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Executive function and temperamental fear concurrently predict deception in school-aged children

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The decision to intentionally withhold truthful information, or deception, is a key component of moral development and may be a precursor to more serious anti-social tendencies. Two factors, executive function (EF) and temperamental fear are each thought to influence childhood deception. Few studies, however, have explored deception in relation to both of these factors simultaneously. This was the goal of the present study. EF, as measured by a working memory (WM) task, and temperamental fear, as measured via maternal report were assessed in relation to observed deceptive behavior among six- to nine-year-old children ($N = 43$). Results showed that children displaying high WM capacity and high temperamental fear were more likely to exhibit deceptive behavior. Implications for predictors of childhood deception and applications for moral education are discussed.

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Deception, the act of intentionally withholding truthful information, is a universally and naturally-occurring phenomenon of human interaction, such that a complete absence of deception suggests the presence of neurodevelopmental disorders, such as autism (Spence et al., 2004). In contrast with other types of transgressions such as cheating, the ability to deceive represents a normative aspect of social development that reflects perspective-taking and cognitive maturity, particularly in cases of prosocial lies (Talwar & Crossman, 2011). Deception is also of interest across many disciplines due to its potential to adversely impact society (Abe et al., 2006). Specifically, pathological deception, in conjunction with other behaviors, is a criterion for sociopathy (Hare et al., 1990). Because of its relation to both normative and pathological development, it is important to identify factors that may contribute to deception. Furthermore, understanding predictors of deception can help inform the development of moral education programs in schools (Goodman, 2000). Previous research has indicated that cognitive factors like executive functioning (Talwar & Lee, 2008), and biologically-based emotional patterns of response like temperament (e.g. Frick & Morris, 2004; Kochanska, 1991) likely impact deceptive behavior. The present study sought to examine a key cognitive factor and a key emotional factor that are thought to influence deception in school-aged children: executive function (EF) and temperamental fear.

The role of executive function in deception

Children as young as three can employ simple deception (Lewis, Stanger, & Sullivan, 1989; Polak & Harris, 1999), an ability that becomes more sophisticated with age (Carlson, Moses, & Hix, 1998). Researchers have suggested that the emergence of deception coincides with the development of EF abilities. EF refers to the extent to which an individual is able to exert control over cognitive functions encompassing inhibition, working memory (WM), and cognitive flexibility (Diamond, 2006). EF abilities markedly increase between the ages of three and seven - years, and become more refined between the ages of five to 11 years (Diamond, 2006). The influential role of EF capacity on deception is apparent among young children who are just beginning to develop more demanding cognitive functions. For example, when lie-telling requires more advanced EF like high inhibitory control, three-year-olds deceive less frequently compared to when EF demands are relatively low (Carlson et al., 1998). Furthermore, Talwar and Lee (2008) showed that three- to eight-year-olds with greater inhibitory control capacity, were more likely to deceive a researcher by lying about peeking at a toy. Using the same behavioral deception task, Evans and Lee (2013) showed that, among two- to three-year-olds, greater EF predicted an increased likelihood to deceive, even when

age and verbal ability were taken into account. In addition, among children eight to 16-years-old, greater EF has been associated with more sophisticated lie-telling (Evans & Lee, 2011). Together, these findings suggest that EF may represent a prerequisite set of skills underlying the ability to deceive (Gombos, 2006).

More specifically, deception requires a range of EF capacities, including inhibiting truthful responses, directed attention and attentional control to track the responses of the audience, and conflict monitoring and WM to maintain consistency of the lie (Gombos, 2006). Furthermore, greater WM allows individuals to maintain knowledge of the situation and the perspectives of others, decide whether to deceive or not, and mentally create and prepare to lie (Gombos, 2006). Neuroscience research supports the link between EF and deception by providing evidence for underlying brain regions that are associated with both capacities. Deception recruits regions of the prefrontal cortex and medial frontal cortex, such as the anterior cingulate cortex (Abe, Suzuki, Mori, Itoh, & Fujii, 2007; Langleben et al., 2002; Lee, Lee, Raine, & Chan, 2010; Luan Phan et al., 2005), thought to be key regions underlying EF (Bunge, Ochsner, Desmond, Glover, & Gabrieli, 2001; Carter et al., 2000; Miller, 2000). Furthermore, modulation of the dorsolateral prefrontal cortex, a brain region associated with WM (Fregni et al., 2005; Smith & Jonides, 1997) via transcranial direct current stimulation, changed the speed and efficiency of deception in adults (Priori et al., 2008).

While EF likely plays a significant role in deceptive ability, it does not uniquely explain individual differences in deceptive behavior. Decisions to either deceive or not are likely also influenced by dispositional traits and the internalization of moral expectations of others. Temperament research highlights the potential role of affective temperamental differences, such as dispositional fear, in the development of conscience and perhaps by extension, a tendency toward deceiving.

Temperament and the development of conscience

Temperament refers to biologically-based individual differences in patterns of reactivity and self-regulation that occur in response to diverse environmental experiences (Rothbart & Derryberry, 1981; Putnam, Ellis, & Rothbart, 2001). Temperamental fear is characterized by a dispositional pattern of behavioral inhibition, nervousness, worry, unease, and increased autonomic arousal in response to unfamiliar people or threatening settings and events (Degnan & Fox, 2007; Kagan & Snidman, 1991; Rothbart, 1989). Maternal ratings of temperamental fear predict increased risk of anxiety in childhood and later in life (Goldsmith & Lemery, 2000; Muris, Steerneman, Merckelbach, & Meesters, 1996). Also, children with higher levels of temperamental fear have a lower threshold of reactivity and are therefore likely to react more intensely to stimuli. In order to mitigate the intensity of stimuli, these individuals refrain from activity and as a result exhibit behavioral inhibition, characteristics typically associated with fear (e.g., restrained motor activity and limited speaking) (Kagan, 1989). Conversely, children with

lower levels of temperamental fear have higher thresholds of reactivity and thus, are less likely to react to unfamiliar people or threatening stimuli. Children with lower temperamental fear are behaviorally more sociable and demonstrate characteristics such as spontaneity in unfamiliar settings (Kagan, 1989). Childhood temperamental fear has been associated with incidences of internalizing problems (Kagan, 1994), conduct disorder (Frick & Morris, 2004), as well as anxiety disorders in adulthood (Kagan & Snidman, 1999). In particular, higher levels of tempermental fear is theorized to be associated with deviation anxiety, a type of negative arousal associated with rule breaking behavior (Kochanska, 1991). Therefore, children with low levels of tempermental fear experience attenuated deviation anxiety, and thus are less likely to comply (Kagan, 1998; Kochanska, 1993).

A growing number of researchers have incorporated temperamental fear into research involving morality and the development of conscience (Frick & Morris, 2004; Jackson & Center, 2002; Kochanska, 1991; Kochanska, DeVet, Goldman, Murray, & Putnam, 1994; Kochanska, Murray, & Coy, 1997; Stifter, Cipriano, Conway, & Kelleher, 2009). Conscience relates to a child's level of affective discomfort or guilt following transgressions. It is posited that the development of conscience is achieved by a child's ability to internalize the moral norms of society (Frick & Morris, 2004). Building on the temperament theory (Asendorpf & Nunner-Winkler, 1992; Frick & Morris, 2004; Kochanska, 1991, 1995; Kochanska, Gross, Lin, & Nichols, 2002), researchers have posited that dispositional fear also plays a role in the development of conscience. Specifically, children with high levels of dispositional fear experience greater discomfort when confronted with immoral activity; they avoid wrong-doing in order to reduce the distress, or negative arousal created by such behavior. Conversely, children with low levels of dispositional fear fail to experience discomfort from immoral activity and thus may be more likely to commit immoral acts. In these instances, the internalization of the moral norms is compromised (Frick & Morris, 2004). Children with low versus high levels of temperamental fear may be at elevated risk for antisocial behavior (Blair, Jones, Clark, & Smith, 1997; Kochanska, 1995; Kochanska et al., 2002).

For example, in a study by Asendorpf and Nunner-Winkler (1992), six- to seven-year-olds who showed greater fear-related inhibition, as measured by maternal report, cheated less during a behavioral task than their counterparts. Similar results have been shown in studies using behavioral and psychophysiological measures of fear, anxiety, and arousal (Fowles & Kochanska, 2000; Kochanska et al., 1994, 2002). Asendorpf and Nunner-Winkler (1992) postulated that the association between morality and temperament was rooted in the behaviorally inhibited nature of children with high temperamental fear (Degnan, Almas, & Fox, 2010; Murray, Creswell, & Cooper, 2009; Pérez-Edgar & Fox, 2005), which makes these children less likely to commit acts of immoral behavior that require approach behavior. The propensity for temperamentally fearful children to inhibit their behavior afford them time to reflect on the moral implications that their behavior might produce, which in turn increases the likelihood of them acting in good conscience.

Potential importance of the interaction between EF and temperament

Despite these suggestive findings, temperamental fear is not sufficient to predict moral behavior. Many fearful children do transgress against rules and moral norms. In particular, while the research literature on EF and deception and on temperamental fear and conscience is substantial (e.g. Frick & Morris, 2004; Gombos, 2006; Jackson & Center, 2002; Stifter et al., 2009) little is known about how EF and temperamental fear might interact in relation to deception. While greater EF capacity coincides with increased lie-telling abilities (Perner, Lang, & Kloo, 2002) and also recruits similar brain regions as deception (Abe et al., 2007; Bunge et al., 2001), considering EF alone does not take dispositional individual differences into account. Aspects of temperamental fear and EF have been shown to jointly influence moral behavior that is reflective of conscience. For example, four- to five-year-olds identified as fearful and inhibited who also showed high EF demonstrated greater emotional regulatory ability during an empathy task, suggesting more advanced conscience development (Stifter et al., 2009). Those highly fearful children who have greater EF capacity also may be able to regulate their negative emotions enough to overcome inhibition and engage in a more expanded behavioral repertoire (Hastings, Zahn-Waxler, & McShane, 2006), which could include more prosocial, or arguably, non-prosocial behaviors, such as deception. It remains an open question whether temperamental fear and EF interact in systematic ways to predict a developmentally-salient aspect of moral behavior such as deception.

The present study

In an effort to build upon previous literature related to EF, temperament, and moral development, the present study explored how EF and temperamental fear interact to predict deceptive behavior in school-aged children—a period of rapid cognitive development related to moral behavior and reasoning (Kochanska et al., 1997; Walker, 1989). The age range of six- to nine-years-old was specifically targeted because during this developmental period, deceptive behavior has been established *and* EF capacity becomes more refined (Diamond, 2006). The first goal of the present study was to examine whether EF and/or temperamental fear independently predicted deception. We hypothesized that greater EF would predict increased deceptive behavior and that greater temperamental fear would predict reduced deceptive behavior. We measured EF in two ways: a behavioral measure of WM and a maternal-report measure of effortful control (EC). WM was targeted as a measure of EF since it is specifically related to perspective taking abilities (Davis & Pratt, 1995), allows for the preparation for and maintenance of a lie (Gombos, 2006), and recruits the same brain regions associated with speed and efficiency of deception (Priori et al., 2008). These findings suggest that WM in particular may be related to the likelihood of deception. EC incorporates characteristics of EF that have been implicated in children's lie-telling in previous

research (i.e., Talwar & Lee, 2008), while reflecting a more elaborated set of skills than inhibitory control alone. Deception was measured as the act of both breaking the rules of a challenging task, and subsequently lying about that transgression to a research assistant (adapted from Milner, 1962). This measurement goes beyond simply cheating, and assesses which children are also willing to deceive the research assistant by attempting to cover up their transgression. By targeting deception as an index of conscience development, the present study builds upon previous studies investigating the relationship between temperamental fear and the development of conscience.

The second goal was to examine the interaction between EF and temperamental fear in relation to childhood deception. We hypothesized that temperamental fear would moderate the association between EF and deception. Specifically, we predicted that children with high EF and lower temperamental fear would be more likely to deceive. In addition, we hypothesized that this interaction would explain more variance in deceptive behavior than either EF or temperamental fear alone.

Method

Participants

Participants included 43 typically-developing children and their mothers. Children ranged from six- to nine-years-old (20 females, $M_{\text{age in months}}$ = 97.93, *SD* = 6.58, range = 80 to113 months). The sample was comprised of 15 Caucasians, 10 Hispanics, 11 African Americans, and 1 Pacific Islander. Six children were reported by their mothers as more than one race. Participants' families included a mean of 2.14 (*SD* = .99) children per household (range = 1 to 5 children). Mothers completed questionnaires assessing their child's temperament and behavior and reported no diagnosed developmental problems. Informed consent was obtained from all parents prior to beginning the study. Participants spent approximately 3 hours in the laboratory and were compensated $100.00 for their time.

Procedure and measures

Temperamental fear. Temperamental fear was measured via the Temperament in Middle Childhood Questionnaire ([TMCQ] Simonds & Rothbart, 2004). The TMCQ is a 195-item maternal report which measures 15 separate dimensions of temperament in children seven to ten years old. The *fear* scale (α = .60) consists of items such as, 'My child is afraid of the dark' and 'My child is scared by nightmares.'

Executive function.

EC. EF was quantified by measuring maternal report of EC via the TMCQ (Simonds & Rothbart, 2004). The EC composite score consists of an average of the attentional focusing (i.e., 'Gets distracted when trying to pay attention in

class'), inhibitory control (i.e., 'Has a hard time stopping him/herself when told to do so'), low intensity pleasure (i.e., 'Likes to sit under a blanket'), and perceptual sensitivity (i.e., 'Notices the color of people's eyes') subscales (Rothbart, Ahadi, Hershey, & Fisher, 2001).

WM. EF was also quantified by measuring WM via the Backward Word Span (BWS) from the Wechsler Intelligence Scale for Children – Fourth Edition ([WISC] Wechsler, 2003). The child was told to repeat lists of words backwards, beginning with two word lists. For example, if the experimenter said, 'book, cup', the child should respond, 'cup, book'. If the child was accurate, he or she was then asked to repeat a longer sequence of words backwards. Administration ended if the child repeated a sequence backwards inaccurately or if they repeated a five word series backwards accurately. WM scores were calculated as the highest number of words the child was accurately able to repeat backwards, ranging from one (lowest) to five (highest).

Deception task. Deception was measured via a tracing task adapted from a study by Milner (1962). During this task, children were asked to trace a star from the reflection in a mirror without looking at the paper in front of them. After briefly practicing, the child was told the experimenter would have to leave the room to prepare their next activity and the child should trace the star while the experimenter was gone. Children were told not to peek at the paper, but no specific consequences of any transgression were mentioned. All children were videotaped during the three minutes the experimenter was absent from the room. After three minutes, the experimenter returned and asked the child, 'Did you peek to trace the star?' Videotapes were later coded for deception. If a child peeked while tracing when the experimenter was not in the room, he or she was flagged for trans-

Table 1. Descriptive statistics for temperamental fear, effortful control, and working memory.

	Mean	*SD*	*Median*	*Range*
Temperamental Fear	2.84	.73	3.00	1.22–4.00
Effortful Control	3.99	2.42	3.46	2.72–16.88
Working Memory	3.02	1.23	3.00	0.00–5.00

Note. Temperamental fear and effortful control were measured by maternal report on the TMCQ, and working memory was measured behaviorally by the BWS.

gressing. Children who transgressed and then answered 'no' in response to the question, 'Did you peek to trace the star?' were coded as deceivers.

Results

Table 1 presents descriptive statistics for temperamental fear, EC, and WM. Temperamental fear was not significantly correlated with EC[1] [$r(43) = -.10$, $p > .05$] or WM [$r(43) = -.08$, $p > .05$]. There was also no significant correlation between EC and WM [$r(43) = .27$, $p > .05$].

Of the 43 children included in the study, 24 children (55.8%) peeked at the star and, subsequently, 17 of those children (39.5%) lied to the experimenter about their transgression, while seven (16.3%) confessed. Those who peeked and lied were categorized as deceivers ($n = 17$) and those who either did not peek or peeked and told the truth were categorized as non-deceivers ($n = 26$). A chi-square test of independence revealed no difference in gender proportions between the deceiver and non-deceiver groups, $\chi^2(1) = .47$, $p > .05$. Similarly, an independent-samples *t*-test determined that deceivers and non-deceivers did not differ in age, $t(41) = .75$, $p > .05$. Furthermore, there were no significant age differences between younger (6 and 7 year olds) and older (8 and 9 year olds) regarding EC [$t(41) = -.04$, $p > .05$], WM [$t(41) = .87$, $p > .05$], or temperamental fear [$t(41) = -.18$, $p > .05$]. We tested the prediction that children with high EF and low temperamental fear would be more likely to show deceptive behavior using two logistic regressions in which EF (EC and WM entered separately), temperamental fear, and their interaction were entered as predictors of children's deceptive behavior.[2]

When parent-reported EC was used to represent EF, the results of the logistic regression showed that neither temperamental fear ($\beta = 0.08$, $p = .66$), EF ($\beta = 0.28$, $p = .61$), nor the interaction between fear and EF ($\beta = 0.62$, $p = .43$)[3] predicted deceptive behavior.

In contrast, when WM was used as the variable for EF in the logistic regression, the model predicted a significant proportion of variance in deception, χ^2 (3, $N = 43$) = 7.61, $p = .05$ (Table 2). The model explained 22% (Nagelkerke R^2) of

Table 2. Logistic regression of deception with working memory and temperamental fear as predictors ($N = 43$).

Variable	Unstandardized β(SE)	Standardized β(SE)	Odds Ratio	95% CI for Odds Ratio
Constant	–.40			
WM	.51(.43)	.12	1.67	(.71–3.89)
Temperamental Fear	–.40(.38)	–.10	.67	(.32–1.41)
WM X Temperamental Fear	1.18*(.50)	*.28	3.26	(1.22–8.74)

Note. $R^2 = .08$ (Hosmer & Lemeshow), .16 (Cox & Snell), .22 (Nagelkerke). Model $\chi^2(3) = 7.61$, $p = .05$.
*$p < .05$.

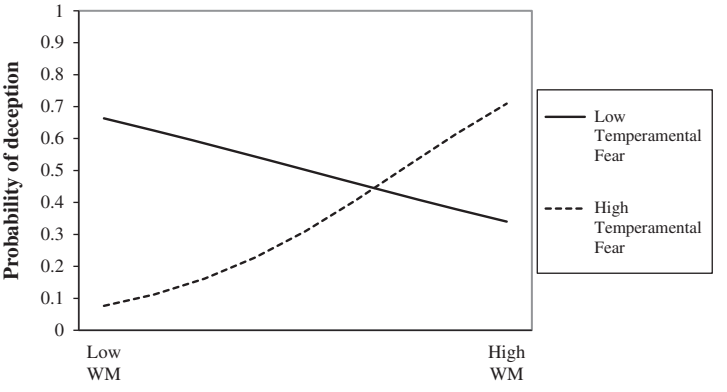

Figure 1. The association between deception and working memory was moderated by temperamental fear (high and low groupings at +/– 1 SD).

the variance in deceptive behavior and correctly categorized 63% of cases. WM (β = 0.12, p = .24) and fear (β = -0.10, p = .29) alone did not significantly predict deception. As predicted, the interaction between EF and temperamental fear (odds ratio = 3.26; β = 0.28, p = .02) significantly predicted deception.[4] Specifically, as temperamental fear increased, the likelihood of deception was greater, but only among those children showing relatively high EF (Figure 1). In contrast, low EF as associated with greater likelihood of deception, but only among those children showing *low* temperamental fear.[5]

Discussion

To explore the potential cognitive and emotional underpinnings of childhood deception, the present study sought to examine the associations among deception, EF, and temperamental fear. We found that neither EF nor temperamental fear solely predicted greater observed deception. Rather, consistent with predictions, temperamental fear moderated the impact of EF on deception. However, the pattern of this interaction was contrary to predictions, children high in temperamental fear were more likely to deceive, but only if they also showed high WM capacity. Although a large number of studies have examined the affective processes involved in the development of conscience (e.g. Frick & Morris, 2004; Jackson & Center, 2002; Kochanska et al., 1994, 1997; Stifter et al., 2009), the present study is the first, to our knowledge, to explore the interaction between temperamental fear and EF as concurrent predictors of childhood deception.

Findings suggest that deception is more likely among children with both high EF and high temperamental fear. While in general, children with high EF may be cognitively able to deceive after they have transgressed, they do not always do so. Instead, it is those with high temperamental fear that are more likely to cover up their transgression by deceiving. Conversely, we can interpret results in the context

of a child's level of dispositional fear. One reason that children high in temperamental fear may have transgressed is that they were perhaps motivated by a fear of failure in the task. In fact, greater behavioral inhibition in childhood is linked to enhanced physiological measures of error monitoring, which may contribute to symptoms of anxiety later in life (McDermott et al., 2009) Among those who transgress due to fear of failure, those that have high EF may be more likely to use those cognitive abilities to cover up their transgression by deceiving. However, children high in temperamental fear who transgress and subsequently confess may have reduced EF capacity available to consider or attempt deception, while others may refrain from transgression to avoid the discomfort associated with breaking rules, reflecting the internalization of moral norms. Interestingly, lower temperamental fear was also associated with greater deception, but when EF was at a low level. This suggests that when EF is relatively low, children with lower temperamental fear may not be able to recruit enough EF resources to successfully inhibit impulses to transgress and must resort to deception. Interpretations of findings also may relate to the restricted behaviors typically observed in children with high temperamental fear (Asendorpf & Nunner-Winkler, 1992; Degnan & Fox, 2007; Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Kagan, 1989). In the current deception task, children with high EF and temperamental fear may have been more distressed by the experimenter's interrogation and potential consequences of their transgression. As a means of avoiding this discomfort, these children denied their transgressions. Therefore, instead of reflecting on the morality of the situation, as some researchers have posited, the time awarded by their behavioral restrictions allowed them to reflect on the potential consequences of admitting their transgressions (Asendorpf & Nunner-Winkler, 1992). In contrast, transgressors with high EF and *low* temperamental fear may not have been as aroused by the potential consequences of the task and as a result, they were less likely to reflect on the costs of their transgression and subsequently admitted to their misdeed.

While this study provides evidence that deceptive behavior is concurrently predicted by temperament and cognitive capacities, there are limitations. First, the ages of participants ranged from six- to nine-years-old, a somewhat wide range during which deceptive behavior fluctuates. However no significant difference in mean age was found between children who deceived and those who did not, and age did not play a moderating role in deception,[6] suggesting that age was not a significant contributor to deceptive behavior for this sample. Also, the measurement of temperament was accomplished entirely via maternal report, which may be biased, and cannot be confirmed without behavioral temperamental measures. Furthermore, while previous studies assessing aspects of EF (Carlson, Moses, & Breton, 2002; Talwar & Lee, 2008) have used multiple concurrent measures to quantify EF, the current study used only two, a parent-report measure of EC and a behavioral measure of WM. There was no predictive relationship between EC and deception, but when WM was used to quantify EF, a significant effect emerged. This may indicate that WM capacity, but not EC broadly defined, may

be the key component of EF that contributes to whether or not deception occurs. WM capacity may represent a more refined measure that influences other aspects of EF. In fact, WM capacity has been shown to moderate performance on tasks intended to target other components of EF (Carlson, 2005; Engle, 2002). Finally, backward span tasks have been suggested to measure not only WM but inhibitory control capacity as well (Carlson, 2005), which has been found in previous research to predict children's lie-telling (Evans & Lee, 2011; Talwar & Lee, 2008). Thus, BWS may be a more sensitive measure of EF relative to parental-report of EC.

Another potential limitation concerns the possibility that children with greater EF may have inhibited their impulse to transgress, thus precluding any opportunity to deceive. Such children were coded as non-deceivers. However, children with high EF who did transgress may have harnessed their inhibitory abilities to more successfully deceive, regardless of their temperament. Furthermore, children who peeked but subsequently told the truth about their transgression were not distinguished from those who did not peek at all: both types of children were coded as non-deceivers. There was no difference in the pattern of results when the children who peeked and told the truth were removed from the logistic regression analysis compared to when they were included. However, when children who peeked and told the truth were compared with those who peeked and deceived, the regressions did not reach significance. This was likely due to the small sample size of children who peeked and confessed. More research is needed to clarify any possible distinctions between children who cheat but confess, and those who cheat and subsequently lie.

Furthermore, the deception task included an additional performance context that may also explain the role of temperamental fear as a moderator of EF to predict deception. Potentially, the pressure of tracing the star for the experimenter's review may have additionally aroused children with high fear, such that they would have been more inclined to peek and then lie about it to avoid potential consequences. Perhaps the potential benefits of meeting performance expectations in this scenario outweighed the discomfort and distress experienced when transgressing moral norms, particularly for children with high temperamental fear. While no explicit consequences of transgression were mentioned to the children, those with high fear may have been predisposed to imagine more severe penalties than those with low fear. Future research should examine how manipulation of the magnitude of consequences may differentially impact deception in children with high and low temperamental fear and EF. In addition, future research should include follow-up questions after the deception task to determine whether or not children who deceived would maintain the lie.

The current findings provide support for a conceptual model of deception that incorporates both cognitive and emotional factors. Future research including predictors of deception such as EF, temperamental fear and parenting may inform a multi-dimensional model of individual differences related to deception. In addition, looking at deception longitudinally could clarify how deception emerges and

changes throughout development, as well as how pathological deception originates. This has important educational implications in terms of whether specific child traits create risk for greater use of deception. Specifically, the current findings suggest deception may be minimized by bolstering EF capacity in those with low temperamental fear, and teaching children with high EF to cope with fearful experiences. Obtaining a clear understanding of factors that contribute to deception can build knowledge of the etiology of potentially problematic deception and development of effective treatment and educational practices.

Notes

1. Two participants had EC scores greater than 3 SD above the mean. All analyses including EC were conducted with and without these outliers, and the pattern of results remained the same.
2. Standardized Beta coefficients are reported.
3. Beta coefficients with EC outliers removed are as follows: temperamental fear (β = -0.04), EF (β = 0.04), interaction between fear and EF (β = 0.01).
4. When children who peeked and then confessed were removed from the regression, the same pattern of results emerged ($p < .10$). When children who did not peek were removed from the regression, thereby comparing children who peeked/confessed and those who peeked/lied, the regression did not reach significance ($p = .26$), nor did the interaction between WM and temperamental fear ($p = .12$).
5. Simple slope analysis revealed that the slope for high temperamental fear (+1 SD = 3.57) was significantly different from zero (simple slope = 1.69, $t = 2.13$, $p = .04$), and the slope for low temperamental fear (–1 SD = 2.11) was not significantly different from zero (simple slope = −0.67, $t = –1.34$, $p = .19$).
6. When age was entered as a moderator in logistic regressions, $p > .10$.

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