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Cheating behavior in children: Integrating gaze allocation and social awareness

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ABSTRACT

Children's cheating and factors supporting honesty are not well understood. The current work explored variables involved in children's cheating through eye-tracking and an implicit manipulation in which extrinsic awareness of the effects of one's behaviors on others was primed. Participants played a computer game with the option for a monetary gain in which they could earn more if they selectively erred in response to more profitable stimuli. Results show that children cheat by making selective effort toward more profitable errors; however, extrinsic awareness inhibits these cheating behaviors. Importantly, gaze toward children's earnings mediates this relationship, suggesting that extrinsic awareness mitigates an impulsive looking pattern, which in turn results in less cheating. Findings suggest that an implicit manipulation, highlighting the potential implications of one's actions for others, seems to effectively suppress cheating among children. Furthermore, attention toward earnings offers a cognitive process that acts to mediate the effect of this manipulation on cheating. Taken together, this framework suggests psychoneurocognitive and social processes that influence cheating in children, offering a direction for future implicit intervention techniques to support honest performance.

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Introduction

Cheating, defined as the violation of a rule or standard in order to increase personal benefits (Jones, 1991; Shu, Gino, & Bazerman, 2011), can encompass anywhere from subtle dishonest behaviors (Brown & Moore, 2000) to large overt acts. Cheating behaviors in children have been studied for nearly a century (Hartshorne & May, 1928; Hoffman, 1994; Kochanska, Murray, & Coy, 1997), and estimated cheating rates in childhood range from 42% to 82% (Callender, Olson, Kerr, & Sameroff, 2010; Ding et al., 2014; Evans, Xu, & Lee, 2011; Piazza, Bering, & Ingram, 2011; Talwar & Lee, 2008; Talwar, Gordon, & Lee, 2007). Despite it being perceived as unethical (Blau & Eshet-Alkalai, 2017), academic cheating has been on the rise during the past decades, with some estimates claiming that up to 90% of students cheat (Jensen, Arnett, Feldman, & Cauffman, 2002). As such, research in children has focused on overt cheating, but the literature is lacking regarding situations that probe subtle rule breaking such as selectively investing effort in a biased way.

One possible moderator of cheating is the motivation to increase personal reward (Kotaman, 2017). This has been seen in regard to increased cheating to increase material gain (Kotaman, 2017) as well as to maintain social reward cues in the form of praise (Li, Gail, Lulu, & Kang, 2017). In contrast, the desire for personal gain is suppressed by the drive to maintain a positive reputation (Fu, Heyman, Qian, Guo, & Lee, 2016; Ma et al., 2018), which may act as an internal reward that balances cheating and noncheating behaviors. This desire for a positive reputation is driven by the external implications that surround cheating. Children understand this notion from an early age. Toddlers already understand the social implications of moral transgressions—that the victims feel bad (Arsenio & Kramer, 1992; Smith, Chen, & Harris, 2010)—and middle school students showed that social motivation factors were the best predictor of cheating (Murdock, Hale, & Weber, 2001). One study found that 7- to 11-year-old children demonstrate the ability to regulate their rule-breaking behavior as a function of social context, particularly in order to avoid harming others (Xu, Bao, Fu, Talwar, & Lee, 2010). Furthermore, sympathy for others was shown to support the suppression of immoral behaviors in children (Malti, Gummerum, Keller, & Buchmann, 2009). In addition, the degree of harm inflicted on others is related to the likelihood of performing unethical behaviors in adults (Dootson, Neale, & Fullerton, 2014), and priming the positive effects of honesty led to less lying in children (Talwar, Yachison, & Leduc, 2016). Therefore, highlighting the consequences of one's behavior for others and their surroundings may suppress dishonesty. This suggests that cheating may be moderated by social contexts and that awareness to extrinsic implications may be important in encouraging honest behavior during childhood.

Another factor related to increased cheating is the permissiveness of the environment (Shu et al., 2011). That is, people cheat more when they think that they will not get caught. This suggests that real-time measures of cheating that are indistinguishable from naturally occurring impulsive errors during conditions with and without the awareness of extrinsic implications, may contribute to the understanding of cheating in children. To explore these notions, it may also be important to understand attention allocation processes that occur in cheating-prone trials.

Attention allocation and decision making

An advantage to studying cheating behavior empirically in real time is the ability to measure processes that lead up to the decision to cheat. Gaze-tracking technology offers an objective and nonconscious method (Fiedler, Glöckner, Nicklisch, & Dickert, 2013) of process tracing in decision research, with fixation duration and fixation count measures permitting a detailed investigation of process models in several decision-making fields (Fiedler & Glöckner, 2012). Eye-tracking has been employed in decision conflict tasks (Vachon, Vallières, Jones, & Tremblay, 2012; Wu, Shimojo, Wang, & Camerer, 2012) and to investigate ethical dilemmas (Pittarello, Leib, Gordon-Hecker, & Shalvi, 2015). Pittarello, Motro, Rubaltelli, and Pluchino (2016) demonstrated that adults allocate less visual attention to the task during cheating behavior (or rather gaze avert), possibly to maintain a sense of consistency between their behavior and their moral standards (Barkan, Ayal, Gino, & Ariely, 2012). Furthermore, gaze durations at the earnings fund was suggested to indicate exertion of gain considerations before cheating events in adults (Pittarello et al., 2016). However, to date no research has explored gaze patterns during children's cheating.

Therefore, the current research aimed to explore the interrelations between gaze regulation and extrinsic awareness in children's cheating behavior by measuring nonconscious responses that shed light on the processes leading up to a cheating event.

Children interact a lot with digital tasks in social leisure, academic, and research environments. The current study, therefore, employed a computerized task with the option for an increase in gain-motivated cheating errors. Study postulations were that participants would cheat to increase gain, with cheating behaviors occurring more than impulsive errors in trials with increased gain prospects. Moreover, we expected that extrinsic awareness to the implications of one's actions would reduce cheating behavior. Finally, we hypothesized that gaze directions in real-time cheating-prone events would give insight into the relationship between extrinsic awareness and gain prospects.

Method

Participants

A total of 87 8- to 12-year-olds (*M* = 10.4 years, *SD* = 1.4, 42% girls) were recruited via ads placed in community centers and on internet forums. Our aim was to recruit 72 participants based on effect sizes presented in a similar study (Greenberg, 2002), calculated using G*Power statistical power analysis (Faul, Erdfelder, Lang, & Buchner, 2007). We recruited the sample of 87 participants, 21% larger than our initial aim. All participants were enrolled in mainstream education in Israel and scored within average range on the Matrices subscale of the Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV) intelligence test (mean IQ = 97, *SD* = 27). All participants were predominantly Caucasian, characterized by average socioeconomic status (SES), and lived in central urban residences. Participants reported normal health and development and no instances of medical or psychological disorders. Both parents and their children signed informed consent prior to participation. Of the original sample, 3 participants were excluded from analysis due to failure to pass the initial no-gain task blocks (reaching error rates >75%), indicating that they did not properly understand or were not able to successfully complete the task. Therefore, 84 participants were included in the study analysis.

Participants were randomly assigned into one of two groups: no extrinsic awareness group (*n* = 49) and primed extrinsic awareness group (*n* = 35). A chi-square for goodness-of-fit analysis indicated that the grouping distribution was not significantly different from 50/50 (χ^2 = 2.33, *p* = .13). No differences were noted between groups in demographic characteristics (see Table 1).

Procedure

An adaptation of the day–night inhibitory control task (Gerstadt, Hong, & Diamond, 1994; Ramon, Geva, & Goldstein, 2011; Yarmolovsky, Szwarc, Schwartz, Tirosh, & Geva, 2017), designed specifically

Table 1
Demographic characteristic of participating groups.

	No social agent implied	Social agent implied	Significance
Age	10.40 ± 1.40	10.48 ± 1.48	*p* = .81
Gender (female %)	46.90	34.30	*p* = .21
IQ[a]	97.2 ± 27.2	98.7 ± 26.8	*p* = .88
Conduct Behavior score[b]	1.67 ± 0.33	1.54 ± 0.29	*p* = .16
Social Problems score[b]	1.53 ± 0.67	1.76 ± 0.70	*p* = .46
Emotional Problems score[b]	1.45 ± 0.58	1.7 ± 0.65	*p* = .48
Prosocial score[b]	2.48 ± 0.57	2.25 ± 0.68	*p* = .11
ADHD[c]	55.85 ± 14.29	55.17 ± 11.23	*p* = .11

Note. ADHD, attention-deficit/hyperactivity disorder.
[a] Estimated based on Matrices subscale of the WISC-IV-Heb (Wechsler, 2003).
[b] Subscale score of Strengths and Difficulties Questionnaire (Goodman & Scott, 1999).
[c] Score of the Conners' Parent Rating Scales–Revised, Short Version (Conners, 1997).

for the current study, was presented on a 2.66-GHz Core 2 Duo PC. All stimuli were presented using E-Prime software Version 1.2, integrated with a 17-inch Tobii 1750 binocular eye-tracking device. The Tobii system tracks both eyes to a rated accuracy of 0.5°, sampled at 50 Hz. A successful 5-point gaze calibration was executed for each participant prior to beginning.

Participants performed a modification of the day–night task designed specifically for the current study (Gerstadt et al., 1994; Ramon et al., 2011; Yarmolovsky et al., 2017), allowing comparisons between gain/no-gain and high-gain (HG) and low-gain (LG) blocks in order to differentiate between cheating tendencies (dependent on gain) and impulsive errors (not dependent on gain). They were presented with images of either a sun or a moon on the computer screen and were told to choose a sun button or a moon button, via mouse click, corresponding to task instructions. Participants were instructed to respond as quickly and accurately as possible, and prior to each block a specific set of rules was presented for the following trials. First, participants underwent a control block in which they were instructed to press a sun key when a sun appeared on the screen and to press a moon key when a moon appeared. This block was included to ensure that participants succeeded in carrying out the basic requirements of the task, including the processing of data displayed on the screen and the use of the buttons to respond. Second, participants underwent a cognitive conflict block in which they were instructed to press the key corresponding to the opposite of the image presented. Third, participants underwent a congruent saliency block in which they were presented with a sun image and a moon image of varying sizes and were instructed to choose the larger (more salient) image. If participants' error rates during the no-gain trials exceeded 75%, indicating that they did not understand the task, they did not continue to the following gain blocks ($n = 3$).

No-gain blocks were always presented prior to the introduction of gain blocks to ensure that participants understood the task and performed according to the instructions before they were given the opportunity for gain. This gave participants the opportunity to understand that they should expect to make some errors given the effort needed for the task. This block order offered an environment permissive to rule breaking. That is, participants learned in the no-gain blocks that impulsive mistakes are inevitable and, therefore, that HG errors in the gain trials are indistinguishable from naturally occurring impulsive errors. Finally, the design provided a baseline measure of impulsive errors for comparison in the gain blocks in order to isolate cheating trials from impulsive error rates.

Following were the gain blocks, for which participants were instructed that they would receive a reward dependent on their button presses; for each sun press they would receive 1 NIS (New Israeli Shekel, equivalant to 25 cents), whereas for each moon press they would receive 0.1 NIS (3 cents). They were informed that at the end of the experiment they would receive the sum of their total earnings. Participants performed the same congruent saliency block procedure as decribed above, but the sun stimuli were labeled with "1 NIS" and the moon stimuli were labeled with "0.1 NIS". In addition, under these conditions they underwent an incongruent saliency block in which they were instructed to choose the smaller and less salient image, followed by a cognitive conflict block in which they chose the opposite image to what appeared on the screen. For the purpose of the current study, the no-gain and gain congruent saliency blocks were compared.

During the gain block, a reward fund was presented at the top middle of the screen showing the sum of the participant's earnings at each trial (funds were 157 × 243 pixels in size) (Fig. 1). The differential reward set a platform to cheat by making profitable "errors" (i.e., errors in pressing the sun key when the moon was larger). The paradigm enabled differentiation between cheating tendencies (i.e., selective errors in response to more profitable items) and impulsive errors (errors made in response to the same stimulus in the absence of gain). During the no-gain baseline blocks the experimenter remained in the room to ensure that participants understood the task, whereas during the following blocks the experimenter left the room so as not to influence the child's ethical decision making.

Extrinsic awareness was introduced by highlighting the external implications of dishonest behavior in two ways. First, a confederate briefly entered the room, acting as a future participant who arrived early, prior to initiation of the task. This primed the participant's awareness to the potential impact of his or her behavior on another. Second, this group was presented with an additional "lab" fund next to the participant's own fund (each fund was 157 × 243 pixels in size). Every time money was added to the participant's fund, the same amount was subtracted from the lab's fund (see Fig. 2), highlighting that the participant's earnings came from a finite source. Together, these two

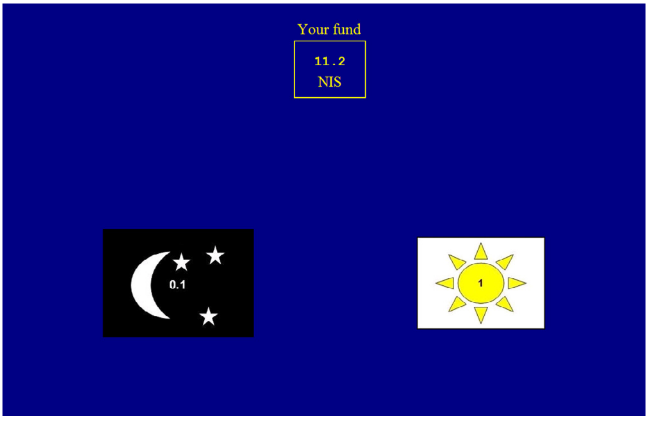

Fig. 1. Screen display of the gain block for the no extrinsic awareness group.

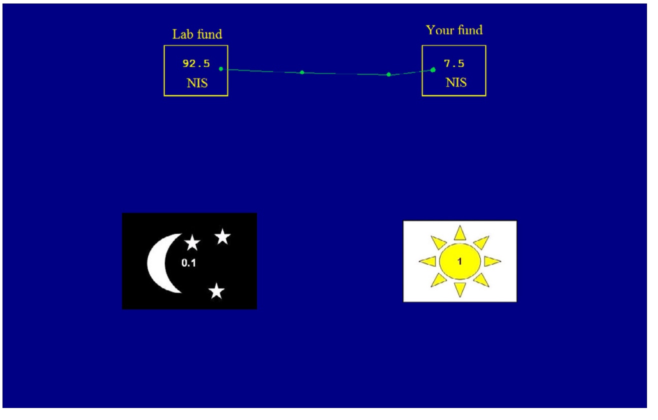

Fig. 2. Screen display of the gain block for the extrinsic awareness group. Green dots represent the participant's gaze pattern during the task. In this example, the participant points his or her gaze toward the money funds prior to making a decision. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

elements aimed to increase implicit awareness of the extrinsic implications of the participant's behavior by emphasizing that his or her earnings bore consequences on available resources for other uses and other people. Other than these two manipulation-related differences, participants in both groups underwent identical procedures.

Dependent measures

Dependent measures for this task included two types of error rates: HG errors comprised the percentage of errors made when choosing the higher rewarded sun instead of the lower rewarded moon, a scenario that led to increased monetary gain, and LG errors comprised the percentage of errors made when choosing the moon instead of the sun, a scenario that led to lesser monetary gain. Therefore, HG errors in the gain blocks included both cheating and impulsive errors, whereas HG errors in the no-gain blocks included only impulsive errors. To isolate cheating behaviors, residual errors were calculated from the prediction of HG errors in the gain block by the same type of errors as in the no-gain block. No correlations were found between this variable and demographic characteristics.

In addition, gain-seeking behavior was evaluated using gaze durations at the gain fund relative to total looking time. To calculate this measure, one area of interest (AOI) (no extrinsic awareness condition) and two AOIs (extrinsic awareness condition) were defined. Each fund was located on the top of the screen above the sun and moon stimuli. Gaze durations exceeding 20 ms were included in the analyses. Recordings of gaze durations began with stimulus presentation for each trial and ended when participants submitted a response.

Following the computerized task, participants completed the Strengths and Difficulties Questionnaire (Goodman & Scott, 1999) and a brief intelligence test (Matrices subscale of the WISC-IV-Heb [Wechsler, 2003]) while their parents completed the Conners questionnaire measuring attention-deficit/hyperactivity disorder (ADHD) symptoms (Conners, 1997), thereby enabling analyses to control for IQ and attention deficits.

Results

Testing the validity of the experiment

A manipulation check was run in order to explore the efficacy of the congruent saliency block. Paired-sample *t* tests were used to assess differences between congruent saliency and control blocks. Findings showed significantly more errors in the congruent saliency block ($M = 0.1$, $SD = 0.086$) compared with the control block ($M = 0.04$, $SD = 0.049$), $t = -3.614$, $p < .001$), highlighting that more impulsive errors were made in the face of higher cognitive load conditions.

Cheating errors with social agent as a moderator

To explore the hypotheses regarding cheating behavior and extrinsic awareness, an analysis of variance (ANOVA) with repeated measures was conducted with error type (HG or LG) and block type (no gain or gain) as within-participant variables and extrinsic awareness as the between-participant variable. Analysis yielded a block type main effect, $F(1, 82) = 7.795$, $p = .007$, $\eta^2 = .09$, such that more errors were made in the gain blocks compared with the no-gain blocks. Furthermore, an error type by block type interaction effect was noted, $F(1, 82) = 4.909$, $p = .029$, $\eta^2 = .06$. Post hoc comparisons show increased errors in the gain blocks compared with the no-gain blocks only for HG errors, $F(1, 82) = 9.020$, $p = .004$, $\eta^2 = .10$, and not LG errors (see Table 2). These results suggest that cheating did in fact occur in the face of gain above and beyond impulsive errors that occurred when no gain was offered.

When considering extrinsic awareness, results show an error type by extrinsic awareness interaction effect, $F(1, 82) = 5.477$, $p = .022$, $\eta^2 = .06$. Post hoc comparisons reveal that more HG errors than LG errors were made in the no extrinsic awareness condition, $F(1, 82) = 5.468$, $p = .022$, $\eta^2 = .06$, and no differences were seen when extrinsic awareness was probed. Finally, an error type by block type by extrinsic awareness interaction was seen, $F(1, 82) = 5.293$, $p = .024$, $\eta^2 = .06$ (Fig. 3). Post hoc analysis shows that HG errors were greater than LG errors only in the gain block during the no extrinsic awareness condition, $F(1, 82) = 10.266$, $p = .002$, $\eta^2 = .11$ (Fig. 3). These data suggest that extrinsic awareness implications are related to reduced rates of cheating.

Table 2
Means and standard deviations for error type by block type.

	No-gain block		Money gain block	
	Mean	*SD*	Mean	*SD*
Low gain (%)	11.39	11.12	11.65	14.16
High gain (%)	10.03	8.67	22.96	25.55

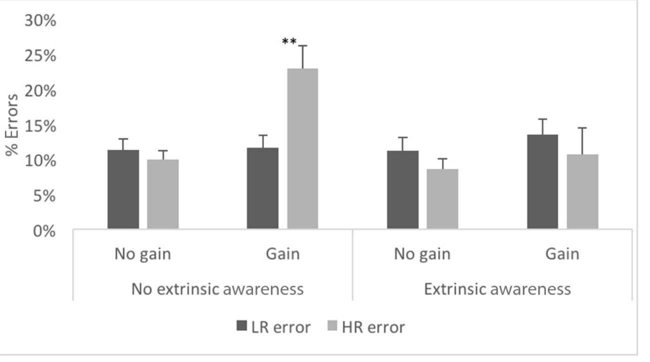

Fig. 3. High-gain (HG) and low-gain (LG) errors as a function of block type and extrinsic awareness. $^{**}p < .01$.

Gaze patterns, extrinsic awareness, and cheating

To understand the relationships among gaze patterns, extrinsic awareness, and cheating behaviors, correlational analyses were conducted. Results showed correlations among all three measures, such that extrinsic awareness was negatively correlated with gaze durations toward the fund and cheating, whereas gaze durations and cheating were positively related (Table 3).

To examine the role of gaze patterns toward the money fund on the relationship between extrinsic awareness and cheating behavior, a mediator model was conducted (Hayes, 2013, PROCESS Model 4). All path coefficients for the PROCESS model are presented in Table 4, and the model is depicted in Fig. 4. Analysis revealed that the total effect of extrinsic awareness on cheating behavior was significant ($c = -0.486$, $p = 0.02$, 95% confidence interval [CI] = −0.888 to −0.084), such that cheating was higher when there was no social agent and that gaze durations toward the fund mediated this relationship. Accounting for the mediator (indirect effect = −0.218, 95% CI = −0.500 to −0.041) eliminated the relationship between extrinsic awareness and cheating ($c' = -0.268$, $p = 0.144$, 95% CI = −0.630–0.094), indicating a full mediation effect explaining the total contribution of extrinsic awareness on

Table 3
Pearson correlations among extrinsic awareness, gaze durations to the fund, and cheating behavior.

	1	2	3
Extrinsic awareness condition	–		
Gaze durations to fund	−.241[*]	–	
Cheating behavior[a]	−.249[*]	.528[***]	–

[*] $p < .05$.
[***] $p < .001$.
[a] Calculated using residual errors from the prediction of high-gain errors in the gain block by the same type of errors in the no-gain block.

Table 4
Path coefficients and standard errors from the mediation model estimated using the PROCESS model.

	B	*SE*	*β*	*p*
Path *a*	−0.068	0.031	−.24	.032
Path *b*	3.224	0.648	.492	.000
Path *c*’	−0.268	0.182	−.146	.144
Indirect effect	−0.218	0.116		95% CI = −.500 to −.041
Total R^2	.298			.000

Note. CI, confidence interval.

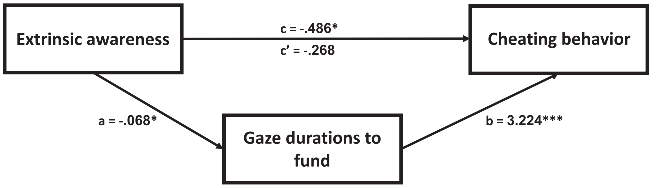

Fig. 4. Mediation model showing the direct and indirect effects and path coefficients relating extrinsic awareness to cheating behavior through gaze durations to the fund as a mediator.

cheating. Overall, the model accounted for 29.8% of cheating behavior variance. A comparable model was run with LG error residuals of no gain predicting gain blocks as the predicted variable. The model resulted in no relationships between social awareness and LG errors as well as no mediating effect of gaze. This highlights the notion that the mediating gaze patterns are related specifically to cheating trials and not simply to increased error rates.

Discussion

The current study employed a computerized paradigm that measured participants' impulsive tendency to err in conditions with and without the prospect for gain. The research design provided an environment permissive to rule breaking with the prospect for personal gain, which offers a measure of subtle cheating relevant to common day-to-day life decisions. Furthermore, the computerized nature of the game provided a realistic environment for this age range given that children spend large amounts of time playing computerized games both at home and in academic settings (Harris, Straker, & Pollock, 2013). Importantly these digital platforms seem to be perceived as more conducive to cheating or dishonesty (Blau & Eshet-Alkalai, 2017; Grieve & Elliott, 2013; King, Guyette, & Piotrowski, 2009).

Findings show that participants erred more often in response to HG stimuli compared with LG stimuli, suggesting that children do in fact cheat when driven by the motivation to increase personal gain. The cheating error rate in the current study was approximately 13% (HG errors in gain blocks minus HG errors in no-gain blocks), suggesting that although children may have made less effort to answer correctly during HG trials, they still made an effort to follow the rules most of the time. The literature on children's cheating focusing mainly on overt binary cheating measures (i.e., presence or absence of cheating) suggests that cheating rates are high at 42–82% (Evans et al., 2011; Piazza et al., 2011; Talwar & Lee, 2008; Talwar et al., 2007), whereas subtle cheating profiles that probe selective effort based on response profitability have not been previously tested at this age. Studies with adults showing similar cheating behavior to the current task suggest that people typically act immorally to a limit—enough to benefit from the situation but not so much that they cannot maintain a self-representation of being an honest person (Gino, Ayal, & Ariely, 2009; Mazar, Amir, & Ariely, 2008). Estimated cheating rates in these adult populations were between 6.7% and 13.5% (Mazar et al., 2008). Although the literature is lacking regarding children's subtle cheating profiles, current findings suggest a similar pattern in this young population.

The basic assumption that children will make more errors with higher gain was validated in three ways: (1) low gain errors occurred less than high gain within the gain blocks; (2) high gain errors occurred more in the gain blocks as compared to the no gain blocks and (3) no LG error differences were seen in the gain versus no gain blocks.

More specifically, data show that in the gain conditions children made selectively biased errors at higher rates than they made impulsive errors due to saliency and/or immature inhibitory control (Kochanska, Coy, & Murray, 2001; Kohlberg & Power, 1981; Mischel, Shoda, & Rodriguez, 1989; Walker, 1980), enabling an increased gain.

Furthermore, the paradigm enabled measurements of impulsive errors compared with cheating errors. The repetitive nature of the experiment, implicated by introducing first a trial without the opportunity to gain followed by the same procedure with gain, facilitated a learning effect that increases the ability to control one's responses and, thus, reduce impulsive errors. The fact that errors increased in the repetitive gain block only in the HG condition and not in the LG condition, therefore, strengthens the validity of the cheating finding.

Effect of extrinsic awareness on cheating in children

An effective mechanism uncovered by the current research suggests that awareness of the effects of cheating on others acts to suppress children's cheating. Current results show that participants made more HG errors only during the no extrinsic awareness condition. This effect is compatible with the notion that the desire to cheat and increase gain is suppressed by children's attempt to comply with social rules (Bender, O'Connor, & Evans, 2018; Diamond, Kirkham, & Amso, 2002). It also fits with previous findings that in making moral decisions people not only are concerned about their gain but also are sensitive to harmful consequences for others (Fu et al., 2016; Gneezy, 2005; Heyman, Fu, Lin, Qian, & Lee, 2015; Krettenauer, Jia, & Mosleh, 2011), possibly through empathizing with the affected persons (Prehn et al., 2007; Young & Koenigs, 2007) or by aspiring to maintain a positive reputation (Fu et al., 2016). The current study enabled this by priming the participant's awareness to the next participant, extending previous findings that external source monitoring, such as an invisible character, reduced cheating in children (Piazza et al., 2011). In the current study, we showed that increased awareness to another is sufficient even if the other is not monitoring his or her performance.

Another point to note is that being alone or not while performing the task does not seem to be the driving factor that affects cheating; rather, awareness of the extrinsic implications seems to supress such behavior. In the current design, the experimenter was present in the room when no gain was introduced and left the child to conduct the task alone when gain was offered. If being alone had mattered, in the extrinsic awareness condition when the children were primed with external implications, the fact that they were alone would theoretically be more potent for cheating and one would expect increased cheating, unlike the opposite effect that was seen.

Thus, in the current study, extrinsic awareness appeared to increase children's sensitivity to the negative effects that their cheating could inflict on their social surroundings. It may be that by probing such an awareness, children were alerted to the existence of an expanded social circle that could be negatively affected by their actions (Bronfenbrenner, 1994), expanding awareness of group concerns, fairness, and cooperation and, thereby, encouraging them to exert greater effort to suppress cheating behavior. Importantly, this effect occurred even without an explicit reference to playing fair (Evans, O'Connor, and Lee, 2018) and without modeling (Salazar et al., 2015). Therefore, current findings indicate that extrinsic awareness is an important consideration for cheating tendencies in children. This suggests that in balancing cheating rates, children consider not only gain but also the consequences for others. The mechanism mediating this suppression was explored in the current study by analyzing attentional focus during cheating-prone events.

Attention allocation in cheating

Results from a mediator model show that gaze durations toward the money fund fully mediated the relationship between extrinsic awareness and cheating. This suggests that when children are not primed with extrinsic awareness, they feel freer to look at their earnings, whereas extrinsic awareness may suppress this gaze pattern, which in turn is associated with less cheating. Notably, this model was significant only when predicting cheating behaviors and not when predicting LG errors. This shows that participants who looked more at the fund were not simply distracted from the stimuli, thereby leading to increased errors; rather, gaze behavior specifically influences the relationship between extrinsic awareness and cheating. It should be noted that due to the comparison between one and two money funds between manipulation conditions, AOIs were different sizes for each extrinsic awareness group. Importantly, however, these size differences were consistent for HG and LG comparisons. Therefore, although this limitation should be considered when reviewing the results, the fact that effects were seen only for HG errors and not for LG errors indicates that the effect exists despite the AOI size difference.

This gaze pattern, noted for the first time in children, appears to be different from that seen in adults. Research in adults shows a tendency to avert gaze when cheating, activating a self-deception strategy to serve one's self-interests while maintaining a positive self-concept (Pittarello et al., 2016). This suggests that the neuropsychological role of gaze direction is different in children and adults, which may be explained by differential attention regulation abilities between the two ages. It may be that fixation toward the fund represents an impulsive temptation in youths, reflecting increased attentional resources being directed toward monetary gain and reducing inhibition of financial temptation. That is, children do not yet use gaze aversion to preserve self-concept without primed extrinsic awareness. It is important to note that awareness of external implications seems to mitigate the impulsive looking pattern seen during HG prospects, and this reduction in gaze toward the target is then related to less cheating behavior. Integrating these data, it seems that extrinsic awareness facilitates children's ability to inhibit their impulsive tendencies that lead to cheating by facilitating gaze aversion.

Conclusions

It is widely accepted that cheating compromises personal safety and sense of well-being. Still, it is a frequently occurring behavior in society affecting daily life. The current study explored factors that influence subtle cheating in children. The subtle cheating arose from making selective effort depending on the profitability of the error (i.e., less effort to avoid errors during higher gain opportunities). Findings show that children cheat in order to increase gain and that extrinsic awareness of the potential harm to others is related to a decrease in cheating. In addition, the current study also advances our understanding of cognitive processes that may serve to suppress cheating. Results showed that attention toward children's earnings mediates the relationship between extrinsic awareness and cheating, such that lack of extrinsic awareness resulted in attention toward the fund, which was related to more cheating behavior.

Therefore, the current work introduces the notion that an implicit manipulation, highlighting the potential implications of one's actions for others, seems to effectively minimize cheating among children. Furthermore, attention toward earnings offers a cognitive process that acts to mediate the effect of this manipulation on cheating. Taken together, this framework suggests psychoneurocognitive and social processes that influence cheating in children, offering a direction for future implicit intervention techniques to support honest performance.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2018.08.013.

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