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Social and Cognitive Correlates of Children's Lying Behavior

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Abstract

The relation between children's lie-telling and their social and cognitive development was examined. Children (3 - 8 years) were told not to peek at a toy. Most children peeked and later lied about peeking. Children's subsequent verbal statements were not always consistent with their initial denial and leaked critical information revealing their deceit. Children's conceptual moral understanding of lies, executive functioning, and theory-of-mind understanding were also assessed. Children's initial false denials were related to their first-order belief understanding and their inhibitory control. Children's ability to maintain their lies was related to their second-order belief understanding. Children's lying was related to their moral evaluations. These finding suggest that social and cognitive factors may play an important role in children's lie-telling abilities.

Lying involves a speaker making a false statement with the intention to deceive the recepient (Bok, 1978; Chrisholm & Feehan, 1977; Coleman & Kay, 1981; Lee, 2000). Lie-telling behavior in children has received increased attention in recent years by developmental psychologists for both its theoretical implications in understanding children's social cognitive development (e.g., Chandler, Fritz, & Hala, 1989; Leekam, 1993; Peskin, 1992; Polak & Harris, 1999; Sodian, 1991) as well as its practical applications in legal, clinical and educational settings (e.g., Chagoya & Schkolne, 1986; Goodman et al., 2006; Lyon, 2000; Strichartz & Burton, 1990; Stouthamer-Loeber, 1986; Talwar, Lee, Bala, & Lindsay, 2002, 2004). The majority of existing research on children and lying has examined children's understanding and moral evaluation of lies (e.g., Bussey, 1992, 1999; Lee, Cameron, Xu, Fu, & Board, 1997; Lee, & Ross, 1997; Siegal & Peterson, 1996, 1998; for a review, see Lee, 2000). These studies have shown that children show rudimentary conceptual and moral understanding of lying around 3 years of age but take more than a decade to reach maturity (e.g., being able to consider intention when categorizing a statement as a lie and evaluate its moral values). Only a limited number of studies have investigated children's actual lie-telling behavior, most of which have involved preschool children (e.g., Chandler et al., 1989; Lewis, Stanger, & Sullivan, 1989; Peskin, 1992; Polak & Harris, 1999; Talwar & Lee, 2002a, 2002b; Talwar et al., 2002; 2004; Talwar, Murphy, & Lee, 2007). Overall, these studies have found that lie-telling behavior emerges in the pre-school years and that young children are able to deceive others early in life.

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Children's Lie-Telling Behavior

The most frequently used method to study lying in children (e.g., Lewis, et al., 1989; Polak & Harris, 1999; Talwar & Lee, 2002a; Talwar, Gordon, & Lee, 2007) is the temptation resistance paradigm pioneered by Sears, Rau, & Alpert (1965). In this paradigm, children are typically told explicitly by a researcher not to peek at or play with a toy when left alone. Due to children's curiosity and difficulty to resist temptation (hence the name of the paradigm), most children tend to disobey the researcher's instruction. Upon returning, the researcher asks children whether they have peeked at or played with the toy. Thus, the temptation resistance paradigm creates a situation where children who have transgressed by disobeying an adults' instruction can make a decision either to lie or to tell the truth about their transgression. The advantage of this paradigm is that it elicits spontaneous lies from children (i.e., children are not instructed to lie) to conceal a transgression. More importantly, it mimics the naturalistic conditions in which children tend to lie (DePaulo & Jordan, 1982; Newton, Reddy & Bull, 2000; Wilson, Smith, & Ross, 2003). Observational studies (e.g., Newton, et al. 2000; Wilson, et al. 2003) have found that the most common and earliest lies children tell tend to conceal misdeeds where they have done something they were not supposed to do. Interestingly, despite the early and common occurrence of these types of lies, children of all ages and adults view them very negatively. For instance, Bussey (1992, 1999) found that children as young as 4 years of age rated lies about misdeeds as being very bad and that the liar would feel guilty for telling such a lie. Furthermore, they rated this type of lie more negatively than other types of lies and even misdeeds themselves.

In a classic study, Lewis et al., (1989) experimentally investigated 3-year-olds' deception to conceal their transgression with the use of a temptation resistance paradigm. Lewis et al., (1989) found of the 33 children tested, 29 peeked and 38% lied about peeking at the toy. Lewis et al. (1989) concluded that children as young as 3 years of age are capable of verbally deceiving others. This result was replicated by Talwar and Lee (2002a) who showed that 36% of 3-year-olds lied about their peeking. They also found that unlike the 3-year-olds, the majority of the children between 4 and 7 years of age lied. Polak and Harris (1999) further modified Lewis et al.'s paradigm. They used a permissive condition where children were allowed to play with a toy and a prohibition condition where children were instructed not to touch the toy. Similar results were obtained with the majority of 3- and 5-year-olds lying in the prohibition condition, whereas all children in the permissive condition admitted to their touching the toy. Thus, Polak and Harris concluded that children's denials about their transgression reflected their deliberate attempt to mislead rather than forgetting. These results, along with the results of related research (Chandler et al., 1989; Lewis et al., 1989; Peskin, 1992; Talwar & Lee, 2002a), suggest that young children are able to engage in intentional verbal deceptive acts when given the opportunity.

Children's Ability to Lie Successfully

While children begin to tell lies from the preschool years, their abilities to lie successfully appear to develop well into middle childhood. To be successful in deceiving an intended dupe, a lie-teller must be able to not only produce a false statement but also ensure consistency between their initial lie with subsequent statements. Any inconsistencies in one's statements may lead to the detection of one's lies. The ability to maintain consistency between statements during deception is referred to as semantic leakage control in the literature (Talwar & Lee, 2002a). Talwar and Lee (2002a) found that when younger children were asked about the identity of the toy, even though children said they had not peeked at the toy, they often failed to feign ignorance and blurted out the identity of the toy. Talwar and Lee (2002a) showed transcripts of the children's exchange with the experimenter to university students who could easily detect children's lies. However, a developmental trend

in children's ability at semantic leakage control was found. Whereas the majority of the children between 3 and 5 years blurted out the name of the toy that they denied having peeked at and thus implicated themselves as having transgressed, about half of the 6- and 7-year-olds feigned ignorance of the toy's identity. As a result, those children who feigned ignorance were not distinguishable from children who did not peek, and they were not detected by adults. This finding suggests that with age children become increasingly capable of maintaining consistency in their subsequent statements when lying.

Social and Cognitive Factors

It has been speculated that younger children may lack the cognitive abilities to be convincing lie-tellers (Talwar & Lee, 2002a), which may account for the developmental differences found in children's lie-telling behavior at different ages. However, there has been very little research on the exact social and cognitive factors that may play a role in children's ability to lie successfully. The limited existing research appears to suggest that children's theory of mind understanding, executive functioning and their conceptual and moral understanding of lies may be related to their lie-telling abilities.

Theory of mind understanding

There exist two hypotheses regarding the relationship between theory of mind understanding and lie-telling. The first hypothesis suggests a relationship between children's lie-telling and their first-order belief understanding (Chandler et al., 1989; Polak & Harris, 1999), herein referred to as ToM_1 Hypothesis. The basis for this hypothesis is that telling a lie successfully requires deliberately creating a false belief in the mind of another. Acts of deception such as lying have been identified as early indicators of a child's understanding of belief and false belief (Chandler et al., 1989; Peskin, 1992; Ruffman, Olson, Ash & Keenan, 1993; Sodian, 1991). Chandler et al. (1989) found that children as young as 3 years of age would intentionally create a false belief in another by withholding genuine information or planting false information. This conclusion remains controversial (Sodian, 1991; Sodian, Taylor, Harris & Perner, 1991). Further evidence of a relation between children's lying and theory of mind understanding comes from Polak and Harris (1999) who found that 3- and 5-year-olds' false belief understanding was related to their false denials about having played with a toy. However, their false belief understanding was not related to the lie-tellers' feigning ignorance in follow-up questions (i.e., failing to conceal their peeking and thus revealing the fact that their initial denial was false).

The second hypothesis posits that there is a relationship between children's abilities to maintain their lies and their second-order belief understanding (herein referred to the ToM_2 Hypothesis). Previous research has shown that second-order mental state understanding (e.g., Peter knows that Sally thinks it is raining) begins to emerge only around 6 years of age and undergoes steady development well into adolescence (Sullivan, Zaitchik, & Tager-Flusberg, 1994; Wimmer & Perner, 1983). Further, Banerjee and Yuill (1999) found that children who passed second-order belief tests were more likely to suggest story protagonists make false claims so as to present themselves in a positive light to others. Based on this evidence, Polak and Harris (1999) and Talwar and Lee (2002a) hypothesized, in the context of the aforementioned temptation resistance paradigm, that older children would be more likely to feign ignorance in follow-up questions and their successful deception would be linked to their performance on second-order belief tasks. They suggested that children's false denials of peeking only require the child to represent a belief that is different from the true state of affairs. Therefore, to falsely deny peeking requires only a first-order false belief understanding. However, to sustain the lie that one had not peeked, when asked the identity of the object they were told not to peek at, children had to infer what belief they ought to have, given the initial denial. Thus, Polak and Harris (1999) predicted that older children

would be more likely to feign ignorance in follow-up questions than younger children, and that success in doing so would be linked to performance on second-order false belief tasks. Indirect support for the ToM2 Hypothesis comes from the findings of Talwar and Lee (2002a) demonstrating that 6-and 7-year-olds (who are known to have better second-order false belief understanding) were better at maintaining their lies than younger children. Recently, Talwar, Gordon, and Lee (2007) provided direct support to the ToM_2 Hypothesis. They showed that feigning ignorance after having peeked at a toy was indeed significantly related to second-order belief scores among children between 7 and 11 years of age.

Thus, while initial false denials may be related to children's first-order belief understanding (ToM_1 Hypothesis), maintaining a lie in follow-up questions may be related to a child's ability to represent another's beliefs and what the other will infer from any knowledge revealed by the child (ToM_2 Hypothesis; Polak & Harris, 1999; Talwar & Lee, 2002a; Talwar et al., 2007). However, these hypotheses have not been concurrently examined. Only one study has directly examined the ToM_1 Hypothesis (Polak & Harris, 1999) with 3 and 5 year-old children, and only one study has examined the ToM_2 Hypothesis with children 7 years and older (Talwar et al., 2007). The development of children's lie-telling behavior between 3 and 8 years of age, when critical changes in theory of mind understanding occurs, has not been examined nor has the relationship between both children's first and second-order belief understanding and their actual lie-telling behavior. Thus, one of the objectives of the current study was to examine the relationship between first and second-order belief understanding and lie-telling abilities in children between 3 and 8 years of age.

Executive functioning

Some evidence exists that children's lie-telling behavior also might be related to executive functioning. Executive functioning has been defined as a set of higher-order psychological processes involved in goal-oriented behavior under conscious control (Zelazo & Muller, 2002). Executive functioning encompasses a collection of cognitive skills including self-regulation, inhibitory control, planning, attentional flexibility, and strategy employment (Welsh, Pennington, & Groisser, 1991; Zelazo, Carter, Reznick, & Frye, 1997). Executive functioning skills have been shown to emerge in late infancy and develop during the childhood years (Welsh & Pennington, 1988; Zelazo & Muller, 2002), a time when researchers have noted increases in lie-telling skill (e.g., Polak & Harris, 1999; Talwar & Lee, 2002a). In particular, it has been suggested that inhibitory control and working memory may be directly related to children's deception (Carlson & Moses, 2001; Carlson, Moses, & Hix, 1998). Inhibitory control is the ability to suppress interfering thought processes or actions (Carlson, Moses, & Breton, 2002), and working memory is a system for temporarily holding and processing information in the mind (Baddeley, 1986). When lying, children have to suppress the reporting of the transgression that they wish to conceal and represent and utter the false information that differs from reality (Carlson et al., 1998, 2002). Additionally, to maintain their lies, children must inhibit those thoughts and statements that are contrary to their lie and that would reveal their transgression, while maintaining in their memory the contents of their lie. Thus, to tell lies and to lie successfully, children must be able to hold conflicting alternatives in their mind (i.e., what they really did/thought and what they said they did/thought).

Only one study has examined the relation between children's executive functioning and deceptive behavior (Carlson et al., 1998). Carlson et al. (1998) found that preschool children who experienced difficulty with executive functioning tasks, especially those that require a high level of inhibitory control, demonstrated difficulties with physical deception (i.e., pointing). Although Carlson et al. (1998) did not explicitly examine lie-telling behavior, their results seem to suggest that children may also have difficulties with lying if they lack advanced executive functioning skills, particularly in terms of inhibitory control and

working memory. However, no study has directly tested this hypothesis. The current study aims to address this gap in the literature by examining the relationship between executive functioning and children's lie-telling abilities.

Children's conceptual and moral understanding of lying and truth-telling

Research has demonstrated that a child's conceptual and moral understanding of lie- and truth-telling emerges early in the preschool years and develops rapidly throughout the school years (Bussey, 1992; 1999; Peterson, Peterson, & Seeto, 1983; Piaget, 1932; Siegal & Peterson, 1998; Talwar et al., 2002; see Lee, 2000 for a review). As young as 3 years of age, children already have a rudimentary concept of lies that are told for antisocial purposes and they evaluate such lies negatively. With increased age, children begin to differentiate antisocial lies from honest mistakes, guesses, exaggerations, and eventually sarcasm and irony. Children also gradually take into consideration the social context in which lies are told and the intention of the lie-teller when evaluating lies. Overall, by early adolescence, children's conceptual and moral understanding of lying and truth-telling becomes comparable to adults.

However, there has been limited research to examine the relationship between children's conceptual and moral understanding and their actual lying behavior. Talwar et al. (2002) found no relationship between children's actual lie- and truth-telling behavior and their conceptual and moral understanding of lies. The majority of children who reported that lying to conceal a transgression was bad, could correctly identify such a lie, and recommended others to tell the truth. Nevertheless, most of them told lies to conceal their own transgressions. Another study by Talwar et al.(2004) found a significant but modest correlation between children's conceptual and moral understanding and their lie-telling behavior to conceal a parent's transgression. It should be noted that in both studies children's conceptual and moral understanding was assessed via tasks commonly used by legal professionals in the court (Bala, Lee, Lindsay & Talwar, 2000; Lyon, 2001; Talwar et al., 2004). These tasks are typically very brief and only assessed whether children had a minimal understanding of lying and truth-telling. As a result, there was low variability in children's scores which may have obscured a genuine relationship between children's developing conceptual and moral knowledge and their lie-telling behavior. One of the objectives of the current study was to address this issue by using a more comprehensive measure of children's conceptual and moral understanding of lie- and truth-telling.

In summary, there have been few studies that have examined social and cognitive factors contributing to the development of lying or truth-telling. Furthermore, the few studies that have examined the relationship between social and cognitive factors (e.g., theory of mind, executive functioning, children's conceptual and moral judgement) and lying have only examined one factor and none have examined the differential role of these factors on children's lie-telling behavior. The aim of the present research was thus to address these gaps in the literature and to provide an integrated and comprehensive picture of the relationship between children's lie-telling behavior and various social and cognitive factors.

In the current study, to assess their lying behavior, children between 3 and 8 years of age participated in a temptation resistance paradigm similar to that used in the previous studies (Lewis et al., 1989; Talwar & Lee, 2002a; Talwar et al., 2002). Children were told not to peek at a toy while the researcher left the room. Later, children were asked to promise to tell the truth, and then questioned whether they had peeked. Children's conceptual and moral understanding was assessed using stories where children were asked to identify if the protagonist lied or not and rate their statements as good or bad (Bussey, 1992, 1999; Peterson et al., 1983; Seigal & Peterson, 1998). Children also completed 3 tests of executive functioning (Gerstadt, Hong, & Diamond, 1994; Hala, Hug & Henderson, 2003; Kochanska,

Murray, Jacques, Koenig, & Vandegeest, 1996), and four belief tasks (Hogrefe, Wimmer, & Perner, 1986; Sullivan et al., 1994; Wimmer & Hartl, 1991; Wimmer & Perner, 1983).

Based on existing evidence, we expected that as age increased, children who peeked at the toy would be more likely not only to deny their transgression (initial lie) but also to conceal their transgression when asked about the identity of the toy (i.e., semantic leakage control). For example, they would feign ignorance about the fact that they knew the identity of the toy. Further, it was expected that children's first-order belief understanding would predict children's lie-telling in the temptation resistance paradigm (ToM_1 Hypothesis) and their second-order belief understanding would predict their semantic leakage control (ToM_2 Hypothesis). It was also expected that better inhibitory control and better working memory would be positively associated with children's semantic leakage control to conceal their transgression in their verbal statements after an initial lie. For example, children who can hold information longer in their working memory and who do not respond impulsively would be more likely to feign ignorance about the identity of the toy. Finally, we hypothesized that children who had high conceptual and moral understanding of lie- and truth-telling (e.g., knowing the difference between truth and lies and its moral negativity) would be less likely to lie in the temptation resistance paradigm.

Method

Participants

Children (N = 150) between 3 and 8 years of age participated in the study (M = 65 months, SD = 12.3; ranging from 36 to 102 months, 80 boys). There were 77 preschool children (M = 49.9; SD = 8.4; 31 girls) and 73 early elementary children (M = 85.4, SD = 10.3; 39 girls). Henceforth, the former age group will be referred to as the younger group and the latter the older group. The children were predominately Caucasians and from middle income families in a medium sized North American city (population: 120,000).

Measures and Procedure

Lie-telling behavior—The present study used a modified version of the temptation resistance paradigm used in previous studies (Lewis et al., 1989; Talwar & Lee, 2002a; Talwar et al., 2002) to examine children's lying behavior. After obtaining parental consent, each child was brought into a room with a researcher. In this room the child and the researcher played a guessing game. The child was instructed to turn around in their chair so their back was to the researcher while the researcher played a sound from a toy. They were instructed not to break the rule by turning around in their chair to peek at the toy during the game. They could only look when the experimenter said so. Upon hearing the toy sound the child was asked to guess what the toy was. All the toys were familiar to the children from television programs and stories (e.g. Buzz Light Year, Godzilla, Elmo) and all had familiar accompanying sounds that were clues to their identity. Throughout the game children were repeatedly told of the no peeking rule. After the child correctly guessed the identity of 2 toys the researcher was called out of the room. The researcher told the child she had to leave for a minute and that the third final toy would be left on the table with the sound playing. The third toy was a Barney doll and the sound that accompanied it was unrelated to the doll and came from a greeting card. Thus, the child could not guess correctly the identity of the toy based upon the sound that he/she heard. Prior to the researcher leaving the room the child was told not to turn around and peek at the toy while the researcher was out of the room. The researcher then left the room for one minute. A hidden video camera recorded the child's behavior while the researcher was absent. When the researcher, who was unaware of whether the child had peeked, returned to the room they told the child not to turn around and then covered the toy with a sheet. Once the toy was covered the child was instructed to turn

around in their chair. The researcher asked the child to promise to tell the truth. This procedure was adapted from Talwar et al. (2002). Asking children to promise to tell the truth was a major modification of the typical procedure because existing studies showed that without asking children to promise to tell the truth, the majority of children would lie (e.g., Lewis et al., 1989; Polak & Harris, 1999; Talwar & Lee, 2002a; Talwar et al., 2002). This would result in low variability in lying behavior leading to difficulty in revealing any potential relations between lying and social and cognitive factors. However, when children were asked to promise to tell the truth, close to 50% of the children would tell the truth (Talwar et al., 2002), making such a procedure ideal for examining the relations between lying and social and cognitive factors.

The child was then asked the critical question "When I was gone, did you peek at the toy?" and the follow-up question "Who do you think the toy is?" Children who gave a correct answer (Barney) were asked "How did you know who the toy was?"

Social and cognitive factors—Children returned on a second visit to complete 3 sets of social and cognitive tasks: conceptual and moral judgment tasks, theory-of-mind tasks, and executive functioning tasks. The order of the tasks was counterbalanced and each child was randomly assigned to 1 of 3 different orders. The whole session lasted on average about 30 minutes with 2 short breaks given between tasks.

Concept and moral judgement tasks: To test children's conceptual and moral understanding of lie- and truth-telling 9 short stories were used. These stories involved various situations in which a character may have lied to conceal a transgression, told the truth about it, lied for a friend, made an honest mistake, inadvertently passed on a lie, told a white lie, played a trick, told an exaggeration, followed through on a promise, or failed to follow through on a promise. The stories were adapted from Bussey (1992), Bussey (1999), Seigal and Peterson (1998), Peterson et al., (1983), and Talwar and Lee (2002a). An example of one of the stories about lying to conceal a transgression is described below:

> Katy's teacher gave her candy for a special treat but told her not to eat it until after lunch. But, when Katy's teacher went away, she ate the candy before lunch. When her teacher came back and asked Katy if she had eaten the candy Katy said no

After each story was complete the child was asked a concept classification question and an act evaluation question. The questions were modeled based on previous research that has examined children's conceptual and moral evaluations of lying and truth-telling (Bussey, 1992, 1999; Seigal & Peterson, 1998, Peterson et al., 1983, Talwar & Lee, 2002a, Wimmer, Gruber, & Perner, 1984). The concept classification question was, "Is what Katy in the story said a lie, the truth, or something else?" To score this component each child was given 1 point for each concept question that he/she answered correctly across all stories, yielding a score out of 9. The act evaluation question was, "Is what Katy said, very very bad, very bad, bad, not good/not bad, good, very good, or very very good." To help answer this question the child was instructed to indicate their answer using a 7-point Likert Scale with stars indicating the positive ratings and Xs indicating the negative ratings. For example, if a child pointed to 3 stars it indicated they thought the character's behavior was very very good. Two stars indicated very good, and one star indicated just good. This format was used in the same way for the Xs such that one X indicated bad, two Xs very bad, and three Xs very very bad. If a child believed the behavior to be not good and not bad they were instructed to point to the circle. Prior to giving the ratings, each child was trained on how to use the scale. This scale was adapted from previous studies (Bussey, 1992; 1999; Peterson et al., 1983) which found that preschoolers were able to successfully use this scale to evaluate lies. Children's ratings were then converted to scores for each moral question ranging between -3 to +3.

Theory of mind understanding: To test children's theory of mind understanding five tasks were used. These five tasks were adapted from Hogrefe et al. (1986), Sullivan et al. (1994), Wimmer and Hartl (1991), and Wimmer and Perner (1983). These tasks included an unexpected contents first-order false belief task, 2 unexpected location first-order false belief stories, and 2 unexpected location second-order belief stories. The stories were acted out in puppet plays and shown to children on video. The order of the stories was counterbalanced between subjects.

For the unexpected contents false belief task (Wimmer & Hartl, 1991), each child was presented with a box of Band-aids in which some unexpected contents (i.e., crayons) were placed. The child was shown the Band-aid box and asked what they thought was in the box. Following the child's answer, the box was opened to reveal a set of crayons. Upon showing the child that the actual contents the box was closed. Then the child was asked two questions about the contents of the box. First, they were asked, "Before you looked inside, what did you think was in the box?" The child was then introduced to a puppet Max and asked, "What does Max think is in the box?" Each child was given 1 point for correctly answering each question. This procedure gave a possible score of 2.

The two unexpected location first-order belief stories were modeled after Wimmer and Perner (1983). One story involved Mark who puts his chocolate in one location before going out to play. His mother moves the chocolate to a second location while he is away. Each child was asked, "Where will Mark look for his chocolate bar?" The second story was the Sally-Ann story where Ann moves Sally's toy car while she is absent. Each child was asked "Where does Sally think her toy car is?" For each story, the child received a score of 1 point for correctly attributing a false belief to the protagonist, for a total possible score of 2. Along with the contents false belief task, each child had a total "first-order belief score" out of 4.

The two second-order belief tasks were adapted from Hogrefe et al. (1986) and Sullivan et al. (1994). One story involved two children – John and Emma who encounter an ice cream man at the park. Emma goes home to get money for an ice cream. While she is gone the ice cream man tells John he is going to the school to sell ice cream. On the way to the school, the ice cream man meets Emma and tells her he is going to the school. Throughout the puppet play the child participant was asked control questions regarding the characters actions (e.g., "What did the ice cream man say to John?"). All children answered the control questions correctly. Each child was asked the following target questions: "Does John know that Emma knows where the ice cream man is now?", and "Where does John think Emma will go to buy ice cream?" Each child received a score of 1 point for correct answers to each question.

The second story involved two children, Mary and Simon, and their Grandpa. In the story, Grandpa gave the children a piece of chocolate to share. Simon wanted to keep the treat for himself so he hid it while Mary played outside. While Simon was busy hiding the chocolate, Mary was watching him through the window. During this puppet play the child participant was asked several control questions (e.g., "Where has Simon put the chocolate?"). All children answered the control questions correctly. Each child was asked the following target questions: "Does Simon know that Mary knows where chocolate is now?" and "Where does Simon think Mary will look for the chocolate?" Each child received a score of 1 point for correct answers to each question. The total score for the two second-order belief stories was out of 4, which is henceforth referred to as the "second-order belief score".

Executive functioning: To test children's executive functioning 3 tasks were used. One task (the Whispers task) was a measure of inhibitory control (Kochanska, et al., 1996), one (the Stroop task) was a measure of inhibitory control involving inhibition and working memory

(Gerstadt, et al., 1994; see Carlson & Moses, 2001 for discussion of task) and one (the Six Box Scramble task) was a measure of working memory (Hala, et al., 2003). The order of the tasks was counterbalanced.

In the Whispers task the child was presented with 10 pictures picked out with the aid of their parent. These pictures consisted of story characters that children were familiar with and others that they were not. Child participants were told they would see a series of pictures, and after each picture they had to tell the researcher who they thought was in the picture. The one rule that each child was given for completing this task was that they were to whisper all their answers. To ensure that all the children understood how to whisper they were asked to whisper their name and their age. It was recorded if the child responded with a whisper, a normal voice, a mixed voice, or a shout. Each child was given 3 points for correctly answering in a whisper, 2 points for answering in a normal voice, 1 point for answering in a mixed voice, and zero points for answering in a shout. This yielded a possible score of 30.

For the Stroop task each child was instructed that they would be playing a game of opposites. The child was shown a picture of a moon and asked what it was to ensure the child was familiar with the object. They were then instructed to say “day or sun” each time the researcher showed them a picture of the moon. The child was then showed a picture of a sun. After ensuring familiarity with the object the child was instructed to say “night or moon” each time the researcher showed them a picture of the sun. Two practice trials were performed to test the child’s understanding of the rules. Following the practice trials the child was shown 16 pictures, 8 of the sun and 8 of the moon. These pictures were randomly ordered to minimize predictability. Each child was given 1 point for answering correctly and 0 points for answering incorrectly with a total score out of 16.

The final executive functioning task was the Six Box Scramble task. Six boxes, each a different color, were placed on a plank in front of children. Each child was told that in each box the researcher had placed a sticker and that it was their job to find them. The child was told that he/she was only allowed to select one box at a time. After each selection the boxes were scrambled and the child was allowed to choose again until they found all six stickers. The child was allowed to keep the stickers once they found them. To score this task the number of trials needed for the children to find all stickers were added up and then subtracted from 15 (the maximum number of trials allowed).

Results

In order to examine children’s lie-telling behaviour and the relation to different social cognitive measures, a series of analyses were conducted. First, descriptive statistical results regarding children’s peeking and lie-telling behavior were obtained. Second, to examine differences between those children who lied and those who did not in their social and cognitive factor scores, ANOVAs were conducted. Finally, to examine what social and cognitive factors predicted children’s behaviour, hierarchical regression analyses were performed.

Peeking behavior

Overall, 82% of the children (123) peeked at the toy in the experimenter’s absence, and on average children peeked 11 seconds after the experimenter left the room (SD = 13.2), with half of the children peeking within 6 seconds. Regression analysis revealed no significant age and sex of child effects for peeking behavior (see below for details).

Initial lie

Of the 123 children who peeked, 79 (64%) children lied about their transgression, while 44 children (36%) confessed. Regression analysis revealed no significant age and sex of child effects (see below for details). All 27 of the children who refrained from peeking stated that they had not peeked.

Lie-teller's responses to the follow-up question (semantic leakage control)

Of the 79 children who lied about peeking, 57 (72%) children gave the correct answer to the follow-up question, "What do you think the toy is?" whereas all 44 children who confessed to peeking gave the correct answer, χ^2 (1, N = 123) = 7.18, $p < .01$. Regression analysis revealed no significant age and sex of child effects (see below for details). All the 27 children who refrained from peeking gave incorrect answers. Thus, it seems that few lie-tellers concealed their knowledge of the identity of the toy that they had peeked at. Most were unable to maintain their lie in answer to the follow-up question.

Children's answers to "How did you know what the toy was?" when they gave the correct answer were analyzed to examine further children's ability to maintain their initial lie. Children's answers were divided into 2 categories: plausible explanations which attempted to conceal their peeking (e.g., "I heard the music before and knew it was Barney"; "My sister has the video and I hear that music on it"; "I knew the song was Barney's"), and explanations which revealed their peeking behavior or did not explain the correct answer (e.g., "I saw purple"; "It looked like Barney"; "I don't know") with 97% inter-coder reliability. Of the 57 children who said the toy was Barney, 28 (49%) gave plausible answers, while 29 either said "I don't know" or implicated themselves (e.g., "I saw purple"). Regression analysis revealed a significant effect of age but no sex of child effect (see below for details). With increased age, children became better at maintaining their lies and giving plausible explanations that concealed their transgression. To illustrate this age effect, we dichotomized children's ages into a younger group (77 preschoolers: M = 49.9; SD = 8.4; 31 girls) and an older group (73 early elementary school children: M = 85.4, SD = 10.3; 39 girls): 77% of the older children gave plausible explanations whereas only 29% of the younger children gave plausible explanations.

Univariate analyses: Social and cognitive measures related to children's lie-telling behavior

To further examine the differences between lie-tellers, confessors and children who did not peek (non-peekers) in terms of each social and cognitive factors (i.e., theory of mind understanding, executive function, and conceptual moral understanding), we conducted a 3 (type of child: liar, confessor, non-peekers) × 2 (gender) × age (continuous variable) ANOVA on each social and cognitive factor. Age was treated as a continuous variable in these analyses to help increase the power of the analysis because only one degree of freedom was used. The reason that individual ANOVAs were conducted on each social or cognitive measure was to ascertain whether our initial a priori hypothesis regarding each measure to be correct.

Whispers task

There was a significant effect for age, $F(1, 149) = 16.36$, $p < .001$, eta^2 = .13. To illustrate the significant age effect for this task as well as the other social-cognitive tasks (see below), we again dichotomized children's ages into two age groups: the younger children (the preschoolers) and the older children (the early elementary school children). As shown in Table 1, the older children's scores on the whispers task were significantly greater than the

younger children's scores. No other factors were significant. There were no differences between lie-tellers, confessors, and non-peekers.

Stroop task

There was a significant effect for age, $F(1, 149) = 41.28$, $p < .001$, $eta^2 = .22$. Children's scores on the stroop task increased with age (Table 1). There was also a significant effect for type of child, $F(2, 149) = 5.32$, $p < .01$, $eta^2 = .07$. Bonferroni posthoc analyses revealed that confessors had significantly lower scores ($M = 10.68$, $SD = 4.47$) than lie-tellers ($M = 13.04$, $SD = 3.80$, $p < .01$) and non-peekers ($M = 13.48$, $SD = 2.87$, $p < .05$). There were no significant differences between the two latter groups.

Six box scramble task

There was a significant effect for age, $F(1, 149) = 7.27$, $p < .01$, $eta^2 = .05$. Children's scores increased with age (Table 1). There was also a significant effect for sex of child, $F(2, 149) = 7.27$, $p < .01$, $eta^2 = .05$. Boys had lower scores on the six box scramble ($M = 7.58$, $SD = 2.28$) than girls ($M = 8.51$, $SD = 1.22$). There were no differences between lie-tellers, confessors, and non-peekers.

First-order belief

There was a significant effect for age, $F(1, 149) = 71.67$, $p < .001$, $eta^2 = .38$. Children's first-order belief scores increased with age (Table 1). There was also a significant effect for type of child, $F(2, 149) = 4.79$, $p = .01$, $eta^2 = .07$. Bonferroni posthoc analyses with lie-tellers as the reference group, revealed that lie-tellers had significantly higher scores than ($M = 3.04$, $SD = 1.28$) than confessors ($M = 1.93$, $SD = 1.50$, $p < .05$) or non-peekers ($M = 2.52$, $SD = 1.60$, $p < .05$). Thus, it appears ToM_1 Hypothesis was confirmed with children who initially lied having higher scores than those who confessed or did not peek.

Second-order belief

There was a significant effect for age, $F(1, 149) = 47.56$, $p < .001$, $eta^2 = .25$. Children's second-order belief scores increased with age (Table 1). There were no other significant factors.

Children's conceptual knowledge of truthful and untruthful statements

There was a significant effect for age, $F(1, 149) = 91.89$, $p < .001$, $eta^2 = .2$. Children's ability to correctly classify lies increased with age (Table 3). There were no other significant effects.

Children's moral judgments of truthful and untruthful statements

A factor analysis using the principal component method of extraction with varimax rotation was performed on children's ratings of the different stories (i.e. their answers to the act evaluation questions). This analysis yielded three factors that accounted for 54 % of the variance (see Table 2). The first factor, labelled Factuality, contained evaluations of three stories (factor loadings above 0.4) including a trickery, white lie, and lying to conceal a transgression (eigenvalue = 2.29, 26% of the variance accounted for). The second factor, labelled Motivation, contained evaluations of four stories including lies for a friend, exaggerations, inadvertent lies, and mistakes (eigenvalue = 1.44, 16% of the variance accounted for). The third factor, labelled Promise, contained evaluations of two stories regarding promising and failure to keep a promise (eigenvalue = 1.15, 13% of the variance accounted for). For subsequent analyses, factor scores representing the three factors were derived.

Three separate ANOVAs were performed for each of the three factor scores: Factuality, Motivation and Promise with age as a continuous variable and type of child as a categorical variable. For the Factuality factor, there was a significant effect for age, $F(1, 149) = 4.92$, $p < .05$, $eta^2 = .04$. Children's Factuality factor scores decreased with age (Table 1). There was also a significant effect for type of child, $F(2, 149) = 3.10$, $p < .05$, $eta^2 = .04$. Bonferroni posthoc analyses revealed that confessors had higher Factuality factor scores (M = 0.32, SD = 0.83) than lie-tellers ($M = -0.17$, $SD = 1.05$, $p < .05$) or non-peekers ($M = -0.02$, $SD = 0.99$, $p < .05$). For the Motivation factor, there was a significant effect for age, $F(1, 149) = 9.46$, $p < .01$, $eta^2 = .06$. Children's Motivation factor scores increased with age (Table 1). There were no other significant effects. For the Promise factor, there was a significant effect for age, $F(1, 149) = 4.65$, $p < .05$, $eta^2 = .03$. Children's Promise factor scores decreased with age (Table 1). There was also a significant effect for type of child, $F(2, 149) = 3.48$, $p < .05$, $eta^2 = .05$. Bonferroni posthoc analyses revealed that non-peekers had higher Promise factor scores ($M = .54$, $SD = 1.09$) than confessors ($M = -0.08$, $SD = .81$, $p < .05$) or lie-tellers ($M = -0.1$, $SD = 1.03$, $p < .05$).

Multivariate analyses: Social and cognitive measures relationship to children's behavior

Given the presence of several significant correlations among the independent variables shown in Table 3, a series of hierarchical regressions were conducted on children's behavior in the temptation resistance paradigm in order to examine whether social and cognitive factors were together or individually predictive of children's peeking (i.e., whether they peeked or did not peek), tendency to lie (i.e., whether they lied or told the truth), and ability to maintain their lies (i.e., whether they were able to feign ignorance after having told a lie). Based upon previous research, it was expected that children's lie-telling behaviour would be predicted by their theory of mind and executive function abilities.

Peeking behavior

A hierarchical logistic regression was conducted with children's peeking behavior (peeking or not peeking) as the predicted variable and child age (continuous variable) and sex entered in the first step, and whispers task score, stroop task score, six box scramble task score, first-order and second-order belief score, concept classification score and 3 factor scores were entered on a second step. For this and subsequent logistic regression analyses, the independent variables, since they were chosen for theoretical reasons (see Menard, 2002), were first entered as predictors. Additional predictors (i.e., interactions) were added individually to determine whether they would contribute significantly to the model. Significance was assessed by a Block χ^2 test (also known as the χ^2 difference test). In this test, the retention of each predictor in a model must increase the variability substantially in order to justify using a more complex model. The overall model was not significant, χ^2 (11, $N = 150$) = 16.74, *n.s.*

Peek latency

In a hierarchical linear regression analysis with peekers' peek latency scores as the predicted variable and the same predictors described above, the overall model was not significant, $F(11, 111) = 1.07$, *n.s.*

Initial lie (tendency to lie)

A hierarchical logistic regression was conducted with children's initial tendency to lie or tell the truth as the predicted variable and child age and sex were entered in the first step, and whispers task score, stroop task score, six box scramble task score, first-order and second-order belief score, concept classification score and 3 factor scores were entered on a second step. The dependent variable was children's answers to the question "Did you peek?" (liars

vs. confessors). The first model was not significant, χ^2 (2, N = 123) = 1.51, *n.s.* The second model was significant, χ^2 (11, N = 123) = 28.02, $p < .01$. Children's Stroop scores were a significant predictor of lying, ($ß = 0.2$, *Wald* = 8.5, $p < .01$). Children who lied had higher Stroop task scores ($M = 13.04$, $SD = 3.8$) than children who confessed ($M = 10.68$, $SD = 4.47$). Children's first-order belief scores was a significant predictor of lying, ($ß = 0.88$, *Wald* = 5.76, $p < .05$). Children who lied had higher first order belief scores ($M = 3.04$, $SD = 1.29$) than children who confessed ($M = 1.93$, $SD = 1.50$).

Lie-teller's responses to the follow-up question (semantic leakage control)

A logistic regression analysis was conducted with children's responses to the follow-up question "Who do you think it is" (correct vs. incorrect) as the predicted variable. Child age and sex were entered in the first step, whispers task score, stroop task score, six box scramble task score, first-order and second-order belief score, concept classification score and 3 moral judgment factor scores were entered on a second step (confessors were excluded from the analysis). The first model was not significant, χ^2 (2, N = 79) = 1.63, *n.s.* The second the model was significant, χ^2 (11, N = 79) = 23.80, $p < .05$. Children's Stroop scores were a significant predictor of lying, ($ß = -0.41$, *Wald* = 3.9, $p < .05$). Children who gave incorrect answers had higher stroop task scores ($M = 14.86$, $SD = 1.13$) than children who gave the correct answer ($M = 12.33$, $SD = 4.23$).

A logistic regression was conducted on lie-tellers' explanations for giving a correct answer. Child age and sex were entered in the first step, and whispers task score, stroop task score, six box scramble task score, first-order and second-order belief score, concept classification score and three moral judgment factor scores were entered on a second step (confessors were excluded from the analysis). The overall regression model was significant, χ^2 (11, N = 57) = 23.42, $p < .05$. In the first step, children's age significantly predicted children's explanations ($ß = 0.79$, *Wald* = 11.61, $p < .001$). In the second step after age was partialled out, children's second-order belief scores were a significant predictor of children's explanations, ($ß = 1.47$, *Wald* = 6.41, $p < .05$). Children who gave plausible explanations that concealed their peeking had higher second-order belief scores ($M = 2.9$, $SD =$. 69) than children who gave the correct answer ($M = 2.1$, $SD =$ .86). Thus, present results supported the ToM_2 Hypothesis with children's second-order belief understanding predicting their ability to maintain their lies and provide plausible explanations that did not reveal their transgression.

Discussion

The current study investigated children's lie-telling behavior and its relation to their theory of mind, executive functioning, and conceptual and moral knowledge of lie- and truth-telling was examined. Several major findings were obtained.

First, not only did most children peek at the forbidden toy, but also, when asked by an experimenter if they had peeked, 64% denied their transgression and thus lied. These findings are consistent with past research, which has found a strong tendency to lie in children under 7 years of age if they have transgressed (Lewis et al., 1989; Polak & Harrris, 1999; Talwar & Lee, 2002a). However, unlike previous studies that did not ask children to promise to tell the truth and found that 3-year-olds were less likely to lie compared to older children, no such difference was found in the present study. Our findings are similar to Talwar et al. (2002) which found no age difference when children were asked to promise to tell the truth. Also like Talwar et al. (2002) we found a similar rate of lying and confessing with more children confessing after promising to tell the truth than that found in other studies when children were not asked to promise to tell the truth. Taking together the present and previous findings, it appears that by 3 years of age and after, the tendency to lie about

one's own transgression remains strong throughout preschool and elementary school years. However, asking young children to promise to tell the truth can reduce their tendency to lie.

Second, it was hypothesized that older children would not only deny their transgression, but also successfully control semantic leakage by concealing their lie in the follow-up questioning. Overall, lie-tellers did not feign ignorance in their response to the first follow-up question. They correctly named the identity of the toy. However, half of the children appeared to make attempts to conceal their transgression by providing seemingly plausible explanations about why they knew the identity of the toy, and the tendency to give plausible explanations increased with age. Younger lie-tellers were more likely to correctly name the identity of the toy after claiming to not having peeked at the toy and then failed to give a plausible explanation for knowing the identity. Thus, it seems that as age increases older children are more skilled at maintaining their lies in subsequent verbal statements after they have told an initial lie.

Third, it was hypothesized that children's lie-telling behavior would be related to their first- and second-order belief understanding. Specifically, it was expected that children who performed better on first-order belief tasks would be more likely to lie (ToM_1 Hypothesis) and children who performed better on second-order belief tasks would be better at maintaining semantic leakage control (ToM_2 Hypothesis). The present results support both hypotheses. Consistent with Polak and Harris (1999), children's performance on first-order belief tasks predicted the false denials of their peeking behavior. Thus, children's initial lies may reflect their ability to represent a false belief that is different from their belief about the true state of affairs.

Furthermore, those children who had higher second-order belief scores were also better at concealing their transgression in follow-up questions, thus supporting the ToM_2 Hypothesis (Polak & Harris, 1999; Talwar & Lee, 2002a). Our results are consistent with the findings of Talwar et al. (2007) that the second-order belief understanding of elementary school-aged children (7 years and older) is significantly related to their ability to maintain semantic leakage control. However, there exists a noteworthy difference between the present study and that of Talwar et al (2007). In Talwar et al. (2007), children's second-order belief understanding was significantly related to their ability to feign ignorance. In contrast, in the present study, children's second-order belief understanding was not significantly related to their ability to feign ignorance but rather to their ability to provide plausible explanations to their correct naming of the forbidden toy. This difference, however, does not suggest inconsistencies between the two studies because the oldest children (7- and 8-year-olds) in the present study, like the youngest children (7- and 8-year-olds) in the Talwar et al. study, tended to blurt out the correct name of the forbidden toy. Thus, seeming inconsistencies in correlational results may reflect a developmental progression in children's ability at semantic leakage control, from being unable to control the leakage at all during the preschool years, to merely explaining away their leakage with plausible answers in the early elementary school years, to exercise greater leakage control by feigning ignorance altogether. It should be noted that future studies are needed to examine these differences and also the relationship between children's theory of mind understanding and other types of lies (e.g., high stakes lies where there are negative consequences to others, prosocial lies told to benefit others). It may be that when children must consider the consequences to others when lying, sharper developmental differences will be found in relation to their theory-of-mind understanding.

Nevertheless, these findings along with previous research begin to provide a developmental picture of children's lying to conceal their own transgression. Children's lying appears to progress through three levels (see also Polak & Harris, 1999, and Talwar et al., 2007). First,

children's "primary lies" begin around 2 to 3 years of age when children are first able to deliberately make factually untrue statements. While it is still unclear whether such statements are a form of word play, wish fulfillment, or genuine deception (i.e., statements made with an intent to instil false belief into the mind of the recipient), children's first falsehoods are often linked to situations of rule violations and children's attempt to avoid incrimination, protect self interests, or present themselves in a more positive light (Newton et al., 2000; Wilson et al., 2003). Given the fact that genuine lies told by children in later childhood tend to serve similar functions, such early falsehood may be a rudimentary form of intentional verbal deception. However, at this age children's lies are still infrequent (Newton et al., 2000; Wilson et al., 2003) with approximately half of 3 year-olds lying about their transgressions, while the remainder tend to be honest and confess their transgression when asked by adults (e.g., Lewis et al., 1989; Polak & Harris, 1999; Talwar & Lee, 2002a).

The second level, "secondary lies", reflects a significant shift that takes place between 3 and 4 years of age (Chandler et al., 1989; Peskin, 1992; Polak & Harris, 1999). At and after 4 years of age, the majority of children will readily tell a lie to conceal their own transgression. The results of the present study and previous studies shows that children's acquisition of first-order belief understanding may play an important role in children's progression from the first to the second level. Perhaps also related to the development of first-order belief understanding, children are able to regulate successfully their nonverbal behaviors to appear honest (Talwar & Lee, 2002a). However, many children at the secondary level appear to have difficulty at semantic leakage control. Their subsequent statements following an initial false statement tend to be inconsistent with the initial lie and thus make their deception readily detected by naïve adults (Talwar & Lee, 2002a). The third level, "tertiary lies", emerges around 7 to 8 years of age. At this level, children become gradually more and more sophisticated at semantic leakage control. Children will tell a deliberate lie while ensuring that their subsequent statements do not contradict the initial lie and thus make their statements difficult to distinguish from statements made by a non-liar. As found in the present study, children's second-order belief understanding may play an important role in the transition from the secondary to the tertiary level. This is perhaps because such understanding "allows intentional social coordination to occur" (Perner, 1988, p.272) such that children can reason about complex interactions between mental states involved in sustaining a lie and act appropriately.

Fourth, the present study found a significant relation between children's executive functioning and their lying behavior. Children with higher stroop task scores were more likely to lie. When children were asked if they peeked, children had to suppress the reporting of the transgression that they wished to conceal, and represent and utter the false information that differs from reality. The inhibitory control that is needed to tell such a lie may be the same executive functioning skills that are involved in performing the stroop task. Our findings are generally in line with Carlson et al. (1998) who found that children who experienced difficulty with executive functioning tasks, especially those that require a high level of inhibitory control, demonstrated difficulties with deception tasks. The stroop task also involves working memory (see Carlson & Moses, 2001). It is thus possible that working memory may also play a role in children's decision to lie. Telling a lie may require the dual ability to remember the rule being violated and inhibit reporting of the transgression that they wish to conceal. However, it should be noted that 2 other executive functioning tasks (one of inhibitory control and one of working memory) were not found to be related to lying. Thus, further investigation of the relations between lying and both inhibitory control and working memory is required to examine the differential impact of these abilities by using tasks where inhibitory control and working memory can be readily isolated. Nevertheless, the present findings suggest that the development of children's lie-telling abilities is not only related to children's theory of mind abilities but also to their executive functioning skills.

This finding may not be surprising because research has consistently shown a significant relationship between children's theory of mind understanding and their executive functioning (e.g., Carlson et al. 2002; Hughes, 1998; Perner, Lang, & Kloo, 2002). Interestingly, dual executive demand tasks like the stroop task used in this study have been found to be more strongly predictive of theory-of-mind capabilities than working memory or inhibitory tasks alone (e.g. Carlson & Moses, 2001; Hala, et al., 2003). Given this finding, it may be that the combination of inhibitory control and working memory may be crucial not only for ToM reasoning but also for lying which requires children to put their theory-of-mind knowledge into action.

The fifth major finding of the present study is the lack of a significant relation between children conceptual understanding of lie- and truth-telling and children's actual behavior. Consistent with previous studies, in the current study, children's concept classification scores increased with age (Bussey, 1992, 1999; Lee, 2000; Peterson et al., 1983; Siegal & Peterson, 1998; Talwar et al., 2002). Although a much more comprehensive measure of children's conceptual knowledge was used in the present study, the findings were similar to the two other studies that have examined the relationship between children's conceptual understanding and their actual lying behavior (Talwar et al., 2002, 2004). Perhaps this is not surprising given that adults know what a lie is but still lie on a day-to-day basis (DePaulo & Kashy, 1998). Taken together, these findings suggest that children's ability to classify truth and lies does not prevent them from telling lies to conceal their transgressions. Future studies should examine if this is also true for children's lie-telling behavior in other situations such as lies told for prosocial reasons (e.g. white lies).

Similar to previous studies (e.g., Bussey, 1992, 1999; Siegal & Peterson, 1998; Piaget, 1932), children's age was significantly related to their evaluations of the moral stories. When making moral judgments, younger children were more likely to attend to factors of factuality and promising than older children. However, they were less likely to take motivation into consideration when compared to older children. Thus, younger children paid more attention to the factuality of a statement and the adherence or violation of rules (e.g., promise-keeping or breaking), to make their moral evaluations, whereas older children considered the character's intention to deceive itself to make their evaluations. These findings are in keeping with previous studies which have found that while children as young as 4 years of age can make basic distinctions between lies and truth, their moral understanding of lies develops overtime with younger children being more influenced by factuality of statements and external factors while older children are more influenced by intentions and internal factors (e.g., Bussey, 1992, 1999, Peterson et al., 1983; Piaget, 1932). Therefore, to fully understand children's emerging understanding of lies it is important to examine not only their classification abilities but also their evaluations of truthful and untruthful statements.

More importantly, the sixth major finding of the present study showed children's lying behavior to be related to their moral evaluations. These findings are different from previous studies (Talwar et al., 2002, 2004) which found no or limited relation between moral understanding and behavior, perhaps due to the fact that the current study used a more comprehensive measure of children's moral understanding. More specifically, the confessors had higher Factuality Scores than lie-tellers. In other words, children who admitted their transgression were more likely to value truthfulness and give it higher ratings regardless of the situation. In contrast, children who chose to lie tended not to have stringent views about the need to be truthful. These results suggest that children who hold more relativist views about the moral implication of lying might be more inclined to tell lies, whereas those who held more stringent moral views about lying are more likely confess. Another noteworthy finding is that in comparison with the liars and confessors, non-peekers gave the most

positive ratings for stories where the protagonist kept a promise and the most negative ratings when the story protagonist failed to keep a promise. One possible explanation is that non-peekers were the most concerned about rules and adherence to them. They might have taken the experimenter's instruction about not peeking at the forbidden toy more seriously than the lie-tellers and confessors, and this concern was strong enough to motivate them to resist the high level temptation to peek in the current procedure. Thus, while children's ability to classify whether a statement was a lie was not related to their behavior, their perceptions of the acceptability of such statements were significantly related to their behavior.

A few caveats to our findings are warranted. First, the present study involved children' disobeying an adult's instruction and lying to them about their transgression. While previous research suggests that this kind of lie is common among children told to parents and teachers and they also considered it to be a serious moral violation (Bussey, 1992, 1999; DePaulo & Jordan, 1982; Newton, et al. 2000; Stouthamer-Loeber, 1986, Wilson, et al. 2003), the violation itself is not severe and hence may be of low stake in nature. When the stakes are high or consequences of transgressions are more serious, children's behavior as well as its relation to moral judgment may change. Given the obvious ethical challenges of creating such situations, this type of lie has not yet been systematically examined. Nevertheless, research with adults suggests that in high-stakes situations, we are less likely to conform to our moral knowledge and standards and more likely to act out of self-oriented motivation (Batson & Thompson, 1999). Second, the present study was the first study to find a relation between children's moral understanding and their lie-telling behavior with the use of more extensive measures of children's moral understanding than those used in previous studies that failed to find a significant relation. Despite this methodological improvement, it is possible that a more refined assessment may yield an even stronger relationship. Furthermore, because we only used one behavioral measure, it is unclear whether children's moral understanding is also related to other types of lying such as white-lie-telling. Future research with multiple behavioral and moral understanding measures will provide necessary evidence to elucidate how children's behaviors are influenced by their moral knowledge about lying and honesty and vice versa.

In summary, current findings demonstrate that the majority of children between 3 and 8 years of age will lie to conceal their transgressions and their ability to maintain these lies increases with age. Children's ability at semantic leakage control increased not only with age but also with increased cognitive sophistication. Lie-telling behavior was related to both children's theory of mind and executive functioning abilities. While children's deception is often considered to be problematic, the current study's results suggest that lying is associated positively with children's cognitive development in terms of their understanding of others' minds and executive functioning. The present study serves only as the first step in understanding possible contributing factors to the development of children's deception, focusing only on the contribution of three major social and cognitive factors to children's lie-telling behavior. Other factors that may influence children's deceptive abilities need to be examined in future studies. For instance, children's general intellectual ability, parenting styles, disciplinary styles, and cultural contexts may be also related to the development of lie-telling behavior (Achenbach & Edelbrock, 1981; Cole & Mitchell, 1998; Lee et al., 1997; Lewis, 1993; Crossman & Lewis, 2006; Stouthamer-Loeber & Loeber, 1986).

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Table 1

Mean (Standard Deviations) Scores of Executive Functioning, Theory of Mind and Conceptual Moral Knowledge by Age Group

	Younger Children	Older Children
Executive function		
Whispers	25.36 (6.14)	28.63 (2.27)
Stroop	11.09 (4.54)	13.83 (2.71)
Six box scramble	7.58 (2.23)	8.45 (1.38)
Theory of mind		
First-order belief	1.88 (1.43)	3.40 (1.09)
Second-order belief	2.08 (.99)	2.99 (.54)
Conceptual moral judgments		
Conceptual knowledge	7.23 (2.03)	9.60 (2.50)
Moral evaluations		
Factuality	.24 (1.15)	-.25 (.74)
Motivation	-.15 (1.04)	.16 (.94)
Promise	.11 (.94)	-.11 (1.05)

Table 2

Factor Loading of Moral Judgements of Verbal Statements

	Factor		
Moral Evaluation	**Factuality**	**Motivation**	**Promise**
Fail to follow through on a promise	.09	.15	-.87
Lie on behalf of a friend	.36	.46	-.03
White lie situation	.70	-.01	-.03
Lie about a transgression	.73	.27	- .02
Follow through on a promise	.15	.23	.78
Exaggeration	.30	.57	-.02
Trickery	.70	.12	.13
Inadvertently pass on a lie	.03	.63	.27
Mistake	-.10	.74	-.07

Table 3

Correlation Matrix among Individual Social and Cognitive Variables

	1	2	3	4	5	6	7
1. Concept	-	-	-		-	-	-
2. Inhibitory Control	.08	-	-		-	-	-
3. Stroop	.18*	.28**	-		-	-	-
4. Working Memory	.21**	.26**	.07		-	-	-
5. False Belief	. .33**	.36**	.32**	.17*		-	-
6. Factor 1 (Factuality)	.16*	–.17*	-.14	-.04	.28**		-
7. Factor 2 (Motivation)	-.40**	-.11	–.13	–.13	–.25**	.00	
8. Factor 3 (Promise)	.14	.08	.09	.06	.19*	.00	.00

Note.

* $p \leq .05$;

** $p \leq .01$;

*** $p \leq .001$;

+ $p \leq .10$.