-/out-group color), green (in-/out-group color), and orange (distractor color). Each color of bead included two star shaped beads, two heart shaped beads, two circular beads, and two square beads, for a total of 24 beads. Yellow and green visors were used in one of the post-test questions.

2.3. Procedure and coding

Children from two locations of an afterschool program participated in this study. One location participated in the ritual condition ($n = 34$; 41% female, 59% male; $M_{age} = 7$ years, 8 months; range = 4 years, 11 months to 11 years, 6 months) and another location participated in the control condition ($n = 37$; 43% female, 57% male; $M_{age} = 7$ years, 2 months; range = 4 years, 2 months to 10 years, 5 months). We ran each condition in different locations to ensure that children in the ritual condition did not transmit information from the social group activities to the control condition (since they would be spending time together outside of the experimental manipulations). The afterschool programs were both run by the same company at the different sites. The curricula, structure of the daily activities (e.g., type of activities, schedules, rules and regulations), and teacher training were identical across sites. This indicates that there should not be differences in ritualistic activities or traditions in regards to ritualistic practice and intergroup competition at one location over another. In addition to being matched by curricula and structure, the afterschool program locations were also matched for ethnic diversity, sex, and SES. In the ritual condition, 76% of children attending the program and in the control condition, 57% of children attending the program were considered economically disadvantaged based on school district records. The ethnic diversity of the participants was comparable as well. In the ritual condition, the ethnic composition was 53% Hispanic, 29% White, 12% African–American, and 6% other ethnicities. In the control condition, the ethnic composition was 49% Hispanic, 49% White, and 3% African–American.

Across locations and conditions, children were randomly assigned to either the yellow group ($n = 17$ in the ritual condition, $n = 18$ in the control condition), or the green group ($n = 17$ in the ritual condition, $n = 19$ in the control condition). Sex and ethnic compositions were comparable across condition by color group. In the ritual condition (green group), the sex breakdown was 47% female and 53% male. The ethnic breakdown was 65% Hispanic, 18% White, 12% African–American, and 6% other ethnicity. In the ritual condition (yellow group), the sex breakdown was 35% female and 65% male. The ethnic breakdown was 41% Hispanic, 41% Caucasian, 12% African–American, and 6% other ethnicity. In the control condition (green group), the sex breakdown was 42% female and 58% male. The ethnic breakdown was 47% Hispanic and 53% White. In the control condition (yellow group), the sex breakdown was 44% female and 56% male. The ethnic breakdown was 50% Hispanic, 44% White, and 6% African–American.

In both conditions, children had an identical amount of exposure to the language relating to their group. In each condition, the color wristbands were introduced, "In this program, we have two groups of children, the green group and the yellow group! You are in the yellow [green] group. Each day you'll put this on to remind you that you are in the yellow [green] group and you'll take it off at the end of the day. Neither group is better than the other; there are just two separate but equal groups. Now each color group is going to use their objects in the special way. I want the yellows to learn together over here, and the greens to learn together over there. Yellow group line up to get your objects, and green group line up to get your objects." In each condition, children were presented with the identical bags of beads and string (described in Materials).

Across conditions, children wore colored wristbands of their in-group daily for two weeks. During this period, they participated in six social group activities of their in-group within their condition. A two week time period was selected in order to allow for repeated exposure to the social group activity. Two confederate adult females (matched for age, ethnicity, and attractiveness), acted as group leaders, supervising each color group, in each condition. The group leader was dressed in a yellow or green t-shirt and a corresponding yellow or green visor. In both the ritual condition and the control condition, children participated in a social group activity. In both conditions, the same pair of group leaders led the social group activity. In the ritual condition, the social group activity was a ritual task (i.e., scripted group necklace-making task). In the control condition, the social group activity was a non-scripted necklace-making task, using the same materials as the ritual task.

2.3.1. Social group activity

In the ritual condition, group leaders for each color group supervised participants in a quiet area of the afterschool program location where there were two lines taped to the floor, one green and one yellow. Colored lines were used to organize children into groups. Each leader asked their respective color group to sit on the matching colored line and passed out bags of beads and string. Once all children received their bags, the leaders sat down in front of their respective groups and in the green group said, "Okay green group, we are going to play with these beads in a special way, the way the green group does it! Watch what I'm doing!" [Pick up a green star]. "First, hold up a green string. Then, touch a green star to your head. Then, string on a green star." [Touch a green star to head and string it on. Pick up a green circle]. "Next clap your hands 3 times. Then string on a green circle." [Clap hands 3 times and then string the green circle on. Pick up a green square]. "Next, touch a green square to your head. Then, string on a green square." [Touch a green square to head and string it on. Pick up a green heart]. "Next clap your hands 3 times. Then string on a green heart." [Clap hands 3 times and then string the green heart on. Pick up a green star]. "Next, touch a green star to your head. Then, string on a green star." [Touch a green star to head and string it on. Pick up a green circle]. "Next clap your hands 3 times. Then string on a green circle." [Clap hands 3 times and then string the green circle on. Pick up a green square]. "Next, touch a green square to your head. Then, string on a green square." [Touch a green square to head and string it on. Pick up a green heart]. "Next clap your hands 3 times. Then string on a green heart." [Clap hands 3 times and then string the green heart on]. "Now, take the beads off and do it again!" [Remove beads from string and repeat ritual as scripted]. After ten minutes, children were asked to put away the beads and the bags were collected from them. "Okay, we're all done! You did it the way the green group does it! Good job!" The scripted activity was done in synchrony with the children (i.e., verbal instructions were given and the children performed the instructed behaviors simultaneously with the group leader), was modeled twice per session, and took approximately ten minutes to complete (see Table 1 for a detailed description of the scripted tasks used in the ritual condition by color group). Children participated in this activity three days a week for two weeks.

In the control condition, group leaders for each color group supervised participants in a quiet area of the afterschool program location where there were two lines taped to the floor, one green and one yellow (the same set up as in the ritual condition). Using the same language as in the ritual condition, each leader asked their respective color group to sit on the matching colored line and passed out bags of beads and string. Once all children had received their bags, the leaders sat down in front of their respective groups and said, "Okay yellow [green] group, we are going to play with these beads in a special way, the way the yellow [green] group does it!" [Children engaged in unstructured necklace making and bead stringing]. After ten minutes, children were asked to put away the beads and the bags were collected from them. "Okay, we're all done! You did it the way the yellow [green] group does it! Good

Table 1
Ritual condition group leader actions by color group. Structured play task for the green and yellow groups in the ritual condition (each group repeated the sequence twice).

Order of Action	Green Group		Yellow Group	
	Bead	Gesture	Bead	Gesture
1st		Touch Star to Forehead		3 Hand Claps
2nd	String Star		String Square	
3rd		3 Hand Claps		Touch Heart to Forehead
4th	String Circle		String Heart	
5th		Touch Square to Forehead		3 Hand Claps
6th	String Square		String Star	
7th		3 Hand Claps		Touch Circle to Forehead
8th	String Heart		String Circle	

job!" Children participated in this activity three days a week for two weeks.

Across conditions, children were allowed to interact with the materials during the social group activity for ten minutes each time. During this time, the vast majority of children strung beads on string. Many children tied the beads and string around their necks, though they were never instructed to do so. After the ten-minute period, they were instructed to put all the beads and string back into the plastic bag they were given. The group leader then collected all the plastic bags. Retrieving the materials from the children controlled for amount of exposure to the materials. Across conditions, the color group leaders always supervised the social group activity and during the social group activity that differed between conditions, children heard the word "group" three times per session. Across conditions, there were also very high levels of social interaction in both of the color groups throughout the two-week period.

2.3.2. Post-test measure

After the two-week period in which children participated in the social group activities, they were interviewed individually about their attitudes towards in- and out-group members. The interview questions were asked on the same day as the last social group activity to control for attendance. All children completed a post-test questionnaire consisting of an in-group affiliation measure administered by research assistants, who were blind to hypotheses and did not serve as group leaders.

2.3.2.1. In-group affiliation measure. Children were presented with an in-group affiliation measure consisting of four questions about their affiliation with members of their in-group versus the out-group: an in-group membership question, an in-group identification question, an in-group preference question, and an in-group privilege question. For the in-group membership question, children were asked, "If you could change the color of your wristbands, would you change it or would you keep it the same?" For the in-group preference question, children were asked, "If a new student came to your class, and your teacher let them pick a color group, would they want to pick the green group or the yellow group?" For the in-group privilege question, the children were told, "We're going to another afterschool program next, and they need to know who you think should be group helpers." Then they were asked, "Should it be a kid from the green group, or a kid from the yellow group?" For the in-group identification question, children were told, "Thank you for helping us out. We're passing out hats once everyone is done." Then they were asked, "Would you like a green or a yellow hat?" For each answer favoring their in-group, children were given a score of 1. For each answer favoring the out-group, they were given a score of 0. Each question was designed to assess in-group affiliation and we did not have unique predictions about each question by condition, so the data were analyzed as a composite score.

2.3.3. Attendance records

Detailed attendance records were kept for the number of days wristbands were worn (out of 10) and the number of social groups activities attended (out of 6). An independent samples t-test indicated that there was no difference in the number of days children wore wristbands between the ritual condition ($M = 8.00$, $SD = 2.09$, range = 6–10 days) and the control condition ($M = 8.57$, $SD = 1.26$, range = 3–10 days), $t(53.27) = -1.37$, $p = .176$. An independent samples t-test indicated that there was no difference in the number of days children participated in the social group activity in the ritual condition ($M = 4.12$, $SD = 1.51$, range = 2–6 days) and the control condition ($M = 4.57$, $SD = 1.41$, range = 2–6 days), $t(67.29) = -1.30$, $p = .200$.

3. Results

3.1. In-group affiliation measure

A composite score was created by summing the individual scores of each in-group affiliation question (0–4). Each question was designed to assess aspects of in-group affiliation, so the data were analyzed as a composite score. A one-way analysis of covariance (ANCOVA) was conducted with the in-group affiliation composite score as the dependent variable, condition (2: ritual and control) as the independent variable, and attendance as the covariate. A preliminary analysis evaluating the homogeneity of slopes assumption indicated that the relation between attendance and in-group affiliation did not differ significantly as a function of condition, $F(1, 67) = 3.35$, $p = .072$, partial $\eta^2 = .05$. Levene's test was not significant, $F(1, 69) = 0.01$, $p = .938$, indicating that the assumption of homogeneity of variance was not violated. The ANCOVA revealed a significant effect of condition after accounting for attendance, $F(1, 68) = 4.54$, $p = .037$, partial $\eta^2 = .06$ (see Fig. 1). Overall, children in the ritual condition had higher in-group affiliation composite scores ($M_{observed} = 3.03$, $SD_{observed} = 1.00$) than children in the control condition ($M_{observed} = 2.59$, $SD_{observed} = 1.14$). The adjusted means of the in-group affiliation composite scores children were $M_{adjusted} = 3.08$, $SD_{adjusted} = 1.04$ in the ritual condition and $M_{adjusted} = 2.55$, $SD_{adjusted} = 1.05$. To test if the basic minimal group effect was observed, children's in-group affiliation composite scores in the control condition were compared to chance ($M = 2.00$ out of 4.00). Children's in-group affiliation composite scores in the control condition significantly differed from chance, $t(36) = 3.17$, $p = .003$. Attendance was significantly related to in-group affiliation, $F(1,68) = 6.25$, $p = .015$, partial $\eta^2 = .08$. There were also no significant effects on in-group affiliation by group color (i.e., yellow versus green) ($t(66.82) = 1.33$, $p = .187$) or sex ($t(64.96) = -0.87$, $p = .387$). A simple linear regression showed that age (in months) was not a significant predictor of in-group affiliation, $F(1, 69) = 0.74$, $p = .392$.

4. Discussion

The role of ritual in enhancing group cohesion has received little empirical attention to date, in part because the complexity and historical diversity of the world's ritual traditions have impeded the identification of common key features of ritualistic behavior (Rossano, 2012). This has made it difficult to establish robust generalizations about the causes and effects of these features in isolation or interaction. Because rituals have been studied almost entirely qualitatively (but see Legare & Souza,
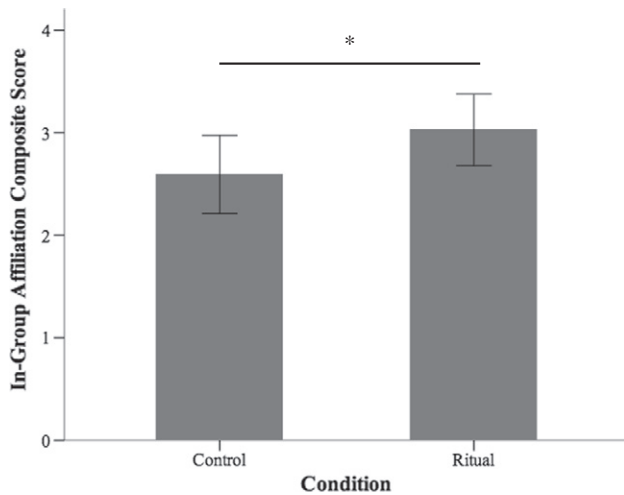
Fig. 1. Observed mean in-group affiliation composite score by condition. Error bars represent 95% confidence intervals.

2012, 2014; Norton & Gino, 2014; Vohs et al., 2013 for exceptions), it has proven difficult to make strong causal inferences about the impact of ritual on human cognition and behavior.

Examining the development of ritual has important implications for understanding the ontogeny of cultural learning in childhood (Legare & Watson-Jones, 2015) and for informing our understanding of the evolution of social cognition (Brewer, 2007; Caporael, 1997; Kurzban & Neuberg, 2005; Richerson & Boyd, 2005). Yet very little is known about the development of ritual. Existing research suggests that adolescence may be the preferred developmental period for religious and ritual transmission due to changes in brain function that make them most receptive to social, emotional, and symbolic stimuli (Alcorta & Sosis, 2005). However, new work on the ontogeny of ritual indicates that children as young as 3-years-old are well-prepared to reason about social conventionality, a core feature of ritual cognition (Clegg & Legare, 2015; Herrmann et al., 2013; Legare et al., 2015; Watson-Jones et al., 2014; Watson-Jones et al., 2015). Our data demonstrate that the experience of participating in a ritual increases in-group preference in childhood, much earlier than previous research has suggested. This is consistent with what we would expect if the capacity to engage in ritual is a psychologically-prepared, culturally-inherited, behavioral trademark of our species.

We propose that examining the psychological effects of ritual in the context of children's social groups informs our understanding of the empirically documented and early developing human tendency to prefer in-group members to out-group members (Legare & Watson-Jones, 2015; Legare & Wen, 2014). Our data are consistent with the hypothesis that ritual increases in-group affiliation. The experience of participating in a ritual (ritual condition) increases in-group affiliation to a greater degree than group membership alone (control condition), when you account for the amount of experience with the social group activity (attendance). Furthermore, because the same children had repeated exposure to the same social group activity over a two-week period and remained marked in their social groups throughout the time they spent at the afterschool program, ecological validity was high.

The current results provide novel empirical evidence for the effects of ritual participation on children's in-group affiliation; however, more research is needed to experimentally manipulate different features of ritual to examine its effects on psychological outcomes. There are several frequently co-occurring features of rituals that we hypothesize make ritual an ideal candidate for amplifying social group affiliation and cohesion. Rituals are socially scripted, frequently accompanied by conventional language, and involve social group coordination and behavioral synchrony. In the current study, rather than attempt to examine the effects of each of these features on in-group affiliation independently, our objective was to examine whether participating in a ritual impacts in-group affiliation to a greater extent than group membership alone. The extent to which particular features of ritual individually contribute to the documented effects on in-group affiliation is a topic we are examining in ongoing research. Additionally, the rituals used here do not involve supernatural or religious elements. Previous work has examined the factors that make non-religious rituals most efficacious (Legare & Souza, 2012), as well as the effect of these rituals on perceived control (Legare & Souza, 2014; Norton & Gino, 2014) and consumption (Vohs et al., 2013). Our data demonstrate that rituals increase in-group affiliation without invoking the supernatural.

Recent findings in psychological research support that because ritual participation involves shared experiences amongst group members, they may provide a mechanism for "fusing" the self with relational and collective groups (Atkinson & Whitehouse, 2011; Swann, Gomez, Seyle, Morales, & Huici, 2009; Swann et al., 2012). Highly fused individuals feel a sense of 'oneness' with the group, supporting the development of strong relational ties and lasting commitment to in-group members (Swann et al., 2012). This is most commonly associated with the imagistic mode (low-frequency, high arousal) of religiosity (Whitehouse, 2004). Notably, there are two forms of social cohesion: identity fusion and group identification (Whitehouse & Lanman, 2014). Identity fused individuals experience a social identity becoming an essential component of one's personal self concept (Swann et al., 2012) and group identified individuals share prototypical features with in-group members, non-essential to personal identities (Gómez et al., 2011). These data support the findings that participation in a collective ritual enhances group identification, and can be considered most characteristic of the doctrinal mode (high-frequency, low arousal) of religiosity. Future ethnographic research may shed light on the kinds of rituals that create group fusion in children.

There is evidence that engaging in synchronous movement (even synchronous singing) may increase cooperation, prosociality, as well as self-reported feelings of connection to and trust of group members (Cohen, Ejsmond-Frey, Knight, & Dunbar, 2010; Konvalinka et al., 2011; Reddish, Fischer, & Bulbulia, 2013; Wiltermuth & Heath, 2009). Kirschner and Tomasello (2010) found that synchronous joint-music making increases prosociality in 4-year-olds. Our work expands upon this by working with larger groups ($n = 17$–19/group with 4 groups compared to n $= 2$/group with 48 groups). We also conducted the work in a school over a laboratory setting, increasing the ecological validity. In addition, our participants had repeated exposure to the same synchronous activity (6 times over 2 weeks) and had the presence of an out-group, unlike previous research's single exposure with no out-group (Kirschner & Tomasello, 2010). Other research, however, suggests that synchrony may not be sufficient to increase prosociality and cooperation with in-group members (Cohen, Mundry, & Kirschner, 2013) and may even increase prosociality towards out-group members (Reddish, Bulbulia, & Fischer, 2013) in adults. Notably, previous research has only examined a single exposure to a synchronous group activity. Our study builds upon this literature by investigating the effects of repeated exposure to a more complex synchronous in-group activity (e.g., bead stringing with a collective goal) rather than a purely "mechanical" one (e.g., drumming) on children's in-group affiliation.

Rituals provide a solution to one of the greatest challenges of social group living, the problem of coordinated and cooperative group action (Tooby et al., 2006). Due to the importance of group membership for our cultural species, we propose that humans are psychologically prepared to engage in socially stipulated, conventional behavior such as ritual as a means of in-group affiliation. Rituals serve four core functions that address the adaptive problems of group living by acting as social identity markers, demonstrating commitment to the group, facilitating cooperation with their coalition, and increasing group cohesion (Legare & Watson-Jones, 2015). Human psychology is thus geared to

motivate individuals to engage in behaviors that increase inclusion within their social groups. Our data support the hypothesis that the experience of participating in a ritual increases in-group affiliation to a greater degree than group membership alone and provide evidence consistent with the proposal that rituals facilitate in-group cohesion in early childhood.

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