Brief Report

Children are more forgiving of accidental harms across development

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A B S T R A C T

Forgiveness is a powerful feature of human social life, allowing for the restoration of positive cooperative relationships. Despite its importance, we know relatively little about how forgiveness develops during early life and the features that shape forgiveness decisions. Here, we investigated forgiveness behavior in children aged 5–10 years ($N = 257$) from the United States, varying transgressor intent and remorse in a behavioral task that pitted punishment against forgiveness. We found that baseline levels of forgiveness are high, suggesting that children assume the best of transgressors in the absence of information about intent and remorse. We also found age-related increases in sensitivity to intent but not remorse, such that older children are more likely to forgive accidental transgressions. Because forgiveness is an important tool in the human social toolkit, exploring the ways in which this ability develops across age can help us to better understand the early roots of human cooperation.

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Introduction

Cooperation is a key feature of human social life, underpinning the vast networks found across human societies (Henrich et al., 2005). These cooperative interactions are not always harmonious, however, given that transgressions can and do occur. Consequently, social behaviors such as punishment and forgiveness are crucial for the maintenance of cooperative relationships (Fehr & Gächter,

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2000; Forster et al., 2020). Whereas much work has focused on punishment's role in restoring cooperation (Raihani, Thornton, & Bshary, 2012), forgiveness—which has been broadly defined as a prosocial change toward a perceived transgressor (Forster et al., 2020)—can also restore positive relationships in sometimes lower-cost ways. Indeed, when formally modeled, generous tit-for-tat strategies that allow for the forgiveness of transgressions can invade and outcompete standard tit-for-tat strategies (Godfray, 1992), suggesting that forgiveness can be a successful strategy in repeated interactions.

Advances in the adult literature have helped to shape our understanding of the form and function of forgiveness (Godfray, 1992; McCullough, 2008; Worthington, Griffin, & Provencher, 2018) as a cognitive system for resolving interpersonal conflict (McCullough, Kurzban, & Tabak, 2013). Functionally, forgiveness can be thought of as a set of motivational changes whereby an individual becomes less disposed to retaliation and more disposed to reconcile with the transgressor (McCullough, Worthington, & Rachal, 1997). In addition, our understanding of the psychological mechanisms supporting forgiveness has been refined through experimental and psychometric research with adults. For instance, work with adults suggests that decision makers are sensitive to social information, tending to forgive more in cases where the transgressor is remorseful (Jeter & Brannon, 2018; Tabak, McCullough, Luna, Bono, & Berry, 2012) or where the transgression is deemed accidental (Wohl & Reeder, 2004). Furthermore, psychometric work has helped to elucidate the underlying psychological structure of forgiveness; in a recent study, Forster et al. (2020) found that the best psychometric model of forgiveness is a single attitudinal dimension ranging from malevolence to benevolence—an approach used to develop the dependent variable in the current study.

Despite its importance to our social lives, we know surprisingly little about the emergence of forgiveness during early life (van der Wal, Karremans, & Cillessen, 2017). Developmental work into this topic can help to elucidate the building blocks of this social ability and how they dissociate across ontogeny. A small but growing body of literature suggests that children's forgiveness becomes increasingly sophisticated with age (Darby & Schlenker, 1982, 1989). When forming third-party judgments, there is evidence to suggest that children are sensitive to relevant social cues when making forgiveness decisions. For instance, in hypothetical vignettes, children report being more willing to forgive transgressions that are accidental (Nobes, Panagiotaki, & Engelhardt, 2017; Ohbuchi & Sato, 1994) and low in severity (Goss, 2002). They are also more likely to report that they would forgive transgressors who are remorseful (Darby & Schlenker, 1982, 1989; Vaish, Carpenter, & Tomasello, 2011) and evaluate them more positively (Banerjee, Bennett, & Luke, 2010; Oostenbroek & Vaish, 2019a; Smith, Chen, & Harris, 2010). These judgments may, in part, be related to broader developments in theory-of-mind ability. For instance, children who pass a false belief task deem it less acceptable to punish accidental transgressions (Killen, Mulvey, Richardson, Jampol, & Woodward, 2011).

However, although the elicitation of vignette-based judgments is helpful for understanding how children reason about forgiveness, it is unclear how these judgments translate to first-person decision making. This relationship between judgments and behavior is complicated by the *knowledge–behavior gap* in children—the dissociation between individuals' actual behavior and their judgments of normative behavior (Blake, McAuliffe, & Warneken, 2014). For instance, in other tasks measuring social behavior, although children are aware of norms surrounding, say, fairness, they still choose to act selfishly and prefer not to share (Kogut, 2012; Smith, Blake, & Harris, 2013). Thus, it may be the case that a closer examination of children's *actual* behavior may provide novel insights above and beyond their reported forgiveness-related judgments. Consequently, of special interest are the few experimental studies that have examined children's forgiveness when children themselves are the targets of transgressions. These studies largely suggest that children are sensitive to transgressor remorse. In a study with 4- to 7-year-old American children, Smith and Harris (2012) found that when children are the victims of transgressions, they report feeling better and judge the transgressor to be nicer when an apology is issued. Furthermore, in a study with 6- and 7-year-old American children, Drell and Jaswal (2016) found that children are more willing to share resources—in this case, stickers—with a transgressor who offers an apology than with one who does not. And more recently, in a study with 4- and 5-year-old American children, Oostenbroek and Vaish (2019b) found that children are more willing to reward a remorseful transgressor over an unremorseful one—in this case, by gifting them a cloth flower.

Although past work highlights a role for remorse in guiding children's forgiveness, we are aware of no prior work that directly tested children's forgiveness as a result of a transgressor's intentions in cases where participants themselves are the targets of transgressions. However, in research inspired by Piaget (1932), Cushman, Sheketoff, Wharton, and Carey (2013) demonstrated that between 4 and 8 years of age, American children increasingly make moral judgments on the basis of an actor's intent as opposed to the outcome that the actor brings about. That is, they believe that accidental harms—bad outcomes with benign intent—are less "naughty" and less punishable than attempted harms—benign outcomes with bad intent. These results lead to the prediction that children will be more forgiving toward accidental transgressors across development.

The studies above suggest that children incorporate relevant social information into their forgiveness behavior. However, we currently do not know whether children's firsthand forgiveness behavior is conditioned on whether transgressions are intentional or accidental, how information about intent interfaces with remorse, or the extent to which children forgive in the absence of this information, particularly in cases where children themselves are victims of transgressions. Here, we examined how information about transgressor intent and remorse influences children's forgiveness behaviors in a behavioral task that allows a continuous choice between punishment and forgiveness.

Method

Participants

Our participants were 257 American children aged 5 to 10 years (M = 7.85 years, SD = 1.72; 125 girls). We chose this age range in hopes of achieving high rates of comprehension in our task and to capture a period of life marked by increasing sophistication in children's understanding of moral responsibility, punishment, and distributive judgment (Shultz, Wright, & Schleifer, 1986; Smith & Warneken, 2016). An additional 14 children were tested but excluded based on prespecified criteria: parental intervention in the study (n = 1), failure to follow directions (n = 1), parent asked to stop (n = 1), neurodevelopmental disorders (n = 2), experimenter error (n = 7), language comprehension issues (n = 1), or previous participation in the task (n = 1). The target sample size was determined by an a priori power analysis that, assuming a medium effect size (d = 0.40) and 80% power, suggested a minimum sample size of 240 participants. In recruiting, we aimed for approximately 80 children in each of the three age groups—5- and 6-year-olds, 7- and 8-year-olds, and 9- and 10-year-olds—with the rule that no single age within each group should represent more than two thirds of the participants therein. Our sample size exceeded the minimum sample size slightly in order to finish a weekend of testing at a given site.

Participants were recruited in Boston, Massachusetts, through institutional databases of interested families, and in-person recruitment at local zoos, museums, and parks. Across testing locations, condition assignment and children's forgiveness behaviors were similar and did not significantly differ (see online supplementary material for more details). We also found no differences in age across conditions (see supplementary material). The forgiveness task described below was sometimes followed by additional tasks measuring other social preferences. However; in all cases the forgiveness task was first. Study methods were approved by the institutional review boards at Boston College and adhered to international standards for ethical human participants research. For all children, participation required written parental consent and children's verbal assent. Children older than 7 years also completed written assent forms. Although individual demographic information was not collected for this study, information collected from subsequent studies among these same locations, similar times of year, and age groups breaks down to roughly 57% White, 13% Asian, 13% other, 11% Black/African American, and 6% Hispanic, with 92% of parents holding a bachelor's degree or higher.

Procedure

Across all conditions, the experimenter sat next to participants and told them that they would have the chance to make some drawings. The experimenter then introduced a novel resource: a "magic

color scratch sheet." The sheet was a small square piece of paper with a layer of black carbon film on it that could be scratched off with a stylus, revealing rainbow colors underneath. The experimenter demonstrated the resource by drawing a star on one sheet. Participants were given a short period of time to practice drawing on the sheet. The experimenter then told participants that they would have a chance to make five more drawings and proceeded to bring out and open a small box that ostensibly held the additional sheets. However, upon opening the box, the experimenter "discovered" that the five sheets had already been drawn on. (Experimenters were instructed to feign surprise and disappointment.) The experimenter then said, "Oh no, it looks like someone before you already drew on them and you won't get to complete this activity. We don't have any more of these." Although we did not directly measure children's own emotional reactions, previous work by Smith and Harris (2012)—using a similar protocol where promised resources were not delivered due to another child's actions—suggest that children tend to be disappointed by this event.

Following this, the experimenter noticed and pulled out a note in the box that was allegedly from another experimenter. Here, to manipulate intent and remorse information, children were randomly assigned to one of five conditions in a 2×2 design with a baseline. First, in a Baseline condition, children were told, "A kid that was here before drew on these scratch sheets." Second, in an Intentional/ Remorse condition, children were told, "A kid that was here before you knew these were for you, but they drew on them anyway on purpose. They are really sorry that they used the scratch sheets." Third, in an Intentional/No Remorse condition, children were told the same information except that the "kid" is "not sorry that they used the scratch sheets." Fourth, in an Accidental/Remorse condition, children were told, "A kid that was here before you did not know these were for you, and they drew on them, accidentally. They are really sorry that they used the scratch sheets." Fifth, in an Accidental/No Remorse condition, children were told the same information except that the "kid" is "not sorry." Following the exclusions outlined above, our final sample had 55 children in the Baseline condition, 53 in the Accidental/Remorse condition, 50 in the Accidental/No Remorse condition, 50 in the Intentional/ No Remorse condition, and 49 in the Intentional/Remorse condition.

Following the manipulation, the experimenter told participants that they needed to decide what to do with the sheets. They could throw away as many of the sheets as they wanted into a trash can, or they could return as many of the sheets as they wanted to the child who drew them by placing them in an envelope. Note that children could not keep the sheets for themselves. We considered the number of sheets returned as a measure of forgiveness. The experimenter then asked participants two comprehension questions to assess whether they understood how to throw away or return the drawings. Success rates for both comprehension questions were high—90% and 96% of responses were spontaneously correct on the first try, respectively. If a participant's response was not spontaneously correct, the experimenter repeated the correct information and then asked the comprehension question again. This process was repeated once more. If the participant failed all three attempts, the researcher read the correct information to the child and moved on. We did not exclude on the basis of comprehension failures, in line with our a priori plan to not exclude such cases as children immediately receive the correct information before proceeding, but note that failure rates after three attempts on the two comprehension questions were quite low—2% and 1%, respectively.

Following the comprehension questions, the experimenter turned around to give participants privacy. Participants were instructed to ring a bell when they were finished making their decision. Afterward, the experimenter posed two recall questions, asking participants to remember whether the transgression was intentional and whether the transgressor expressed remorse. Recall questions were not asked in the Baseline condition. Recall rates were fairly high, with 78% of participants accurately recalling whether the transgression was intentional and 90% of participants accurately recalling whether the transgressor was remorseful. A generalized linear mixed model with participant-level random effects suggests that the recall rate for remorse was indeed higher than that for intent [odds ratio (OR) = 3.31, 95% confidence interval (CI) [1.69, 6.45], z = 3.5, p < .001]. The results reported below include all participants, regardless of recall rate. However, to ensure that recall rates did not play a significant role in children's behaviors, we ran additional analyses (reported in the supplementary material) and found that recall rates did not change the main findings reported below. The experimenter then asked participants to judge how bad the transgressor's actions were. See the supplementary material for our full protocol and visualizations of children's judgments. To ensure that

participants had a positive experience in the task, all children received prizes upon the study's conclusion.

For each participant, we recorded the number of sheets given back to the transgressor (numeric: 0–5), the experimental condition (factor: five levels), and the age of the participant (numeric: calculated from date of birth). For 9 participants with incomplete date of birth information, exact age was imputed as their reported age plus 6 months (e.g., if a parent reported a child's age as 8 years, the child's exact age was recorded as 8.5 years). Data were coded from worksheets by an independent coder and from videos of recorded sessions by a separate independent coder. A comparison of video and paper coding for recorded sessions (~88% of the sample) revealed high consistency, with a 93% match rate for the dependent variable of interest (number of sheets given back). In the small percentage of cases with coding conflict, a research assistant reviewed the live coding worksheet and video and reconciled the discrepancy, which was then reviewed again and approved by the senior experimenter.

We used R Version 4.0.0 for all analyses (R Core Team, 2020). A new variable for remorse was dummy coded (1 = remorse, 0 = no remorse) across the experimental conditions, as was a new variable for whether the transgression was accidental (1 = accidental, 0 = intentional). We ran a total of five Poisson regressions to investigate the role of intent (numeric: dummy coded 0–1), remorse (numeric: dummy coded 0–1), and condition (factor: five levels) in the number of sheets children chose to return to the transgressor (numeric: 0–5). We also included exact age (numeric) to investigate developmental trends and gender (factor: male or female) to allow comparison with previous work on gender differences in prosocial behavior (Benenson et al., 2019).

Results

We found no main effects of condition or an interaction between condition (factor: five levels) and age (numeric: continuous) on children's forgiveness behavior (see supplementary material). Interestingly, we found that children returned a sizable number of sheets to the transgressor in the Baseline condition (M = 3.76, SD = 1.39) even in the absence of intent and remorse information. Indeed, across all conditions, children gave back more sheets (M = 3.47, SD = 1.53) than predicted by chance, t (256) = 10.09, p < .0001. Looking just at the Baseline condition, we further did not find that children's forgiveness behavior changed with age (see supplementary material for model output).

Participants' judgments of the badness of the transgressor's actions tracked these forgiveness behaviors as well. On a scale of 1 being *very, very good* to 6 being *very, very bad,* participants judged transgressors in the Baseline condition (M = 3.72, SD = 1.19) similarly to how they did in the Accidental/Remorse condition (M = 3.88, SD = 1.04), suggesting that they did not assume the worst of transgressors in the absence of clear reasons to do so. Participants' judgments of the badness of the transgressor's actions were significantly higher in the remaining three conditions: Intentional/Remorse (M = 4.19, SD = 1.06), Accidental/No Remorse (M = 4.55, SD = 1.00), and Intentional/No Remorse (M = 4.72, SD = 1.11). This suggests that intentional harms and lack of remorse were relevant to children's attitudes as well as their behaviors (see supplementary material for analysis). We also found a significant effect of age, such that older children were less harsh in their evaluations of the transgressor (B = −.13, SE = .04, p = .0009). In addition, we found a relationship between judgments and number of sheets given back, such that the more negative the judgment, the fewer the number of sheets children returned to the transgressor (B = −.07, SE = .03, p = .02).

To investigate the primary research question of the effects of intent and remorse on forgiveness, we continued our analyses on the four experimental conditions, excluding the baseline. As mentioned above, we dummy coded our conditions to distinguish between accidental and intentional conditions and between remorseful and unremorseful conditions. We built a total of five models to investigate how intent and remorse influence children's forgiveness behaviors across age (Table 1): one model to consider the main effects of the variables of interest, two models to investigate how intent and remorse information interacts with age to influence forgiveness behaviors, one model to investigate the two-way interaction between intent and remorse, and another model to consider the three-way interaction among intent, remorse, and age. We did not find evidence for a two-way interaction

Table 1

Effects (and standard errors) from Poisson regressions predicting number of sheets returned to the transgressor.

	Model 1	Model 2	Model 3	Model 4	Model 5
(Intercept)	0.97***	1.02***	1.40***	0.99***	1.49***
	(0.20)	(0.27)	(0.26)	(0.20)	(0.37)
Exact age	.03	.03	−.02	.03	−.03
	(.02)	(.03)	(.03)	(.02)	(.05)
Accidental	.00		−.81*	−.04	−.96
	(.08)		(.37)	(.11)	(.54)
Remorseful	.05	−.04		.01	−.17
	(.08)	(.37)		(.11)	(.51)
Male	−.07	−.07	−.08	−.07	−.08
	(.08)	(.08)	(.08)	(.08)	(.08)
Exact Age × Remorseful		.01			.02
		(.05)			(.06)
Exact Age × Accidental			.10*		.12
			(.05)		(.07)
Remorseful × Accidental				.07	.29
				(.15)	(.74)
Exact Age × Remorseful × Accidental					−.03
					(.09)
AIC	786.29	786.22	781.73	788.06	788.89
BIC	802.83	802.77	798.27	807.91	818.67
Log likelihood	−388.14	−388.11	−385.86	−388.03	−385.45
Deviance	194.78	194.72	19.22	194.55	189.38
Number of observations	202	202	202	202	202

Note. Model 1 reports the main effects, Model 2 includes the exact age by remorse interaction, Model 3 includes an exact age by intent interaction, Model 4 includes the remorse by intent interaction, and Model 5 includes the three-way interaction among intent, remorse, and exact age. The table also shows goodness of fit. AIC, Akaike information criterion; BIC, Bayesian information criterion.

* $p < .05$.
*** $p < .001$.

between intent and remorse (likelihood-ratio test [LRT], χ^2, $p = .63$) or a three-way interaction among age, intent, and remorse (LRT, χ^2, $p = .77$). We found no interaction between age and remorse but did find evidence of an interaction between age and intent (Table 1), suggesting that older children are more forgiving of accidental transgressions than intentional transgressions (Fig. 1). We found no evidence of gender differences.

To further break down the interaction between age and intent, we conducted a simple slopes analysis to compare how age predicts the number of sheets given back between the intentional and accidental conditions. Using the *interactions* package (Long, 2019), we found that there was no significant effect of age on forgiveness behavior in cases of intentional harms ($\beta = -.02$, $SE = .03$, $p = .56$), but there was a significant effect of age on forgiveness behavior in cases of accidental harms ($\beta = .08$, $SE = .03$, $p = .01$). In other words, the interaction between age and intent was driven by children being more forgiving of accidental harms as they get older.

Discussion

Here, we examined how information about a transgressor's intent and remorse influences children's forgiveness in a task that pitted forgiveness against punishment. In a large sample of American children, we found that in the absence of intent and remorse information, children are very forgiving, suggesting that they are filling in the blanks of the transgression rather charitably. Whereas other work has found age-related increases in forgiveness across adolescence and adulthood (Cheng & Yim, 2008; Girard & Mullet, 1997), we did not find overall age-related increases in forgiveness across childhood but did find that children's judgments of the transgressor softened with age, such that older children were less willing to say that the transgressor's actions were *very, very bad.* We further found targeted changes with age based on specific information about the transgressor, such that the
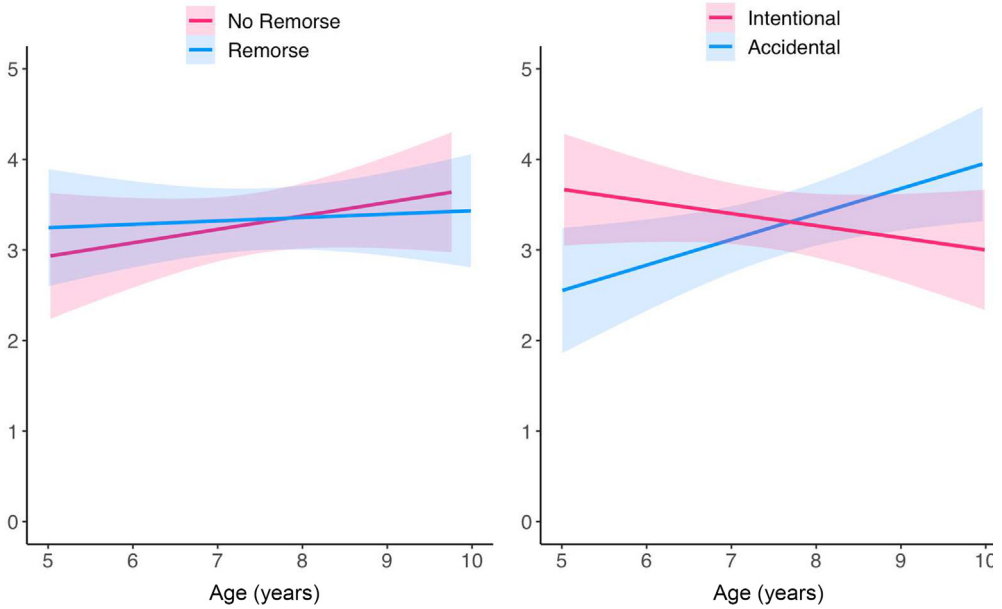
Fig. 1. Numbers of sheets given back by age and remorse information (left) and intent information (right). The shaded ribbons represent 95% confidence intervals.

transgressor's intent seemed to matter relatively more across age, with children becoming increasingly forgiving of accidental harms. These results align with previous evidence suggesting that older children view accidental harms as less punishable (Cushman et al., 2013).

Children's judgments of the transgressor's actions provide another interesting window into the emergence of forgiveness. We found that intentional harms and lack of remorse were judged more harshly and that those who judged the transgressor more harshly were also less willing to return sheets to the transgressor. These results support the notion that children are reasoning about both remorse and intent in their evaluations and align with previous work suggesting that children's evaluations of others are often internally consistent with their behaviors (Paulus, Nöth, & Wörle, 2018).

Our findings raise important questions that are ripe for exploration in future work. First, given that previous work has suggested that theory of mind plays a role in shaping moral judgments of accidental versus intentional harms (Killen et al., 2011), it is possible that the age trends we observed are explained in part by proficiency in mentalizing ability. Thus, future work should consider more explicitly how theory-of-mind ability influences forgiveness decisions in similar contexts. Second, although we did not find a strong effect of remorse on children's forgiveness, this does not suggest that remorse plays no role but rather suggests that it may be weighted less when intent information is also available.

There are methodological differences between this study and others that could account for the limited role of remorse. For instance, in Oostenbroek & Vaish (2019b), children made a choice regarding which person to give a flower to—one who was remorseful or one who was not. This explicit contrast may have made the presence of an apology more salient. However, our results also differ from studies without these explicit contrasts; for instance, Drell and Jaswal (2016) found that children shared more with a transgressor who verbally apologized. Thus, it may be that remorse in our study was also less salient than in other studies where participants could actually see or hear a transgressor apologizing. Although we found that children judged remorseful transgressors less harshly, this might not have been a strong enough manipulation to lead to behavioral differences. Differences in our findings compared with past work may also be due to variation in our measure given that our task involved a

continuous decision between throwing away resources and returning them, whereas other tasks frequently involve behaviors such as sharing and allocating resources across two characters. Our task also differed in that it asked children to distribute resources that were supposed to be for them but were used by another individual. Furthermore, our task involved first-person decisions, which may differ from past work examining third-person judgments. Taken together, however, our results do converge with previous findings in the literature suggesting that children's forgiveness behaviors become increasingly sensitive to relevant social cues, such as intent, across age. Whereas apologies are generally thought to facilitate forgiveness, some work with adults has found that apologies actually decrease forgiveness following intentional harms (Struthers, Eaton, Santelli, Uchiyama, & Shirvani, 2008). This is not a pattern we observed in our age range. Thus, further studies should explore this possibility in older children.

Overall, our findings suggest early-emerging limits to children's forgiveness of remorseful but intentional transgressors; such limits may have implications for forgiveness in adulthood. Given recent advances in our understanding of the psychological constructs (Forster et al., 2020) and neural mechanisms (Fourie, Hortensius, & Decety, 2020) underpinning forgiveness, behavioral tasks like ours, in which recipients are the targets of transgressions and make a continuous choice between forgiveness and punishment regarding a single individual, may better represent how these social decisions are typically made in real settings. Given the importance of forgiveness in sustaining cooperative relationships, exploring the ways in which this ability develops across age, and the features that influence these behaviors, can help us to better understand the early roots of human cooperation.

Declaration of Competing Interest

Acknowledgment

Data availability

Open data and analysis scripts are available on the Open Science Framework (https://osf.io/m6fhw/).

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