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EMPIRICAL REPORT

CHILD DEVELOPMENT

The developmental origins of a default moral response: A shift from honesty to dishonesty

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Abstract

People are sometimes tempted to lie for their own benefit if it would not harm others. For adults, dishonesty is the default response in these circumstances. The developmental origins of this phenomenon were investigated between 2019 and 2021 among 6- to 11-year-old Han Chinese children from China (N = 548, 49% female). Children had an opportunity to win prizes in a behavioral economics game (Experiment 1) or a temptation resistance game adapted from developmental psychology (Experiment 2). In each experiment, the youngest children showed a default tendency of honesty and there was an overall age-related shift toward a default tendency of dishonesty. These findings provide direct evidence of developmental change in the automatic and controlled processes that underlie moral behavior.

The interplay between automatic and deliberative processing has been linked to a range of psychological phenomena, including recognition memory (Jones & Jacoby, 2001), moral reasoning (Greene et al., 2008), and the ability to manage emotions (Gyurak et al., 2011). A standard research strategy involves disrupting deliberative processing to reveal the intuitive default response, and we took this approach to investigate the developmental origins of a default tendency to lie that has been documented in adults (Bereby-Meyer & Shalvi, 2015; Köbis et al., 2019). As a starting point for addressing this question, we examined lies told to further one's self-interest, a type of moral decision-making that has far-reaching implications for interpersonal relationships, and for society at large (Bok, 1978).

Dishonesty is the default response for adults in contexts in which it is aligned with self-interest and is not expected to cause harm to other people (Köbis et al., 2019). Evidence for this comes from studies showing that disrupting deliberative reasoning processes by introducing a challenging task leads to greater dishonesty (Mead et al., 2009; Pitesa et al., 2013; Shalvi et al., 2012; Wang et al., 2017). In one such study, Mead et al. (2009) paid undergraduate participants based on their correct answers to

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a problem-solving task in which they were able to over-report their successes without fear of detection. When a Stroop task was used to induce fatigue, the lying rate increased. Mead et al. used this evidence to infer that dishonesty was the default under these circumstances, based on the assumption that imposing a cognitively demanding secondary task will have a greater impact on responses that are highly demanding of resources than responses that are less demanding of resources.

There is reason to believe that young children might have the opposite default response under these circumstances (Lee, 2013). Prior theoretical work suggests that executive function should be closely related to the development of lying because lying can be conceptualized as executive function in action (Sai et al., 2021). Young children struggle with some of the cognitive demands associated with the ability to tell a lie, such as the need to keep track of what is true and what is false (Lee, 2013), and young children's level of executive functioning predicts their tendency to lie to promote their own interest (Ding et al., 2018; Fu et al., 2018; Hala & Russell, 2001). However, to date, there has been no direct evidence regarding children's default tendencies toward either honesty or dishonesty.

The present research

In the present research, we directly assessed children's default tendency to lie under circumstances in which they had something to gain from being dishonest and were unlikely to harm others by behaving dishonestly. We did so by comparing the honesty of children in a baseline *control* condition to that of children in a *fatigue* condition that contained a secondary task designed to induce fatigue. This manipulation allowed us to determine children's default response, as defined by how they respond when they are operating under a high cognitive load (Bereby-Meyer & Shalvi, 2015). It took the form of a relatively easy shape identification task performed by children in both conditions, with children in the fatigue condition also performing a concurrent and cognitively demanding stop signal task (e.g., Dekkers et al., 2017; Huizenga et al., 2012). We tested children between the ages of 6 and 11 because during this time children develop cognitive abilities that support their capacity to lie effectively (Evans & Lee, 2011).

Based on the evidence from children and adults, we hypothesized that (1) young children would show a default tendency to be honest, as evidenced by a greater shift toward honesty when fatigued versus not fatigued, and (2) there would be an age-related shift toward a default tendency of dishonesty, as evidenced by an interaction in which the fatigue manipulation promotes increased honesty among younger children and increased dishonesty among older children.

Each of the two experiments consisted of a single session with three phases (see Figure 1). In the first phase, the pre-test, children played a game to assess their rate of lying. In the second phase, they completed the shape-identification task, which contained the stop signal task for children in the fatigue condition only. Finally, the third phase consisted of a post-test in which children again played the game they had played in the pre-test. The change in the lying rate between the first and third phases served as the primary dependent measure, and it was used to assess children's default tendency, based on the assumption that they will respond in the default way when fatigued. We hypothesized that there would be an age-related shift in the default tendency, with honesty being the default response for younger children but not for older children. In addition to our primary hypothesis, we were also interested in whether the overall rate of lying would differ by age. Prior research provides some evidence that lying for self-interest tends to decrease with age (Carl & Bussey, 2019; Evans & Lee, 2011; Glätzle-Rützler & Lergetporer, 2015; Maggian & Villeval, 2016), but this pattern is not always observed (Bucciol & Piovesan, 2011).

To ensure that the implications of our findings would not be limited to the particular game that we chose, we used different games to assess lying across the two experiments.

EXPERIMENT 1

In Experiment 1, the number game that children played in the first and third phases was based on a task developed by behavioral economists for use with adults (Kajackaite & Gneezy, 2017). In this task, an experimenter asks participants to silently think of a secret number between 1 and 6. Participants then roll a six-sided die in the presence of the experimenter and report whether their secret number matches what the die is showing. Participants earn a point for each match they report, which gives them an incentive to lie. The game we used was similar, except that there were six trials and participants received tokens at the end of the experiment that they could exchange for prizes. For both the pre-test and the post-test, the dependent variable was the number of matches the child reported. According to the results of pilot testing (see the Appendix in Supporting Information), the task is appropriate for use with children in this age range.

Method

Participants

A total of 258 school-aged children were recruited to participate, including 86 children in Grade 1 (43 boys, M_{age} = 7.71 years, SD = 0.47, range = 6.57–8.34), 86 children in Grade 3 (44 boys, M_{age} = 8.95 years, SD = 0.38,

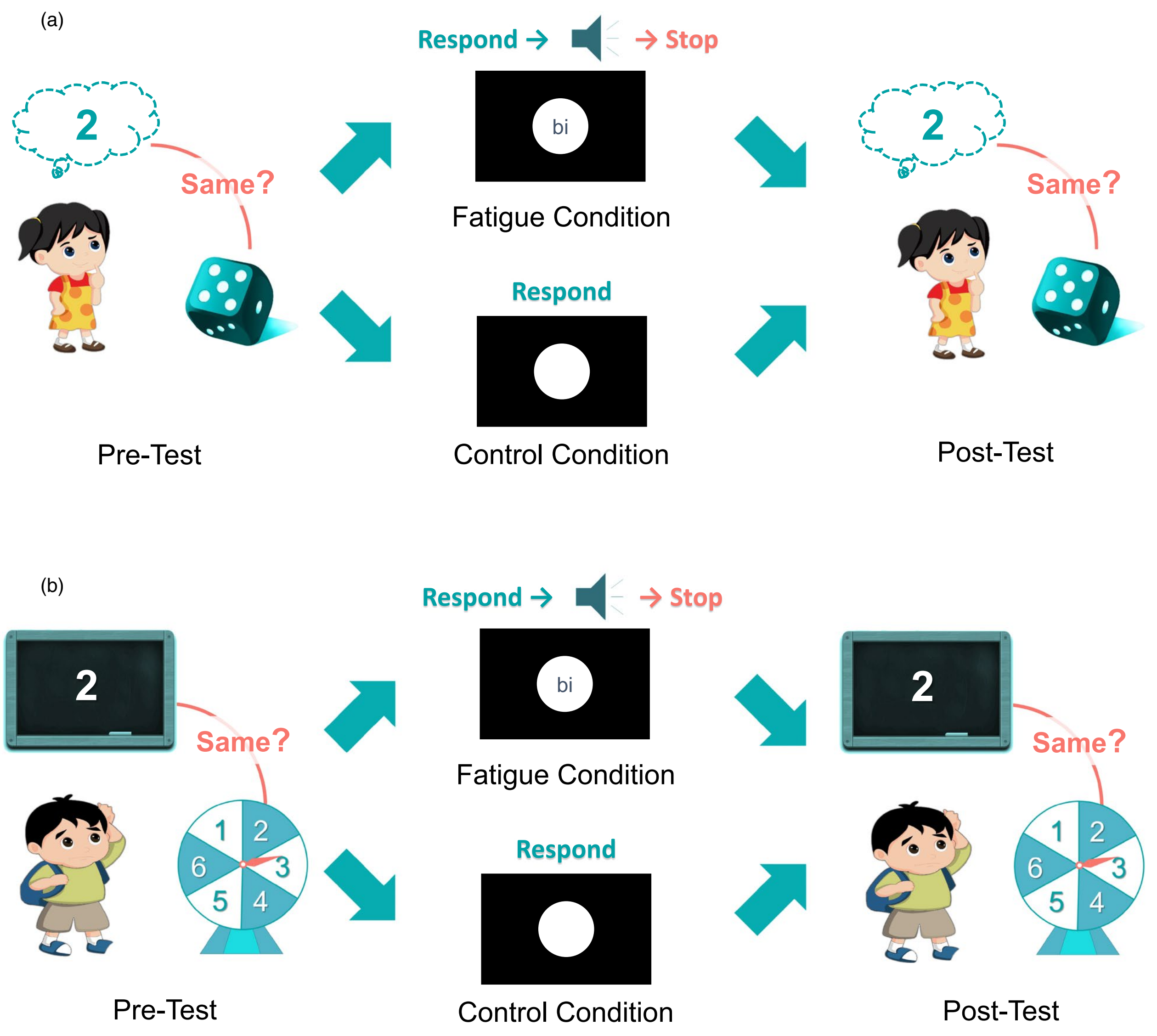

FIGURE 1 Overview of the procedure. Both (a) Experiment 1 and (b) Experiment 2 began with a number game (which differed between experiments) as a pre-test, followed by the shape identification task, and the number game again as a post-test. Targets in the shape identification task consisted of circles and squares, and for children in the fatigue condition only, an auditory stop signal was presented on 25% of the trials

range = 8.23–9.85) and 86 children in Grade 5 (43 boys, M_{age} = 11.20 years, SD = 0.32, range = 10.38–11.96). The sample size was based on a priori Power analysis using G*Power 3.1 (Faul et al., 2009) with Power ($1 - \beta$) set at .95 and α = .05 (27), which showed that to detect a three-way interaction (3 grades × 2 conditions × 2 testing phases) in an ANOVA with a medium effect size (f = .25), 251 participants would be required (about 42 children in each combination of grade by condition). The participants in both experiments attended preschools in an eastern city in China. Informed consent was obtained from parents or legal guardians, and verbal consent was obtained from participants. Data collection took place between November 2019 and May 2020.

Procedure

Participants were tested individually in a quiet room at their school. Each session began with the number guessing game as a pre-test, with the same game also used for the post-test. Children were told that they could win tokens for correctly guessing the number on a die, and that any tokens they won could be exchanged for prizes at the end of the session. On each of the six trials, children began by thinking of a secret number between 1 and 6. They then rolled a standard six-sided die and reported whether their secret number was the same as what the die was showing. Each time they reported "same" they won a token, and the number of reported matches served as the dependent variable.

In the shape identification task, children identified a series of shapes that were presented centrally on a computer screen. Before the task began, they were instructed to press the "Z" key on the computer's keyboard every time a square appeared, and the "M" key every time a circle appeared.

The shape identification task consisted of three blocks: a practice block with 32 trials, and two test blocks with 64 trials each. In both conditions, the entire task took approximately 5 min to complete. Each trial began with a central fixation cross that was presented for 250 ms, followed by a central square or circle that was presented for 1250 ms. During this 1250 ms interval, participants identified the shape by pressing the "Z" or the "M" key.

For children in the fatigue condition, the shape identification task also included a stop signal component (Logan et al., 1984; Verbruggen & Logan, 2008). In this condition, 25% of the trials were stop trials, which were randomly interleaved. On each stop trial, after the shape appeared, children heard an auditory stop signal, which indicated that they should refrain from responding on that trial. The interval between the presentation of the shape and the onset of the stop signal was initially set to 250 ms, and it was systematically adjusted based on the child's performance, within a possible range of 50–500 ms (Verbruggen & Logan, 2008). Specifically, whenever a child successfully refrained from pressing a key on a stop trial, the interval was decreased by 50 ms, and whenever a child failed to heed the stop signal the interval was increased by 50 ms, unless making this adjustment would exceed the bounds of the range. For children in the control condition, the shape identification task was identical except that there was no stop signal component.

In an effort to keep the results from the two conditions comparable, the experimenter told the children in the fatigue condition at the beginning of the session that they should respond to the shape as soon as it appears, without waiting for the stop signal.

Following the shape identification task in this experiment and in Experiment 2, we asked participants a set of three questions to assess the effects of the between-subjects manipulation on self-reported fatigue. See the Appendix in Supporting Information for details.

Results

All analyses conducted for Studies 1 and 2 were confirmatory. The only exploratory analyses are presented in Supporting Information, and they are labeled accordingly.

Fatigue manipulation and dishonesty

Our primary-dependent measure took the form of a difference score that was computed for each participant by subtracting the number of reported matches in the pre-test from the number of reported matches in the post-test, yielding the change in reported matches. We found the predicted interaction effect, with difference scores varying as a function of both grade and condition ($F_{2,252} = 8.91$, $p < .001$, partial $\eta^2 = .066$; see Figure 2a; note that all tests reported in this paper are two-tailed). Specifically, for children in Grades 1 and 3, difference scores were lower in the fatigue condition than in the control condition, but the reverse pattern was seen for children in Grade 5. These findings were confirmed by follow-up analyses using Bonferroni correction, which showed that each of the effects was significant (Grade 1: $M_{\text{fatigue-control}} = -0.58$, $SE = .24$, $p = .015$, $d = .48$; Grade 3: $M_{\text{fatigue-control}} = -0.54$, $SE = .24$, $p = .026$, $d = .47$; Grade 5: $M_{\text{fatigue-control}} = 0.67$, $SE = .24$, $p = .005$, $d = .72$). This indicates that, as predicted, the fatigue manipulation led to a decrease in lying for the younger children, but not for the older children.

Overall level of dishonesty

In addition to the analyses described above, which we used to assess our primary hypotheses, we also examined whether there were any changes in children's overall level of dishonesty on the task. To do this, we analyzed data from the pre-test, which children completed before the between-subjects manipulation was introduced. We found that older children reported fewer matches overall (see Figure 2b), which suggests that they lied less than the younger children, $F_{2,255} = 88.88$, $p < .001$, partial $\eta^2 = .411$. Specifically, children in Grade 1 ($M = 3.38$, $SD = 1.29$) and Grade 3 ($M = 3.16$, $SD = 0.98$) reported matches significantly more often than children in Grade 5 ($M = 1.35$, $SD = 0.99$, $ps < .001$, d comparing Grade 1 and Grade 5 = 1.77; d comparing Grade 3 and Grade 5 = 1.84). However, the older children still reported significantly more matches than the rate of 1/6 that would be expected by chance ($t_{85} = 3.26$, $p = .002$).

EXPERIMENT 2

Study 2 was a preregistered (https://aspredicted.org/u7bt2.pdf) conceptual replication of Experiment 1. The goal was to determine whether the developmental shift in children's default tendency that was seen in Study 1 is robust enough to be observable using a different paradigm to measure dishonesty. We also sought to address some limitations of the number task used in Study 1. Specifically, the design of Study 1 did not allow us to rule out the possibility that children might have forgotten or misremembered their secret number, and this might have happened more frequently among the younger children than among the older children. To help address these issues, we developed a new number game that involved

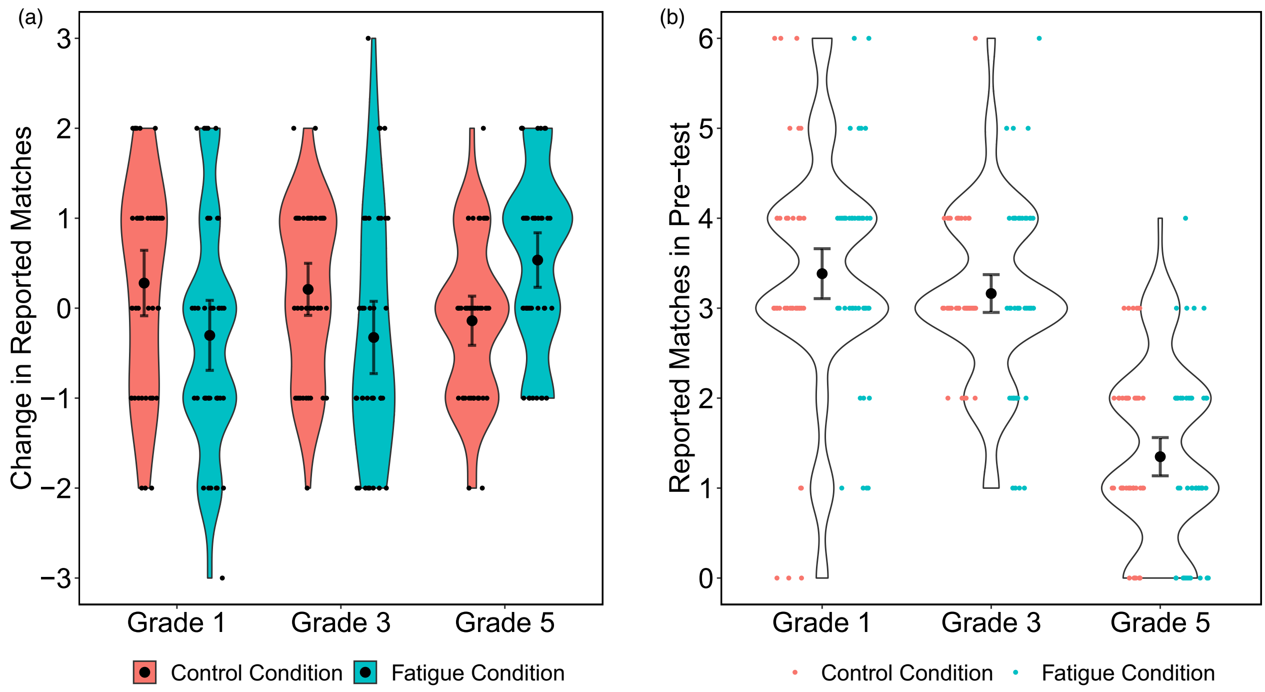

FIGURE 2 Results from Experiment 1. (a) Change in reported matches between pre-test and post-test by grade and condition, with positive values indicating an increase in reported matches from pre-test to post-test and negative values indicating a decrease. (b) Reported matches from pre-test, by grade; dashed line indicates number of matches expected by chance. *Note*: For each grade and condition, the dot indicates the mean, and the ends of the whiskers indicate the 95% CI

spinning a spinner rather than guessing the number on a die. This spinner game is based on the temptation resistance paradigm, which has been widely used in developmental psychology research (Talwar & Lee, 2008). In both the pre-test and the post-test, children spun a spinner on each of eight trials and won a point if the number indicated by the spinner matched the corresponding value on a list of winning numbers. The experimenter made an excuse to leave the room before children began playing the game, which gave them an opportunity to falsely report matches. Children had no reason to believe that false reports could be detected, but we were able to identify the numbers that the spinner pointed to because we had placed a hidden camera in the room (as is often done in developmental psychology studies, see Talwar & Lee, 2008). In contrast to the number guessing game in Experiment 1, the spinner game allowed us to determine whether children had falsely reported matches on individual trials. This allowed us to use the actual lying rate as our dependent measure.

Method

Participants

A total of 304 school-aged children were recruited. Fourteen subjects were excluded, either because, as specified in the preregistration, they got four or more matches by chance (n = 11), or because they were in the fatigue condition and did not successfully complete the practice trials for the stop signal task (n = 3). The reported analyses are based on 290 participants, including 95 children in Grade 1 (46 boys, M_{age} = 7.19 years, SD = 0.30, range = 6.61–8.01), 98 children in Grade 3 (43 boys, M_{age} = 9.17 years, SD = 0.28, range = 8.71–9.70) and 97 children in Grade 5 (49 boys, M_{age} = 11.19 years, SD = 0.30, range = 10.66–12.02). Based on the same power analysis that was reported for Experiment 1, a total of 251 participants are required to detect the relevant three-way interaction. Data collection took place in April and May of 2021.

Procedure

The procedure was the same as in Experiment 1 except that the spinner game was used to assess lying in the pre-test and post-test phases instead of the number guessing game. The spinner game involved placing a spinner labeled 1 through 6 in front of the child. Children were told they would win a token each time the spinner landed on a number that matched the number for that trial that appeared on a list of winning numbers. Children first played three practice trials in the presence of the experimenter, and then played eight test trials after the experimenter had left the room. Children were instructed to spin the spinner once on each trial, and report the outcome by writing a check mark on the list of winning numbers if the numbers matched, and an "X" if they did not. Following the practice trials, the experimenter explained that she needed to do some work in another room and left for the duration of the phase. A hidden camera recorded children's behavior while the experimenter was away.

Video from the hidden camera was coded to determine the number of trials on which each child had lied. As specified in the preregistration, lying was defined as the child falsely reporting a match. We calculated the number of false reports by subtracting correctly reported matches from total reported matches, and this value served as the dependent variable.

Results

Fatigue manipulation and dishonesty

We found the predicted interaction, with difference scores varying as a function of both grade and condition ($F_{2,284}$ = 5.15, p = .006, partial η^2 = .035; see Figure 3a). Specifically, children in Grade 1 lied less in the fatigue condition than in the control condition, but children in Grades 3 and 5 showed the reverse pattern. Follow-up analyses using Bonferroni correction showed that the difference between conditions reached significance for Grade 1 only (Grade 1: $M_{\text{fatigue-control}}$ = −0.07, SE = .03, p = .015, d = .46; Grade 3: $M_{\text{fatigue-control}}$ = 0.03, SE = .03, p = .281, d = .22; Grade 5: $M_{\text{fatigue-control}}$ = 0.05, SE = .03, p = .072, d = .40). These results indicate that Experiment 2 replicated the general pattern of age-related change that was seen in Experiment 1, in which the fatigue manipulation led to a decrease in lying among younger children, but not among older children.

Overall level of dishonesty

We again used pre-test scores to examine whether there was any age-related change in the overall level of lying (see Figure 3b). We found that older children lied less than younger children overall, $F_{2,287}$ = 3.27, p = .039, partial η^2 = .022. This difference was only statistically significant between Grade 3 (M = 0.29, SD = 0.26) and Grade 1 (M = 0.39, SD = 0.27), p = .037, d = .38.

GENERAL DISCUSSION

A common way to examine default tendencies in adults is to disrupt deliberative processing in order to reveal default responses (Bereby-Meyer & Shalvi, 2015). Previous studies with adults using this approach have found evidence of a default tendency to be dishonest in contexts in which lying is aligned with self-interest (Köbis et al., 2019). We investigated the developmental origins of this phenomenon among 6- to 11-year-old children. Across two experiments, we examined children's tendency to lie

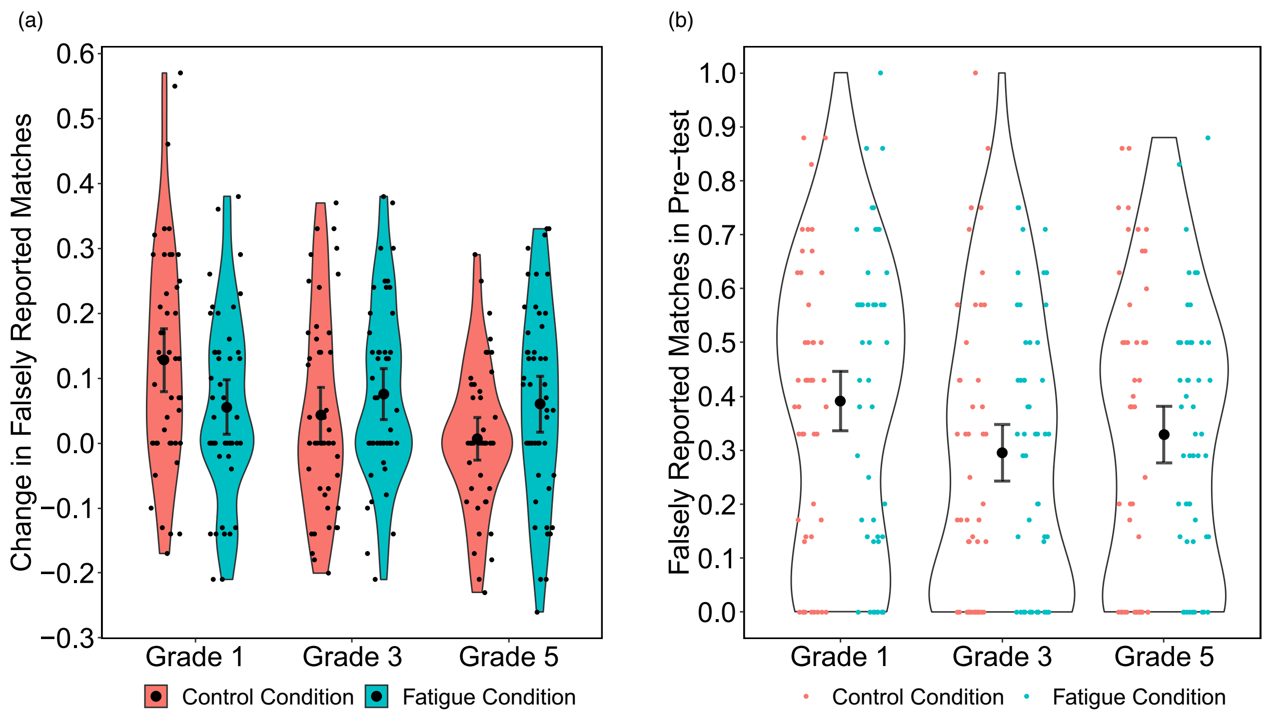

FIGURE 3 Results from Experiment 2. (a) Change in falsely reported matches between pre-test and post-test by grade and condition, with positive values indicating an increase in falsely reported matches from pre-test to post-test, and negative values indicating a decrease. (b) Falsely reported matches from pre-test, by grade, as a proportion of actual mismatches. *Note*: For each grade and condition, the dot indicates the mean, and the ends of the whiskers indicate the 95% CI

in two different ways: in Experiment 1 we used a method adapted from behavioral economics, and in Experiment 2 we used a method adapted from developmental psychology. Notably, both methods gave children an incentive to lie in a context that did not involve any obvious costs to others. We found that young children showed a default tendency to be honest, with an age-related shift toward dishonesty.

In the present research, we provide the first direct evidence of a shift in children's default tendency to be honest under conditions of careful experimental control, and we have shown that this shift occurs in two different tasks derived from two different literatures. It is possible that the effects of our fatigue manipulation were weaker for older children, given that older children performed better on the fatigue task than younger children (see Appendix in Supporting Information). However, there is no reason to believe that an age-related difference in the effectiveness of the fatigue manipulation would reverse its effect on children's default tendency to lie.

The present work only documents the presence of this shift in a context in which lying would benefit the self but does not appear to harm others. How this generalizes to other contexts remains an open question. Prior research with adults suggests that the type of lie in question may make a substantial difference. For example, there is evidence that adults show a shift in their default tendency toward honesty when behaving dishonestly would have a negative effect on others (Köbis et al., 2019; Pitesa et al., 2013).

Relatedly, our findings regarding older children's tendency to default to dishonesty in these types of contexts build on studies that have used similar methods with adults (e.g., Mead et al., 2009). These findings are in apparent conflict with Levine's (2014) truth-default theory, which posits that honesty needs to be the default in the real world in order for communication to be effective. As suggested by Verschuere and Shalvi (2014), the motivation to lie may explain this apparent discrepancy, and honesty may actually be the default for older children and adults in everyday contexts in which there is no clear reason to lie.

Future research will also be needed to determine which age-related factors affect children's decisions about lying to promote their self-interest. One surprising finding that will require further exploration concerns the age-related shift toward honesty that we found in Phase 1, prior to the fatigue manipulation. Although one might expect that the cognitive challenges of lying would lead younger children to lie less than older children, we found no evidence for this. Indeed, in each experiment we found some evidence for the reverse pattern. However, this finding should be interpreted with caution because these analyses lack the pre-test versus post-test design that allows us to control for motivational and cognitive factors that could change with age. For example, these rates could be affected by the extent to which children have reputational concerns (Choshen-Hillel et al., 2020), as well as factors such as children's level of interest in the prize, and the perceived likelihood of being caught lying. Our experimental design allowed us to control for these factors as we sought to measure the effect of our fatigue manipulation on children's honesty.

It will also be important to investigate the possible role of culture. For example, the age-related differences we found may relate to the development of children's executive function skills (Talwar & Crossman, 2011), and there is evidence that these skills develop more quickly in China, where the research was conducted, than in North America (Sabbagh et al., 2006).

In sum, the default tendency to lie for one's own benefit when it does not harm others that previous researchers have found among adults was not observed in young children. Instead, we found that young children have the opposite default tendency, and that it gradually shifts with age. Thus, our findings are consistent with the possibility that younger children require executive function skills to prevent themselves from telling the truth, and that older children require executive function skills to prevent themselves from lying. These findings provide the first direct evidence that the automatic and controlled processes that underlie moral behavior can undergo age-related change.

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