THE DEVELOPMENT OF DECEPTIVE BEHAVIOURS IN 8- TO 16-YEAR-OLDS

by

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While the majority of developmental deception research has examined the truth- and lie-telling behaviours of younger children (3 to 8 years of age), the development of deceptive behaviours in older children and adolescents has mainly been ignored, despite the fact that this age group appears more frequently in forensic settings. The general goal of this dissertation was to examine deceptive behaviours in 8- to 16-year-olds including the development of lie-telling behaviours and the ability to detect their lies.

The investigation began by examining the influence of promising to tell the truth and moral competency tests on the veracity of 8- to 16-year-olds statements. Consistent with previous findings with younger children (Lyon et al., 2008; Talwar et al., 2002), 8- to 16-year-olds were significantly more likely to tell the truth after promising. Additionally, asking children to complete a competency test did not influence the veracity of children’s statements alone.

Next, building on previous findings with 3- to 7-year-olds (Talwar & Lee, 2008) the relation between concealing a transgression through verbal deception and cognitive development was examined in 8- to 16-year-olds. Consistent with previous findings with younger children (Talwar & Lee, 2008), these results indicate that both working memory and inhibitory control are related to the sophistication of lies. In addition, the present
study demonstrates that 8- to 16-year-olds planning ability is also related to the sophistication of their lies.

Finally, the ability to detect 8- to 16-year-olds lies was examined. Overall, detection rates were around chance levels for both parents and 8- to 17-year-olds. However, consistent with findings with younger children (Leach et al., 2004), parents’ rates were significantly above chance for detecting lies after the speaker had promised to tell the truth.

Overall, these results demonstrate that while 8- to 16-year-olds show similar patterns of deception as younger children, developments during this period resulted in additional findings calling for the examination of this older population.
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Chapter 1: General Introduction

1.1 General Overview

This dissertation examines deception in 8- to 16-year-olds. There were two major components to this project. The first component examined the development of deceptive behaviours in older children and adolescents. I began by examining whether promising to tell the truth would significantly decrease lie-telling behaviours in 8- to 16-year-olds (Chapter 2). I then assessed the cognitive skills related to 8- to 16-year-olds’ deceptive behaviours (Chapter 3). The second component of this investigation evaluated the ability to detect 8- to 16-year-olds’ lies. In this section, I assessed parents’ abilities to detect their own children’s lies (Chapter 4 - Experiment 1) and then assessed whether experience in the same situation as the speaker influenced lie-detection rates (Chapter 4 – Experiment 2). These issues were assessed in a series of studies (Chapters 2 to 4) that will be presented in turn. Chapter 1 will begin by examining the theoretical background and reviewing the relevant literature and will be followed by an outline of the remaining chapters.

1.2 Theoretical Background

Lying has been studied for centuries from many different perspectives. The original study of deception dates back to Charles Darwin (1877) who observed his son telling lies during the preschool years. The examination of children’s deceptive behaviours was later revived in the late 1980’s by Lewis, Stanger, and Sullivan (1989). Since the 1980’s, researchers have investigated children’s understanding and classification of lies (Bussey, 1999; Lee & Ross, 1997; Peterson, 1995), the morality of telling lies (Bussey, 1992, 1999; Peterson, Peterson, Seeto, 1983), different motivations
behind lying (Fu, Evans, Wang, & Lee, 2008; Polak & Harris, 1999; Talwar & Lee, 2002a; b; Talwar, Murphy, & Lee, 2006; Wagland & Bussey, 2005), lie-telling in the legal context (Bala, Lee, Lindsay & Talwar, 2001; London & Nunex, 2002; Lyon, Malloy, Quas, & Talwar, 2008; Lyon & Saywitz, 1999) as well as cross-cultural differences in lying (Fu, Lee, Cameron, & Xu, 2001; Fu, Xu, Cameron, Heyman, & Lee, 2007; Lee, Cameron, Xu, Fu, & Board, 1997; Lee, Xu, Fu, Cameron, & Chen, 2001). One theory that provides conceptual integration of many of the aforementioned perspectives is the Speech Act Theory.

1.2.1 Speech Act Theory

One of the original founders of the Speech Act Theory was the philosopher J. L. Austin. Austin believed that statements were not simply the description of a performance, but rather acts in themselves. Specifically, Austin theorized that language is made up of these *speech acts* that serve different social functions. Philosophers such as Paul Grice (1980) and John Searle (1969) expanded upon Austin’s original theory, creating what is known today as speech act theories. While Searle stressed the importance of the intentional component of speech acts, Grice emphasized the conventional aspect of verbal communication.

Searle (1969) believed that the meaning behind a speech act is mediated by the speaker’s beliefs and intentions. According to Searle, there are five factors that must be considered when determining the communicative function of a speech act: the factuality (reflective of reality), the literal meaning (what is said), the deeper meaning (the meaning the speaker wishes the statement to hold), the intention of the speaker (what the speaker aspires to state), and the speaker’s beliefs (belief about the statement). By using different
combinations of these five factors, different communicative functions can be achieved. For example, a truthful speech act occurs when all five factors are the same, whereas an honest mistake occurs when four of the factors are the same but the statement is not factually correct. On the other hand, a lie occurs when the speaker’s belief conflicts with the literal meaning, deeper meaning and intention of the speaker. This discrepancy is referred to as the “intention to deceive” (Bok, 1978; Chisholm & Feehan, 1977). The factuality of the statement is not relevant when determining if the statement is a lie.

Grice’s conventionality component of a speech act consists of the social and cultural rules of conversation (Grice, 1980; Sweetser, 1987). It has been theorized that these social rules are organized in a hierarchy (Sweetser, 1987). At the top of the hierarchy is the general cooperative rule. According to the general cooperative rule, speech acts intended to help are socially encouraged while speech acts intended to harm are condemned. The second level in this hierarchy has two components: the informational setting and the politeness setting. In the informational setting, the main goal is to communicate information and it is expected that Grice’s maxims of conversation will apply (Grice, 1980). For example, Grice’s Maxim of Quality requires the speaker to be truthful. However, lie-telling directly violates fundamental rules of communication. For example, telling a lie violates the General Cooperative Rule which states that speech acts that are intended to help are encouraged while speech acts that are intended to harm are discouraged. In addition, when telling a lie the speaker explicitly violates the Maxim of Quality by not being truthful.

In terms of speech acts, lies are uniquely influenced by both the intentionality and conventionality components. The intentionality component focuses on the speakers’
beliefs and the intention behind the speech act while the conventionality component emphasizes the influence of our social and cultural rules of conversation. In the remainder of this chapter, I will review the developmental literature on children’s understanding of lying as well as their own lie-telling behaviours in relation to the intentionality and conventionality components.

1.2.2 Children’s concepts and evaluations of lies

As children grow up they must develop an understanding of the intentional and conventional aspects of lies in order to determine what behavior is appropriate and what is inappropriate. This is a difficult task for children because it not only requires them to understand abstract concepts such as intentions and beliefs and to learn social rules, but it is typically not explicitly taught. In order to form a mature concept of lying, children must realize that when a speaker makes a statement they believe to be false and intend to deceive the listener, they are telling a lie (Chisholm & Feehan, 1977). In addition, children must consider what social norms and rules may have been violated when making such a statement. I will begin by discussing children’s understanding and evaluation of lies in terms of intentionality and then move on to the conventionality component.

1.2.2.1 Intentionality

The examination of children’s conception of lie-telling began decades ago by Piaget (1932/1965) and regained interest in the early 1980’s (Peterson, Peterson, Seeto, 1983). Recent studies have indicated that children begin to understand the concept of lying during the preschool years (Bussey, 1992, 1999; Siegal & Peterson, 1996; Talwar & Lee, 2002a, 2002b). While children typically do not confuse lying with other behavioral misdeeds (e.g., theft or vandalism), young children have been found to confuse lying with
other prohibited or discouraged verbal behaviors. Specifically, Piaget (1932/1965) originally found that children around the age of 6 years tend to classify “naughty” words (e.g., swearing) as lies. More recent studies have obtained similar results supporting Piaget’s original findings (Berthoud-Papandropoulou, & Kilcher, 2003; Bussey, 1992; Peterson, et al., 1983).

In terms of children’s conceptualization of deception, there are three verbal components of a lie that children have been found to take into consideration at different ages. These three components include: the factuality of the statement, the speaker’s intention and the speaker’s belief. Children begin by using the factuality of a statement to determine whether it is a lie around 5 years of age (Peterson et al., 1983). According to the Speech Act Theory, the factuality of a statement does not determine whether it is a lie and thus children may incorrectly categorize statements (Piaget, 1932/1965; Peterson et al., 1983; Bussey, 1992; Strichartz & Burton, 1990; Wimmer, Gruber and Perner, 1984). For example, Peterson, et al. (1983) presented 5-, 8-, 9-, and 11-year-olds and adults with videotaped stories depicting deliberate lies and unintentionally false statements and found that younger children were significantly more likely to classify an incorrect guess as a lie than older children or adults. In addition, almost all children, but not adults, were significantly more likely to classify exaggerations or jokes as lies.

When examining the role of intention on children’s concept of a lie, Piaget (1932/1965) found that young children did not use the speaker’s intentions when determining whether the statement was a lie. Specifically, Piaget discovered that children would classify honest mistakes, where the speaker does not intend to deceive the listener but makes a factually false statement, as lies. Peterson et al. (1983) later supported
Piaget’s findings, as they demonstrated that children do not use the speaker’s intentions to determine whether a statement is a lie until 11 years of age.

Another method used to examine children’s understanding of intentions and the concept of lies is through children’s false-belief understanding. For example, Wimmer et al. (1984) presented 4 to 12 year old children with a series of short stories with three protagonists. Protagonist A passed information to B and then B passed information to C. In one scenario, A intentionally passed false information to B, and B did not know the information was false when he passed it on to C. Children were then asked to determine whether A and B were telling a lie. Results revealed that even 4-year-olds were able to correctly classify A as telling a lie. However, children under the age of 7 neglected to consider B’s belief about the statement and incorrectly classified the statement as a lie. Eight-to 10-year-olds also incorrectly labeled B’s statement as a lie when the information was received from A, but not when B’s statement was derived from his own false belief about a true state of affairs. Berthoud-Papandropoulou, et al. (2003) supported Wimmer et al.’s (1984) findings in a study that demonstrated that children under 7 years of age incorrectly labeled a statement a lie based on a false belief.

To date, a few studies have challenged the questioning methods of the aforementioned studies. A series of experiments conducted by Siegal and his colleagues indicate that children’s failure to correctly identify lies in Piaget’s studies may be due to the violation of the conversational rules in the questioning method (Siegal & Peterson, 1996, 1998; Gilli, Marchetti, Siegal & Peterson, 2001). Siegal and colleagues suggested that there are two problems with previous studies’ questioning methods: the format of the question and the context in which the question was asked. Specifically, Siegal and
colleagues suggested that the traditional questioning style of, “Was it a lie or not a lie?”, was leading and implied that the statement in question was a lie. Thus, they revised the question to, “Was it a lie or a mistake?” By presenting children with the two options, children are encouraged to think about the speaker’s intentions, and in turn improve the accuracy of children’s labeling of deceptive statements. To address the context issue, Siegal and Peterson created scenarios that children could relate to involving the contamination of food. When both the questioning format and the context of the lie were revised, even 3- to 5-year-olds correctly identified the difference between a lie and a mistake.

Taken together, the previous studies demonstrate that while preschool children are able to discern the difference between a lie and a mistake when the critical information is highlighted and the situation is familiar (Siegal & Peterson, 1998), older children can generalize their understanding of lies to many different situations without the critical information being highlighted for them (Broomfield, Robinson, & Robinson, 2002; Bussey, 1992, 1999; Peterson et al., 1983; Strchartz & Burton, 1990; Taylor, Lussier, & Maring, 2002; Wimmer et al., 1984).

Children must not only develop a concept of a lie, but also learn to evaluate the morality of telling lies. Once again, Piaget (1932/1965) was the first to examine children’s evaluation of lies by presenting children with story characters who either told the truth or a lie and asking children to evaluate who was naughtier. Piaget’s results revealed a developmental trend in children’s evaluation of lies. In general, younger children tended to judge a lie that was punished as more “naughty” than a lie that was not punished. In addition, as age increased, children began to consider how different the lie
was from the truth. The more different the statement was from the truth, the naughtier it would be rated by children. However, Piaget found that children did not consider the speaker’s intention until 10 years of age when making moral evaluations. He also found that when presented with one story where a character intentionally gave someone incorrect directions yet the traveler found the correct location compared to a story where a character intends to give correct directions yet the traveler gets lost, children under 10 years of age tended to rate the second character as naughtier.

Since Piaget’s original work, many researchers have found results suggesting that Piaget may have underestimated children’s ability to make moral judgments of lies (Bussey, 1992, 1999; Gilli et al., 2001; Peterson et al., 1983; Wimmer et al., 1984). Specifically, Peterson et al. (1983) proposed that requiring children to compare the two stories may have been too cognitively demanding for young children. Thus, Peterson et al., revised the methodology and only asked children to evaluate one character’s behavior. Results revealed that 5- to 11-year-olds were able to use the character’s intention when making an evaluation about the morality of their behavior. These results were supported by Bussey and her colleagues, who demonstrated that even 4-year-olds rated lies more negatively than misdeeds or the truth (Bussey, 1992; 1999; Bussey & Grimbeek, 2000). Additionally, older children also tended to demonstrate a sense of pride for telling the truth.

When examining intentionality in children’s conceptualization and evaluation of lies, it appears as though even young children use the intention of the speaker to determine whether the statement is a lie and when making a moral evaluation. By 3 years of age, children are able to correctly categorize statements as lies with the right
contextual and questioning format. In addition, by 4- or 5-years of age, children begin to use the speaker’s intention when evaluating the naughtiness of the statement.

1.2.2.2 Conventionality

While the majority of studies to date have focused on the intentionality component of lies, a series of projects have begun to examine the social and cultural influences on children’s conceptualization and evaluation of lies (Fu et al., 2008; Fu et al., 2007; Lee et al., 1997; Lee & Ross, 1997; Lee et al., 2001; Siegal, Surian, Nemeroff, & Peterson, 2001; Xu, Bao, Talwar, & Lee, under review). Philosophers have debated for centuries over whether our moral judgments of lies are influenced by context and culture. On one hand, the deontological view states that lying is intrinsically wrong regardless of situations and cultural contexts (Bok, 1978; Kupfer, 1982). On the other hand, the social-conventional view of lying suggests that whether a lie is right or wrong is determined by social-cultural conventions.

Children’s conceptualization of lying has been tested from many different social and cultural perspectives. For example, Sweetser’s theory of lying states that the determining factor of whether a false statement is a lie, is whether the statement helps or harms another individual. Lee and Ross (1997) tested this theory by reading 12-, 16-, and 19-year-olds scenarios where the character either told the truth or a lie. The character’s statement was either intended to help or harm the listener in either a politeness or informational setting. Participants were asked to rate how strongly they either agreed or disagreed that the character’s statement was a lie. Lee and Ross found that statements in the harm condition were rated as more of a lie than statements in the help condition. In
addition, lies told in an informational setting were rated as more of a lie than lies told in a
politeness setting (e.g., white lies).

In addition to social factors, cultural background has been found to influence our
categorization of lies (Fu et al., 2001). For example, Fu et al. (2001) found that while
Chinese and Canadian adults categorized intentional untruthful statements to conceal
one’s transgression as lies, they differed in their categorizations of untruthful statements
told to be modest. Specifically, while almost all Canadian adults categorized untruthful
statements to be modest as lies, a substantial number of Chinese adults did not consider
them to be lies. This may be due to the fact that modesty is highly valued in the
collectivist Chinese society. However, studies examining the influence of cultural factors
on children’s categorization of lies have failed to replicate these findings (Fu et al., 2008;
Lee et al., 1997; Lee & Ross, 1997; Lee et al., 2001; Xu, Boa, et al., in press).

Lee et al., (2001) examined 7-, 9- and 11-year-old Chinese and Canadian
children’s categorization of lies told for modesty purposes. Children were read stories
where a story character did something good and either told the truth (immodest) or a lie
(modesty) about their behavior. Results revealed that overall, both Chinese and Canadian
children labeled lies as lies and truths as the truth. These results have been replicated with
7-, 9- and 11-year-old Chinese and Canadian children’s categorization of white lies (lies
told for politeness purposes: Xu, Boa, et al., in press) and blue lies (lies told for the
collective good: Fu et al., 2008).

Taken together, these results suggest that social and conventional rules do not
influence the categorization of untruthful statements as lies by children as old as 11 years
of age. However, by adulthood, our categorization of untruthful statements appears to become influenced by our cultural context.

While children’s categorization of lies does not appear to be influenced by the social and cultural context of the statement, a different story emerges for children’s evaluation of lies. A series of studies have examined cross-cultural differences between Chinese and Canadian children’s moral evaluations of lies in both prosocial and antisocial situations (Lee et al., 1997; Lee et al., 2001; Xu, Boa, et al., in press).

In Lee et al.’s (2001) study, children were read a series of stories in which the character either completes a good deed or bad deed and then the character either lies or tells the truth about their behavior to their teacher. Children were then asked to evaluate the story character’s statement. While there were no cultural differences found in children’s evaluations of truths and lies in antisocial situations, significant differences emerged in the prosocial situations. Specifically, Chinese children rated truth-telling about prosocial behaviours less positively and lie-telling more positively than Canadian children. In addition, these cultural differences increased with age. These differences in moral evaluation may reflect the Chinese’s cultural emphasis on modesty and the Canadian’s focus on personal achievements. As children become more socialized around these cultural values their own moral values are revised, as denoted in the developmental change.

It has also been found that the context of the lie influences our moral evaluations. In particular, studies have shown that when the speaker’s intention is to help the lie-recipient, the statement will be rated less harshly. Children as young as 6 years of age
have been found to evaluate white lies less negatively than lies told with the intent to harm (Bussey, 1992; Peterson et al., 1983; Xu, Bao, et al., under review).

To date, studies appear to provide support for the idea that our culture and context influence our evaluation of lies and that lie-telling is not rated universally as wrong.

1.2.3 Children’s own lie-telling behavior

While many studies to date have focused on children’s conceptualization and evaluation of lies, an increasing number of studies have examined children’s own lie-telling behaviors. (Chandler et al., 1989; Fu et al., 2008; Lewis et al., 1989; Peskin 1992; Polak & Harris, 1999; Sodain, 1991; Talwar & Lee, 2002a; 2002b; Talwar & Lee, 2008; Talwar, Lee, Bala, & Lindsay, 2002; Talwar, Lee, Bala, & Lindsay, 2004; Talwar, Lee, Bala, & Lindsay, 2006; Talwar, Gordon, & Lee, 2007; Talwar, Murphy, & Lee, 2006; Wilson, Smith, & Ross, 2003). As with children’s conceptualization and evaluation of lies, the intentionality and conventionality components play important roles in children’s production of lies.

1.2.3.1 Intentionality

In order to successfully lie, one must have an understanding that the statement has a direct impact on another person’s mental state. When telling a lie, a lie-teller must be able to intentionally create a false belief in the listener. This ability appears to emerge around 3 years of age (e.g., Polak & Harris, 1999; Talwar & Lee, 2002a; 2002b; Talwar et al., 2002; Talwar et al., 2007). Using the temptation resistance paradigm, Talwar and Lee’s (2002a) study asked children not to peek at a toy while the experimenter was out of the room. When asked whether they had peeked, about half of the 3-year-olds who had peeked and the majority of older children who had peeked lied about their transgression.
In addition, using a naturalistic observation method, Wilson et al. (2003) recorded 2- and 4-year-olds’ lie-telling behavior at home. Wilson et al. found that older children tended to tell lies more often than younger children.

Children’s ability to successfully lie has been evaluated by assessing their ability to maintain consistency between the original lie and subsequent statements (semantic leakage control). For example, after asking children whether or not they had peeked at the toy while the experimenter was gone, Talwar and Lee (2002a) asked children what they thought the toy was. Results revealed that while younger children (3- to 5-year-olds) tended to respond with the correct answer, (e.g., Barney), revealing that they had peeked at the toy, about half of 6- to 7-year-olds feigned ignorance of the toy’s identity, thus concealing their transgression.

In another study conducted by Xu, Evans, and Lee (under review), children’s ability to successfully tell a lie was examined by assessing children’s ability to maintain consistency between their original denial of transgressing and the physical evidence of their transgression placed in front of them. The results of this study found that when the cognitive demands are reduced, even young children around 4 years of age are able to successfully maintain their original lie and this ability increases with age.

1.2.3.2 Conventionality

As children are socialized within society, they must learn to understand social rules and etiquette and determine under what settings to apply such rules. Although children are generally socialized not to tell lies, there are some situations in which children are actually encouraged to tell lies such as when they receive an undesirable gift. Thus, when determining whether or not it is appropriate to tell a lie, children must
determine when they are in a politeness setting and whether the lie will help or harm the listener. Talwar, Murphy, et al., (2007) examined children’s prosocial lie-telling behaviours. Three to 11 year old children received a gift from the experimenter; a wrapped bar of soap. Although all children indicated that they did not like the gift while the experimenter was out of the room, the majority of children told a prosocial lie and said they liked it. As age increased, children were significantly more likely to tell white lies. These results suggest that children are socialized to tell white lies and incorporate this socialization into their behavior at an early age. Consistent with Talwar, Murphy, et al.’s (2007) findings, Xu, Boa, et al., (in press) used similar methods and found that Chinese children will lie to protect the gift giver.

Fu et al., (2008) examined the influence of culture on Chinese children’s lie-telling behaviours to protect the collective. In the study, 7-, 9-, and 11-year-old Chinese children were placed in a real life situation in which they must decide whether or not to lie to conceal their class’ cheating behavior. Results revealed that a significant proportion of Chinese children lied to conceal their class’ collective decision to cheat in a school district competition in order to win the competition for the school and the tendency to lie increases with age.

Taken together, these studies suggest that children from an early age apply the social and conventional rules for a specific context when determining whether or not to lie.

1.3 Goals of the Current Thesis

While the majority of research to date has focused on younger (3 to 8 years of age) children’s understanding, evaluation, and lie-telling behaviour, the goal of the
present investigation was to examine the development of older children and adolescents’ (8 to 16 years of age) lie-telling behaviours. I began by examining whether promising to tell the truth would significantly decrease lie-telling behaviours in 8- to 16-year-olds in a similar manner to 3- to 7-year-olds (e.g., Talwar & Lee, 2002a). Given that many more older children and adolescents are also involved in the court system than younger children (Puzzanchara & Kang, 2008), gaining an understanding of the influence of promising to tell the truth on truth- and lie-telling behaviours is vitally important and to date has remained unexamined (Chapter 2).

The second portion of this investigation examined the relation between 8- to 16-year-olds’ cognitive skills and their deceptive behaviours. While previous studies with 3- to 8-year-olds have demonstrated that children’s executive functioning skills are related to their lie-telling behaviours, we currently do not have an understanding of the development of this relation with older children or adolescents. Chapter 3 examines the relation between both the frequency and sophistication of 8- to 16-year-olds’ lies and executive functioning skills.

Finally, in Chapter 4, I examined the ability to detect 8- to 16-year-olds’ lies. Given that previous studies have discovered that younger children’s statements are more easily detected than older children’s or adults’, an investigation of lie detection rates for adolescents is warranted. Experiment 1 examined parents’ ability to detect their own children’s lies while Experiment 2 examined whether 8- to 17-year olds are able to detect other same aged peers’ (8- to 16-year-olds) deceptive statements.
Chapter 2: The Influence of Promising to Tell the Truth on 8- to 16-year-olds’ Dishonest Behaviour

2.1 Introduction

Promoting truth and honesty within the justice system has been the focus of many researchers over the past decade (e.g., London & Nunez, 2002; Lyon & Dorado, 2008; Lyon, Mally, Quas, & Talwar, 2008; Talwar, Lee, Bala, & Lindsay 2002; Talwar, Lee, Bala, & Lindsay, 2004). Researchers have examined areas such as the influence of question types (e.g., Hutcheson, Baxter, Telfer, & Warden, 1995; Quas, Davis, Goodman, & Myer, 2007), support mechanisms for witnesses (e.g., Bala, 1999; Bennett, 2003; Goodman et al., 1998), and promising procedures (Lyon et al., 2008; Lyon & Dorado, 2008; Talwar et al., 2002; Talwar et al., 2004) on the honesty and accuracy of testimony.

To date, research has demonstrated that children begin to tell lies during the preschool years (Hala, Chandler, & Fritz, 1991; Lewis, Stanger, & Sullivan, 1989; Peskin, 1992; Polak & Harris, 1999; Talwar & Lee, 2002a) and that by 4 years of age children demonstrate clear signs of intentions to deceive others (Polak & Harris, 1999). Young children’s lie-telling behaviour also appears to increase with age (Gervais et al., 2000; Talwar & Lee, 2002a; Wilson, Smith, & Ross, 2003). For example, Talwar and Lee (2002a) used a temptation resistance paradigm in which children were asked not to peek at a toy. When children who had peeked at the toy were later asked about whether they had transgressed, about half of the 3-year-olds and the majority of older children lied about their transgression. Additionally, Wilson, Smith, and Ross (2003) recorded 2- and 4-year-olds’ lie-telling at home using a naturalistic observation method. Wilson et al. found that older children tended to tell lies more often than younger children. Gervais et
al. (2000) also found that 7- and 8-year-olds tended to tell lies more frequently than 6-year-olds.

Not only does the frequency with which children tell lies increase with age, but also the sophistication. Talwar and Lee (2002a) evaluated the sophistication of children’s lies by assessing their ability to maintain consistency between the original lie and subsequent statements (semantic leakage control). After asking children whether they had peeked at the toy they had been asked not to look at, children were asked what they thought the toy was. Talwar and Lee found that while 3- to 5-year olds tended to correctly name the toy (e.g., Barney), revealing that they had peeked at the toy, approximately half of the 6- to 7-year-olds concealed their transgression by feigning ignorance as to the identity of the toy.

One technique commonly used in the court system to increase truth-telling is requiring witnesses to promise to tell the truth prior to testifying in court. In most North American jurisdictions children are also required to undergo examinations to determine whether they are legally competent to testify (Bala et al., 2000; Haugaard, Reppuci, Laird, & Naful, 1991; Myers, 1996). While some researchers have found that discussing or evaluating the morality of lie-telling increases children’s accuracy rates (Huffman, Warren, & Larson, 1999; London & Nunez, 2002), others have found no relation with children’s lie-telling behaviours (Talwar et al., 2002).

In regards to promising, empirical studies have demonstrated that explicitly asking children to promise to tell the truth decreases the lie-telling behaviours of 3- to 11-year-olds (Lyon et al., 2008; Talwar et al., 2002a; Talwar et al., 2004). For example, Talwar et al. (2002a) asked 3- to 7-year-olds to promise to tell the truth prior to asking
them about an earlier transgression they had committed (peeking at a toy). The results revealed that children were significantly less likely to lie about their transgression after promising to tell the truth compared to children who did not make such a promise. Talwar et al. (2004) also found that promising to tell the truth decreased 3- to 11-year-olds’ lie-telling when questioned about a transgression their parent had committed. Lyon and Dorado (2008) found similar results with 5- to 7-year-old maltreated children. When asked to promise to tell the truth, maltreated children were significantly less likely to conceal a transgression they previously committed with an adult confederate.

Additionally, Lyon and Dorado (2008) demonstrated that promising to tell the truth did not simply increase children’s acquiescence to the questioner, as children who did not transgress did not falsely claim to have done so after promising to tell the truth.

Findings indicating that requiring children to promise to tell the truth successfully decreases children’s lie-telling, while moral competency examinations do not, resulted in revisions to the Canadian court system through Bill C-2 in 2006 (Bala, Ramakrishnan, Lindsay, & Lee, 2005; Bala, Duvall-Antonacouplos, Lindsay, Lee, & Talwar, 2006; Bala, Lee, Lindsay, & Talwar, in press). Specifically, children under the age of 14 are no longer required to pass a moral assessment of truth and lies but are still required to promise to tell the truth prior to testifying in a Canadian court. However, to date studies supporting these revisions have only been conducted with children up to 11 years of age (Lyon et al., 2008; Talwar et al. 2002; Talwar et al., 2004). Each year there over one million juvenile court cases in the United States of which over four hundred thousand adjudicated cases involve adolescents between 13 and 16 years of age (Puzzanchara, &
Given this astounding involvement of adolescents in the court system, it is vital to gain a greater understanding of this age group’s lie-telling behaviours.

While there is currently a general understanding of lie-telling behaviours in younger children through experimental studies, no such studies have been completed with adolescents. It is possible that lying may become more frequent in adolescence due to factors such as decreased parental supervision. Furthermore, with an increase in autonomy, disapproval from parents or friends and new social activities may increase deceptive behaviours in this population. A recent self-report study conducted by Jensen, Arnett, Feldmen, & Cauffman (2004) demonstrated that adolescents commonly lied to their parents, with more than half of high school students lying to their parents about drugs/alcohol, parties, friends and money. However, these self-reported rates of deception may be underestimated due to the negative perception associated with telling lies. Behavioural measures of lie-telling are therefore required in order to gain a greater understanding.

The present set of experiments addresses this neglected age group in the deception literature by examining their lie-telling behaviours. Experiment 1 assessed whether discussing truth and lies in a competence examination and asking 8- to 16-year-olds to promise to tell the truth would decrease lie-telling behaviours about a transgression they committed. A modification of Talwar, Gordon, & Lee’s (2007) temptation resistance paradigm was used to assess 8- to 16-year-olds’ truth- and lie-telling behaviours. Participants were tempted to cheat on a test to gain a monetary prize (based on methods used with younger children: Lewis, 1993; Lewis et al., 1989; Polak & Harris, 1999; Talwar et al., 2002; Talwar & Lee, 2002a; Talwar & Lee, 2008). Participants were then
later questioned about whether they had peeked at the answers to the test. This method allowed me to assess 8- to 16-year-olds’ truth- and lie-telling behaviours in a naturalistic situation where they were faced with the option of being deceptive to cover up their transgression. The questions used in the competence examination were based on questions commonly used in the North American court system (Bala et al., 2000; Huffman et al., 1999; Lyon & Saywitz, 1999). Participants were given a hypothetical situation in which a character violates a rule and makes a false statement about it and asked to label the statement and evaluate the moral implications. Based on previous findings with younger children (Lyon et al., 2008; Talwar et al., 2002; Talwar et al., 2004) it was expected that promising to tell the truth would significantly decrease 8- to 16-year-olds’ lie-telling.

2.2 Experiment 1

2.2.1 Method

2.2.1.1 Participants

One hundred and eight 8- to 16-year-olds participated in this study ($M = 12.07$, $SD = 2.32$, 58 males). Informed consent was obtained from all parents prior to beginning the study and oral assent from all participants.

2.2.1.2 Materials

Ten trivia style questions were placed on the front page of a testing booklet (e.g., “How many musicians are in a trio?”). Two of the 10 questions, no-answer questions, had no correct answer (e.g., “Who discovered Tunisia?”). The answer to each question was listed in numerical order on the inside of the testing booklet. Fabricated answers were inserted for the no-answer questions.
2.2.1.3 Design and Procedure

Participants were taken to a quiet testing room with the experimenter and were asked to complete a trivia style test designed to assess their general knowledge about the world. They were told that there were 10 questions and if they got all 10 questions correct they would receive $10.00, but if they got even one question incorrect they would not receive the money. Participants were told the experimenter would wait for them to complete the task down the hall in the waiting room and they were to retrieve the experimenter when they had completed the test. Participants were also told the answers were on the inside of the testing booklet but were told not to look at the answers while the experimenter was gone. Since two of the test questions had no known correct answer, it was extremely tempting for participants to peek at the test answers.

While the experimenter was out of the room, four hidden cameras recorded whether participants peeked at the answers to the test. As there were ten test questions, participants often peeked at the answers multiple times. The number of peeks were counted. Those participants who looked at the answers were classified as peekers and those who did not look were classified as non-peekers. Once the participant completed the test they retrieved the experimenter from the waiting room. Prior to taking up the answers to the test the experimenter, who was blind to whether the participant had peeked at the answers, asked the target question, “While I was gone out of the room, did you peek at any of the answers to the test?” (Time 1). Peekers’ responses were coded into one of three categories. If they peeked at the answers and said “yes” in response to the target questions they were classified as truth-tellers. If they peeked at the answers and said “no” in response to the target question they were classified as lie-tellers. Finally, I had a
unique group of participants who were classified as *partial lie-tellers*. Partial lie-tellers included participants who peeked at the test answers multiple times but told the experimenter they had only peeked “once”. Thus, partial lie-tellers told the truth about having peeked but lied about the magnitude of their transgression. Those participants who did not peek at the answers to the test were classified as non-liars.

Participants then completed a filler task assessing their trivia knowledge and memory. Next, based on Talwar and Lee (2002) assessments of their conceptual knowledge about truth- and lie-telling, and their understanding of a promise were completed. Then, participants were asked to promise to tell the truth prior to being asked the target question again. To assess their conceptual knowledge about lie-telling, participants were read two stories. First they were given a scenario where a story character, Kathy, eats a candy that her teacher told her not to eat. When the teacher returns, she asks Kathy whether she has eaten the candy. Participants were asked, “What do you think Kathy should say?” They were then told that Kathy said she had not eaten the candy and were asked a series of questions: “Is what Kathy said the truth or a lie?”, “Is what she said good or bad?”, and “Was it a little bit good/bad or very good/bad?”. In the second scenario, participants were asked to place themselves in a situation where their mother asked them not to touch a new glass vase. While their mother is out of the room, they drop it and break the vase. Participants are then asked what they would say if their mother asked them if they broke the vase. All participants were then asked what it means to promise to do something and were then finally asked to promise to tell the truth for the next question the experimenter asked. Regardless of their responses at Time 1 all participants promised to tell the truth and then the experimenter asked them the target
question again, “While I was gone out of the room, did you turn around and peek at the answers to the test?” Based on their response to the target question at Time 2, children who peeked were coded into the categories of truth-tellers, lie-tellers and partial lie-tellers based on the same criteria as Time 1.

Upon completion of the testing session, all participants were debriefed with their parents and discussed issues regarding truth- and lie-telling. All participants received the $10.00 for participating in the study regardless of their performance on the test.

2.2.2 Results

Preliminary results revealed no significant effects of sex. Thus, the results for both genders have been collapsed for all subsequent analyses.

2.2.2.1 Peeking behaviour

Approximately 54% of participants (58 out of 108) peeked at the answers to the test while the experimenter was gone. A logistic regression was performed with age in years as a continuous variable as the predictor of peeking behaviour (1 = peeked, 0 = did not peek). The model was significant, $\chi^2(1, 108) = 7.88$, Nagelkerke $R^2 = .07, p < .05$, indicating that as age increased, participants were significantly less likely to peek, $\beta = -.21$, odds ratio = 1.27. Specifically, for every year increase in age, participants were 1.27 times less likely to peek.

2.2.2.2 Lie-telling behaviours before promising to tell the truth

Next, I examined whether participants who peeked at the test answers would lie about their transgression. Of the 58 participants who peeked at the answers to the test approximately 74% told a lie (N = 43), 15% told the truth (N = 9) and 10% a partial lie (N = 6) (see Figure 1). A multinomial logistic regression was performed with lie-telling
at Time 1 as the predicted variable (0 = truth, 1 = lie, 2 = partial lie) and age in years (continuous variable) as the predictor to assess whether there was a relation between lie-telling behaviours and age. The model was found to be significant, $\chi^2(1, 58) = 7.05$, Nagelkerke $R^2 = .15$, $p < .05$. A priori contrasts were performed with truth-tellers as the reference group for the predicted variable and revealed that as age increased participants were significantly more likely to tell the truth about their transgression than to tell a lie ($\beta = -.46$, Wald = 5.72, $p < .05$, odds ratio = 1.59). Specifically, the odds ratio indicates that for each year increase in age, participants were 1.59 times more likely to tell the truth about their transgression. However, there was no significant age difference between truth-tellers and partial lie-tellers.

![Figure 1](image.png)

Figure 1. The percentage of 8- to 16-year-olds by the veracity of their statement prior to promising to tell the truth (Time 1) and after promising to tell the truth (Time 2).

2.2.2.3 Lie-telling behaviours after promising to tell the truth

Of the 58 peekers, 48% ($N = 28$) continued to lie, 34% ($N = 20$) told the truth, and 17% ($N = 10$) told a partial lie after completing the conceptual knowledge task and
promising to tell the truth (see Figure 1). A multinomial logistic regression was
performed with lie-telling at Time 2 as the predicted variable (0 = truth, 1 = lie, 2 =
partial lie) and age in years (continuous variable) as the predictor to assess whether there
was a relation between lie-telling behaviours and age. The model was significant, \( \chi^2(1, 58) = 8.36, \) Nagelkerke \( R^2 = .15, \) \( p < .05. \) A priori comparisons with truth-tellers as the
reference group for the predicted variable indicated that as age increased participants
were significantly more likely to tell the truth than a partial lie (\( \beta = -.61, \) \( Wald = 5.93, \) \( p < .05, \) odds ratio = 1.85). Specifically, the odds ratio indicates that for each year increase in
age, participants were almost 2 times more likely to tell the truth than to tell a partial lie.
However, there was no significant age difference between truth- and lie-telling.

2.2.2.4 Does promising to tell the truth increase truth-telling?

A comparison between the statements made at Time 1 and Time 2 were made to
assess whether participants were significantly more likely to tell the truth after making a
promise to tell the truth compared to when no promise was made. Participants’ responses
were coded into two categories: the truth or a lie. Given that I was specifically interested
in whether truth-telling behaviour would increase after promising to tell the truth, partial
lies were coded as lies as they were not completely truthful disclosures. The Wilcoxon
signed-rank test revealed a significant difference in participants’ statements from Time 1
to Time 2, \( Z = -2.67, \) \( p < .05. \) Specifically, participants were significantly more likely to
tell the truth when asked to promise at Time 2 (\( M = .66, SD = .48, \) where 1 = lie)
compared to when no promise had been made at Time 1 (\( M = .84, SD = .37), \) see Figure
1. Overall, participants were significantly more likely to tell the truth about their
transgression as age increased. In addition, participants were significantly more likely to
tell the truth after being asked to promise to tell the truth. However, there is another possible explanation for these findings. Rather than promising to tell the truth, it may be that simply asking participants a second time whether they peeked at the test answers influences participants’ responses. Past research on question repetition has demonstrated that children sometimes change their original responses after being asked the same question a second time (Krähenbühl & Blades, 2006; Poole & White, 1991; Zajac & Hayne, 2003). Children may perceive the repeated question about their peeking behaviour as an indirect request to change their original response as adults typically only repeat questions when the desired answer was not obtained (Siegal, 1991). It is also possible that the discussion of truth and lies in the moral competency examination may have influenced the veracity of participants’ responses. Experiment 2 addressed these issues.

2.3 Experiment 2

Experiment 2 isolated the effect of promising to tell the truth on the veracity of 8- to 16-year-olds statements. Two main issues were addressed. First, whether simply asking participants the target question a second time increased truth-telling rather than promising to tell the truth. Second, I assess whether a discussion of truth and lies influenced the veracity of participants’ statements. In Experiment 2, participants were no longer asked to promise to tell the truth. However, participants were asked two times whether they had peeked at the test answers. In addition, prior to the second question of whether participants had peeked at the answers to the test, participants completed a moral competency examination. A comparison between Time 1 and Time 2 was made to assess
whether either repeated questioning or a discussion of truth and lies decreased lie-telling at Time 2.

2.3.1 Method

2.3.1.1 Participants

Forty-one 8- to 16-year-olds ($M = 11.34$, $SD = 2.29$, males = 22) completed the same temptation resistance paradigm as Experiment 1. Participants were recruited from a major Canadian city through advertisements placed in the local newspaper and posters within the community. Informed consent was obtained from all parents prior to beginning the study and oral assent from all youth.

2.3.1.2 Design and Procedure

The exact same methods were used as in Experiment 1 except that participants were not asked to discuss what a promise is or asked to promise to tell the truth. After completing the truth and lies conceptual understanding task, participants were simply asked a second time whether they peeked at the answers to the test while the experimenter was out of the room. Including the conceptual knowledge task and removing the promise procedure allowed for the assessment of the influence of conceptual knowledge tasks alone on lie-telling. Based on previous findings with younger children (Talwar et al., 2002), the conceptual knowledge task was not expected to increase truth-telling. In addition, while repeated questioning has been found to influence the accuracy of children’s autobiographical reports, it was expected that such an implicit request for 8- to 16-year-olds to change their answer would not be strong enough for participants to change their answer and admit to their own transgression. Thus, it was
expected that 8- to 16-year-olds’s truth-telling at Time 1 would not significantly differ from Time 2.

2.3.2 Results

Preliminary analyses revealed that participants’ age and sex were not significantly related to their peeking or lie-telling and thus were not considered further.

2.3.2.1 Peeking and lie-telling behaviour

Approximately 68% of participants (28 out of 41) peeked at the answers to the test while the experimenter was gone. Of the 21 participants who peeked at the answers to the test approximately 60% lied (N = 17), 17% told the truth (N = 5) and 21% gave a partial lie (N = 6) at Time 1. Similar truth and lie-telling rates were found at Time 2 with approximately 60% telling a lie (N = 17), 21% telling the truth (N = 6) and 17% telling a partial lie (N = 5), see Figure 2. A comparison between the statements made at Time 1 and Time 2 were made to assess whether participants were significantly more likely to tell the truth when being asked about their transgression a second time. As in Experiment 1, participants’ responses were coded into two categories: the truth or a lie. The Wilcoxon signed-rank test confirmed that there was no significant difference in truth-telling rates between Time 1 and Time 2, Z = -1.00, p = .32.
were participants more likely to change their answer in response to promising or repeated questions?

To examine the influence of promising and repeating questions on truth-telling, dummy codes were created to denote the difference between statements at Time 1 and Time 2. Specifically, a code of 1 was given if a participant lied at Time 1 and Time 2 (lie-lie). A code of 2 was given if participants gave a partial lie at Time 1 and again at Time 2 (partial-partial). A code of 3 was given if participants lied at Time 1 and then gave a partial lie at Time 2 (lie-partial). A code of 4 was given if participants gave a partial lie at Time 1 and told the truth at Time 2 (partial-truth). Finally, a code of 5 was given if a participant lied at Time 1 and told the truth at Time 2 (lie-truth), see Table 1.

Table 1. The percent (frequency) of participants in each difference code category in Experiment 1 and Experiment 2
A Chi-square analyses was performed on participants’ deception codes between the Promise Experiment (Experiment 1) and No promise Experiment (Experiment 1) and was significant, $\chi^2(1, 72) = 9.82, p < .05$. Thus, there was a significant difference between experiments in how participants changed their responses from Time 1 to Time 2 depending on whether promising was used or not. To further assess where the significant differences were, a multinomial logistic regression was performed. Since none of the participants in the No promise Experiment told a lie at Time 1 followed by the truth at Time 2 (lie-truth), it was impossible to analyze this category. Therefore the categories of lie-truth and partial-truth were collapsed together (deception-truth). Additionally, I collapsed the lie-lie and partial-partial categories where deception was maintained (deception-deception). This resulted in three possible veracity categories: deception-truth, lie-partial, and deception-deception.

The multinomial logistic regression was run with the three veracity categories of participants’ responses from Time 1 to Time 2 as the predicted variable (0 = deception-deception, 1 = lie-partial, 2 = deception-truth) and experiment (1 = promise, 0 = no
promise) as the predictor. The model was significant $\chi^2(2, 72) = 9.09$, Nagelkerke $R^2 = .15$, $p < .05$. A priori contrasts with the deception-deception category as the reference group revealed that participants in the Promise Experiment (Experiment 1) were significantly more likely to change their response from a lie to the truth rather than maintaining their lie compared to participants in the No promise Experiment (Experiment 2), $\beta = -2.32$, $Wald = 4.65$, $p < .05$, odds ratio = 10.10. Specifically, the odds ratio indicated that participants in the Promise Experiment were over 10 times more likely to change their lie to the truth compared to participants in the No promise Experiment. There was no significant difference between whether participants would maintain their lie or move from a lie to a partial lie across experiments.

These results suggest that promising to tell the truth does indeed increase truth-telling behaviour in older children and adolescents. In addition, simply asking 8- to 16-year-olds a second time and asking them about their knowledge of truth and lies does not appear to influence their truth and lie-telling behaviour.

2.4 General Discussion

This series of experiments examined the influence of promising to tell the truth and competency tests on the veracity of 8- to 16-year-olds’ statements. These results are consistent with previous findings with younger children (3- to 8-year-olds), indicating that promising to tell the truth decreases lie-telling behaviours with 8- to 16-year-olds and finding support for the revisions made in the Canadian justice system under Bill C-2.

Both Experiments 1 and 2 demonstrated that the majority of 8- to 16-year-olds peeked at the answers to the test and proceeded to deny their transgression. This pattern of behaviour is consistent with results of studies with younger children between 3- to 11-
years of age, demonstrating a strong tendency to lie about their own transgression (e.g., Lewis et al., 1989; Polak & Harris, 1999; Talwar & Lee, 2002a; Talwar & Lee, 2008; Talwar, Gordon, & Lee, 2007). Additionally, the results of Experiment 1 revealed a significant decrease in 8- to 16-year-olds’ lie-telling behaviours after promising to tell the truth and completing the moral competency examination. These results are consistent with the finding that asking younger 3- to 7-year-olds to promise to tell the truth reduces their tendency to tell a lie (Lyon et al., 2008; Talwar et al., 2002; Talwar & Lee, 2008). It is important to note that while promising to tell the truth decreased lie-telling behaviours, it did not eliminate lie-telling as 48% of 8- to 16-year-olds continued to lie after promising. However, a significant reduction in deception after promising was found.

To ensure that the effect of promising was not the result of asking participants a second time whether they peeked at the test answers, Experiment 2 was performed. Additionally, Experiment 2 assessed whether the moral competency examination used in Experiment 1 decreased rates of lie-telling. Results of Experiment 2 revealed no significant difference in participants’ lie-telling behaviour from Time 1 to Time 2 suggesting that neither repeating the question, “Did you peek?”, nor asking participants to complete the competency examination led to decreases in lie-telling behaviours in 8- to 16-year-olds. A comparison of the results of Experiment 1 and Experiment 2 revealed that participants in the Promise experiment (Experiment 1) were 10 times more likely to change their response from a lie to the truth, rather than maintaining their lie compared to the No promise Experiment (Experiment 2). Given that participants still completed a discussion of the concepts and moral implications of truth- and lie-telling, the act of promising to tell the truth alone appears to have a significantly stronger effect on 8- to
16-year-olds’ truth-telling behaviour than discussing the concepts and moral implications of truth- and lie-telling. Consistent with previous findings with younger children (London & Nunez, 2002; Lyon et al., 2008; Talwar et al., 2002) the discussion of truth and lies is not related to the veracity of 8- to 16-year-olds’ statements.

While the Canadian justice system has revised the requirements so that truth and lies assessments are no longer administered, many other North American and European justice systems have maintained this requirement. Our findings, along with others (London & Nunez, Lyon et al., 2008; 2002; Talwar et al., 2002), suggest that while promising to tell the truth should be retained, the requirement to complete a truth and lies assessment should be eliminated for 3- to 16-year-olds.

A concern of the present investigation is the ecological validity of the temptation resistance paradigm. Participants lied to conceal a minor transgression, whereas in actual legal cases they may lie about serious criminal behaviour. In the present investigation, the consequences of telling the truth or a lie were minimal. In court, 8- to 16-year-olds are often testifying against relatives (e.g., parents), friends who have committed a crime, or to protect themselves from being sanctioned for a transgression they committed themselves. These situations have major consequences for their social relationships and personal lives. In these “high-stakes” situations 8- to 16-year-olds’ motivations for lying may differ. Additional research regarding lie-telling behaviour in “high-stakes” situations are needed to further assess this relation. For example, Strömwall, Hartwig, and Granhag (2006) increased the ecological validity of their deception studies by placing participants in a high-stakes environment in which they were interrogated by real police officers about a previous transgression. Ethical concerns aside, similar methods are required to be
completed with children and adolescents to gain an ecologically valid perspective on the influence of promising. Perhaps child friendly interviews with real police officers or increasing the consequences of telling the truth or a lie (loss of a large monetary amount or a highly valued privilege) would provide greater insight into the relation between promising and honesty.
Chapter 3: Performance on Executive Functioning Tasks and Lie-telling Behaviours in Older Children and Adolescents

3.1 Introduction

To date, studies on deception have frequently demonstrated that children begin to tell lies during the preschool years (Hala, Chandler, & Fritz, 1991; Lewis, Stanger, & Sullivan, 1989; Peskin, 1992; Polak & Harris, 1999; Talwar & Lee, 2002a) and that by 4 years of age, children demonstrate clear signs of intentions to deceive others (Polak & Harris, 1999). Not only does the frequency with which children tell lies increase with age (Gervais, Tremblay, Demarais-Gervais, & Vitaro, 2000; Talwar & Lee, 2002a; Wilson, Smith, & Ross, 2003), but the sophistication of such lies also increases. Talwar and Lee (2002a) evaluated the sophistication of children’s lies by assessing their ability to maintain consistency between the original lie and subsequent statements (semantic leakage control). After asking children whether they had peeked at a toy that they had been asked not to look at, children were asked what they thought the toy was. Talwar and Lee found that while 3- to 5-year-olds tended to correctly name the toy (e.g., Barney), revealing that they had peeked at the toy, approximately half of the 6- to 7-year-olds concealed their transgression by feigning ignorance of the identity of the toy.

While there is currently a general understanding of lie-telling behaviours in younger children through experimental studies, no such studies have been completed with adolescents. A recent self-report study conducted by Jensen, Arnett, Feldmen, and Cauffman (2004) demonstrated that adolescents often lied to their parents. However, these self-reported rates of deception may be underestimated due to the negative
perception associated with telling lies. Behavioural measures of such actions are required to gain a greater understanding of adolescents’ lie-telling.

With previous studies indicating a developmental increase in both the frequency and sophistication of lies, it has been suggested that the development of cognitive skills may be related to the development of lie-telling behaviours (Talwar & Lee, 2002a; Talwar & Lee, 2008; Xu, Evans, & Lee, under review). Some evidence supports the idea that lie-telling behaviours may be related to executive functioning skills. Executive functioning skills have been defined as higher-order psychological processes involved in goal-oriented behavior under conscious control (Zelazo & Muller, 2002). A number of cognitive skills, such as inhibitory control, planning, cognitive flexibility, and working memory, are included in executive functioning skills (Welsh, Pennington, & Groisser, 1991; Zelazo, Carter, Reznick, & Frye, 1997). Developmental studies have shown that executive functioning has a long course of development that begins in the preschool years and continues into adolescence. For example, on the Tower of London task, which assesses problem-solving skills, errors and time violations continue to improve from middle childhood into adolescence and young-adulthood (e.g., Baker et al., 2001). Additionally, working memory performance has been found to develop throughout childhood and into adolescence (e.g., Brocki & Bohlin, 2004; DeLuca et al., 2003; Luciana, Conklin, Hooper, & Yarger, 2005) and inhibitory control skills do not appear to reach adult levels until around the age of 12 (Bunge, Dudukovic, Thomason, Vaidya, & Gabrieli, 2002; Durston et al., 2002) or early adolescence (Williams, Ponesse, Schachar, Logan, & Tannock, 1999). Three forms of executive functioning have been suggested to be related to deception: inhibitory control, working memory and planning ability (Carlson
Inhibitory control, or an individual’s ability to suppress a response or behavior while completing a separate goal, is required to tell a lie as one must inhibit the truth while reporting false information. To date, few studies have assessed this relationship. However, one study, conducted by Carlson, Moses, and Hix (1998) found that 3-year-olds who demonstrated difficulty with inhibitory control had difficulty deceiving someone by pointing to the wrong location of an object. More recently, Talwar and Lee (2008) built on Carlson et al.’s findings by assessing 3- to 8-year-olds’ verbal lie-telling behaviors and found that children’s ability to deny their transgression, but not their ability to maintain consistency between their initial lie and their other verbal statements, was related to their inhibitory control skills. In addition, Xu, Evans, and Lee (under review) examined the relation between 4-year-olds’ ability to tell a strategic lie by maintaining consistency between the physical evidence of their transgression (candies they spilled on the table after being told to not touch them) and their verbal statements. Consistent with previous findings, the study revealed that children’s inhibitory control skills were indeed related to their ability to maintain consistency between the physical evidence and their statements. Taken together, these studies provide support for the relation between inhibitory control skills and lie-telling behaviours in younger children. To date, the relation between these skills has not been examined with older children or adolescents.

The second executive functioning skill that has been proposed to be related to children’s lie-telling is working memory – a system for temporarily holding and processing information in the mind (Baddeley, 1986). In order to successfully maintain a
lie, one must maintain in memory the details of the lie as well as the true state of affairs. Talwar and Lee (2008) explicitly examined the relation between 3- to 8-year-olds’ working memory and lie-telling behaviours. Children’s verbal lie-telling behaviours were not related to working memory measures. However, there was a relation between the Stroop task (which involves both inhibitory control skills and working memory) and lie-telling. Thus, it is possible that working memory may play a role in children’s lie-telling. Additionally, it may be that a more developmentally advanced form of working memory is related to deception and can be found among older children and adolescents.

The third executive functioning skill that has been suggested to be related to children’s strategic lie-telling is planning ability. Planning is the ability to create a scheme or course of action prior to the accomplishment of an objective. In order to successfully tell a lie, one must create a plan of deception by organizing the statements in a fashion that will successfully conceal the transgression. Without the ability to plan what one is going to say or do, it would be difficult to successfully tell a lie consistent with either existing physical or verbal evidence. Thus, it is predicted that planning ability will be related to the sophistication of participants’ lies.

To date, only one study has assessed the relation between children’s planning ability and lie-telling (Xu, Evans, & Lee, under review). This study used a modified temptation resistance paradigm in which children were left alone in a room with a container (filled with candies) and children were asked not to touch the container. If a child moved the container to see what was inside, then the contents would spill onto the table and they would not be able to return the contents to the original position. Children were then asked to explain what happened. Surprisingly, no relation was found between
children’s deception and planning ability. One possible explanation is that this planning measure was too simple for children and there was not enough variability in children’s planning scores. It is possible that a more developmentally advanced form of planning in older children and adolescents may be related.

As the majority of deception research has focused on the deceptive behaviors of younger children, the potential developmental changes that might occur after 8 years of age have largely been ignored. The present study addresses this limitation by examining how concealing a transgression through verbal deception is related to cognitive development in 8- to 16-year-olds. To test this possibility, the present study utilized a modified temptation resistance paradigm based on Talwar, Gordon, and Lee (2007) in which 8- to 16-year-olds are left alone in a room with the answers to a test and told not to peek at the answers. Upon returning to the room, participants are asked whether they peeked at the test answers. In addition, participants were asked follow-up questions to assess the sophistication of their lies by examining their ability to maintain consistency between their initial and subsequent statements. Additionally, participants were asked a second time whether they peeked at the answers to the test after promising to tell the truth. Three forms of executive functioning were examined in this investigation: inhibitory control (Word-Colour Stroop), working memory (Digit Span Backwards), and planning skills (Tower of London). Consistent with previous studies, it was expected that increased inhibitory control skills would be related to the ability to tell lies. It was also predicted that participants working memory and planning skills would be related to 8- to 16-year-olds’ lie-telling and the sophistication of their lies. With more developmentally advanced working memory and planning abilities, I expected that older children and
adolescents’ performance on the Digit Span Backwards and the Tower of London would
be significantly related to their ability to conceal a transgression.

3.2 Method

3.2.1 Participants

One hundred and eight 8- to 16-year-olds ($M = 12.07$, $SD = 2.32$, 58 males) were
asked to complete a short answer test on their general knowledge followed by a series of
cognitive tests. Participants were recruited from a major Canadian city through
advertisements in the local newspaper. Informed consent was obtained from all parents
prior to beginning the study and oral assent was obtained from all participants.

3.2.2 Materials

3.2.2.1 Trivia Tasks

The test booklet included 10 trivia style questions placed on the front page (e.g.,
“How many musicians are in a trio?”). Two of the 10 questions, no-answer questions,
had no correct answer (e.g., “Who discovered Tunisia?”). The answer to each question
was listed in numerical order on the inside of the testing booklet. Fabricated answers
were inserted for the no-answer questions. Additionally, to the right of each answer the
letter, shape, and number, H, ♥, 8 were printed.

The “second-chance” trivia task booklet included 5 trivia questions placed on the
front page (e.g., “What year was the smoke detector invented in?”). Fabricated answers to
each question were listed in numerical order on the inside of the testing booklet. All
answers to the questions were fabricated to ensure that participants could not “correctly”
answer the questions. In addition, the letter, shape, and number, W, ⊕, 4 were printed to
the right of each answer.
3.2.2.2 Executive Functioning Measures

Participants completed the Digit Span Backward subtest from the Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) to assess their working memory. Participants were given strings of numbers and were asked to repeat the series in reverse order. One point was awarded for each string of digits recalled correctly. Participants received scores for both the total number of strings correct (ranging from 0 to 16) as well as the longest string of digits recalled backwards (ranging from 0 to 8).

To assess participants’ inhibitory control skills, the Word-Color Stroop was administered. First, participants were presented with a page with the words “RED” “BLUE” and “GREEN” written in black ink repeatedly in random order and asked to read as many words as possible in 45 seconds (Word trial). Second, participants were presented with “XXX” written in blue, red or green ink repeatedly in random order and asked to name the colors of ink as fast as possible in 45 seconds (Color trial). Finally, participants were presented with words written in a contrasting color and asked to name the color of the ink and ignore the word (Word-Color trial). For example, the word BLUE was written in red ink (the participant must say red). An interference score was calculated by subtracting the total number of words read on the Word trial from the total number of items on the Word-Color trial.

To evaluate participants’ executive planning, the Tower of London Drexel University 2nd Edition (TOL$_{DX}$) was administered. The test consists of two boards with pegs; 1 blue bead, 1 red bead, and 1 green bead. The experimenter created a pattern with the bead on their peg board and participants are asked to move the beads on their corresponding board to create the same pattern as the experimenter in as few moves as
possible. Participants received scores for the total number of trials correctly completed (total correct), and the total number of times it takes longer than 1 minute to complete each trial (total time violations) as measures of executive planning.

3.2.3 Design and Procedure

Participants were taken to a quiet testing room with the experimenter and were asked to complete a trivia style test designed to assess their general knowledge about the world. They were told that there were 10 questions and if they got all 10 questions correct they would receive $10.00 but if they got even one question incorrect they would not receive the money. Participants were told that the experimenter would wait for them to complete the task down the hall in the waiting room and they were to retrieve the experimenter when they had completed the test. Participants were also told the answers were on the inside of the testing booklet but were told not to look at the answers while the experimenter was gone. Since two of the test questions had no known correct answer, it was extremely tempting for participants to peek at the test answers.

While the experimenter was out of the room, four hidden cameras recorded whether participants peeked at the answers to the test. As there were ten test questions, participants often peeked at the answers multiple times. The number of peeks was counted. Those participants who looked at the answers were classified as peekers and those who did not look were classified as non-peekers. Once the participant completed the test they retrieved the experimenter from the waiting room. Prior to taking up the answers to the test, the experimenter, who was blind to whether the participant had peeked at the answers, asked the target question, “While I was gone out of the room, did you peek at any of the answers to the test?” (Time 1). Peekers’ responses were coded into
one of two categories. If they peeked at the answers and said “yes” in response to the
target questions they were classified as truth-tellers. If they peeked at the answers and
said “no” in response to the target question they were classified as lie-tellers. In addition,
if participants gave a partial lie (e.g., stated that they only peeked at once when in fact
they peeked multiple times) they were also coded as a lie-teller. Those participants who
did not peek at the answers to the test were coded as non-liars.

Next, participants were told that there was a bonus question that was not worth
any money but that the experimenter wanted to see if they could answer it. Participants
were asked to name the letter, shape, and number listed on the inside of the card.
Participants ought not to know the answer to this question unless they peeked at the
answers. Thus, participants who lied about transgressing should feign ignorance and give
inaccurate answers to the bonus question to conceal their transgression and original lie.
Participants were given 1 point for each correct answer. The Letter-Shape-Number total
score ranged from 0 to 3.

To ensure that participants were able to accurately remember the letter, shape, and
number with just a quick look at the answers, a “second-chance” trivia task was
completed with the same experimenter. Participants were told that for this trivia task we
were looking at how people learn information. They would be asked a question and if
they did not know the answer they would be given 3 seconds to learn the answer by
reading it on the inside of the card. Since all the answers on the inside were fabricated, all
participants were given the opportunity to look at the inside of the card. The number of
times they looked inside was yoked with the number of times they peeked at the trivia
answers when left alone in the room up to a maximum of 5 peeks. After completing the
corresponding yoked number of peeks, participants were told there was a bonus question and were asked to identify the letter, shape, and number on the inside of the card. Participants were given 1 point for each correct answer. All “second-chance” scores ranged from 0 to 3.

All participants then completed the three executive functioning measures (Digit Span, Word-Color Stroop, and TOL). The order of the three tasks was randomized between participants. Finally, participants completed an assessment of their conceptual knowledge of truth and lies and were asked to promise to tell the truth for the next question the experimenter asked. All participants promised to tell the truth and then the experimenter asked the target question again, “While I was gone out of the room, did you peek at the answers to the test?” Responses to the target question at Time 2 were coded based on the same criteria as Time 1.

Upon completion of the 30 minute testing session, all participants were debriefed with their parents and discussed issues regarding truth- and lie-telling. All participants received the $10.00 for participating in the study regardless of their performance on the test.

3.3 Results

Preliminary results revealed no significant effects of sex. Thus the results for both genders have been collapsed for all subsequent analyses.

3.3.1 Peeking behaviour and its relation to executive functioning

Approximately 54% of participants (58 out of 108) peeked at the answers to the test while the experimenter was gone. A logistic regression was performed with age in years (continuous variable) entered on the first step followed by all of the executive
functioning scores on the second step (Digits Backwards, Longest Digit Backwards, TOL total correct, TOL total time violations, Stroop interference) and peeking behaviour (1 = peeked, 0 = did not peek) as the predicted variable. The first model with age was significant, $\chi^2(1, 108) = 7.45$, Nagelkerke $R^2 = .09$, $p < .05$, indicating that as age increased, participants were significantly less likely to peek, $\beta = -.24$, Wald = 6.98, $p < .05$, odds ratio = 1.28. Consistent with previous findings with younger children, executive functioning skills were not significantly related to children’s peeking behaviour (Talwar & Lee, 2008; Xu, Evans & Lee, under review).

3.3.2 Lie-telling behaviour and its relation to executive functioning skills

3.3.2.1 Lie-telling behaviours prior to promising to tell the truth

Of the 58 participants who peeked at the answers to the test, approximately 84% lied (N = 49, 6 of whom told a partial lie by saying they peeked one time when in fact they peeked multiple times), and 16% told the truth (N = 9). A logistic regression was performed with lie-telling at Time 1 as the predicted variable (0 = truth, 1 = lie). Age in years (continuous variable) was entered on the first step followed by all of the executive functioning scores (Digits Backwards, Longest Digit Backwards, TOL total correct, TOL total time violations, Stroop interference) on the second step. The first model with age in years was found to be significant, $\chi^2(1, 58) = 6.86$, Nagelkerke $R^2 = .30$, $p < .05$, indicating that as age increased, participants were significantly more likely to tell the truth rather than lie ($\beta = -.46$, Wald = 5.91, $p < .05$, odds ratio = 1.59). Specifically, the odds ratio indicates that for each year increase in age, participants were 1.59 times more likely to tell the truth. However, the second step of the model including all of the executive functioning skills was not significant.
3.3.2.2 Lie-telling behaviours after promising to tell the truth

Of the 58 peekers, 65% (N = 38) continued to lie and 34% (N = 20) told the truth after completing the conceptual knowledge task and promising to tell the truth. A multinomial logistic regression was performed with lie-telling at Time 2 as the predicted variable (0 = truth, 1 = lie). Age in years (continuous variable) was entered on the first step followed by all of the executive functioning scores (Digits Backwards, Longest Digit Backwards, TOL total correct, TOL total time violations, Stroop interference) on the second step. Again, the first model with age was significant, $\chi^2(1, 58) = 5.47$, Nagelkerke $R^2 = .13$, $p < .05$, indicating that as age increased participants were significantly more likely to tell the truth rather than lie ($\beta = -.32$, $Wald = 5.03$, $p < .05$, odds ratio = 1.37). Specifically, the odds ratio indicates that for each year increase in age, participants were 1.37 times more likely to tell the truth. However, the second step was not significant indicating that none of the executive functioning measures entered on the second step were related to whether participants told the truth or a lie at Time 2.

3.3.3 The sophistication of lies and its relation to executive functioning skills

The sophistication of 8- to 16-year-olds’ lies was assessed as their ability to maintain their lie and conceal information they ought not to know (Letter-Shape-Number score). To control for participants’ memory ability, a difference score was created by subtracting participants’ second-chance score ($M = 1.11$, $SD = 1.03$) from their Letter-Shape-Number score ($M = .24$, $SD = .64$). Z-scores were created for both Letter-Shape-Number scores and second-chance scores prior to subtracting one from the other. Negative difference scores indicated that participants reported more correct responses on the second-chance task than the Letter-Shape-Number task (suggesting an ability to
conceal knowledge). A difference score of zero indicated that there was no difference in participants’ performance on the two tasks and positive scores indicated that participants performed better on the Letter-Shape-Number task than the second-chance task (suggesting an inability to conceal knowledge).

I began by examining the difference scores for those participants who told lies at Time 1. A linear regression was performed with difference scores as the predicted variable. Age in years (continuous variable) was entered on the first step followed by all of the executive functioning scores (Digits Backwards, Longest Digit Backwards, TOL total correct, TOL total time violations, Stroop interference) on the second step. The first model with age in years was not significant, $\Delta F(1, 47) = .03, p = .87, R^2 = .01$. However, after controlling for age the second step was significant, $\Delta F(1, 45) = 4.88, p < .05, R^2 = .08$. When examining which executive functioning scores significantly contributed to the model above and beyond all other common contributions in the model, only the LDSB and TOL time violation scores were found to be significant. Specifically, for those participants who lied at Time 1, higher LDSB ($\beta = -.29, t = 2.88, p < .05$, part correlation = -.38) and TOL time violation ($\beta = -.22, t = 2.21, p < .05$, part correlation = -.29) scores were related to lower difference scores, indicating that 8- to 16-year-olds with better working memory and those who take their time planning were better able to conceal knowledge they ought not to know.

Next, the difference scores for only those participants who told a lie at Time 2 were assessed. A linear regression was performed with difference scores as the predicted variable. Age in years (continuous variable) was entered on the first step followed by all of the executive functioning scores (Digits Backwards, Longest Digit Backwards, TOL
total correct, TOL total time violations, Stroop interference) on the second step. The first model with age was not significant, $\Delta F (1, 35) = .34, p = .56, RD^2 = .01$. However, after controlling for age the second step was significant, $\Delta F (1, 33) = 4.44, p < .05, RD^2 = .10$. When assessing which executive functioning scores significantly contributed to the model above and beyond all other common contributions in the model, only DSB and Stroop interference scores were significant. Specifically, for those participants who maintained their lie at Time 2, higher Stroop interference ($\beta = -.03, t(33) = 2.48, p < .05$, part correlation = -.37) and DSB ($\beta = -.19, t (33) = 2.11, p < .05$, part correlation = -.32) scores were related to lower difference scores, indicating that 8- to 16-year-olds with better inhibitory control and working memory skills are better able to conceal knowledge they ought not to know.

Taken together, the findings of the present investigation indicate that, consistent with previous findings, whether 8- to 16-year-olds peek or tell a lie is not related to their executive functioning skills. However, when 8- to 16-year-olds do lie, the sophistication of their lie is related to their executive functioning skills. Additionally, 8- to 16-year-olds’ peeking and lie-telling rates were found to decrease with age.

3.4 Discussion

The present investigation assessed the relation between concealing a transgression through verbal deception and cognitive development in 8- to 16-year-olds. Results revealed several novel findings in terms of the relation between the sophistication of 8- to 16-year-olds’ deceptive behaviours and their executive functioning skills.

Similar to findings with younger children (Lewis et al., 1989; Polak & Harris, 1999; Talwar & Lee, 2002; Talwar & Lee, 2008; Talwar, Gordon, & Lee, 2007), the
majority of 8- to 16-year-olds peeked at the test answers and lied about their transgression. Developmental trends were also found with both peeking and lie-telling rates decreasing with age. Given that self-report measures of cheating behaviour have reported a developmental increase in cheating (Anderman & Midgley, 2004), the present study’s findings may be due to a lack of older participants’ interest or motivation in the trivial test. Perhaps, if the stakes were higher (e.g., an increased monetary reward or direct impact on their actual academic success), the developmental trend in the present investigation would be eliminated.

Next, the relation between children’s lie-telling and executive functioning skills was examined. While previous studies with 3- to 7-year-olds found a relation between deception and higher levels of inhibitory control (Carlson & Moses, 1998; Talwar & Lee, 2008), no significant relation with any of the executive functioning measures was found in the present study. One possible explanation for this finding is that while 8- to 16-year-olds have more advanced inhibitory control skills overall compared to younger children, thus both truth- and lie-tellers have the ability to tell lies. However, Xu, Evans, and Lee (under review) also failed to find a significant relation between children’s (4-year-olds’) lie-telling and inhibitory control skills.

While no relation between executive functioning skills and lie-telling behaviour was found, a significant relation was found with the sophistication of 8- to 16-year-olds’ lies. Consistent with our original prediction, the sophistication of children’s ability to conceal their lies told by participants prior to promising to tell the truth was related to both working memory and planning scores with both working memory and planning significantly contributing to the model above and beyond all other factors. Specifically,
of the 8- to 16-year-olds who told lies at Time 1, those with better working memory and those who tend to take their time planning are better able to conceal knowledge they ought not to know. Thus, these participants may have been better able to hold in memory the truth and develop alternative responses while taking their time to plan their response, resulting in greater sophistication in their deception.

When examining the sophistication of lies told by participants who continued to lie after promising to tell the truth, Stroop and DSB scores were significantly related to the sophistication of lies above and beyond all other factors in the model. Specifically, of those 8- to 16-year-olds who told lies at Time 2, those with better inhibitory control and working memory skills were better able to conceal knowledge they ought not to know. These findings are consistent with Talwar and Lee (2008) who also found that 3- to 7-year-olds’ Stroop scores significantly predict the sophistication of lies. Specifically, children with higher Stroop scores were better able to conceal information they ought not to know (i.e., the identity of a toy they were asked not to peek at). While Talwar and Lee did not find a direct relation between working memory measures and the sophistication of lies, the Stroop task is thought to measure both inhibitory control and working memory skills. Thus, the present study supports previous findings with younger children and demonstrates a relation between executive functioning skills such as working memory, inhibitory control, and planning abilities and the sophistication 8- to 16-year-olds’ deception.

An interesting finding of the present investigation was that lies told prior to promising and after promising to tell the truth were related to different executive functioning measures. Specifically, for participants who lied at Time 1, the longer they
took to plan (TOL time violations scores), the more sophisticated their responses were to the “ought not to know” bonus questions. Conversely, for participants who lied at Time 2, the greater their inhibitory control skills (Stroop), and the more sophisticated their responses were to the “ought not to know” bonus questions. Planning ability may have been less relevant at Time 2 due to the increased length of time between the first time they were asked and the second time. Given that all participants had a long time to prepare their lie at Time 2, the relation between the ability to conceal their knowledge and planning skills may have been obscured. Future studies examining the relation between deception and time delays are required to gain a greater understanding of this relation. On the other hand, the inhibitory control skills of those participants who continued to tell a lie at Time 2 may have been more relevant given that they were required to inhibit the truth across multiple questions (Time 1 and Time 2) similar to inhibiting the truth in response to three items (letter, shape, and number).

Previous studies have demonstrated a relation between executive functioning skills such as working memory and inhibitory control and children’s theory-of-mind understanding (Carlson & Moses, 2001; Carlson, Moses, & Breton, 2002; Carlson, Moses, & Hix, 1998; Hala, Hug, & Henderson, 2003; Sabbagh, et al., 2006). Additionally, children’s theory-of-mind understanding has been found to be related to children’s lie-telling behaviours (Polak & Harris, 1999; Talwar, Gordon, & Lee, 1997; Talwar & Lee, 2008). In particular, second-order theory-of-mind understanding (the ability to infer someone’s belief about another’s belief), which begins to emerge around 6 years of age and continues to develop into adolescents (Hogrefe, Wimmer, & Perner, 1986; Sullivan, Zaitchik, & Tager-Flusberg, 1994) has been hypothesized to be related to
lie-telling behaviours (Polak & Harris, 1999; Talwar & Lee, 2002a). Recently, Talwar, Gordon, and Lee (2007) assessed the relation between second-order theory-of-mind understanding and lie-telling behaviours in 6- to 11-year-olds and discovered that children’s ability to maintain consistency between their initial lie and subsequent verbal statements was positively correlated with their second-order theory-of-mind understanding. It has been proposed by some that children’s executive functioning skills are required to develop sufficiently to negotiate the cognitive demands of theory-of-mind tasks (Carlson et al., 1998). Thus, executive functioning skills may mediate the relation between theory-of-mind understanding and lie-telling. Future studies are needed to examine the relation between second-order theory-of-mind understanding and deception in adolescents as well as the possible mediation of executive functioning skills.

Building on the findings of previous studies with younger children, the present study indicates that the ability to conceal ones’ lies is related to executive functioning skills between 8 to 16 years of age. Those with higher inhibitory control skills, working memory and those who take their time when planning appear to be more sophisticated in their ability to deceive. It is evident that deceptive behaviours continue to develop after 7 years of age and future studies are needed to gain a greater understanding of this developmental trajectory.
Chapter 4: Detection of Dishonest Statements of 8- to 16-year-olds.

4.1 Introduction

How to accurately detect others’ lies is an interest to both justice system professionals and psychologists. Within the legal system, assessing the truthfulness of a witness’ testimony is the responsibility of many frontline workers including social workers, police officers, judges, and jury members, while many psychologists are intrigued by the use of deception within social relationships. While the majority of studies completed to date focus on the detection of deception with adults, hundreds of thousands of children and adolescents are involved in the court system each year (Bruck, Ceci, & Hembrook, 1998; Puzzanchara, & Kang, 2008). The present investigation addresses this issue by examining both parents (Experiment 1) and 8- to 17-year-olds’ (Experiment 2) ability to detect 8- to 16-year-olds’ lies.

4.1.1 Accuracy of Lie-detection

Despite the importance of determining the veracity of a statement, adults tend to achieve an average of 55% correct judgments in rating other adults’ statements, which is only slightly better than would be expected by chance (e.g., see Bond & DePaulo, 2006; Bond & DePaulo, 2008; also see Ekman, O’Sullivan, Friesen, & Scherer, 1991; Malone & DePaulo, 2001; Vrij & Baxter, 1999). However, there has been some evidence to suggest that certain groups or individuals are able to detect lies above chance levels. For example, some previous studies have found that sheriffs, forensic clinical psychologists, and trained professionals in the Secret Service and CIA perform at rates between 60-80% accurate when attempting to identify adults’ false statements (Ekman & O’Sullivan,
In addition to the extensive research with adults, a few studies to date have begun to investigate children’s lie-telling. Developmental research has demonstrated that children begin to tell lies during the preschool years and the frequency and sophistication of their lies increases with age (Gervais et al., 2000; Polak & Harris, 1999; Talwar & Lee, 2002; Talwar & Lee, 2008; Wilson, Smith, & Ross, 2003). Wescott and colleagues (1991) found that as children’s age increases, it becomes more difficult to detect their deceptive statements. Specifically, undergraduate students were asked to assess the veracity of 7- to 8- and 10- to 11-year-olds’ statements about visiting a museum. Results revealed that adults’ overall lie-detection rates were slightly above chance at 59% accurate, but their accuracy rates for younger children’s statements were even higher. In addition, Edelstein, Luten, Ekman and Goodman (2006) found that children’s deception was easier to detect than adults’. Similarly, Talwar and Lee (2002) found that deceptive verbal statements made by children less than 8 years of age were easily detected by adults. Conversely, Vrij, Akehurst, Brown, and Mann (2006) found no differences in the ability of teachers, social workers, police officers, and laypersons’ in detecting deceptive statement about a transgression in 5- to 6-year-olds, 14- to 15-year-olds and adults.

Similar to research on our ability to detect adults’ deceptive statements, individual differences in the ability to detect children’s lies has been examined (Bala, Ramakrishna, Lindsay, & Lee, 2005; Edelstein et al., 2006; Leach, Talwar, Lee, Bala, & Lindsay, 2004; Lewis & Crossman, 2006; Vrij et al., 2006). Studies examining the ability to detect children’s lies in professionals such as law students, judges, police officers, social
workers, and customs officers found that the only group performing slightly above chance levels was judges (Bala, Ramakrishna, Lindsay, & Lee, 2005; Leach et al., 2006; Vrij et al., 2006). While parents have been found to be no better than undergraduates (Crossman & Lewis, 2006; Talwar & Lee, 2002), professional experience working with children (child care workers and psychologists) has been found to be related to higher deception detection accuracy rates (Crossman & Lewis, 2006). Thus, it appears as though there may be individual differences in adults’ ability to detect children’s lies, with judges and those with professional experience with children performing significantly better than others. While some studies have evaluated parent’s abilities to detect other children’s lies, parents’ ability to detect their own children’s lies has remained unexamined to date. Since many parents’ experiences with children are limited to their own children, parents may be able to detect their own children’s lies.

Another group whose lie-detection skills have been minimally examined is children and adolescents. One study conducted by Lee, Cameron, Doucette, and Talwar (2002) investigated 3- to 6-year-olds ability to identify implausible statements. Children were told a story of a mother asking her child about how a glass cup was broken, and the child responding with an implausible statement, “The ghost in the book jumped out of the book and broke the glass”. Results revealed that younger children believed the implausible statement to be the truth, while older (6-year-old) children recognized it to be a lie. These findings suggest that children begin to detect others fabricated statements around 6 years of age. To date, only one study has examined children’s ability to detect spontaneous occurring lies. Talwar, Crossman, Gulmi, Renaud & Williams (in press) presented 4- to 6-year-olds, 7- to 9-year-olds and young adults (17- to 25-year-olds) with a series of
video segments in which children between 4- and 9-years of age either told the truth or a lie about committing a transgression. Results revealed that while both children and adults were below chance at detecting truthful statements, older children were significantly better at detecting lies than younger children and adults. Given that there appears to be a developmental trend in which children’s lie-telling increase with age during childhood, an investigation of this older age group is warranted.

Another perspective that remains unexamined is how previous experience in the same situation as the lie-teller may influence one’s ability to detect others’ lies. One’s episodic memories (memory of autobiographical events such as times, places, associate emotions and other contextual information, Tulving, 1984) of being in the same situation as the lie-teller may allow the lie-detector to identify cues to deception. For example, if the lie-detector remembers being nervous and attempted to maintain eye-contact with the lie-recipient, they may look for such cues when viewing a similar scenario. Additionally, knowledge of the situation where the lie-teller is being deceptive may assist in accurately identifying lies.

While studies have repeatedly found that confidence ratings for veracity judgments are not significantly related to lie-detection accuracy for younger children and adults (DePaulo, Charlton, Cooper, Lindsay, & Muhlenbruck, 1997; DePaulo & Pfeifer, 1986; Elaad, 2003; Ekman & O’Sullivan, 1991; Leach et al., 2006; Vrij & Graham, 1997), individual differences have been found (DePaulo & Pfeifer, 1986; Leach et al., 2006). For example, Leach et al. (2006) found that while customs officers were no more accurate in their veracity judgments than other groups, they were significantly more confident in their judgments.
4.1.2 Moral reasoning tasks and promising to tell the truth

One technique commonly used in the court system to increase truth-telling is requiring witnesses to promise to tell the truth prior to testifying in court. In most North American jurisdictions, children are also required to undergo examinations to determine whether they are legally competent to testify (Bala et al., 2000; Haugaard et al., 1996). While some researchers have found that discussing or evaluating the morality of lie-telling increases children’s accuracy rates when describing an event (Huffman, Warren, & Larson, 1999; London & Nunez, 2002), others have found no relation with children’s lie-telling behaviours (Talwar, Lee, Bala, & Lindsay, 2002). Conversely, empirical studies examining promising have demonstrated that explicitly asking children to promise to tell the truth decreases the lie-telling behaviours of 3- to 11-year-olds (Talwar et al., 2002; Talwar et al., 2004; Lyon et al., 2008).

While the influence of competency examinations and promising to tell the truth has been examined in relation to children’s lie-telling behaviour, only one study to date has assessed this influence on adults’ ability to detect 3- to 11-year-olds’ lies (Leach et al., 2006). Leach et al. showed police officers, customs officers, and undergraduates videotapes of children either telling the truth or a lie about a transgression. Prior to the video recording, some of the children had completed a moral reasoning competency examination and promised to tell the truth. Results revealed that while adult observers could not accurately detect children’s lies when no moral reasoning task or promising occurred, adults were significantly more accurate than chance levels when the child completed either the moral reasoning competency examination or promised to tell the truth. These results suggest that promising to tell the truth and completing the moral
competency examination may increase adults’ ability to detect 3- to 11-year-olds’ lies. However, we currently do not know whether such procedures increase our ability to detect the lies of those over 11 years of age.

In the present investigation, the detection of 8- to 16-year-olds’ lies were examined through two experiments. In Experiment 1, parents were shown two video clips of their own children’s statement about having peeked at the answers to a test. In the first video clip, 8- to 16-year-olds simply responded to the question of whether they peeked at the test answers. Prior to the start of the second video clip, all 8- to 16-year-olds completed a moral competency examination and promised to tell the truth. Consistent with Leach et al.’s (2004) findings, it was expected that lie-detection accuracy rates will be higher after the moral competency examination and promising to tell the truth was completed. Additionally, all parents’ completed personality measures including a measure of Machiavellianism (MACH IV, a measure of the tendency to deceive or manipulate others) and an Empathy measure (a measure of the ability to understand another’s feelings and emotions). Previous studies examining Machiavellianism and deception have found a relation between the detectability of lies and Machiavellianism scores (Bradley & Klohn, 1987; Geis & Moon, 1981). Thus, it was predicted that parents with higher Machiavellianism scores would be significantly more accurate at detecting their own children’s lies. Additionally, given that empathy is the ability to put oneself into the mental shoes of another person (Goldman, 1993), it was predicted that parents with higher empathy scores would be significantly more accurate at detecting their own children’s lies.
In Experiment 2, 8- to 17-year-olds (lie-detectors) were shown a series of videos in which the person was either telling the truth or a lie about having peeked at the answers to the test. All lie-detectors had previously participated in the same experiment as those in the videos. It was expected that participants’ previous experience in the same situation as the speaker in the video may influence their lie-detection abilities.
4.2 Experiment 1

4.2.1 Method

4.2.1.1 Participants

Seventy-one parents (20 males, mean age was not collected as it was not included on the consent form approved by ethics) rated the veracity of statements made by their own children. Informed consent was obtained prior to beginning the session.

4.2.1.2 Materials

The video clips presented to parents were taken from a session in which their own child (8 to 16 years of age) was left alone in a room with the answers to a test and were asked not to peek at the answers. Upon returning to the room, the experimenter asked whether they peeked at the answers while they were gone (Time 1). After taking up the answers to the tests, participants completed an assessment of the conceptual understanding of truth and lies, and asked to promise to tell the truth in response to the experimenter’s next question. Participants were again asked whether they peeked at the answers to the test (Time 2).

Parents were shown two video clips (Time 1 and Time 2) of their own child either telling the truth about not peeking at the test answers (non-liars) or a lie about having peeked at the answers (lie-tellers). Thus, all children answered the questions “Did you peek at the answers to the test?” with the response of “no”. Video clips included the experimenter asking the question, “While I was gone out of the room, did you peek at the answers to the test?”, the participant’s response to the question, and five seconds of footage after their response ended. Parents were not aware that their child had been asked to promise to tell the truth prior to responding. Each video clip was approximately 10
seconds in length ($M = 10.67$ seconds, $SD = 4.09$). The order of Time 1 and Time 2 was counterbalanced between participants.

4.2.1.3 Questionnaires

Parents were asked to complete two personality scales. The first scale was a measure of empathy based on Mehrabian and Epstein (1972). The empathy consisted of 30 items that included both positive and negative emotional situations. To reduce response bias, six of the items were negatively-worded and were reverse scored (e.g., “I find it annoying when people cry in public”). Participants were asked to respond to each question on a 9-point scale ranging from “very strongly disagree (-4)” to “very strongly agree (4)”. Total empathy scores were created by summing all 33 items. Higher scores represent a more empathetic personality.

The second scale was the MACH IV Machiavellian Personality Questionnaire (Christie, 1970), designed to measure a person’s level of Machiavellianism or tendency to deceive and manipulate others. The questionnaire consists of 20 statements such as, “The best way to handle people is to tell them what they want to hear” in which participants are asked to rate each statement on a 5-point Likert agreement scale from “Strongly Disagree (1)” to “Strongly Agree(5)”. Total scores are computed by summing each response and range from 20 to 100. Higher scores represent a more deceptive and manipulative personality.

4.2.1.4 Design and Procedure

Parents were invited to view two short video clips of their own child either telling the truth or a lie about peeking at the answers to a test. After completing consent forms, all parents completed the Machiavellian and Empathy Questionnaires in the waiting
room. Once their child had completed the testing session, parents were brought into a
room to watch the two short video clips. Parents and children were not given the
opportunity to discuss the session before parents made their ratings of the videos. Parents
were told they would be shown two short video clips in which the experimenter would
ask their child whether they had peeked at the answer to the test and their child’s answer.
Parents were given a score of 1 if they correctly identified the veracity of the statement
and a score of 0 if they incorrectly identified the veracity of the statement. After viewing
each video clip, parents were asked to rate whether they thought the statement was the
truth or a lie as well as how confident they were on a scale of 1 to 100 (1 = not confident
at all, and 100 = completely confident). Each parent was given an accuracy and
certainty score for each video. After rating both videos, all participants were debriefed.

4.2.2 Results and Discussion

The videos of children who confessed to peeking at the test answers were
excluded from analyses since they admitted to peeking at the test answers and the
veracity of their statement was evidently truthful. This resulted in a total of 80 children’s
videos at Time 1 (43 non-liars who had not peeked at the test answers and 37 lie-tellers
who had peeked at the test answers) and 70 videos at Time 2 (41 non-liars and 29 lie-
tellers). Preliminary analyses revealed both the age and sex of the children in the videos
were not significantly related to parents’ accuracy rates. Thus, all following analyses
were run collapsing both of these variables. The analyses begin by examining parents’
ability to identify the veracity of their own children’s statements when they are *not* asked
to promise to tell the truth (Time 1), followed by their ability to identify the veracity
when their child promises to tell the truth (Time 2).
4.2.2.1 Parents’ ability to detect their own children’s lies prior to promising (Time 1)

To assess whether parents were able to accurately identify the veracity of their own children’s statements, a one-sample t-test was performed comparing parents’ overall accuracy rate (including non-liars and lie-tellers) against chance (.50). Results revealed that parents’ overall accuracy rates ($M = .54, SD = .50$) were not significantly different from chance, $t(79) = .67, p = .51$.

Next, the accuracy rates for non-liars ($N = 43$) and lie-tellers ($N = 37$) were assessed separately to assess whether parents were significantly more accurate at detecting the veracity of the truthful or untruthful statements. First, a one-sample t-test was performed comparing the accuracy rate for the non-liars’ videos ($M = .93, SD = .23$) against chance and revealed that parents were significantly above chance levels at detecting children’s honest statements, $t(42) = 10.95, p < .05$. Conversely, a one-sample t-test comparing the accuracy rate for the lie-tellers’ videos ($M = .08, SD = .28$) revealed that parents were significantly below chance levels at detecting deceptive statements, $t(36) = 9.21, p < .05$, see Figure 3.
Figure 3. Parents’ mean accuracy rates for non-liars videos and lie-tellers prior to participants promising to tell the truth (Time 1) and after promising to tell the truth (Time 2).

Given that parents’ overall accuracy rates are not significantly different from chance but their accuracy rates for the non-liars’ and lie-tellers were independently significantly differ from chance, a signal detection analysis was performed.

Signal detection analysis was run on parents’ total mean accuracy scores to determine parents’ sensitivity to discriminate between truths and lies and whether parents are biased towards responding in a particular manner (e.g., truth or lie). Given that each parent only had a single score of 0 or 1, a total mean accuracy rate was created by summing all parents’ accuracy scores in order to perform a signal detection analysis. Results revealed that parents tended to have a truth bias (Mean $d' = .05$, Mean criterion $c = 1.44$; Note that no t-tests could be performed or SD reported since there was only one overall mean score for parents). Taken together these results demonstrate that parents have a strong truth bias when judging the veracity of their own child’s statement resulting in extremely high accuracy rates for detecting truthful statements but extremely low accuracy rates for detecting deceptive statements.

Next, the relation between parents’ overall confidence ratings for their judgment at Time 1 ($M = 69.29, SD = 35.87$) were evaluated in relation to their accuracy scores. Because parents were rating only their own child’s video and each parent simply had a score of either 0 (incorrect) or 1 (correct), a logistic regression was performed. The logistic regression with overall confidence ratings as the predictor and overall accuracy score as the predicted variable (0 = inaccurate, 1 = accurate) was not significant, $\chi^2(1, 80) = 1.50, \text{Nagelkerke } R^2 = .03, p = .22$, indicating that there was no relation between
parents' confidence ratings and accuracy scores. Separate logistic regressions were performed for truth and lie videos and again no relation was found between parents' confidence ratings and accuracy scores (truth: $\chi^2(1, 43) = 0$, Nagelkerke $R^2 = .0$, $p = .99$, and lie: $\chi^2(1, 37) = .07$, Nagelkerke $R^2 = .01$, $p = .78$). A paired samples t-test was performed to assess whether parents were more confident in their ratings for truth statements or lies. Results revealed no significant difference between parents’ confidence ratings of truthful statements ($M = 74.74$, $SD = 32.33$) and lies ($M = 63.26$, $SD = 38.97$), $t(78) = 1.44$, $p = .15$.

Finally, I assessed whether the age of the child in the video influenced parents’ confidence ratings. A linear regression with age as the predictor variable and overall confidence as the predicted variable demonstrated that children’s age was not a significant predictor of parental confidence, $F(1, 79) = .22$, $p = .64$, $R^2 = .003$.

Taken together, these results indicate that parents tend to have confidence in their veracity judgments with the mean overall confidence rating at 70%. However, confidence ratings were not significantly related to the accuracy of their judgments.

The relation between parents’ scores on the personality measures (Machiavellianism and Empathy) and accuracy rates was also assessed. Parents’ Machiavellianism scores ranged from 24 to 66 ($M = 48.49$, $SD = 7.65$). Additionally, parents’ Empathy scores ranged from -7 to 115 ($M = 37.58$, $SD = 23.89$) demonstrating a wide range of Empathy scores with the mean Empathy score falling in the middle range of possible Empathy scores. Given that there were significant differences in parents’ accuracy rates for truthful statements and deceptive statements, separate logistic regressions were performed.
The first regression evaluated only the videos of the children who told the truth. Given that parents only rated their own child’s video and received a score of either 0 (inaccurate) or 1 (accurate), a logistic regression was performed. Parents’ Machiavellianism and Empathy scores were entered as the predictors and parents’ accuracy score for truth videos were entered as the predicted variable (0 = inaccurate, 1 = accurate). The regression was not significant, $\chi^2(2, 43) = .83$, Nagelkerke $R^2 = .05$, $p = .67$, indicating that neither parent’s Machiavellianism nor Empathy scores were related to the accuracy of their evaluation of their own child’s truthful statement.

A second logistic regression was then performed examining only the videos of children who told a lie. Again, since parents only rated their own child’s video and received a score of either 0 (inaccurate) or 1 (accurate), a logistic regression was performed. Parents’ Machiavellianism and Empathy scores were entered as the predictors and parent’s accuracy rates for the lie videos were entered as the predicted variables (0 = inaccurate, 1 = accurate). The model was significant, $\chi^2(2, 37) = 6.60$, Nagelkerke $R^2 = .39$, $p < .05$. Further inspection of the final logistic equation revealed that only parents’ Empathy score was a significant predictor of accuracy rate ($\beta = .08$, Wald = 4.27, $p < .05$, odds ratio = 1.08). Specifically, for each 1 point increase in parents’ Empathy scores they were 1.08 times more likely to accurately identify deceptive statements. While parents in general tended to have a truth bias, according to the signal detection analysis, these results suggest that more empathetic parents are slightly more likely to detect their own children’s lies.

**4.2.2.2 Parents’ ability to detect their own children’s lies after promising to tell the truth (Time 2)**
Next, parents’ ability to detect the veracity of their own children’s lies when their child has promised to tell the truth was assessed. Since children who confessed to peeking were excluded from analysis, only the videos of 70 children were included after promising to tell the truth (41 truth tellers and 29 lie-tellers). A one-sample t-test was performed comparing parents’ overall accuracy rates (including both truth and lie-tellers) for Time 2 against chance (.50). Results revealed that parents’ overall accuracy rate ($M = .64, SD = .48$) was significantly above chance, $t(69) = 2.47, p < .05$. To assess whether parents were significantly more accurate at detecting the veracity of truthful statements or lies, the accuracy rates for non-liars ($N = 41$) and lie-tellers ($N = 29$) were examined separately.

First, a one-sample t-test was performed comparing the accuracy rate for truth videos ($M = .88, SD = .33$) against chance and revealed that parents were significantly above chance levels at detecting their own child’s honest statements, $t(40) = 7.31, p < .05$. Conversely, a one-samples t-test comparing the accuracy rate for lie videos ($M = .31, SD = .47$) to chance revealed that parents were significantly below chance levels at detecting deceptive statements, $t (28) = 2.17, p < .05$, see Figure 3.

Signal detection analysis was performed on parents’ mean accuracy rate to determine whether parents are biased towards responding in a particular manner (e.g., truth or lie). Given that each parent only had a single score of 0 or 1 a total mean accuracy rate was created by summing all parents’ accuracy scores in order to perform a signal detection analysis. Results revealed that parents had a truth bias ($Mean d’ = .48$, Mean criterion $c = .84$; Note that no t-tests could be performed or SD reported since there was only one overall mean score for parents). These results indicate that while parents
appear to be better than chance at detecting deceptive statements after children have promised to tell the truth, parents still have a truth bias when judging the veracity of their own child’s statement.

Next the relation between parents’ overall confidence ratings for their judgment at Time 2 ($M = 68.63$, $SD = 34.02$) were examined in relation to their accuracy rates. The regression analysis with overall confidence ratings as the predictor and overall accuracy rates as the predicted variable was not significant, $\chi^2(1, 70) = .04$, Nagelkerke $R^2 = .001$, $p = .85$, indicating that there was no relation between parents confidence ratings and overall accuracy scores. Separate regressions were performed for truth videos and lie videos and again, no relation was found between parents’ confidence ratings and accuracy scores (truth: $\chi^2(1, 41) = .16$, Nagelkerke $R^2 = .01$, $p = .69$, and lie: $\chi^2(1, 29) = 1.11$, Nagelkerke $R^2 = .05$, $p = .29$). To examine whether there was a significant difference in parents’ confidence ratings for the truth videos and lie videos, a paired samples t-test was performed. Results revealed that there were no significant differences between parents’ confidence ratings when viewing truthful statements ($M = 73.00$, $SD = 29.79$) and viewing lies ($M = 62.45$, $SD = 38.94$), $t(68) = 1.28$, $p = .20$.

Finally, I investigated whether the age of the child in the video influenced parents’ confidence ratings. A linear regression with age as the predictor variable and overall confidence as the predicted variable demonstrated that children’s age was not a significant predictor of parental confidence, $F(1, 69) = .08$, $p = .78$, $R^2 = .001$. Overall, parents appeared to have confidence in their veracity judgments; however, confidence ratings were not significantly related to the accuracy of their judgments even after their own child had promised to tell the truth.
The relation between parents’ scores on the personality measures (Machiavellianism and Empathy) and accuracy rates was assessed next. Similarly to the previous analysis, the 70 parents’ Machiavellianism scores ranged from 24 to 64 ($M = 47.74$, $SD = 7.48$), indicating that parents tended to fall in the low Machiavellianism range. Additionally, Empathy scores ranged from -9 to 115 ($M = 39.34$, $SD = 25.26$) suggesting that parents on average fell in the middle of the Empathy range. Given that there were significant differences in parents’ accuracy rates for truthful statements and deceptive statements, separate logistic regressions were performed.

The first logistic regression with parents’ Machiavellianism and Empathy scores as the predictors and the accuracy scores of parents whose children told the truth as the predicted variable (0 = inaccurate, 1 = accurate) was not significant, $\chi^2(2, 41) = 2.73$, Nagelkerke $R^2 = .13$, $p = .26$. The second logistic regression with parents’ Machiavellianism and Empathy scores as the predictors and the accuracy scores of parents whose own child told a lie as the predicted variables was also not significant, $\chi^2(2, 29) = 1.15$, Nagelkerke $R^2 = .06$, $p = .56$. These results suggest that once a child has promised to tell the truth, neither empathetic nor Machiavellian personalities are related to parents’ accuracy to determine the veracity of their own child’s deceptive statement.

Overall, Experiment 1 has demonstrated that parents are typically around chance levels in detecting their own children’s lies. Asking children to promise to tell the truth increases parents overall accuracy; however, parents still tend to have low levels in detecting deceptive statements. Additionally, parents have a strong bias towards believing their own child is telling the truth.

4.3 Experiment 2
Experiment 2 examines 8- to 17-year-olds’ ability to detect 8- to 16-year-olds’ lies. In addition, Experiment 2 examines whether adolescents’ previous behaviours (transgressing or not; telling the truth or a lie) influences the lie detection rates of this age group.

4.3.1 Method

4.3.1.1 Participants

Eighty 8- to 17-year olds participated in Experiment 2 ($M = 12.31$ years, $SD = 2.33$, 45 males) as lie-detectors. Informed consent was obtained from all parents and assent was obtained from all participants.

4.3.1.2 Materials

A series of video clips were created based on the same study as Experiment 1 where participants were left alone in a room and asked not to peek at the answers to a test. All videos were taken from Time 2 in which participants were asked to promise to tell the truth prior to being asked if they peeked at the test answers. Video clips included the experimenter asking the question, “While I was out of the room, did you peek at the answers to the test?”, the participant’s response to the question and five seconds of footage after their response ended. Each video clip was approximately 10 seconds in length ($M = 10.93$, $SD = 2.69$). There were 46 video clips in total, half of the videos contained non-liars and half contained lie-tellers. Thus, all participants in the videos replied “no” in response to the question of whether they had peeked. Video clips were matched with respect to age for truth and lie tellers. There was no significant difference in length between the video clips of truth tellers ($M = 11.35$, $SD = 3.39$) and lie tellers ($M$
All videos were presented on a 13.5 inch by 10.5 inch computer screen using E-prime software.

4.3.1.3 Procedure

All lie-detectors in the present experiment had previously participated in the prior study session (session 1) in which they were left alone in the room and were asked not to peek at the answers to a test. During session 1, participants were asked twice whether they had peeked at the answers to the test. One time they were simply asked if they peeked at the test answers (Time 1) and one time they were asked to promise to tell the truth prior to being asked if they peeked (Time 2). Forty-five of the eighty lie-detectors transgressed and peeked at the answers. Of those forty-five that peeked, 87% (N = 39) had told a lie about transgressing at Time 1 and 71% (N = 32) told a lie at Time 2. After a period of 9 to 12 months, participants were invited back to the laboratory to participate in the current session.

After obtaining consent, participants were taken to a quiet room to complete the lie-detection task. Participants were told that they would see a series of videos in which a person would be asked if they had peeked at the answers to a test, and that it was their job to determine if the person was telling the truth or a lie. Participants then viewed the series of forty-six videos and made judgments of whether they thought the person in the video was either telling the truth or a lie. In addition, participants made a judgment of how confident they were in their decision on a scale of 1 to 100 for each video. If applicable, participants’ own video was excluded from analyses. After rating the series of videos, all participants were debriefed.
Participants received 1 point for each video they correctly labeled. Three different accuracy scores were created. First, participants received an overall accuracy rate (mean accuracy rate of all videos). Second, participants received a non-liar video accuracy rate (mean accuracy rate for judgments of non-liars’ videos). Finally, participants received a lie video accuracy rate (mean accuracy rate for judgments of lie-tellers’ videos).

4.3.2 Results and Discussion

The results begin by examining participants’ lie-detection accuracy rates, followed by examining their confidence ratings. Finally, the relation between participants’ own behaviour at session 1 and their lie-detection abilities is examined.

Preliminary analysis revealed that participants’ age and sex were not related to their accuracy rates and thus all analyses were collapsed across age.

4.3.2.1 Lie-detection accuracy rates

To examine 8- to 17-year-olds’ ability to accurately identify the veracity of other 8- to 16-year-olds’ statements, a one-sample t-test was performed comparing lie-detectors’ overall accuracy rates against chance (.50). Results revealed that overall accuracy rates ($M = .50, SD = .07$) were not significantly different from chance, $t(79) = .33, p = .74$.

Next, the accuracy rates for the non-liar videos and lie-teller videos were individually assessed. A one-sample t-test comparing the non-liar accuracy rates to chance revealed that 8- to 17-year-olds’ lie-detectors’ non-liar accuracy rates ($M = .46, SD = .17$) were marginally below chance, $t(79) = 2.04, p = .05$. Conversely, a one-sample t-test comparing the lie-teller video accuracy rate ($M = .53, SD = .16$) was not significantly different from chance, $t(79) = 1.84, p = .07$. Given the mixed results with
the overall accuracy rate not being significantly different from chance and the non-liar videos alone being significantly above chance, signal detection analysis was performed to assess participants’ decision-making process.

Two aspects of the decision-making process were assessed: (1) lie-detectors’ ability to discriminate between non-liars and lie-tellers ($d'$ refers to their ability to discriminate between truths and lies) and (2) lie-detectors’ biases or their tendency to favor a specific response (criterion $c$ refers to how conservative or liberal a person’s criterion is for making a truth or lie judgment).

**Discrimination.** A one-sample t-test was performed on lie-detectors’ $d'$ values, an index of discrimination ability with the level of sensitivity compared to 0. However, participants’ detection rate was not significantly different from 0, $t(79) = .30, p = .76$, indicating they were unable to discriminate between non-liars and lie-tellers ($d' = -.01$).

**Response Bias.** The response bias was assessed using criterion $c$ which assesses a person’s tendency to identify statements as truths or lies. A one-sample t-test was performed on lie-detectors’ criterion $c$ values, as an index of the tendency to indicate that the people in the videos were non-liars or lie-tellers, with values compared to 0 (no bias). Participants’ responses did significantly differ from zero indicating a response bias, $t(79) = 2.14, p < .05$. Given the negative direction of criterion $c$ (criterion $c = -.11$) it appears as though participants had a slight bias towards labeling statements as a lie.

### 4.3.2.2 The relation between confidence scores and lie-detection accuracy

Next, the relation between 8- to 17-year-olds’ confidence ratings for their judgments ($M = 71.08$, $SD = 16.10$) were examined in relation to their accuracy rates. The linear regression with overall confidence ratings as the predictor and overall
accuracy rate as the predicted variable was not significant, $F(1, 77) = .26, p = .61$, indicating there was no relation between participants overall confidence and accuracy scores. Separate linear regressions were performed for non-liar video accuracy rates and lie-teller video accuracy rates and again no relation was found between 8- to 17-year-olds’ confidence ratings and accuracy scores (truth: $F(1, 77) = .002, p = .97$, and lie: $F(1, 77) = .31, p = .58$).

Finally, a paired samples t-test was performed to assess whether participants’ confidence ratings differed between non-liar videos and lie-teller videos. There was no significant difference found between participants’ confidence ratings of non-liars ($M = 70.67, SD = 16.55$) and lie-tellers ($M = 71.50, SD = 16.71$), $t(77) = .87, p = .39$. In general, consistent with Experiment 1, participants appear to have confidence in their veracity judgments. However, participants’ confidence ratings were not significantly related to the accuracy of their judgments.

4.3.2.3 The relation between lie-detectors’ previous behaviour and accuracy rates

Next, lie-detectors’ own behaviour in session 1 was assessed in relation to their detection abilities.

4.3.2.3.1 Lie-detectors’ peeking behaviour

A One-way between-subjects Analysis of Variance (ANOVA) was performed on participants’ overall accuracy rate with peeking behaviour (peeked vs. did not peek) as the between subjects variable. Results revealed that there was no significant difference between the overall accuracy rates for lie-detectors who peeked ($M = .49, SD = .07$) and lie-detectors who did not peek ($M = .50, SD = .07$), $F(1, 79) = .15, p = .70$. 


Next, separate One-way ANOVAs were performed for non-liar video accuracy rates and lie-teller video accuracy rates, respectively. The One-way ANOVA on lie-detectors’ non-liar video accuracy scores with peeking behaviour as the between-subjects variable revealed that lie-detectors who peeked ($M = .40, SD = .17$) were significantly less accurate than lie-detectors who did not peek ($M = .53, SD = .13$), $F(1, 79) = 14.07, p < .05$. One-sample t-tests comparing the non-liar video accuracy rates of lie-detectors who were peekers and non-peekers to chance indicated that while lie-detectors who peeked are significantly below chance, lie-detectors who did not peek were not significantly different from chance, $t(44) = 3.69, p < .05$, and $t(34) = 1.66, p = .11$, respectively.

Conversely, the One-way ANOVA on participants’ lie-teller video accuracy scores with peeking behaviour as the between-subjects variable revealed that lie-detectors who peeked ($M = .60, SD = .16$) were significantly more accurate than lie-detectors who did not peek ($M = .45, SD = .13$), $F(1, 79) = 19.70, p < .05$. One-sample t-tests comparing the lie-teller video accuracy rates of lie-detectors who peeked and who did not peek to chance indicated that while lie-detectors who peeked were significantly above chance, lie-detectors who did not peek were significantly below chance, $t(44) = 4.71, p < .05$, and $t(34) = 2.20, p < .05$, respectively (See Figure 4). Again, given the different findings with the overall accuracy rates and the accuracy rates for the non-liar and lie-teller videos separately, signal detection analysis was performed to assess the participants’ decision making process.
Discrimination. A one-way ANOVA, with the peeking behaviour of the lie-detector (peekers vs. non-peekers) as the independent variable, was performed on lie-detectors’ $d'$ values. Results revealed no significant difference between lie-detectors who were peekers ($M = -.01, SD = .28$) and non-peekers ($M = -.02, SD = .27$) ability to discriminate between non-liar and lie-teller videos, $F(1, 79) = .03, p = .87$.

Response Bias. A one-way ANOVA, with the peeking behaviour of lie-detectors as the independent variable, was performed on lie-detectors’ criterion $c$ values. A significant difference between lie-detectors who were peekers ($M = -.29, SD = .48$) and non-peekers ($M = .13, SD = .29$) emerged, $F(1, 79) = 20.11, p < .05$. T-tests comparing each group’s criterion $c$ values to 0 revealed a significant bias for both lie-detectors who were peekers and non-peekers, $t(45) = 4.04, p < .05$, and $t(33) = 2.62, p < .05$, respectively. Specifically, the negative criterion $c$ value for lie-detectors who were peekers suggests they have a lie bias while the positive criterion $c$ value for lie-detectors who were non-peekers suggests they have a truth bias. These results indicate that those lie-detectors who peeked themselves tend to judge others to have peeked as well,
resulting in a bias towards believing that all participants in the video were lying.
Conversely, those lie-detectors who did not peek themselves tend to believe that others did not peek at the test answers and thus were biased towards believing that other participants in the video were telling the truth.

4.3.2.3.2 Lie-detectors’ lie-telling behaviour prior to promising to tell the truth

Of those lie-detectors who transgressed and peeked at the test answers (N = 45), the lie-detection accuracy rate between non-liar and lie-teller videos was evaluated. A One-way ANOVA on overall accuracy rate with the lie-detectors own lie-telling behaviour during session 1 prior to promising to tell the truth (truth-teller vs. lie-teller) as the between-subjects variable found no significant differences between lie-detectors who were truth-tellers (M = .52, SD = .08) and lie-tellers (M = .50, SD = .07), F(1, 44) = .61, p = .44.

Separate One-way ANOVAs were performed on non-liar and lie-teller video accuracy rates with the lie-detectors own lie-telling behaviour during session 1 prior to promising to tell the truth as the between subjects variable. Again, neither model was significant, F(1, 44) = 3.53, p = .07, F(1, 44) = 1.76, p = .19, non-liar and lie-teller accuracy rates, respectively. Thus, lie-detectors’ own lie-telling behaviour prior to promising to tell the truth does not appear to be related to their detection accuracy rates.

To further examine lie-detectors’ decision making process and evaluate whether any truth or lie bias was present, signal detection analysis was performed.

**Discrimination.** A one-way ANOVA, with the lie-detectors’ own lie-telling behaviour (truth vs. lie) as the independent variable, was performed on participants’ d’ values. Results revealed no significant difference between lie-detectors’ who were truth-
(M = .07, SD = .30) and lie-tellers’ (M = -.02, SD = .28) ability to discriminate between non-liar and lie-teller videos, F(1, 45) = .67, p = .42.

**Response Bias.** A one-way ANOVA, with the lie-detectors’ own lie-telling behaviour as the independent variable, was performed on participants’ criterion c values. Results revealed no significant difference between lie-detectors’ who were truth (M = -.04, SD = .37) and lie-tellers’ (M = -.34, SD = .49) response bias, F(1, 45) = 2.74, p = .11. T-tests comparing each group’s criterion c values to 0 revealed a significant bias for lie-detectors who were lie-tellers, t(35) = 4.29, p < .05. Specifically, the negative direction of the criterion c value for lie-detectors who were lie-tellers suggests they have a lie bias. No significant bias was found for lie-detectors who were truth-tellers.

**4.3.2.3.3 Lie-detectors’ lie-telling behaviour after promising to tell the truth**

Next, lie-detectors’ lie-telling behaviour after promising to tell the truth was examined in relation to their lie-detection accuracy rate. A One-way ANOVA on overall accuracy rate with lie-detectors’ lie-telling behaviour during session 1 after promising to tell the truth (non-liars vs. lie-tellers) as the between subjects variable found no significant differences between lie-detectors who were truth (M = .53, SD = .06) and lie-tellers (M = .49, SD = .08), F(1, 44) = 2.21, p = .16.

Separate One-way ANOVAs were performed on non-liar videos and lie-teller videos accuracy rates with lie-detectors’ own lie-telling behaviour during session 1 after promising to tell the truth as the between-subjects variable. Again, neither model was significant, F (1, 44) = .87, p = .36, F (1, 44) = .09, p = .77, for non-liar and lie-teller video accuracy rates, respectively. Thus, lie-detectors’ lie-telling behaviour after promising to tell the truth does not appear to be related to their detection accuracy rates.
To further assess the decision making process and evaluate whether any lie or truth bias was present, signal detection analysis was performed.

**Discrimination.** A One-way ANOVA, with lie-detectors’ own lie-telling behaviour (truth vs. lie) as the independent variable, was performed on participants’ $d’$ values. Results revealed no significant difference between lie-detectors who were truth ($M = .05, SD = .25$) and lie-tellers’ ($M = -.03, SD = .29$) ability to discriminate between truth- and lie-tellers, $F(1, 45) = .82, p = .37$.

**Response Bias.** A One-way ANOVA, with lie-detectors’ own lie-telling behaviour as the independent variable, was performed on participants’ criterion $c$ values. Results revealed no significant difference between lie-detectors who were truth ($M = -.26, SD = .70$) and lie-tellers’ ($M = -.29, SD = .37$) ability to discriminating between non-liar and lie-tellers videos, $F(1, 45) = .04, p = .85$. T-tests comparing each group’s criterion $c$ values to 0 revealed a significant bias for lie-detectors who were lie-tellers, $t(32) = 4.54, p < .05$. Specifically, the negative direction of the criterion $c$ value for lie-detectors who were lie-tellers suggests they have a lie bias. No significant bias was found for truth-tellers.

In general, 8- to 17-year-olds’ veracity evaluations of other 8- to 16-year-olds appear to be at chance levels. Previous experience in the same paradigm did not appear to influence their overall accuracy rates. However, while there was no bias for non-liar videos, lie-detectors who peeked or lied themselves in the same situation as the speaker in the video tended to have a lie-bias and lie-detectors who did not peek themselves had a truth bias. These results suggest that 8- to 17-year-olds’ veracity evaluations are influenced by their own behaviour in the same situation.
4.4 General Discussion

The present series of studies assessed the detection of 8- to 16-year-olds’ lies. While the overall accuracy rates of parents and other 8- to 17-year-olds tended to be around chance levels, several major findings were made in relation to factors influencing detection rates.

Consistent with previous findings of adults’ ability to detect younger children’s lies (Leach et al., 2004), adults’ ability to detect lies of 8- to 16-year-olds was significantly more accurate when the speaker had promised to tell the truth compared to when they had not promised. Specifically, parents were significantly above chance (.64) in detecting deception when their child had promised to tell the truth. However, it is important to note that while parents were significantly above chance, parents’ accuracy was far from perfect and still held a truth bias.

Parents’ Machiavellian and Empathy personality traits were also assessed in relation to their lie-detection accuracy. While Machiavellianism was not found to be related to lie-detection accuracy rates, perhaps because the Machiavellian scores were relatively low, parents’ Empathy scores significantly predicted accuracy rates for lie-telling videos. Specifically, more empathetic parents were found to be more accurate at detecting their own children’s lies. However, this relation was only found at Time 1 (when no promise to tell the truth was made) and the odds ratio of 1.08 suggest that empathy may have a small effect on accuracy rates. Thus, the Empathy findings from Experiment 1 should be interpreted with caution. Future studies examining this relation are needed to confirm these preliminary findings.
Another interesting finding, discovered using signal detection analysis, demonstrated that while parents tended to hold a truth bias when evaluating their own children’s statements, other 8- to 17-year-olds tended to hold a bias to believe that others will behave in the same manner as themselves. Some studies to date with younger children have found that adults may have a lie bias when evaluating children’s statements (Masip, Garrido, & Herrero, 2004; Talwar & Lee, 2002a; Vrij & Baxter, 1999). Talwar and Lee (2002a) found that while both undergraduates and parents tended to have a lie bias, parents’ lie bias was not as strong as the undergraduates. However, in the present investigation parents were not evaluating other children’s lies (as was the case in Talwar & Lee, 2002) but rather their own children’s lies. Thus, parents in the present study may have been biased towards believing that their child was telling the truth, as it might reflect on their own parenting skills.

While 8- to 17-year-olds’ own behaviour in the same situation was not related to their lie-detection accuracy rates, their own behaviour tended to bias their ratings. Specifically, a truth bias was found for those participants who did not peek at the test answers themselves and a lie bias for those who did peek. These results suggest that those children who peeked tended to believe that others would peek in the same situation, biasing them towards evaluating videos as lie-tellers. Conversely, those who did not peek believed that others would not peek in the same situation, biasing them towards evaluating videos as non-liars. Additionally, a lie bias was found for those who lied about their own transgression (no bias was found for non-liars). Overall, given that the majority of participants peeked and lied themselves in the same situation, a lie bias in general was found for 8- to 17-year-olds. Altogether, these results suggest that prior experience in the
same situation as the speaker does influence our judgments of their statements.

Consequently, when jury members are being selected, having knowledge of their background and possible experiences in the same situation as the defendant or victim may be extremely important.

Future studies are needed to examine other populations, such as parents with no attachment to the child, teachers, police officers, judges and others involved in the justice system, and consider their evaluations of 8- to 16-year-olds’ statements to gain a greater understanding of our accuracy and biases for their deceptive statements. Additionally, the present study investigates the deceptive behaviours of a community sample of 8- to 16-year-olds. Given that Chapter 3 and other studies (Talwar & Lee, 2008; Xu, Evans, & Lee, under review) demonstrate that cognitive skills are related to lie-telling behaviours, and previous studies have suggested that maltreated children may have lower cognitive abilities (e.g., Beers & De Bellis, 2002), it may be important to investigate lie-detection with this population of children who are often involved in the court system.
Chapter 5: General Discussion

5.1 Overview of the Chapter

This chapter will begin by reviewing the goals of my dissertation, followed by the main findings of each chapter. The main findings will then be discussed in relation to previous literature. Next, some limitations of the present investigation and suggestions for future research will be discussed. Finally, I will conclude with implications of the dissertation.

5.2 Goals of the Thesis

While the majority of developmental deception research has examined the truth-and lie-telling behaviours of younger children (3 to 8 years of age), the development of deceptive behaviours in older children and adolescents has mainly been ignored, despite the fact that this age group appears more frequently in forensic settings. The general goal of this dissertation was to examine deceptive behaviours in 8- to 16-year-olds including the development of lie-telling behaviours and our ability to detect their lies.

The dissertation began by examining the influence of promising to tell the truth on 8- to 16-year-olds’ lie-telling. Given that promising to tell the truth has been previously found to decrease lie-telling in younger children (Talwar & Lee, 2002a), and many older children and adolescents are also involved in the court system (Puzzanchara & Kang, 2008), gaining an understanding of the influence of promising on lie-telling with 8- to 16-year-olds is vitally important. Chapter 3 assessed the relation between cognitive skills and deceptive behaviours. Previous studies examining 3- to 8-year-olds’ executive functioning skills and deception have demonstrated a relation between better executive functioning skills and successful deception. However, to date the development of this
relation beyond 8 years of age has been neglected. Finally, I investigated our ability to
detect 8- to 16-year-olds’ lies. Both parents’ and 8- to 17-year-olds’ ability to detect lies
were examined, as well as the relation with personality traits and previous behaviour.

5.3 Summary of the Main Findings

5.3.1 Chapter 2: The Influence of Promising to Tell the Truth on 8- to 16-year-olds’

Dishonest Behaviour

Chapter 2 assessed the influence promising to tell the truth and moral competency
tests on the veracity of 8- to 16-year-olds’ statements. Consistent with previous findings
with younger children (Lyon et al., 2008; Talwar & Lee, 2008; Talwar et al., 2002), 8- to
16-year-olds were significantly more likely to tell the truth after promising. Additionally,
Experiment 2 demonstrated that the increase in truth-telling was not a result of repeating
the question or the moral competency exam, as lie-telling behaviour from Time 1 to Time
2 did not decrease in Experiment 2. Thus, consistent with previous findings with younger
children (London & Nunez, 2002; Lyon et al., 2008; Talwar et al., 2002), the discussion
of truth and lies did not decrease 8- to 16-year-olds’ lie-telling about their own
transgression.

While the Canadian justice system has revised the requirements to testify so that
those under 14 years of age are no longer required to pass a moral competency
examination, many other North American and European justice systems have maintained
this requirement. Our findings along with others (London & Nunez, 2002; Lyon et al.,
2008; Talwar et al., 2002) suggest that while promising to tell the truth should be
retained, the requirement to complete the moral reasoning portion of the competency
examination does not influence the veracity of adolescence statements.
5.3.2 Chapter 3: Performance on Executive Functioning Tasks and Lie-telling  
Behaviours in Older Children and Adolescents

Chapter 3 builds on previous findings with 3- to 7-year-olds (Talwar & Lee, 2008) by examining the relation between concealing a transgression through verbal deception and cognitive development in 8- to 16-year-olds. While previous studies with younger children found a relation between lie-telling and inhibitory control (Carlson & Moses, 1998; Talwar & Lee, 2008), no such relation was found in the present experiment. One possible explanation for this finding is that 8- to 16-year-olds have more advanced inhibitory control skills overall compared to younger children, thus both truth- and lie-tellers may already have the ability to tell lies. However, Xu, Evans, and Lee (under review) also failed to find a significant relation between children’s (4-year-olds’) lie-telling and inhibitory control skills. Future studies are needed to clarify this relation between inhibitory control and lie-telling.

Consistent with the original hypothesis, the sophistication of lies told by participants prior to promising to tell the truth was related to both working memory and planning scores. Specifically, 8- to 16-year-olds who told lies at Time 1 with better working memory and those who tended to take their time planning were better able to conceal knowledge they ought not to know. Additionally, when examining the sophistication of lies told by participants after promising to tell the truth, higher Stroop and DSB scores were significantly related to the sophistication of lies. Specifically, 8- to 16-year-olds who told lies at Time 2 with better inhibitory control and working memory skills were better able to conceal knowledge that they ought not to know. Consistent with previous findings with younger children (Talwar & Lee, 2008), these results indicate that
both working memory and inhibitory control are related to the sophistication of lies. In addition, the present study demonstrates that 8- to 16-year-olds’ planning ability is also related to the sophistication of their lies.

5.3.3 Chapter 4: Detection of Dishonest Statements of 8- to 16-year-olds

Chapter 4 examined both adults’ and 8- to 17-year-olds’ ability to detect 8- to 16-year-olds’ lies. Overall, detection rates were around chance levels for both parents and 8- to 17-year-olds. However, consistent with findings of adults’ ability to detect younger children’s lies (Leach et al., 2004), parents’ rates were significantly above chance for detecting lies after the speaker had promised to tell the truth. These results emphasize the importance of promising to tell the truth within the justice system as it not only decreases lie-telling behaviour (Chapter 2), but also increases parents’ ability to detect lies told after promising.

Results of parents’ responses to the personality questionnaires revealed that empathy may be related to lie-detection accuracy rates, specifically for lie-telling videos. However, the relation was found only at Time 1 and the strength of the odds ratio was quite small. Thus, future studies are needed to assess the consistency of these findings and the current findings should be interpreted with caution.

Different response biases were also found for parents and 8- to 17-year-olds with parents tending to hold a truth bias and 8- to 17-year-olds holding a lie bias. Parents may have tended to hold a truth bias as they were evaluating their own child’s responses, wanting to believe their child told the truth. Conversely, 8- to 17-year-olds’ lie bias may have been the result of the majority of participants peeking themselves and being biased towards believing that others must have peeked as well. This interpretation is supported
by the finding that those participants who peeked and those who lied tended to have a lie bias. Additionally, those participants who did not peek at the test answers tended to have a truth bias. Altogether these results suggest that our own behaviour does influence our judgment of the veracity of others’ statements, but not accuracy.

5.3.4 Overall Findings

Overall, these findings address the main goal of the dissertation and begin to shed light on the deceptive behaviours of 8- to 16-year-olds. While the majority of the results appeared to be consistent with findings of younger children’s deceptive behaviours (e.g., the reduction in lie-telling after promising to tell the truth, the relation between inhibitory control and the sophistication of lies, and chance levels of lie-detection), the results also revealed a somewhat different picture of the deceptive behaviours of 8- to 16-year-olds. For example, while previous studies demonstrated that inhibitory control skills are related to 3- to 8-year-olds lie-telling behaviour, the present study indicates that after 8 years of age, not only are children’s inhibitory control skills related to the sophistication of their lies, but also their working memory and planning strategies. Additionally, unlike previous studies with younger children, a unique group of partial liars were discovered in which participants partially admitted to transgressing, but did not fully disclose the severity of their transgression. When examining lie-detection rates, contrary to previous findings, a truth bias was found for parents’ evaluation of 8- to 16-year-olds’ statements while their same aged peers tended to hold a lie-bias.

5.4 Relation to Existing Literature

5.4.1 The development of lying
Previous studies have demonstrated that children begin to tell lies during the preschool years (Hala, Chandler, & Fritz, 1991; Lewis, Stanger, & Sullivan, 1989; Peskin, 1992; Polak & Harris, 1999; Talwar & Lee, 2002) and that young children’s lie-telling behaviour increases with age (Talwar & Lee, 2002a; Wilson, Smith, & Ross, 2003; Gervais et al., 2000). Not only does the frequency with which young children tell lies increase with age but also the sophistication between 6 and 11 years of age (Talwar & Lee, 2002a; Talwar, et al., 2007). The present study builds on these developmental findings by examining the developmental trend of deceptive behaviours between 8 to 16 years of age.

Results of the present investigation revealed that contrary to findings with younger children as age increased, participants were significantly less likely to tell a lie (Chapter 2). Additionally, age was not found to be significantly related to the sophistication of 8-to 16-year-olds’ lies (Chapter 3). Taken together with previous findings, these results suggest a curvilinear developmental trend in which, after an increase in deceptive behaviours between 3 to 7 years of age, a small decrease in deception occurs. While the present study demonstrates that the sophistication of lies does not appear to increase with age after 8 years of age, the development of cognitive factors were found to be significantly related.

5.4.2 Lying and its relation to cognitive factors

Previous studies have demonstrated that not only do lie-telling behaviours increase with age, but also with cognitive development (Talwar & Lee, 2008; Xu et al., under review). Specifically, studies examining 3- to 8-year-olds’ lie-telling behaviour have found that their ability to deny their transgression (Talwar & Lee, 2008) and the
sophistication of their lies (Xu, Evans, & Lee, under review) are related to their inhibitory control skills. While it has been hypothesized that both working memory and planning abilities may also be related to children’s deceptive abilities, studies with younger children have either neglected to explicitly measure these skills or failed to find a significant relation (Xu, Evans & Lee, under review).

In the present investigation it was proposed that the cognitive development that occurs during 8 to 16 years of age may play an important role in the deceptive abilities of 8- to 16-year-olds. Indeed, the results of the present investigation support this hypothesis. Specifically, while inhibitory control, working memory, and planning abilities were not found to be related to whether 8- to 16-year-olds tell lies, they were significantly related to the sophistication of lies. Participants with better inhibitory control and working memory scores, as well as those who took their time planning had a greater ability to conceal their transgression. These results suggested that after 8 years of age deceptive behaviours develop in relation to individual differences such as executive functioning skills rather that age, and further investigation of this population is warranted.

5.4.3 The Influence of Promising to Tell the Truth

Another area of investigation with younger children has been the promotion of truth-telling. One method that has been demonstrated to be effective in increasing truth-telling has been requesting children to promise to tell the truth (Lyon, Malloy, Quas, & Talwar, 2008; Talwar, Lee, Bala, & Lindsay, 2002; Talwar, Lee, Bala, & Lindsay, 2004). Conversely, requiring children to complete a moral competency examination has not found to be significantly related to increased truth-telling behaviour (Talwar et al., 2002). These findings resulted in revisions to the Canadian court system through Bill C-2 in
2006, reforming the requirement for children under the age of 14 to no longer pass a moral competency examination in order to testify (Bala et al., 2006). However, prior to the completion of the present investigation, studies had only been conducted with children up to 11 years of age (Talwar et al. 2002; Talwar et al., 2004; Lyon et al., 2008). The results of the present investigation with 8- to 16-year-olds support previous findings indicating that promising to tell the truth does indeed decrease lie-telling behaviours with 8- to 16-year-olds. In turn, the revisions to the Canadian justice system under Bill C-2 are supported.

An additional advantage of requiring children to promise to tell the truth is the increased accuracy rates in lie-detection. Consistent with previous findings with younger children (Leach et al., 2004), parents were significantly above chance levels in detecting lies after the speaker promised to tell the truth. However, when no such promise was made parents’ accuracy rates were simply at chance. These results appear to indicate that promising to tell the truth not only decreases deception, but makes the lies told by those who continue to deceive after promising more easily detectable. However, parents tended to hold a truth bias when detecting such lies.

5.4.4 Deception detection

Consistent with previous findings examining the ability to detect adults’ lies (Bond & DePaulo, 2006; Bond & DePaulo, 2008; also see Ekman, O’Sullivan, Friesen, & Scherer, 1991; Malone & DePaulo, 2001; Vrij & Baxter, 1999), the present study indicates that parents and adolescents tend to be at chance levels for detecting 8- to 16-year-olds’ lies. However, while previous studies examining 3- to 7-year-olds lies have found that adults are unable to detect their lies based on non-verbal cues, 3- to 7-year-
olds lies can be detected based on verbal cues (Talwar & Lee, 2002a). Taken together, these results suggest that after 8 years of age verbal lies are extremely difficult to detect. As the present dissertation and previous studies have demonstrated that executive functioning and theory of mind skills are related to children’s lie-telling abilities, (Talwar, Gordon, & Lee, 2007; Talwar & Lee, 2008; Xu, Evans & Lee, under review), the developmental increase in these skills during this period may play a roll in the increased difficulty of detecting 8- to 16-year-olds lies.

Examining individual differences in personality traits, the present study demonstrated that while parents’ Machiavellianism scores did not appear to be related to their ability to detect lies, empathy may have increased parents’ ability to detect their own children’s lies. While the strength of these findings was quite weak, consistent with some of the previous individual difference findings these results suggest that small individual differences may be related to our accuracy at detecting lies.

The present investigation also allowed for the assessment of 8- to 17-year-olds previous behaviours may influence their veracity judgments. To date, no previous study has assessed this situation which may occur regularly in our daily lives. While Chapter 4 demonstrates that previous behaviour is not related to 8- to 16-year-olds’ accuracy rates in detecting lies, previous behaviour does appear to biases their evaluation of others’ statements. Specifically, adolescents tend to believe that others will behave in the same manner as themselves.

Previous studies investigating lie detection rates have discovered that adults tend to hold a lie bias when evaluating children’s statements (Masip, Garrido, & Herrero, 2004; Talwar & Lee, 2002a; Vrij & Baxter, 1999). However, Chapter 4 demonstrated that when
the adult is evaluating their own child, this lie bias is eliminated and actually becomes a truth bias. One possible explanation for this result is that parents are biased towards wanting to believe their own child is telling the truth. Conversely, 8- to 17-year-olds, who had experienced the same temptation resistance paradigm as the speaker in the video, tended to hold a lie bias. This lie bias may have been the result of the majority of 8- to 17-year-olds having peeked at the test answers themselves and being biased towards believing that others behaved in the same manner as themselves. These results build on previous lie and truth bias findings that indicate the relationship with the lie-teller and previous experience influence the perceptions of the veracity of their statements.

5.5 Limitations and Suggestions for Future Research

5.5.1 Partial lie-tellers

One limitation of the present investigation was the small number of participants who told a partial lie. Since this group of participants was so small, I was unable to examine them separately from full lie-tellers. Examining age and executive functioning scores, partial lie-tellers’ and those participants who completely lied do not appear to differ (see Table 2). However, partial lie-tellers failed to completely conceal their deception. It is possible that partial lie-tellers morally wanted to tell the truth but feared the consequences of their actions and thus downplayed the severity of their transgression. Conversely, partial lie-tellers may have thought it was strategically beneficial to disclose a small transgression (peeking at one answer) in hopes to conceal a larger transgression (peeking at all of the answers). Such a disclosure may have decreased the experimenter’s suspicion for why they got so many answers correct while still allowing the transgressor to appear intelligent and knowledgeable. Increasing this sample of participants is
necessary to gain a greater understanding of this population. Additionally, asking participants about their strategy to conceal their transgression or why they told a partial lie may help gain insight into why such a strategy was used.

Table 2. Mean and Standard deviation (SD) of Lie-tellers and Partial lie-tellers at Time 1 and Time 2

<table>
<thead>
<tr>
<th></th>
<th>Time 1 Lie-tellers (SD)</th>
<th>Partial lie-tellers (SD)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>11.28 (1.06)</td>
<td>11.00 (2.10)</td>
<td>0.75</td>
</tr>
<tr>
<td>DSB</td>
<td>7.52 (2.23)</td>
<td>8.17 (2.14)</td>
<td>0.51</td>
</tr>
<tr>
<td>LDSB</td>
<td>4.30 (1.55)</td>
<td>4.83 (1.47)</td>
<td>0.43</td>
</tr>
<tr>
<td>TOL correct</td>
<td>4.33 (1.97)</td>
<td>3.83 (.98)</td>
<td>0.55</td>
</tr>
<tr>
<td>TOL time violations</td>
<td>1.51 (1.55)</td>
<td>1.83 (1.17)</td>
<td>0.63</td>
</tr>
<tr>
<td>Stroop</td>
<td>-18.22 (13.94)</td>
<td>-17.50 (11.52)</td>
<td>0.90</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Time 2 Lie-tellers (SD)</th>
<th>Partial lie-tellers (SD)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>11.31 (1.93)</td>
<td>10.20 (1.23)</td>
<td>0.10</td>
</tr>
<tr>
<td>DSB</td>
<td>7.79 (2.18)</td>
<td>7.20 (2.04)</td>
<td>0.46</td>
</tr>
<tr>
<td>LDSB</td>
<td>4.38 (1.61)</td>
<td>4.30 (1.25)</td>
<td>0.89</td>
</tr>
<tr>
<td>TOL correct</td>
<td>4.34 (2.09)</td>
<td>3.80 (1.75)</td>
<td>0.47</td>
</tr>
<tr>
<td>TOL time violations</td>
<td>1.14 (1.01)</td>
<td>1.90 (1.66)</td>
<td>0.10</td>
</tr>
<tr>
<td>Stroop</td>
<td>-18.00 (16.34)</td>
<td>-20.40 (3.66)</td>
<td>0.65</td>
</tr>
</tbody>
</table>

5.5.2. Higher stakes

Previous studies with adults have demonstrated that lies told in high-stakes situations tend to be easier to detect than in low-stakes situations (DePaulo, Kirkendol, Tang, & O’Brien, 1988; Vrij, 2000). Additionally, DePaulo and colleagues have demonstrated that highly motivated lie-tellers tend to display a “motivational impairment effect” in which they appear rigid and rehearsed (DePaulo & Kirkendol, 1989; DePaulo, Lanier, & Davies, 1983). In the present study, the stakes of being caught were minimal, the loss of $10.00, and motivation to achieve 10 correct answers on the test may have been nominal. Given that the costs of telling lies within the justice system are extremely high and lie-tellers are highly motivated to conceal their own or other’s transgressions,
further investigation into the differences between high- and low-stakes lies told by 8- to 16-year-olds are required. Perhaps, when the stakes are higher more 8- to 16-year-olds will lie but the successful concealment of their deception will be even more strongly related to their executive functioning skills. In addition, similar to results found with adults, our ability to detect lies by this age group may increase when the stakes are higher.

In Chapter 4, I found that parents were better able to detect lies after 8- to 16-year-olds promised to tell the truth. This commitment made between the experimenter and participant may have increased the stakes resulting in parents being better able to detect their lies. Future studies are needed to investigate the relation between the cost of deception and the sophistication and detectability of lies told by 8- to 16-year-olds. There are two methods for increasing the stakes of deception: the stakes of the transgression or the stakes of the interview. First, the stakes of the transgression can be increased by increasing the cost of revealing a transgression (e.g., increasing the monetary loss or increasing the impact on social perceptions of intelligence by telling students that everyone else achieved 100% on the examination). This may increase participants’ motivation to conceal their transgression. Second, the stakes of the interview phase could be increased. For example, participants could be interviewed by real police officers (e.g., Strömwall, Hartwig, & Granhag, 2006) or could be interviewed in a real courtroom situation (Talwar, Lee, Bala, & Lindsay, 2006). Studies examining 8- to 16-year-olds’ deception in such high stakes scenarios will increase the ecological validity of the findings for the justice system at large.

5.5.3 Executive functioning and lie-detection rates
Another area for future investigation is the relation between lie-detection accuracy rates and executive functioning skills. The present dissertation demonstrates that those participants with higher executive functioning skills are better able to conceal their deception by avoiding verbal leakage of information that they ought not to know (Chapter 3). However, the relation between executive functioning skills and lie-detection accuracy rates of naïve observers is currently unknown. If someone with higher executive functioning skills is better able to conceal their transgression verbally compared to someone with lower executive functioning skills, it would suggest that their lies would be less readily detected. However, when assessing whether someone is telling the truth or a lie non-verbal behaviour may also be considered by the lie-detector. Thus, examining the relation between executive functioning skills and non-verbal behaviours (e.g., the ability to inhibit gestures) is warranted. A future study in which videos of truth- and lie-tellers with high and low executive functioning scores is needed to address this question.

5.6 Implications of the current thesis

There are several implications of the results of the current investigation. The first applies to the justice system. While ensuring the veracity of statements made in court is of the highest priority, the majority of studies to date have either focused on young children or adults. However, each year there are over one million juvenile court cases in the United States with over four hundred thousand cases involving youth between 13 and 16 years of age (Puzzanchara & Kang, 2008). Additionally, changes have been made to procedures in the Canadian court system under Bill C-2 that impact juveniles under the age of 14 years of age but have not been empirically tested with children over 8 years of age until now. The results of the present investigation find empirical support for Bill-C2,
indicating that while asking children and adolescents to promise to tell the truth increases truth-telling, completing a moral competency examination does not (Chapter 2).

Providing further support for the inclusion of promising to tell the truth prior to testifying, this dissertation demonstrated that asking 8- to 16-year-olds to promise to tell the truth increased the lie-detection accuracy rates of parents to above chance levels (Chapter 4).

Not only does the influence of promising to tell the truth have applications to the justice system but also for others who work with 8- to 16-year-olds such as parents and teachers. These results demonstrate that by simply asking 8- to 16-year-olds to promise to tell the truth, and obtaining a verbal confirmation of the commitment, the likelihood of them telling a lie significantly decreases and if they do in fact lie, the likelihood of identifying the lie becomes significantly above chance levels (Chapters 2 and 4). This is a simple technique that can be easily administered to promote truth-telling in 8- to 16-year-olds.

The present investigation also demonstrated that executive functioning skills are required to make convincing deceptive statements (Chapter 3). These results have implications for atypically developing populations who have deficits in executive functioning skills. For example, children with Attention Deficit and Hyperactivity Disorder (ADHD) have been found to have weaknesses in executive functioning skills such as inhibitory control skills (Biederman et al., 2004; Barkley, 1997; Mullane & Corkum, 2007). Given the link between deception and executive functioning skills, those with ADHD may have difficulties with deception. Supporting this idea, Pearl, Bryan, Fallon, and Herzog (1991) presented 7th and 8th grade typically-developing students and
students with learning disabilities with a series of audio tracks of sincere, deceptive or sarcastic interactions between two people. Results revealed that students with a learning disability were significantly less likely to recognize the deceptive statements than typically-developing students. Since deception is not only used to conceal transgressions and protect oneself, but also is often used to protect others’ feelings (e.g., prosocial lies), difficulty understanding deception or making deceptive statements may result in social problems. Given that children with ADHD have also been found to have difficulties with peer relationships (Guvermont & Dumas, 1994; Kuhne & Wiener, 2000; Wiener & Schneider, 2002; Wiener & Tardif, 2004; see Nixon, 2001 for a review), further exploring this relation between executive functioning and deception in atypically-developing children is warranted.

In summary, this dissertation provides insight into a variety of deceptive contexts including the legal system, parenting practices, and cognitive development. Overall, these results demonstrate that while 8- to 16-year-olds show similar patterns of deception as younger children, individual differences in executive functioning development during this period resulted in additional findings calling for the examination of this older population. Future research in other deceptive situations such as lies told for pro-social purposes are still required to gain a greater understanding of deceptive behaviours in this age group.
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