

**Lies, Damned Lies and Preschoolers:
The Roles of Theory of Mind and Executive Function in Preschoolers' Conceptual
Understanding and Telling of Self-Serving and Prosocial Lies**

by

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Abstract

Children begin to tell lies, and to reason about lies told by others, during the preschool period (e.g., Lee, 2013). Most of the work on children's telling and understanding of lies examines those told in self-serving contexts (to deny misdeeds) or in prosocial contexts (to spare the feelings of others). However, the vast majority of this work has been conducted within one context or the other: no study has reported children's lie telling across contexts, and only one study compares children's understanding of these different kinds of lies (Bussey, 1999). Although some research has investigated how Theory of Mind and Executive Function relate to children's telling of self-serving lies, little is known about how these abilities relate to children's prosocial lie telling or to their understanding of lies.

The two studies reported here compared preschoolers' understanding and telling of lies across self-serving and prosocial contexts, and examined the roles of Theory of Mind and Executive Function in these abilities. In Study One, I found that both four- and five-year-olds identified lies and truths in both contexts and demonstrated some understanding of the emotional consequences of lie telling for the speakers. However, only five-year-olds were sensitive to the moral consequences of telling lies in self-serving and prosocial contexts. Further, different aspects of Theory of Mind were related to these different *kinds* of reasoning.

In Study Two, though fewer children took the opportunity to tell lies than expected, I found some support for a correspondence between children's lie telling in self-serving and prosocial contexts. I also found some converging evidence for the findings of Study One with regard to preschoolers' reasoning about lies and truths in self-

serving and prosocial contexts and the role of Theory of Mind in these abilities.

However, children's participation in lie telling tasks also influenced their reasoning about others' lies. Taken together, this research demonstrates that important developments in children's understanding of lies take place during preschool, and suggests that different aspects of Theory of Mind contribute to these developments. More work is needed to investigate children's lie telling across contexts.

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Chapter 1: General Introduction

Philosophers and psychologists define lying as a verbal act of deception that occurs when a speaker makes a statement she believes to be false with the intention to deceive another (e.g., Bok, 1978; Lee, 2000). This definition specifies both that the speaker *believes* her statement to be false and that she *intends* to deceive her audience, thereby instilling a false belief. Thus, when telling a lie, the speaker must consider her audience's beliefs, the true state of affairs, and their correspondence to the (false) belief she intends to create. Similarly, in order to identify a statement as a lie, the recipient must consider the speaker's beliefs and intentions, as well as the correspondence between the statement made and his own beliefs about the true state of affairs. These requirements have placed research on children's *telling* and *conceptual understanding* of lies in the context of their developing Theory of Mind (e.g., Lee, 2000). Since lying involves creating a false belief in the mind of another, both telling and understanding lies ought to rely, at least in part, on the ability to represent and reflect on the mental states of others. This ability is a fundamental feature of Theory of Mind understanding, and one that develops significantly between four- and five-years of age (e.g., Wimmer & Perner, 1983).

Lying is also a morally relevant act, and when a speaker tells a lie, she is likely acting out of accordance with the social rules and conventions that govern communication in her social group (e.g., Grice, 1980). According to Sweetser (1987), all verbal communication is governed by a set of implicit, socially maintained rules, the most primary of which is the *general cooperative rule* – that the goal of all communication is to help, and not harm. Secondary to the general cooperative rule, are

two sets of rules: one for *informational contexts*, whose primary tenet is that communication be truthful (e.g., Grice, 1980); and another for *politeness contexts*, whose tenets include that communication be amicable (e.g., Lakoff, 1973). Any verbal act of communication can be judged by its accordance to the *general cooperative rule*, as well as the rules specific to its particular context; and a violation of any of these rules may result in social disapproval from conversational partners (e.g., Sweetser, 1987).

Thus, whether telling a lie, or reasoning about a lie told by another, one must not only consider the mental states of the individuals involved, but also the moral implications of the statements made, given the general cooperative rule and the relevant rules for the social context involved. Despite these relatively complex requirements, children begin to tell lies (e.g., Lee, 2013) and to reason about lies told by others during the preschool years (e.g., Bussey, 1999), during a period when Theory of Mind and moral reasoning undergo major developments. Research should therefore consider both Theory of Mind and moral reasoning, as these are likely key factors contributing to young children's telling and conceptual understanding of lies.

Children's conceptual understanding and telling of lies have most often been studied from the Speech Act perspective (e.g., Lee, 2000; Lee, 2013). This framework casts lying (and other speech acts) as intentional, socially motivated actions aimed at some goal or function (Austin, 1962); and in the case of lying, that goal is to create a false belief in another. As Lee (2000) puts it, lying is, in effect, 'doing deceptive things with words.' Two main components of Speech Act Theory have been emphasized with respect to lying: the *intentionality* component, concerned with the mental states of the speaker (i.e., her intention to deceive) which gives way to examining the role of Theory

of Mind, and; the *conventionality* component, concerned with the social rules governing communication, which gives way to examining the moral implications of lying, given the social conventions outlined above.

With respect to children's *lie telling*, both naturalistic and experimental evidence demonstrate that young children begin to tell lies from the age of two or three, and that lie telling is frequent in the preschool period (e.g., Evans & Lee, 2013; Wilson, Smith & Ross, 2003). Indeed, laboratory work has shown that very young children tell different kinds of lies (see Lee, 2013 for a review): most frequently, *self-serving lies*¹, told to conceal misdeeds in informational contexts (e.g., Evans & Lee, 2013; Lewis, Stanger & Sullivan, 1989; Talwar & Lee, 2008) and *prosocial lies*, told to spare the feelings of others in politeness contexts (e.g., Popliger, Talwar & Crossman, 2011; Talwar & Lee, 2002b). This work has also demonstrated that children's lie telling in self-serving contexts is related to various aspects of Theory of Mind understanding (e.g., Polak & Harris, 1999; Talwar & Lee, 2008) and to developments in Executive Function, which are skills involved in the conscious control of thought and action (e.g. Talwar & Lee, 2008; Evans & Lee, 2013; Evans, Xu & Lee, 2011). However, little is known about the skills that contribute to children's prosocial lie telling (i.e., the role of Theory of Mind and Executive Function) or the correspondence between the different kinds of lies that young children tell. That is, research on children's lie telling has largely been conducted within one context or the other (self-serving or prosocial) but has not investigated whether these different kinds of lies are told by the same children or depend on the same set of skills.

¹ Often termed 'antisocial lies'

Considerably less is known about young children's *conceptual understanding* of lies. Although some work has demonstrated that children begin to identify lies told by others during preschool (e.g., Bussey, 1992) and to morally discriminate between lies told in different social contexts (Bussey, 1999), very little is known about the skills that support these abilities. While there is a strong theoretical argument for the role of Theory of Mind in children's ability to identify a speaker's statement as a lie, it has not been empirically tested. Similarly, no research has considered the role of Executive Function in children's conceptual understanding of lies, despite its demonstrated role in children's lie telling. Finally, very few studies have considered how young children's conceptual understanding of lies is related to their own lie-telling behavior. Without this research, our understanding of young children's conception of lies more broadly, is far from complete.

The two studies presented here aimed to fill these gaps in the literature by examining preschoolers' *conceptual understanding* and *telling* of self-serving and prosocial lies, considering the roles of different aspects of Theory of Mind and Executive Function in these abilities. Preschoolers were chosen since it is during this period of development that children begin distinguishing lies from truths (e.g., Bussey, 1992; 1999), begin telling self-serving (e.g., Talwar & Lee, 2002a; Talwar & Lee, 2008) and prosocial lies (Talwar & Lee, 2002b; Talwar, Murphy & Lee, 2007), and it is a period when significant developments in moral reasoning (e.g., Fu, Xiao, Killen & Lee, 2014; Piaget, 1932/1965; Zelazo, Helwig & Lau, 1996), Theory of Mind (e.g., Wellman, Cross & Watson, 2001; Wimmer & Perner, 1983), and Executive Function (e.g., Anderson & Reidy, 2012; Carlson, 2005) are made.

The goals of Study One were to investigate: (1) preschoolers' identification, moral, and emotional considerations of lies (and truths) told by story characters in both self-serving and prosocial contexts, and; (2) how Theory of Mind (first- and second-order false-belief understanding) and aspects of Executive Function (inhibitory control and working memory) are related to their conceptual understanding of lies and truths. Study One is presented in Chapter Two.

The goals of Study Two were to build upon, and extend, Study One. More specifically, the goals were to: (1) investigate preschoolers' telling of self-serving and prosocial lies (using two well-used paradigms designed to elicit lie telling in children); (2) examine the roles of Theory of Mind (first- and second-order false-belief understanding and affective perspective taking), Executive Function (inhibitory control and working memory), and children's conceptual understanding of lies and truths in children's lie telling, and; (3) replicate and extend the findings of Study One in a second sample of preschoolers, and in relation to additional Theory of Mind measures. Study Two is presented in Chapter Three.

In Chapter Four, the findings of these two studies are discussed in terms of their contribution to our understanding of preschoolers' conceptual understanding and telling of self-serving and prosocial lies in relation to the intentional and conventional components of lie telling and children's Theory of Mind and moral development, more generally.

Chapter 2: Examining the Role of Theory of Mind and Executive Function in Preschoolers' Conceptual Understanding of Lies

Most of the recent research on children's conceptual understanding of lies and truths focuses on those told in self-serving and prosocial contexts, in line with the research being done on children's lie telling. The majority of these studies focus on children's conceptual understanding of self-serving lies and truths, fewer studies consider prosocial lies and truths, and only one study directly compares children's understanding across contexts (Bussey, 1999). Further, most of these studies examine children's conceptual understanding of lies and truths across wide age ranges (throughout childhood and early adolescence) and the skills that support children's understanding have not been directly investigated. As a result, relatively little is known about preschoolers' emerging understanding of lies and truths across contexts, or how it relates to their developing Theory of Mind or Executive Function. These are the topics of Study One.

This chapter begins with a brief discussion of the early work conducted on children's conceptual understanding of lies and other kinds of false statements, followed by a review of the extant research on preschoolers' conceptual understanding of lies and truths in self-serving and prosocial contexts. Subsequently, Theory of Mind and Executive Function are discussed in relation to preschoolers' conceptual understanding of lies and truths, and the hypotheses, methods and findings of Study One are presented. The chapter concludes with a discussion of the findings and limitations of this study and ideas for future research.

Preschoolers' Identification and Moral Judgments of Lies and Other False Statements

In his seminal work on moral development, Piaget (1932/1965) described how young children's understanding of lies changed around the age of eight from that of the 'moral objectivist' who classified all untrue or naughty statements as lies (including jokes, honest mistakes and swear words), to the 'moral subjectivist' who considered speakers' intentions and could discriminate between intended and unintended falsities, as in the case of lies and honest mistakes. More recent experimental studies have found general support for Piaget's claim that young children fail to consider speakers' beliefs and intentions when classifying statements as lies, over-extending the concept to include other kinds of false statements, like honest mistakes (e.g., Berthoud-Papandropoulou & Kilcher, 2003; Peterson, Peterson & Seeto, 1983; Strichartz & Burton, 1990; Wimmer, Gruber & Perner, 1984; 1985). However, in contrast to Piaget's work, these studies have also reported that when asked to morally judge such speakers, the same children rated lie-tellers more negatively than those who unintentionally misled others (e.g., Peterson et al., 1983; Wimmer et al., 1984; 1985). Thus, though young children fail to discriminate between lies and other kinds of false statements in their identification, they are able to differentiate between them in their moral judgments.

These findings emphasize the value of including children's moral judgments in research on their conceptual understanding of lies. Young children's moral discrimination between lies and other false statements provides evidence that they are sensitive to the speakers' beliefs and intentions when reasoning about their statements, suggesting that their over-extension of the term "to lie" is a lexical misunderstanding and

not a failure to consider mental states, as suggested by Piaget's 'moral objectivist' account (see also Wimmer et al., 1984). More recent research has suggested that preschool-age children were better able to morally distinguish between speakers who made true and untrue statements (e.g., by identifying which speaker said something *bad*) than to identify true and false statements as being lies or truths (e.g., by identifying which speaker told a lie), or to explain the differences between lies and truths (Lyon & Saywitz, 1999). That said, other work using similar measures has reported that preschoolers were equally accurate at labeling true and false statements as lies/truths or as good/bad (Lyon, Carrick & Quas, 2010). In addition to demonstrating young children's sensitivity to the differences between lies and truths, children's moral judgments may also offer us insight into their reasoning about lies told in different contexts, as discussed below in relation to the present study.

Much of the early work on children's conceptual understanding of lies contrasted simple, intended lies (when speakers do not believe their own statements and intend to deceive another) with more complex false statements that arise from different pairings of beliefs and intentions (e.g., honest mistakes, wrong guesses, verbal accidents and the like). However, very few of these studies included scenarios in which speakers told representative truths as a comparison point. Although this research suggests that young children fail to discriminate between lies and other false statements, more recent research has shown that even preschoolers are quite skilled at discriminating between simple, intended lies and truths, in both their identification and moral judgments (e.g., Bussey, 1992; 1999).

Preschoolers' Identification and Moral Judgments of Simple, Intended Lies and Truths

Much of what we do know about preschoolers' understanding of lies and truths follows the work of Bussey (1992; 1999), who was the first to examine children's understanding of simple, intended lies and truths in two studies with four-, eight-, and 11-year-olds. In her 1992 study she examined the effects of statement type (lie or truth), belief of statement (believed or not believed), and punishment on children's conceptual understanding of lies. Children were presented with twelve stories about characters who committed minor transgressions in self-serving contexts that made statements crossing the three factors (statement type, belief of statement, punishment of speaker): in six stories the speakers told lies and were either believed (two stories), not believed and punished (two stories), or not believed and not punished (two stories); in four stories the speakers told the truth and were either punished (two stories), or not punished (two stories); and in the final two stories the characters made no statement after their misdeeds. Children were asked to identify the speakers' statements as lies or truths (forced choice), to morally judge the speakers for making their statements (on a six-point scale ranging from *very good* noted by three gold stars to *very bad* noted by three black spots) and to provide affective evaluations of the speakers on a four-point scale (rating how much they would feel *x* from *not at all* to *very*, denoted by bars of different lengths) for each of four emotions: *scared*, *pleased*, *guilty/terrible inside*, and *good*.

Bussey found that that four-year-olds' accuracy in identifying lies and truths told in self-serving contexts was greater than chance ($M= 71\%$), albeit less accurate than eight- and 11-year-olds' (means $\geq 97.5\%$). Children's identification accuracy was not

influenced by whether the speakers were punished or believed, in any age group. Thus, even preschoolers were able to identify simple, intended lies and truths regardless of these other factors.

In terms of moral judgments, children of all ages rated speakers who told lies more negatively than those who told truths, and more negatively than those who made no statement after their misdeeds, though these distinctions were greater for eight- and 11-year-olds than for four-year-olds. These findings indicate that children's moral judgments reflected the statements the speakers made and not just the misdeeds they had committed, since all speakers committed similar misdeeds, regardless of their statements. Whether lies were believed or not had no influence on children's moral judgments. However, four-year-olds rated lie-tellers who were punished more negatively than those who were not, demonstrating that their moral judgments *were* influenced by the presence of punishment. In contrast, the presence of punishment did not influence the moral judgments of eight- or 11-year-olds. Though older children's moral judgments were based solely on whether the speakers told lies or truths, the judgments of four-year-olds were additionally influenced by the presence of punishment.

In their affective evaluations of the speakers, although eight- and 11-year-olds attributed greater positive feelings (such as 'pleased' and 'good') to speakers who told truths than to those who told lies or made no statement after their misdeeds, four-year-olds made no such distinctions, rating all speakers similarly. Like older children, however, four-year-olds did attribute more negative feelings (such as 'scared' or 'guilty/terrible inside') to speakers who told lies than those who told truths or made no statement after their misdeeds. Whether or not speakers' statements were believed had

no bearing on children's affective evaluations, though all children rated speakers who were punished as feeling more negatively than those who were not.

Bussey's 1992 study was the first to examine children's conceptual understanding of simple, intended lies and truths and her findings demonstrated that even preschoolers can identify such statements and distinguish between them in terms of moral judgments and affective evaluations. By including stories in which speakers told truths or made no statement at all after their misdeeds, she was able to show that children's reasoning was affected by the statements the speakers made, and not just the misdeeds they had committed, since their misdeeds were equivalent, regardless of whether they told lies or truths. The inclusion of truths is an important methodological contribution to the field, as much of the earlier work on children's understanding of lies failed to include truths as a comparison point. That being said, the study is not without limitations. The moral judgment and affective evaluation scales were abstract and complex; children may have found it challenging (and unclear) to use the symbols of gold stars and black spots to represent 'good' and 'bad', and to use bar graphs to represent the magnitude of somewhat complex emotions. Thus, these factors may have limited children's performance – especially that of four-year-olds. Further, since the stories all took place in self-serving contexts, we do not know whether context influences preschoolers' conceptual understanding of lies and truths, or if preschoolers are sensitive to contextual differences at all.

In her 1999 study, Bussey extended her earlier work presenting four-, eight-, and 11-year-olds with stories about speakers who told lies and truths in self-serving, prosocial and pretend contexts. This was the first study to examine preschoolers' understanding of

prosocial lies and truths, and the only to directly compare young children's identification and moral judgment of lies and truths told in different contexts. In self-serving stories, speakers committed a minor misdeed (e.g., spilled milk) and either lied about it (e.g., blaming the dog) or told the truth. In prosocial stories, speakers did not like something (e.g., thought mum's cookies tasted awful) and either lied about it (e.g., saying the cookies tasted very nice) or told the truth. In pretend stories, speakers knew the actual identity or location of some object (e.g., a grey ball that rolled across the floor) and either lied about it (e.g., saying that it was a mouse) or told the truth. As in her previous study, children were asked to identify the statements as lies or truths and to provide moral judgments and affective evaluations of the speakers (using the same scales).

While eight- and 11-year-olds were near perfect in identifying both lies and truths in all three contexts (means $\geq 95\%$), four-year-olds were less so ($M = 73.5\%$), and their accuracy varied by context: they were more accurate in identifying lies in self-serving contexts than in prosocial or pretend ones, and more accurate at identifying self-serving and pretend truths than prosocial ones. Though four-year-olds again demonstrated moderate accuracy in identifying statements as lies or truths, their performance (unlike that of older children) was influenced by both the context and the statement type: they were least accurate in identifying both lies and truths in the prosocial context. In their moral judgments, children of all ages rated lies more negatively than their respective truths, but not all lies (or truths) were rated equally: self-serving lies were rated more negatively than both prosocial and pretend lies, though self-serving and pretend truths were rated equally more positively than prosocial ones.

This finding demonstrates that children of all ages were able to consider context in their moral judgments of the speakers' statements, in addition to the truthfulness of the statements themselves. Lies told to protect oneself (self-serving lies) were rated more negatively than lies told to trick someone else (pretend lies) or to spare someone else's feelings (prosocial lies). Similarly, truths told in self-serving (which involve owning up to a misdeed) and pretend contexts were rated more positively than prosocial truths, which likely involve hurting another's feelings. This pattern of findings suggests that young children are able to use information about the context to make inferences about the speakers' motives for making the statements they made.

In their affective evaluations, all children attributed more negative emotions (scared, guilty/terrible inside) to speakers who told lies than to those who told truths in self-serving and pretend contexts, but rated lie- and truth-tellers in prosocial contexts similarly (as feeling slightly negative). However, in terms of positive emotions, though older children attributed more positive emotions (pleased, good) to speakers who told truths than to those who told lies in both self-serving and pretend contexts (but not prosocial ones), four-year-olds did not. Instead, four-year-olds rated all speakers as feeling slightly positive, overall. Though again, the abstract nature of the rating scale and the complex emotions described may have limited younger children's performance on this measure.

In the only other study to examine preschoolers' understanding of prosocial lies and truths (in relation to their prosocial lie telling, as discussed in Chapter 3), Popliger, and colleagues (2011) presented preschool (four- to six-year-olds), early elementary school (seven- to nine-year-olds) and late elementary school (ten- to twelve-year-olds)

children with four short stories (modeled on Bussey, 1999) about speakers who told lies or truths in prosocial contexts. Children were asked to identify each statement as a lie or the truth (forced choice), to identify the statement as good or bad (on a six-point scale ranging from *very good* noted by three gold stars to *very bad* noted by three black Xs) and to provide affective evaluations of both the speaker and the recipient (using the same six-point scale as for moral judgment).

Though elementary school children accurately identified both lies and truths (means ≥ 1.75 out of a possible 2), preschoolers had difficulty in accurately identifying prosocial truths ($M = 0.6$) as compared to lies ($M = 1.61$). Consistent with Bussey (1999), children rated prosocial lies more negatively than prosocial truths, though the tendency to rate prosocial lies negatively decreased with age, suggesting that children's ability to consider context may improve with age. In their affective evaluations, overall, children reported that speakers would feel better after having told a truth than a lie, though no overall effect was reported for children's affective evaluations of the recipients of lies versus truths (however, participants' affective evaluations were also influenced by whether they themselves told lies, as discussed in Chapter 3).

Following Bussey's work, studies using similar stories and measures have reported comparable identification accuracy rates and moral judgments from preschool-aged children in self-serving contexts (Talwar & Lee, 2008; Talwar, Lee, Bala & Lindsay, 2002). This work has also demonstrated developmental trends in that school age children outperform preschool age children in their identification accuracy (Talwar & Lee, 2008; Talwar et al., 2002). Similarly, work with older children and adults in prosocial contexts suggests that although older children and adults tend to accurately

identify prosocial lies and truths, they are less likely to identify lies *as lies* in prosocial contexts than in self-serving ones (Lee & Ross, 1997; Xu, Luo, Fu & Lee, 2009) and they rate prosocial lies less negatively with age (Xu et al., 2009; Xu, Bao, Fu, Talwar & Lee, 2010).

Taken together, the work on children's conceptual understanding of lies demonstrates that preschoolers can identify and morally discriminate between lies and truths in both self-serving contexts (Bussey, 1992; 1999; Talwar & Lee, 2008; Talwar et al., 2002) and prosocial ones (Bussey, 1999; Popliger et al., 2011). Further, Bussey's (1999) findings indicate that context affects the moral judgments of preschoolers and older children alike. Thus, although young children over-extend the term 'lie' to other kinds of false statements (e.g., Piaget 1932/1965), they do understand the difference between simple, intended lies and truths and can distinguish between them lexically and morally, considering both the truthfulness of speakers' statements and the context in which the statements were made.

However, much work remains to be done. With the exception of Bussey's 1999 study, most of what we know about preschoolers' understanding of lies and truths is quite piecemeal; the conclusions outlined here cut across studies that explore one context or the other, within slightly different age groups and methodologies. Further, since each of these studies used stories, questions and scales designed to evaluate performance across a relatively wide age range, they are somewhat complex and may have limited younger children's performance. Further, none of the studies examining children's understanding of lies and truths have examined the skills that support these abilities.

The Role of Theory of Mind in Children's Understanding of Lies and Truths

Theory of Mind generally refers to the ability to consider the mental states of self and others (e.g., desires, beliefs and intentions) and to use those mental states to explain and predict behaviour (e.g., Premack & Woodruff, 1978). Children's belief understanding is a fundamental aspect of Theory of Mind that undergoes significant developments during the preschool period (e.g., Wimmer & Perner, 1983). Belief understanding is typically measured *via* false-belief tasks, which require children to predict the behavior of a character that has an inaccurate (false) belief about the true state of affairs. To succeed on false-belief tasks, children need to represent and reflect on the character's *false* belief in order to predict his behavior. In the classic version of the task, children have to predict that Maxi will look for his chocolate in the cupboard where he *thinks* it is (because he left it there), even though it is *really* in the fridge (because Mother moved it when he was not looking; Wimmer & Perner, 1983). It has been well established that children do not pass measures of false-belief understanding before the age of 4 years, and children are not considered able to reason about the beliefs of self and others before this age (see Wellman et al., 2001 for a meta-analysis).

Understanding of beliefs is not complete at this point, and more complex situations require more complex representations of beliefs. For instance, it is frequently necessary to consider one person's representation of another person's beliefs. This ability, referred to as *second-order* belief understanding, involves considering a belief about a belief, or more broadly, a mental representation *about* a mental representation (e.g., Miller, 2009). Second-order false-belief understanding develops after first-order

false-belief understanding, at around 5 to 6 years (e.g., Miller, 2009; Sullivan, Zaitchik & Tager-Flusberg, 1994).

Though there is a strong theoretical argument for the role of Theory of Mind, and belief understanding in particular, in children's *understanding* of lies and truths, it has not been directly investigated². Instead, research in this area has either investigated children's distinctions between lies and false beliefs and how these relate to their Theory of Mind (e.g., Berthoud-Papandropoulou & Kilcher, 2003; Ruffman, Olson, Ash & Keenan, 1993; Wimmer et al., 1984; 1985), the role of Theory of Mind in children's reasoning about other kinds of false statements (e.g., insincere promises; Maas, 2008), or the role of Theory of Mind in children's ability to *produce* lies for characters in story-based tasks (e.g., Bigelow & Dugas, 2008; Broomfield, Robinson & Robinson, 2002; Hsu & Cheung, 2013).

In a recent study, for example, Hsu and Cheung (2013) told five-year-olds illustrated stories about characters in self-serving and prosocial contexts and asked children what the speakers *should say* if they wanted to deceive their recipients. Children also completed measures of nonverbal intelligence, vocabulary, second-order false-belief understanding and interpretive Theory of Mind (e.g., children's the ability to appreciate more than one interpretation the same stimulus, as in Jastrow's "duck-rabbit"). As predicted, after controlling for intelligence and vocabulary, second-order false-belief understanding uniquely contributed children's ability to produce and maintain lies for speakers in the self-serving scenarios, and interpretive Theory of Mind uniquely

² It has, however, been investigated in relation to children's lie telling (e.g., Talwar & Lee, 2008). This work will be reviewed Chapter 3.

contributed to children's performance on the prosocial scenarios. Though this study demonstrates the role of different aspects of Theory of Mind in children's awareness of how to *tell* lies, direct evidence for the role of Theory of Mind in their conceptual and moral understanding of lies is still needed. Given the work being done on children's lie telling (e.g., Evans et al., 2011; Evans & Lee, 2013; Polak & Harris, 1999; Talwar & Lee, 2008), this is a surprising gap in the literature that needs to be addressed.

There are several reasons to expect children's first- and second-order false-belief understanding to contribute to their conceptual and moral understanding of lies and truths. First, since identifying a statement as a lie or the truth requires an appreciation of the speaker's beliefs (i.e., that the speaker does not believe her statement to be true), first-order false-belief understanding should be required. Second, since lies and truths are statements made by a speaker with the intention to deceive a recipient, a consideration of the recipient's perspective may also be required when making moral judgments of lies. More specifically, one must consider the mental states of both the speaker and the recipient, which differ from one another, and consider the interplay between them – whether that be the speaker's consideration of the recipient's beliefs, the recipient's beliefs about the speaker's beliefs and intentions, or both. This requirement suggests a potential role for second-order false-belief understanding. Third, first- and second-order false-belief understanding have been empirically implicated in children's *lie telling*, and so, it stands to reason that they are related to children's understanding of lies as well (e.g., Evans et al., 2011; Evans & Lee, 2013; Polak & Harris, 1999; Talwar & Lee, 2008).

The Role of Executive Function in Children's Understanding of Lies and Truths

Although Executive Function abilities have been implicated in children's lie telling (e.g. Evans et al., 2011; Talwar & Lee, 2008), their role in children's conceptual understanding of lies has not been examined. Executive Function refers to a set of higher order cognitive processes related to the conscious control of thought and action (e.g., Best & Miller, 2010; Zelazo & Müller, 2002). Most definitions of Executive Function include the constructs of inhibitory control (the ability to inhibit a prepotent response in favor of a more contextually appropriate one; e.g., Frye, Zelazo, & Palfai, 1995), working memory (the ability to hold and manipulate information in mind; e.g., Baddeley, 1990), and cognitive flexibility (the ability to flexibly switch between two aspects of some stimulus or task; e.g., Jacques & Zelazo, 2005). Each of these skills undergoes significant developments during the preschool period (e.g., Best & Miller, 2010; Carlson, 2005), alongside major developments in children's Theory of Mind understanding and their conceptual understanding and telling of lies.

There are two main ways in which preschoolers' conceptual understanding of lies could relate to developments in Executive Function, and specifically, in inhibitory control and working memory. First, both of these abilities have been shown to be important to children's false-belief understanding (e.g., Carlson, Moses & Breton, 2002; see Benson & Sabbagh, 2010 for a review) because in order to reason about another's false belief (e.g., Maxi's belief that his chocolate is in the cupboard, from the above example), one must inhibit attending to his own knowledge about the true state of affairs (e.g., that his chocolate is in the fridge). In order to do so, one must engage inhibitory control to override attending to his own knowledge, and working memory to hold in mind all of the

story details and track ‘who thinks what’. When considering a lie told by another, one may engage in the same kind of thinking: reasoning from the speaker and recipient’s perspectives (considering both what the speaker knows to be true, the untrue statement she makes, her intention to deceive, and the recipient’s beliefs about her statement). And so, understanding that a statement is a lie may also require inhibiting reasoning solely from one’s own perspective (requiring inhibitory control), and tracking the complex interrelations between the speaker’s and recipient’s beliefs (requiring working memory).

Second, both inhibitory control and working memory have been implicated in the literature on children’s *lie telling*, and studies have presented evidence of a relation between preschoolers’ Executive Function and their ability to tell and maintain self-serving lies (Evans et al., 2011; Evans & Lee, 2013; Talwar & Lee, 2008). Given the demonstrated involvement of inhibitory control and working memory in children’s false-belief understanding, and given the role of these abilities in children’s lie telling, their role in children’s conceptual understanding of lies warrants investigation as well.

The Present Study

In the present study, I investigated four- and five-year-olds’ identification, moral considerations, and affective evaluations of self-serving and prosocial lies and truths and the role of Theory of Mind and Executive Function in these developments. My goals were two-fold. The first was to confirm and extend previous research on preschoolers’ identification of self-serving and prosocial lies and truths, and their moral considerations and affective evaluations of the speakers who told them in a within-subjects design, using scales and measures adapted for younger participants. My second goal was to directly test the role of children’s Theory of Mind (first- and second-order belief understanding)

and Executive Function (inhibitory control and working memory) in these abilities. I chose preschoolers because it is during this period of development that children begin distinguishing lies from truths, begin telling self-serving and prosocial lies, and it is when first-order false-belief understanding develops, second-order false-belief understanding begins to emerge, and when major gains in inhibitory control and working memory are made.

I told four- and five-year-olds short stories about speakers who told lies and truths in both contexts. In self-serving stories, the speakers committed minor transgressions and told lies (to deny their misdeeds) or truths when asked by the recipients about their actions. In prosocial stories, the speakers did not like something and told lies (to spare the recipients' feelings) or truths when the recipients asked about their preferences. After each story, children were asked: 1) to identify the speaker's statement; 2) to morally judge the speaker for making the statement; 3) whether to assign punishment to the speaker, and; 4) to provide affective evaluations of both the speaker and the recipient. I included punishment assignment as a second index of children's moral reasoning, as is common in the moral development literature (e.g., Zelazo et al., 1996). Children also completed measures of first- and second-order false-belief understanding, measures of inhibitory control and working memory, as well as a measure of receptive vocabulary as a control, since the story-based tasks were quite verbal in nature.

My first set of hypotheses follows from my first goal – to confirm and extend previous findings on children's conceptual understanding of lies. Given the accuracy rates reported in the literature, I expected preschoolers' identification accuracy to be greater than chance in both contexts, and extending earlier work, I predicted that five-

year-olds would outperform four-year-olds. I also expected that children would demonstrate greater identification accuracy in self-serving contexts relative to prosocial ones (following Bussey, 1999).

In terms of moral judgments and punishments, I expected preschoolers to rate lies negatively and truths positively, and to assign more punishment to speakers who told lies than those who told truths. In line with Bussey (1999), I also expected that context would influence children's moral judgments and punishments, with self-serving lies rated more negatively and assigned more punishment than prosocial lies. Again, extending previous work, I predicted that five-year-olds would make greater distinctions between lies and truths, and between self-serving and prosocial lies, than four-year-olds.

In their affective evaluations of the speakers, I expected preschoolers to rate speakers who told lies as feeling less happy than those who told truths in both contexts (following Bussey, 1992 and Popliger et al., 2011). Again, I also expected this effect to differ by context, and that speakers who told self-serving lies would be rated as feeling less happy than those who told prosocial ones. In their affective evaluations of the recipients, I expected the same pattern: that preschoolers would rate recipients who were told lies as feeling less happy than those who were told truths, and that recipients who were told self-serving lies would be rated as feeling less happy than those who were told prosocial lies. Again, I expected both of these effects to be greater for five-year-olds than four-year-olds, extending previous work.

My second set of hypotheses follows from my second goal – to examine the role Theory of Mind and Executive Function in children's conceptual understanding of lies. In terms of Theory of Mind, I predicted that first- and second-order false-belief

understanding would play different roles in children's identification, moral judgments and punishments, and affective evaluations of speakers and recipients, after controlling for variability due to age and receptive vocabulary. Specifically, I hypothesized that children's first-order false-belief understanding would be related to their identification accuracy for lies and truths, regardless of context, since identifying a speaker's statement as a lie or the truth requires a consideration of the speaker's beliefs.

I also predicted that children's second-order false-belief understanding would relate to their moral judgments and punishments of speakers who lied, regardless of context, since these judgments should require a coordinated consideration of the speakers' and recipients' beliefs. I expected that second-order false-belief would only be related to judgments of stories in which the speakers told *lies* because it is in these situations that children's own perspectives differ from the speakers' and recipients'. That is, when speakers told truths, the speakers, the recipients and the participants themselves would have the same knowledge and so children could simply reason from their own perspectives. In contrast, when speakers told lies, children would need to consider the speakers' and recipients' representations of each others' beliefs in order to reason about the moral implications of their statements. Finally, I predicted that children's second-order false-belief understanding would also relate to their affective evaluation of the speakers and recipients, since considering how both characters would feel should also require a coordinated consideration of their beliefs (e.g., how the speaker feels about how the recipient will feel, and how the recipient feels about what the speaker has said, and so on).

Though the examination of Executive Function was somewhat exploratory, I predicted that children's Executive Function would be related to their performance on the story measures, after controlling for the contributions of age and receptive vocabulary. First, I predicted that working memory would be related to children's performance on all measures, since tracking the story details and the characters' statements and mental states is a significant demand of the story-based tasks. Second, I expected that inhibitory control would relate to children's identification accuracy for lies only, since identifying a speaker's statement as a lie requires children to override responding based on their own knowledge of the speaker's actions and to instead consider the speaker's beliefs and the statement made.

Method

Participants

Participants were 99 children: 54 four-year-olds ($M = 53.5$ months, $SD = 3.74$, 28 girls) and 45 five-year-olds ($M = 64.6$ months, $SD = 3.16$, 28 girls) recruited from daycare centers in a large, metropolitan Canadian city. Daycare providers and parents or guardians provided written informed consent for children's participation, and children provided verbal assent. Children were given stickers as thanks (including four additional children who were excluded from the study since they did not complete most of the tasks). Five children refused to complete the vocabulary measure and two children refused to complete one of the working memory measures. These participants were excluded from the analyses involving those measures.

Procedure

Testing took place in two thirty-minute sessions, about a week apart, in a quiet spot at each daycare. Each child heard eight stories: two self-serving lies, two self-serving truths, two prosocial lies, and two prosocial truths, in random order. Children heard stories in sets of two, separated by other measures. The order of all other tasks was fixed. In the first session, children began with two short warm-up activities³, received four stories and completed the first-order false-belief measures, the inhibitory control measure and one of the working memory measures. In the second session, children received the remaining four stories, and completed the second-order false-belief, and the vocabulary measure.

Tasks

Stories. The stories were modeled on those used in Bussey (1999). Each story was seven sentences long and supported by five photos of key scenes (using Playmobil toys; see Appendix A). The stories were read aloud by the experimenter who pointed out the key details as she read. Each story included: a sentence introducing the speaker, the recipient, and the setting (first picture); four sentences describing the plot (second, third and fourth pictures); a sentence in which the recipient posed a question to the speaker (fifth picture); and a final sentence in which the speaker told a lie or the truth (fifth picture). The speakers were gender matched to the participant.

Within each context, one of the lies involved a ‘yes’ statement (e.g., “Yes, I did brush my teeth”) and the other a ‘no’ statement (e.g., “No, I didn’t take an extra turn”).

³ Diverse Desires and Diverse Beliefs; early Theory of Mind tasks (adapted from Wellman & Liu, 2004). Performance was at ceiling on these measures.

The same was true for truths. Therefore, children could not correctly identify a statement as a lie or the truth based solely on whether the speaker said 'yes' or 'no'. After each story, children were asked: 1) comprehension questions; 2) to identify the speaker's statement; 3) to morally judge the statement; 4) whether to assign punishment to the speaker, and; 5) to rate how both the speaker and the recipient would feel. The comprehension questions were always asked first, followed by either the identification questions or the moral judgment and punishment questions (counterbalanced, between-subjects), the affective evaluations of the speakers and recipients were always asked last.

A pilot study conducted with a separate group of thirty four-year-olds ($M = 52.3$ months) confirmed that children understood the stories and response scales, and established that the stories were matched for difficulty for lies and truths. In the pilot study, each of 12 stories (six self-serving: three lies and three truths; six prosocial: three lies and three truths) was presented to half of the sample as a lie story and the other half as a truth. Performance on comprehension and identification questions was compared and eight stories were selected based on children's very high performance on the comprehension questions, and on their equivalent identification accuracy whether tested as a lie story or a truth story. These eight stories were used for the present study, including two of each type: self-serving lie, self-serving truth, prosocial lie and prosocial truth. Children did not have difficulty with any of the scales.

The following are examples of self-serving and prosocial lie stories (all stories are included in Appendix A).

Self-serving lie: Jenny's dad was helping her get ready for bed. It was time to brush her teeth. Her dad went downstairs to get her teddy bear. Jenny left the bathroom

without brushing her teeth. Even though she was supposed to brush her teeth, she didn't. When her dad got back, he asked Jenny, "Did you brush your teeth?" Jenny said, "Yes, I did brush my teeth".

Prosocial lie: Danny was helping his dad in the yard. When they were all finished, his dad gave him a special gift to thank him for his help. It was a new book. Danny did not like the book at all. Even though his dad liked it, Danny didn't like the book. His dad asked Danny, "Do you like the book?" Danny said, "Yes, I do like the book."

Comprehension questions. After each story, children were asked comprehension questions: one about what the characters were doing (e.g., "Was Jenny's dad helping Jenny get ready for bed?"); one about the true state of affairs in self-serving stories (e.g., "Did Jenny brush her teeth?") or the speaker's true feelings in prosocial stories (e.g., "Did Danny like the book?"); and one that required children to recall the speaker's statement (e.g., "What did Jenny/Danny say to his/her dad?"). These questions required both 'yes' and 'no' responses to ensure that children understood that both were appropriate, possible answers to the questions. If a child erred on a comprehension question, story details were retold and the question was asked again, up to three times. If a child did not correctly answer all comprehension questions (in three attempts) for a given story, their scores for that story were excluded. A maximum of four children were excluded for any given story, and most children were correct on all questions on the first try ($\geq 84\%$ per story).

Identification. In previous research, children have been asked to identify speakers' statements as 'a lie or not a lie' (e.g., Wimmer et al., 1985), as 'a lie or the

truth' (e.g., Bussey, 1992; 1999; Popliger et al., 2011; Talwar et al., 2002), or as 'a lie or the truth or something else' (e.g., Strichartz & Burton, 1990; Talwar & Lee, 2008).

Although including 'something else' should increase the response options available to children instead of forcing them to classify a statement as either a lie or the truth, neither of the studies including this option reported that any children endorsed it. So although three options were offered, only two were utilized, effectively leaving chance accuracy at 50%.

I employed a more stringent requirement before crediting children with correctly identifying a statement. Children were asked two questions: *both* whether a speaker's statement was a lie (e.g., "Is what Jenny said a lie?"), *and* whether it was the truth (e.g., "Is what Jenny said the truth?") and these questions were scored contingently. In the self-serving example, for instance, a child had to indicate that Jenny's statement was a lie *and* that it was not the truth to be scored as correct. Children who responded that Jenny's statement was the truth and not a lie, that it was *both* a lie *and* the truth, or *neither* a lie *nor* the truth were counted as incorrect. Other researchers have asked the lie and truth questions separately, but have either scored them as separate variables (e.g., Peterson, 1995), or have asked them in a stepwise fashion, only asking if the statement was the truth if a child had already answered that it was not a lie, or vice versa (Xu et al., 2009, though this study was conducted with older children). The measure of identification accuracy used here is likely more conservative than those used in the literature: the level of chance is reduced to 25% for each story (as compared to 50%), and the contingent scoring screens out children with yes or no response biases. The order of the lie and truth questions was counterbalanced, between-subjects. For each story, children received a

score of 1 for identification accuracy if they answered both questions correctly. These scores were summed within story types, for scores ranging from 0 to 2 for each type: self-serving lie, self-serving truth, prosocial lie, prosocial truth.

Moral Judgment. In previous research, children have been asked to make moral judgments using rating scales ranging from ‘very, very bad’ to ‘very, very good’ with visual supports using symbols like gold stars and black Xs or spots to denote ‘good’ and ‘bad’ (e.g., Bussey, 1992; 1999; Popliger et al., 2011; Talwar & Lee, 2008). In order to simplify this judgment for younger participants, I asked children two questions: *both* if it was good *and* if it was bad that the speaker had made the statement, and followed up ‘yes’ responses with questions about degree. For each story, children were reminded what the speaker had said, for example, “Think about what Jenny said, she said ‘Yes, I did brush my teeth.’” The reminder was followed by the two moral judgment questions: “Was it good that she said that?” and if the child responded ‘yes,’ “How good was it? A little bit good, or a lot?” and “Was it bad that she said that?” and if ‘yes,’ “How bad was it? A little bit bad or a lot?” If children answered ‘yes’ to the initial good/bad question, their response was scored as 1 if they responded it was ‘a little bit’ good (or -1 for ‘a little bit’ bad), and as 2 if they said it was ‘a lot’ good (or -2 for ‘a lot’ bad). If children answered ‘no’ to the initial good/bad question, they received a score of 0 for that question. Scores on these questions were summed, for scores that ranged from -2 to +2 for each story. As with the identification questions, these scores were then summed within story types, for scores ranging from -4 to +4 for each type. The order of the ‘good’ and ‘bad’ questions was also counterbalanced, between-subjects.

Punishment. For each story, children were also asked whether to assign punishment to the speaker (e.g., “Should Jenny get in trouble for saying that?”). If children responded ‘yes,’ they were asked, “How much trouble: a little bit or a lot?” The punishment question always followed the moral judgment questions. Children’s answers were scored as 0 if they assigned no punishment, 1 if they assigned ‘a little bit’ of trouble, and as 2 if they assigned ‘a lot’ of trouble, for scores ranging from 0 to 2 for each story. Again, these scores were then summed within story types, for scores ranging from 0 to 4 for each type.

Affective Evaluations. For each story, children were also asked to provide affective evaluations of the speaker and the recipient. Specifically, they were asked if each character felt happy about what was said and whether each character felt sad about what was said, and ‘yes’ responses were followed by questions about degree. These questions were asked in a fixed order, following the other story questions. First, children were asked about the speaker: “Think about Jenny. Does Jenny feel happy about what she said?” and, if ‘yes,’ “How happy? A little bit or a lot?” and “Does Jenny feel sad about what she said?” and, if ‘yes,’ “How sad? A little bit or a lot?” Then children were redirected to the recipient, “Now think about Jenny’s dad. Does Jenny’s dad feel happy about what Jenny said?” and, if ‘yes,’ “How happy? A little bit or a lot?” and “Does Jenny’s dad feel sad about what Jenny said?” and, if ‘yes,’ “How sad? A little bit or a lot?” For each character, if children answered ‘yes’ to the initial happy/sad question, their response was scored as 1 if they responded s/he was ‘a little bit’ happy (or -1 for ‘a little bit’ sad), and as 2 if they said it was ‘a lot’ happy (or -2 for ‘a lot’ sad). If children answered ‘no’ to the initial happy/sad question, they received a score of 0 for that

question. For each character (the speaker and the recipient) scores on the happy and sad questions were summed, for scores that both ranged from -2 to +2 (one score for each character in each story). Again, these scores were then summed within story types, for scores ranging from -4 to 4 for each character in each story type.

First-order false-belief understanding. Children completed two measures of first-order false-belief understanding and scores were summed for a composite score, ranging from 0 to 3.

Change of location. In this task (adapted from Wimmer & Perner, 1983) a scenario was acted out using two dolls: “Jill was playing with a ball. When she was done playing with it, she put it in the white box and then she went outside.” Jill then exited the scene, out of the child’s sight. “While Jill was outside, her friend Peter came along. Peter found the ball in the white box and he played with it for a while. When he was done, he put it in the blue box and then he went home for lunch.” Peter then exited the scene, and children were asked a memory question, “Where did Jill put the ball?” and a reality question, “Where is the ball really?” to ensure that the details were understood and recalled. Then Jill returned to the scene and children were asked, “Look Jill is back and she wants to play with that ball again. Where will Jill first look for the ball?” Children passed the task only if they answered all three questions correctly, for scores of 0 or 1.

Unexpected contents. In this task (adapted from Gopnik & Astington, 1988), children were presented with a crayon box and were asked about its contents, “Look at this box. What’s in here?” After children responded (all guessed crayons or similar), the experimenter opened the box to reveal that it did not contain crayons at all, “Look at that, it’s really a pig inside!” After taking a moment to enjoy the surprise, the pig was placed

back in the box and children were asked the reality question, “So, what is in the box?” and the false-belief *self* question, “What did you think was in the box before we opened it?” Then the experimenter explained that she would show the crayon box to another girl or boy ‘tomorrow’ and children were asked the false-belief *other* question, “What will s/he think is in the box, before we open it?” If children answered the reality question correctly (pig), they received one point for also answering the false-belief *self* question accurately (i.e., that they initially thought the box contained crayons) and one point for answering the false-belief *other* question accurately (that another child would think the box contained crayons), for scores ranging from 0 to 2.

Second-order false-belief understanding. In this task (adapted from Sullivan et al., 1994), children were told stories about two characters (acted out with dolls and props), in which one character had a false belief about the other character’s belief: “John and Sarah were playing in John’s room. John had a new book that he just got. Sarah wanted to read John’s new book, but he didn’t want her to. John’s mum called him to go downstairs. So he took his book, and he put it under his blanket and then he went downstairs to see his mum.” John then exited the scene, out of the child’s sight. “When John was gone, Sarah took the book and she read it. When she was all done, she put it in John’s toy box. But look -- ” at this point, John re-entered the scene, standing behind Sarah. “When John came back from seeing mum, he saw Sarah putting his book in his toy box. John watched Sarah, but Sarah *did not* see John.” Children were asked a recall question about the book’s initial location and a reality question about its current location. Children were then asked about John’s belief, “Does John know where the book is now?” and the second-order false-belief question, “Where does Sarah think that John will look

for the book?” Children who passed the recall, reality, and belief questions received one point for the second-order false-belief question, for scores of 0 or 1.

Inhibitory control: Black/White Stroop. This task (e.g., Vendetti, Kamawar, Podjarny & Astle, in press; adapted from Simpson & Riggs, 2005), based on the Day/Night Stroop task (Gerstadt, Hong, & Diamond, 1994), examines children’s ability to respond to visual stimuli in an unexpected way, and therefore to inhibit their natural response tendency and replace it with a conflicting response. Children were asked to look at black and white cards (solid color), and respond to the cards in the opposite manner than their natural tendency. For instance, when presented with a black card, children were told to respond with “white” and when presented a white card, they were told to respond with “black”. There were 2 practice trials (with feedback) and 21 test trials. Children received a point for each ‘correct’ trial, for scores ranging from 0 to 21. The internal consistency of the Black/White Stroop was very high, demonstrating the strong reliability of this measure (Cronbach’s $\alpha = .902$).

Working Memory. Children completed three measures of working memory (described below) and a principal components analysis was used to create a component score reflecting their common variance, as summarized in the Results section.

Forward digit span. In this task (e.g., Carlson et al., 2002), children were asked to repeat short sequences of numbers back to the experimenter. Beginning with two practice trials, digits were spoken aloud by the experimenter, approximately one second apart, and children were asked to repeat them. Starting with two digit sequences, the number of digits increased every two trials. The task ended when children failed both trials of a given length. Children received a point for each trial on which they succeeded,

excluding practice trials, for scores (potentially) ranging from 0 to 10. The internal consistency of the Forward Digit Span was moderate, demonstrating adequate reliability (Spearman-Brown's correlation coefficient for split-half reliability, $r = .794$).

Corsi Span. In this task (adapted from Rasmussen & Bisanz, 2005), children were presented with a piece of paper with nine shaded identical spots on it. Children were told that the spots were 'lily pads' and that their fingers were frogs jumping from lily pad to lily pad. They watched the experimenter's frog jump on some lily pads, and were then asked to make their frog jump 'on the same lily pads in the same order.' Starting with two-lily-pad sequences, the number of lily pads in a sequence increased every two trials. The task ended when children failed both trials of a given length. Children received a point for each trial on which they succeeded, for scores (potentially) ranging from 0 to 10. The internal consistency of the Corsi Span was moderate, demonstrating adequate reliability (Spearman-Brown's correlation coefficient for split-half reliability, $r = .695$).

Backward Word Span. In this task (adapted from Carlson et al., 2002), children were shown cards, one at a time, with pictures of common objects on them (e.g., car, fox, leaf, etc). Children were asked to identify each picture aloud before the experimenter turned the card face down on the table. Once all cards in a trial were viewed, children were asked to recall the items in reverse order. Children received two sets each of 2 cards, 3 cards, 4 cards, and 5 cards. The task ended when children were incorrect on both trials of a given level, for scores (potentially) ranging from 0 to 8. The internal consistency of the Backward Word Span was weak, demonstrating poor reliability (Spearman-Brown's correlation coefficient for split-half reliability, $r = .446$).

Receptive vocabulary: Peabody Picture Vocabulary Task – 3rd Edition (PPVT – III). The PPVT-III (Dunn & Dunn, 1997) is a standardized measure of receptive vocabulary. In this task, children see arrays of four pictures, hear the name of one of them and have to point to the appropriate picture. The task is arranged in blocks of 12 words (with increasingly difficult vocabulary), and in its standard administration, basal and ceiling rules dictate where testing begins and ends. In the current study, an abbreviated version of this task was used to reduce the administration time (as in Skwarchuk, Sowinski & Lefevre, 2014). All children started at Set 3 (the start point for 5-year-olds) regardless of the basal rule, and stopped either when they committed eight or more errors in a set (the standard ceiling rule) or at the end of Set 11. Children’s raw scores were used.

Results

Preliminary examination of the data ensured that the assumptions were met for the analyses conducted, including: normality of the sampling distribution, homogeneity of variance, independence of errors and an absence of outliers. See Appendix B for details.

With respect to my first set of hypotheses, concerning children’s conceptual understanding of self-serving and prosocial lies and truths, separate analyses were conducted for each dependent measure: identification, moral judgment, punishment, affective evaluations of the speakers and affective evaluations of the recipients. Recall that there were three, fully counterbalanced orders embedded in the different story questions: the order of the question types (identification first vs. moral judgment and punishment first), the order of the lie/truth questions, and the order of the good/bad questions. The result was eight between-subjects orders, with between 10 and 15

children per cell. Due to the small sample size within each cell, testing for the order of all three factors together was not possible.

Since there is only evidence of an effect of the order of question type in the literature, only this factor was considered in the analyses (e.g., Wimmer et al., 1985), though others have reported including this order factor and have not found an effect (e.g., Bussey, 1992; 1999). Preliminary analyses were conducted for each dependent measure including question order (between-subjects), age (between-subjects) context (self-serving or prosocial, within-subjects) and statement type (lie or truth, within-subjects) in mixed-design ANOVAs and found no main effects or interactions involving the order factor for any of the dependent measures; as such, order was not included in any of the analyses.

The final analyses consisted of separate mixed ANOVAs for each of the dependent measures with age (4- vs. 5-year-olds) as a between-subjects factor, and context (self-serving vs. prosocial) and statement type (lie vs. truth) as within-subjects factors. Significant effects were followed by planned comparisons of the relevant means, when justified. Recall that children were required to correctly answer three comprehension questions for each story in order for their scores for each dependent measure to be included for that story. Therefore, the number of children in each cell varies slightly, depending on the number of children who were excluded (never more than four children per story, and never more than one child per cell).

Identification

A 2 (age) x 2 (context) x 2 (statement) mixed ANOVA was performed on children's identification of lies and truths. For each story, children received a score of 1 for correct identification of the speaker's statement, and the level of chance was 25%.

There were eight stories in total, two of each: self-serving lie, self-serving truth, prosocial lie and prosocial truth. Therefore, children's scores ranged from 0 to 2 in each cell and chance performance was 0.5.

As hypothesized, a main effect of context was found, $F(1, 96) = 7.84, p = .006, \eta_p^2 = .076$. Collapsing across statement type (scores ranged from 0 to 4), children were more accurate in identifying statements in self-serving contexts ($M = 2.73$) than in prosocial ones ($M = 2.46$). A main effect of statement was qualified by a statement by age interaction, $F(1, 96) = 5.61, p = .020, \eta_p^2 = .055$. As shown in Figure 2.1, collapsing across the two contexts (scores ranged from 0 to 4), four-year-olds correctly identified statements as lies or truths about half the time ($M = 2.35$ and $M = 2.0$, respectively), while five-year-olds did so about three-quarters of the time ($M = 2.98$ and $M = 3.22$, respectively). Consistent with my predictions, five-year-olds significantly outperformed four-year-olds in the identification of lies, $t(97) = -2.12, p = .036, d = .44$, and truths, $t(97) = -4.35, p = .0001, d = .89$, and this difference was greater for truths, driving the interaction (which I had not predicted). Also consistent with my hypotheses, children's accuracy was greater than chance on all counts (all $ps = .0001$, for each comparison to chance), though the performance of four-year-olds was modest – as they accurately identified statements only half the time. I found no differences in accuracy for identifying lies versus truths within either age group.

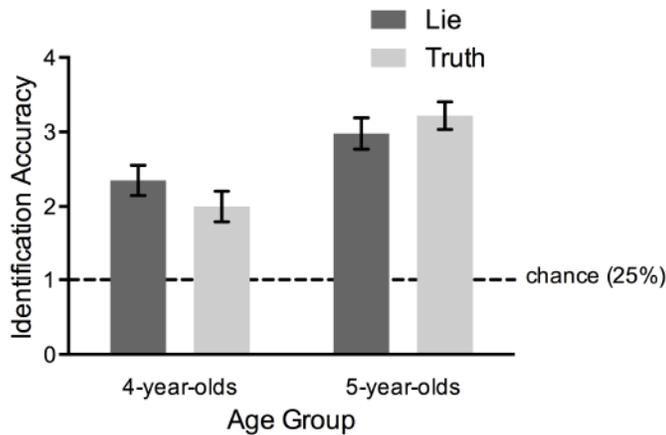


Figure 2.1 Four- and five-year-olds' identification accuracy for lies and truths. The statement by age interaction is depicted, and scores are collapsed across context. Error bars represent standard errors and chance performance (25%) is marked with the dashed line.

Moral Judgment

A second 2 (age) x 2 (context) x 2 (statement) mixed ANOVA was performed, this time on children's moral judgments. For each story, children's judgments ranged from a score of -2 ('a lot' bad) to +2 ('a lot' good). Therefore, in each of the four cells, scores ranged from -4 to +4.

Main effects of context and statement were qualified by a significant context by statement interaction, $F(1, 96) = 11.57, p = .001, \eta_p^2 = .108$, and a significant statement by age interaction, $F(1, 96) = 17.99, p = .0001, \eta_p^2 = .158$. Following the context by statement interaction (see Figure 2.2), planned comparisons revealed that, as predicted, self-serving lies ($M = -1.78$) were rated more negatively than self-serving truths ($M = 0.22$), $t(97) = -5.91, p = .0001, d = .78$, and prosocial lies ($M = -0.25$) were rated more negatively than prosocial truths ($M = 0.51$), $t(98) = -2.52, p = .014, d = .11$. Also consistent with my hypotheses, self-serving lies were rated more negatively than prosocial lies, $t(97) = -6.01, p = .0001, d = .61$, though self-serving and prosocial truths

did not differ. The interaction was driven by the greater distinction between self-serving lies and truths than between prosocial lies and truths.

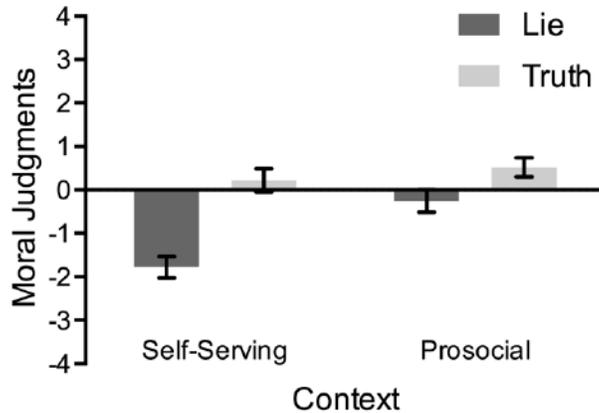


Figure 2.2. Children's moral judgments of lies and truths in self-serving and prosocial contexts. The context by statement interaction is depicted, and scores are collapsed across age. Error bars represent standard errors.

Comparisons following the statement by age interaction (collapsed across context, scores ranged from -8 to +8) indicated that these findings were driven by the five-year-olds (see Figure 2.3). Though four-year-olds did not differentiate between lies and truths (rating both somewhat negatively), five-year-olds did, $t(44) = -6.75, p = .0001, d = .21$, rating lies negatively ($M = -2.91$) and truths positively ($M = 2.11$). I did not predict that four-year-olds would fail to differentiate between lies and truths in their moral judgments. As expected, five-year-olds' moral judgments of lies were more negative than four-year-olds' ($M = -1.26$), though this contrast was only approaching significance, $t(97) = -3.05, p = .06, d = .39$, and five-year-olds' ratings of truths were significantly more positive than four-year-olds' ($M = -0.37$), $t(97) = -3.05, p = .003, d = .43$.

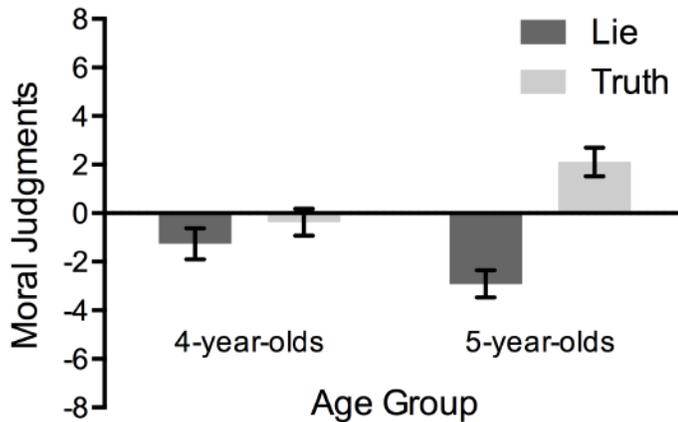


Figure 2.3. Four- and five-year-olds' moral judgments of lies and truths. The statement by age interaction is depicted, and scores are collapsed across context. Error bars represent standard errors.

Punishment

A third 2 (age) x 2 (context) x 2 (statement) mixed ANOVA was performed, this time on children's assignment of punishment. For each story, children's punishment assignments ranged from 0 (*no trouble*) to +2 (*a lot of trouble*). Therefore, in each of the four cells, summed scores ranged from 0 to 4.

The findings for punishment paralleled those for moral judgments. Main effects of context and statement were qualified by a significant context by statement interaction, $F(1, 96) = 6.11, p = .015, \eta_p^2 = .015$, and a significant statement by age interaction, $F(1, 96) = 10.36, p = .002, \eta_p^2 = .097$. Following the context by statement interaction (see Figure 2.4), planned comparisons again revealed that, as predicted, children assigned more punishment to self-serving lies ($M = 2.18$) than self-serving truths ($M = 1.34$), $t(97) = 4.53, p = .0001, d = .53$, and to prosocial lies ($M = 1.52$) than to prosocial truths ($M = 1.15$), $t(98) = 2.52, p = .027, d = .26$. Also consistent with my hypotheses, self-serving lies were assigned more punishment than prosocial lies, $t(97) = 4.43, p = .0001, d = .40$, though again, self-serving and prosocial truths did not differ. Consistent with the

findings for moral judgments, the interaction resulted from the greater difference between punishment of self-serving lies and truths than prosocial ones.

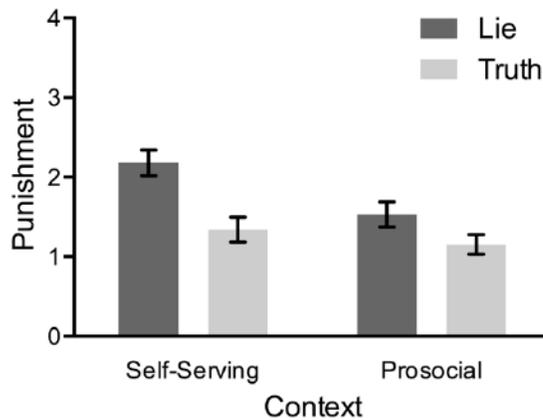


Figure 2.4. Children's punishment of lies and truths in self-serving and prosocial contexts. The context by statement interaction is depicted, and scores are collapsed across age. Error bars represent standard errors.

These findings were again driven by the five-year-olds (see Figure 2.5).

Following the statement by age interaction (collapsing across context, scores ranged from 0 to 8), four-year-olds did not differentiate between lies and truths in their assignment of punishment, though five-year-olds did, $t(44) = 5.40, p = .0001, d = .95$, assigning more punishment to lies ($M = 4.02$) than truths ($M = 1.82$). Though five-year-olds did not assign more punishment to lies than four-year-olds, they assigned less punishment to truths than four-year-olds ($M = 3.02$), $t(97) = 2.49, p = .015, d = .51$.

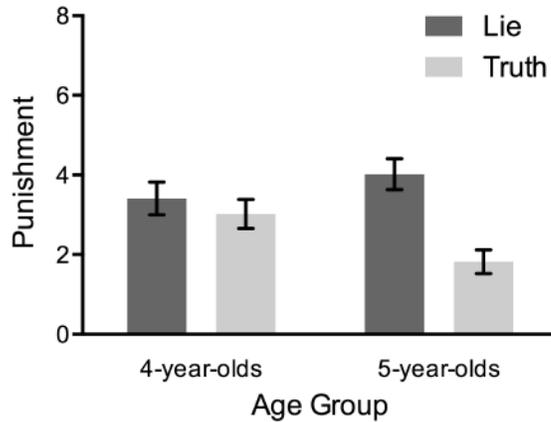


Figure 2.5. Four- and five-year-olds' punishment of lies and truths. The statement by age interaction is depicted, and scores are collapsed across context. Error bars represent standard errors.

Affective Evaluations of the Speakers

A fourth 2 (age) x 2 (context) x 2 (statement) mixed ANOVA was performed on children's affective evaluations of the speakers. For each story, children's affective evaluations ranged from -2 (*a lot sad*) to +2 (*a lot happy*). Therefore, in each of the four cells scores ranged from -4 to +4.

The ANOVA suggested a context by statement interaction, $F(1, 96) = 5.20, p = .025, \eta_p^2 = .051$ and a context by age interaction, $F(1, 96) = 3.75, p = .056, \eta_p^2 = .038$, though the latter was only approaching significance. Following the context by statement interaction (see Figure 2.6), planned comparisons revealed that children rated speakers that told self-serving lies as feeling less happy ($M = .58$) than those that told self-serving truths ($M = 1.24$), as predicted, $t(97) = 2.69, p = .009, d = .26$, though they rated speakers that told prosocial lies ($M = 1.02$) and prosocial truths ($M = 1.03$) similarly, which was contrary to my prediction. However, speakers that told self-serving lies were rated as feeling less happy than those who told prosocial lies, which was consistent with my prediction. Although children did rate self-serving lie-tellers as feeling less happy about

their statements, it seems that they did not make any further distinctions, rating all other speakers as feeling ‘a little bit’ happy. Following the context by age interaction, collapsing scores across statement type, all planned comparisons failed to reach significance.



Figure 2.6. Children’s affective evaluations of speakers who told lies and truths in self-serving and prosocial contexts. The context by statement interaction is depicted, and scores are collapsed across age. Error bars represent standard errors.

Affective Evaluations of the Recipients

Unexpectedly, when asked how the recipients would feel in response to the speakers’ statements, several children refused to provide an answer to the questions, citing that the story did not indicate whether the recipients knew that they had been lied to or not. Moreover, a few children even answered the questions about the recipients’ feelings by providing two answers (e.g., ‘if he knows she is lying he will feel sad, but if he doesn’t know then he will feel happy’). Though these results are anecdotal evidence of the role of children’s second-order false-belief understanding in their consideration of the recipients’ feelings, they demonstrated a critical flaw in the measure itself: because the story does not include information about whether the recipient believes the speaker’s

statement or suspects that the speaker is lying, it is difficult to reason about how the recipient feels about the speaker's statement. Since this issue was raised by several of the participants, the results for this measure were not analyzed since they would not have been interpretable.

Relations to Theory of Mind and Executive Function

Recall that children also completed measures of first- and second-order false-belief understanding, inhibitory control, working memory and receptive vocabulary (see Table 2.1 for descriptive statistics). The three working memory measures were significantly correlated with one another ($r_s \geq .298$, $p < .01$) and a principal components analysis extracted a single factor ($\lambda = 1.75$) that accounted for 58.34 % of the variance in children's performance on the three measures. A working memory component score was computed and used for the analyses.

To test my hypotheses, I examined the partial correlations⁴ between children's identification accuracy, moral judgments and punishments, affective evaluations of speakers and their first- and second-order false-belief understanding, inhibitory control and the working memory component score, after controlling for age (in months) and receptive vocabulary (see Table 2.2 for correlation matrix). These comparisons were made collapsing across context (whether self-serving or prosocial), but not statement type, since context was not predicted to influence the relation between children's Theory of Mind and Executive Function and the story variables.

⁴ A MANOVA with the eight story variables as dependent measures and first-order false-belief, second-order false-belief, inhibitory control, working memory, age in months and receptive vocabulary as predictors completely supported the pattern of findings of the partial correlations.

Table 2.1.

Descriptive Statistics for the Major Study Variables for the Full Sample and by Age

| Variable | <i>Full Sample</i> | | <i>4-year-olds</i> | | <i>5-year-olds</i> | |
|---|--------------------|------------------|--------------------|------------------|--------------------|------------------|
| | <i>N</i> | <i>M (SD)</i> | <i>N</i> | <i>M (SD)</i> | <i>N</i> | <i>M (SD)</i> |
| Age (in months) | 99 | 58.6 (6.54) | 54 | 53.54 (3.74) | 45 | 64.62 (3.16) |
| First-order False-Belief (out of 3) | 99 | 2.08 (1.08) | 54 | 1.78 (1.14) | 45 | 2.44 (.87) |
| Second-order False-belief (out of 1) | 99 | .32 (.47) | 54 | .28 (.45) | 45 | .38 (.49) |
| Black/White Stroop (out of 21) | 99 | 16.55 (4.89) | 54 | 15.57 (5.40) | 45 | 17.71 (3.93) |
| Forward Digit Span (max of 10) | 98 | 6.36 (1.55) | 54 | 6.06 (1.52) | 44 | 6.72 (1.51) |
| Backward Word Span (max of 8) | 98 | 2.29 (1.02) | 53 | 2.0 (1.02) | 45 | 2.62 (.91) |
| Corsi Span (max of 10) | 99 | 4.53 (1.66) | 54 | 4.17 (1.61) | 45 | 4.98 (1.62) |
| Working Memory Component Score | 97 | .006 (1.00) | 53 | -.29 (.98) | 44 | .37 (.92) |
| PPVT – III | 94 | 71.28 (16.94) | 53 | 63.89 (14.56) | 41 | 80.85 (15.01) |

Note. Two children were missing scores for one of the Working Memory measures and five children were missing scores for the PPVT-III.

As predicted, first-order false-belief understanding was significantly correlated with children's identification of lies, $r(92) = .443, p = .0001$, and truths, $r(92) = .419, p = .0001$. Also as predicted, second-order false-belief understanding was significantly correlated with children's moral judgments, $r(92) = -.237, p = .022$, and punishments of lies, $r(92) = .227, p = .028$, but not truths ($ps > .05$). However, contrary to my predictions, neither children's affective evaluation of the speakers who told lies nor those who told truths were related to their second-order false-belief understanding ($ps > .05$).

Contrary to my predictions, the partial correlations did not provide evidence for the role of Executive Function in children's conceptual understanding of lies and truths. After controlling for age and receptive vocabulary, inhibitory control did not relate to their identification accuracy for lies (and indeed, inhibitory control did not relate to any of the story variables). Similarly, children's working memory performance was unrelated to their performance on any of the story variables, though it was related to children's first-order false-belief understanding, $pr(92) = .311, p = .002$.

Though I made no predictions about the correlations among the other dependent measures, it is worth noting that the pattern of relations among children's identification, moral judgments and punishments, and affective evaluations of lies and truths tell a cohesive story. Even when controlling for age and receptive vocabulary, children's identification of lies and truths related to one another, and their identification of each statement type related to their moral judgment, punishment and affective evaluations of that statement type (i.e., identification of lies related to moral judgment, punishment and affective evaluations of lies, and the same for truths). Moreover, the partial intercorrelations among moral judgment and punishment scores were all significant.

Table 2.2

Partial Correlations between Children's Identification, Moral Judgment and Punishment, and Speaker Affective Evaluations of Lies and Truths and Theory of Mind and Executive Function, Controlling for Age (in months) and Receptive Vocabulary

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----|---------------------------|---|---------|----------|---------|----------|----------|----------|----------|---------|--------|-------|--------|
| 1 | Lie Identification | - | .389*** | -.389*** | -.025 | .349** | .050 | -.099 | .051 | .443*** | .161 | .107 | .160 |
| 2 | Truth Identification | | - | -.157 | .253* | .087 | -.213* | -.021 | .142 | .419*** | .102 | -.063 | .160 |
| 3 | Lie Moral Judgment | | | - | .359*** | -.724*** | -.321** | .289** | .209* | -.141 | -.237* | .007 | -.157 |
| 4 | Truth Moral Judgment | | | | - | -.300** | -.700*** | .100 | .468*** | .011 | -.165 | .012 | -.091 |
| 5 | Lie Punishment | | | | | - | .468*** | -.360*** | -.207* | .060 | .227* | .018 | -.001 |
| 6 | Truth Punishment | | | | | | - | -.130 | -.404*** | -.106 | .063 | -.003 | -.092 |
| 7 | Lie Affect. Evaluation | | | | | | | - | .614*** | -.038 | -.119 | -.001 | -.067 |
| 8 | Truth Affect. Evaluation | | | | | | | | - | .107 | -.060 | .035 | .036 |
| 9 | First-Order False Belief | | | | | | | | | - | .270** | .017 | .338** |
| 10 | Second-Order False Belief | | | | | | | | | | - | .069 | .077 |
| 11 | Inhibitory Control | | | | | | | | | | | - | -.048 |
| 12 | WM Component | | | | | | | | | | | | - |

Note: * $p < .05$. ** $p < .01$. *** $p < .001$.

$N = 92$; five children were excluded because they were missing scores for receptive vocabulary (control).

Discussion

The first goal of this research was to confirm and extend previous findings, using measures that were designed to better assess preschoolers' abilities. Consistent with previous work (e.g., Bussey, 1999), I found that both four- and five-year-olds were above chance in their identification of lies and truths and that they were more accurate in identifying lies and truths in self-serving contexts than in prosocial ones. Thus, I concur with previous work that credits preschoolers with some sensitivity to the difference between lies and truths.

Children's accuracy in this study was lower than reported in the literature. Bussey (1999) reported that four-year-olds identified self-serving lies with approximately 90% accuracy and self-serving truths with approximately 80% accuracy (actual means not reported), whereas four-year-olds in the present study did so 65% and 50% of the time, and five-year-olds 80% and 85% of the time (lies and truths, respectively). The discrepancy was smaller for prosocial lies and truths: Bussey (1999) reported that four-year-olds accurately identified prosocial lies and truths approximately 68% and 58% of the time, whereas, in the present study, four-year-olds did so 50% of the time and five-year-olds did so 75% of the time (for both lies and truths). Other studies that provide accuracy rates for preschoolers' identification (in either context) are comparable to those reported by Bussey, though they typically report on group findings from a wider age range (e.g. Pimpler et al., 2011; Talwar & Lee, 2008). Overall, five-year-olds in this study significantly outperformed four-year-olds, and their identification accuracy was similar to the rates reported in the literature. By comparing the performance of four- and five-year-olds, I was able to capture significant developments in children's identification

accuracy *within* the preschool period, which previous research has not reported. This finding emphasizes the importance of examining preschoolers' early emerging understanding of lies and truths.

The lower identification accuracy I found is likely due to the more stringent method I used for the identification questions. For each story, between 18 and 27 children identified statements as *both* lies *and* truths, or as *neither* lies *nor* truths, and were therefore counted as incorrect (an average of around 20% of children). It is possible that these children were responding randomly to these questions, though because they had correctly answered three comprehension questions that required both 'yes' and 'no' responses, this is not the most likely explanation. It seems more likely that these children failed to *fully* understand the terms 'lie' and 'truth'. Given the 50% likelihood of accurately identifying a statement by chance alone using the typical forced-choice scales, the rates reported in the literature are likely an overestimate children's understanding. By requiring a correct answer to both the 'lie' and 'truth' questions, I required that children understand the mutual exclusivity of the terms in order to get credit. Additionally, I screened out more children who may have responded randomly by lowering chance performance to 25% per story. This method provided a much more conservative, but I argue more accurate, estimate of children's understanding of the terms 'lie' and 'truth' than previous research has provided.

I also presented evidence that preschoolers differentiate between lies and truths, as reflected in their moral judgments and punishments. Importantly, my findings for moral judgments and punishment tell the very same story, providing converging evidence of children's moral reasoning about the speakers' statements. This finding extends and

supports previous research that has only used moral judgments. Consistent with previous work, children rated lies more negatively and assigned them more punishment than their respective truths in both contexts, and more so in the self-serving context. Though they rated self-serving lies more negatively and assigned them more punishment than prosocial lies (consistent with Bussey, 1999), they did not differentially judge self-serving and prosocial truths: they rated both truths quite neutrally but assigned both ‘a little’ punishment.

The fact that children morally judged the two types of truths somewhat neutrally, but assigned them some punishment, makes sense: though speakers in both cases told the truth (which one would expect to be rated positively), in self-serving contexts they also committed a minor misdeed, and in prosocial contexts they said something unkind. Although I was careful to emphasize to children that I was asking about the *statements* speakers made, it is possible that children’s knowledge of the speakers’ minor transgressions in the self-serving stories influenced their moral judgments to some extent. Similarly, many participants in this study exclaimed during the prosocial stories that the speakers *should have* liked the object in question, suggesting that it is perhaps also minor transgression to dislike something at all, regardless of whether a lie or the truth is told! Thus, it is likely that children’s moral judgments and punishments in both contexts were somewhat coloured by the actions/opinions of the speakers in addition to the statements they made: though it is morally good to tell the truth, it is morally bad to commit a misdeed or to say something unkind, and both of these acts deserves a little punishment.

The value of including stories in which speakers told truths is that it allows us to interpret their moral judgments and punishments of lie stories with confidence. First,

within contexts, because speakers had committed similar misdeeds (self-serving context) or had similar dislikes (prosocial context) whether they told lies or truths, the differential treatment of lie-tellers and truth-tellers must have resulted from the statements they made. Second, between contexts, because children treated speakers that told self-serving and prosocial truths similarly, we can see that their differentiation between the two types of lies does not simply result from differential moral judgments of the speakers' actions, but instead has to do with the nature of statements they made. And so, children's more negative ratings and greater assignment of punishment to self-serving lies than to prosocial lies suggests that they are sensitive to the need to be both truthful (via Grice, 1980) and amicable (via Lakoff, 1973) in communication with others, depending on the context.

In the only other study to compare self-serving and prosocial contexts, Bussey reported that children rated self-serving truths positively and prosocial truths negatively (1999). The findings of the present study were not consistent with those. Since I allowed children to rate statements as being *both good and bad*, their overall moral judgments had the possibility of being neutral, though Bussey's six-point scale did not allow neutral scores (responses had to be either positive or negative), potentially accounting for the discrepancy between our findings. Another possible source of the difference is that in several of Bussey's prosocial stories, the speakers are described as thinking something was *awful* (mom's cookies and dad's new hat), whereas the speakers in the prosocial stories I used held much milder opinions and *didn't like* or *didn't want* something (e.g., a book or a backpack). Perhaps prosocial truths in Bussey's stories (e.g., 'your hat looks awful') were deemed *less good* than prosocial truths in mine (e.g., 'no, I don't like your

backpack'), driving the differences between our findings. Future research could investigate children's conceptual understanding of lies of different *magnitudes* and whether the *extremity* or *degree* of the lie also influences children's moral judgments.

In the present study, five-year-olds made greater distinctions between lies and truths than four-year-olds in terms of their moral judgments and punishments, as predicted. However, I did not anticipate that this would be because four-year-olds would make no moral distinctions between lies and truths at all. This finding is inconsistent with previous research involving four-year-olds, and again, the difference between four-year-olds in this study and Bussey's (1992; 1999) may result from differences in the scales used or the stories themselves. Other preschool samples in the literature pool across children from a wider age range (e.g., three- to five-year-olds or four- to six-year-olds), and indeed, the findings for the full sample (as in Figures 2.2 and 2.4) are not at odds with those in the literature. That being said, the present findings demonstrate that important developments are also made in children's moral reasoning about truths and lies, between four and five years (similar to the findings for identification accuracy).

Children's affective evaluations of the speakers who told self-serving and prosocial lies and truths also demonstrated their sensitivity to the context in which lies and truths were told. While children rated speakers that told self-serving lies as feeling less happy than those that told self-serving truths, as predicted, they did not rate speakers that told prosocial lies as feeling less happy than those who told truths (contrary to my predictions). Also contrary to my predictions, though the statement by age interaction approached significance, five-year-olds did not make greater distinctions between lie-tellers and truth-tellers than did four-year-olds. This finding demonstrates that four- and

five-year-olds alike were sensitive to the different emotional consequences of telling lies (or truths) in different contexts. That is, in self-serving contexts, speakers ought to feel worse if they lie to deny their misdeeds than if they confess to them. However, in prosocial contexts, speakers feel somewhat neutral no matter what they say, perhaps because making either statement involves a tradeoff between being polite and being honest.

These findings are consistent with those of Bussey (1999) who reported that children rated prosocial lie- and truth-tellers neutrally in terms of both positive and negative emotions (in contrast to their ratings of speakers in self-serving and pretend contexts). In contrast, however, Popliger and others (2011) reported that children rated prosocial truth-tellers ‘more positively’ than lie-tellers. Since these authors asked children to provide moral judgments and affective evaluations on the same scale (a six-point scale ranging from three black Xs to three gold stars), however, it is possible that children were responding on a more abstract level (i.e., ‘Does the speaker feel good or bad?’) than in the present study (i.e., ‘Does the speaker feel happy?’ and ‘Does the speaker feel sad?’) Thus, children’s ratings of goodness and badness in Popliger and others’ work (2011) may have been more akin to a moral judgment than an evaluation of feelings.

As mentioned, children’s affective evaluations of the recipients were not analyzed because several children refused to answer these questions because the story details did not indicate whether the recipients believed the speakers’ statements. These children highlighted a significant flaw in the design of that scale. Future research should examine

children's affective evaluations of the recipients by including information in the stories about whether or not the speakers' statements were believed by the recipients.

In summary, though four-year-olds' identification of lies and truths was better than chance in both contexts, their moral judgments and punishments suggest that four-year-olds do not fully appreciate the differences between them. On the other hand, in their affective evaluations, four-year-olds did demonstrate sensitivity to the emotional consequences of telling lies and truths in different contexts. Thus, though identifying a statement as a lie does not suffice understanding the moral implications of that lie, it may be enough to infer that a speaker would feel bad when telling it. In contrast to four-year-olds, five-year-olds accurately identified lies and truths more often, judged lies more negatively and assigned them more punishment than truths. Five-year-olds further considered the moral implications of the different contexts, judging self-serving lies as 'worse' and assigning them more punishment than prosocial lies, indicating their sensitivity to the different sets of rules and expectations put in place for self-serving and prosocial contexts. And again, in their affective evaluations all children demonstrated this same awareness.

Previous work has not charted developmental differences within the preschool period, either including only a subset of children in this age group (Bussey, 1992; 1999) or pooling findings across a larger age group (Popliger et al., 2011; Talwar & Lee, 2008). The differences between four- and five-year-olds' performance on these measures, as reported here, demonstrate that important developmental differences exist within the preschool period. When simple, intended lies and truths are considered, children may first become sensitive to the lexical or definitional differences between them (as

evidenced by four-year-olds' greater-than-chance identification accuracy and affective evaluations of the speakers) and then to the moral implications of these statements (shown only by five-year-olds).

The second goal of this study was to examine the role of Theory of Mind and Executive Function in children's conceptual understanding of lies and truths, since previous research has not done so. The relation between children's first-order false-belief understanding and their ability to identify statements as lies and truths (even after for controlling for variability due to age and receptive vocabulary) supports the theoretical argument that in order to identify a statement as a lie or the truth one must be able to consider the beliefs of the speaker. This finding parallels research on children's lie telling (e.g., Evans et al., 2011; Polak & Harris, 1999; Talwar & Lee, 2008), supporting the role of Theory of Mind in children's broader conception of lies and truths. Additionally, the relation between second-order false-belief understanding and children's moral judgments and punishments of lies suggests that when making moral considerations, one engages in higher-order mental state reasoning, coordinating considerations of the speaker's and recipient's mental states. More specifically, one must represent and reflect on what the speaker thinks about the recipient's beliefs (i.e., whether the recipient believes her statement), and what the recipient thinks about the speaker's beliefs and intentions (i.e., whether the recipient believes that the speaker is telling a lie or the truth).

These findings may account for four-year-olds' performance in the current study: though four-year-olds demonstrated modest accuracy in identifying lies and truths, as supported by their developing false-belief understanding, they did not differentiate

between them in terms of moral judgments and punishments, presumably due to their less-developed ability to reason about second-order false-beliefs. The role of children's second-order false-belief understanding in their moral reasoning about lies is a novel finding that has not been previously raised in the literature on children's moral judgments of lies and truths.

This finding also contributes to our understanding of the role of second-order false-belief understanding in young children's moral reasoning, more generally, and is consistent with some very recent research. Fu and colleagues (2014) have reported a similar finding for four- to seven-year-olds' reasoning about characters' intended and unintended transgressions. They found that children's moral judgments of a character who brought about a negative outcome *unintentionally* (e.g., accidentally throwing out a classmate's cupcake) related to their second-order false-belief understanding, while their moral judgments of a character who brought about a negative outcome *intentionally* did not. The same children's understanding of the characters' *intentions* was significantly related to their understanding of the characters' beliefs (i.e., that the character falsely believed he was throwing out trash).

Taken together, our findings and these indicate that different considerations are brought to bear when making conceptual and moral considerations of other people's behaviour. When classifying an individual's action (e.g., the statement made or action performed), one may only need to consider that individual's mental state. However, when considering the moral implications of that action, one may also need to consider the mental states of those affected by the act (i.e., the 'victims' of the lie or the accident, in these examples).

That being said, future research using a more comprehensive assessment of second-order false-belief understanding is warranted to replicate these findings, since only one measure of this ability was included, which is a limitation of the present study. Further, other aspects of Theory of Mind understanding are also likely to play a role in children's identification, moral judgments and punishments of lies and truths, and especially across different contexts. For example, several studies that have asked children to reason from the perspective of a speaker who has the intention to deceive have found relations to a range of Theory of Mind abilities, including visual perspective taking (Bigelow & Dugas, 2008) and interpretive Theory of Mind (Hsu & Cheung, 2013). These abilities may also be important for children's conceptual and moral understanding of lies and truths, and may play different roles in self-serving and prosocial contexts. These possibilities should be investigated in future work.

Surprisingly, children's affective evaluations of the speakers did not relate to their second-order false-belief understanding as predicted – nor did they relate to their first-order false-belief understanding. A tentative explanation for this finding is that children did not *need* to take the speaker's perspective when reasoning about how she would feel after telling a lie or the truth, and instead answered this question in a more basic way – appealing to their own perspective and not the speaker's. However, several children refused to answer questions about how the recipient would feel because the stories did not indicate whether the recipient's knew that the speaker had told a lie. Though the data for the affective evaluations of the recipients were not analyzed for this reason, the children who refused to answer questions about the recipients' feelings did demonstrate that they were considering the recipient's representation of the speaker's intention to

decieve (second-order belief reasoning) and thinking about whether or not the recipients believed the speakers' statements.

The present data did not support the involvement of Executive Function in children's conceptual understanding of lies and truths. There was no relation between inhibitory control and any of the story variables, after controlling for age and receptive vocabulary, and children's performance on the working memory measures related only to their first-order false-belief understanding (as is consistent with previous research on children's false-belief understanding; e.g., Carlson et al., 2002). Although Executive Function may not be important factor in children's conceptual understanding of lies and truths, it is also possible that the high level of support given to children (e.g., the story format and picture supports, the repetition of comprehension questions, and the simple response scales) greatly reduced the executive demands of the tasks.

The design of the present study was largely modeled on previous research (e.g., Bussey, 1999), though some significant modifications were made to the dependent measures in terms of the questions asked and the response scales used to better suit younger participants. The similarity between these findings for five-year-olds and the findings for preschoolers in the literature support the utility of the scales used here, to some degree. Moreover, the converging findings for moral judgments and punishment and the consistent significant correlations among children's identification scores, moral judgments and punishments, and affective evaluations provide more evidence that these measures are indeed reflective of children's reasoning. That being said, replication of these findings would provide additional support for the validity of the questions and scales used.

Conclusion of Study One

The findings presented here make two important contributions to our knowledge about preschoolers' conceptual and moral understanding of lies and truths. First, I have shown that significant developmental changes take place during the preschool period. Though four-year-olds' identification of lies and truths is developing, they do not appear to understand the moral implications of such statements. Five-year-olds are not only better able to identify statements as lies or truths, but they differentiate between them, and between different kinds of lies, in their moral judgments and punishments. Finally, both four- and five-year-old children showed some sensitivity to the emotional consequences of lies and truths in different contexts.

Second, I have also shown that different aspects of belief understanding are involved when making conceptual and moral considerations of lies and truths. Specifically, the ability to identify a statement as a lie or the truth requires first-order false-belief understanding, whereas making moral considerations of lies relies on second-order false-belief understanding. This is the first study to empirically investigate the role of Theory of Mind in children's conceptual understanding of lies and truths at all, and the first to suggest that different aspects of children's reasoning about lies may rely on two different kinds of belief understanding.

Chapter 3: Examining the Role of Theory of Mind and Executive Function in Preschoolers' Lie Telling

The vast majority of the work on children's lie telling examines their ability to tell self-serving or prosocial lies. Most of these studies focus on children's telling of self-serving lies, examining developmental differences across the preschool and early school years, and the role of children's conceptual understanding of lies, Theory of Mind and Executive Function in their telling of self-serving lies. Fewer studies focus on the development of prosocial lie telling in children, and only two studies have examined children's conceptual understanding of lies in relation to their telling of prosocial lies. The roles of Theory of Mind and Executive Function have not been examined with respect to prosocial lie telling.

In parallel with the literature on children's conceptual understanding of lies, all of the work on children's lie telling has examined it within one context or the other, and tends to focus on lie telling across wide age ranges, and so, less is known about the skills that contribute to lie telling in preschoolers. Only one study to date has directly compared children's lie telling in self-serving and prosocial contexts within the same group of children (Li, Kelley, Evans & Lee, 2011). The primary goals of Study Two were to address these gaps in the literature. The secondary goal of this study was to replicate and extend the findings of Study One in a novel sample of children and in relation to some additional Theory of Mind measures.

This chapter begins with a review of the extant research on preschoolers' and young children's self-serving lie telling, and the work that has been done examining the roles of children's conceptual understanding of lies, Theory of Mind and Executive

Function in this ability. Next, the research on preschoolers' and young children's prosocial lie telling is reviewed, and the hypotheses, methods and findings of Study Two are presented. This chapter concludes with a discussion of the findings and limitations of Study Two, and ideas for future research.

Children's Telling of Self-Serving Lies

The first empirical work to systematically study children's lie telling was conducted by Lewis and colleagues (1989). These authors developed the temptation resistance paradigm, which is now the standard method for investigating lying in young children. Thirty-three young three-year-olds (33- to 37-month-olds) were seated with their backs to a table and were told that the experimenter would place a surprise toy on the table, but that they were not to look at it until the experimenter returned, at which point they would be able to play with it. The vast majority of children (88%) peeked at the toy in the experimenter's absence. When the experimenter returned, children were asked if they peeked while the experimenter was gone: 38% of children who peeked confessed to having done so, 38% falsely denied peeking (i.e., told a self-serving lie), and 24% of children gave no response. Boys were more likely to confess than girls, who were more likely to lie or to give no response at all.

This study was the first to provide empirical evidence that young children will deny their misdeeds after a transgression (Lewis et al., 1989), and the temptation resistance paradigm is now the dominant methodology for studying self-serving lie telling in children. However, this study did not demonstrate that children's denials were indeed *lies* in the full sense of the term. That is, children may have denied peeking as a rudimentary strategy to avoid getting in trouble, without the specific intention to create a

false belief in the mind of the experimenter. It is also possible that children may have forgotten that they peeked or that they may not have considered their own peeking behaviour (turning their head and seeing the toy) to have been *intentional peeking* when they were questioned by the experimenter – especially given how difficult it is for three-year-olds to inhibit strongly motivated responses (e.g., Kochanska, Murray, Jaques, Koenig & Vandegest, 1996).

In order to examine whether preschoolers' denials were in fact lies, in the full sense of the term (i.e., intended to create a false belief in their recipients), Polak and Harris (1999) investigated children's ability to tell self-serving lies using two modified temptation resistance paradigms and investigated children's denials in relation to their false-belief understanding. In their first experiment, an experimenter placed a toy guitar in front of three- and five-year-old children and told them that he had to leave the room for a few minutes and gave them one of two sets of instructions: children in the *permission* condition, were told that they could touch the toy in the experimenter's absence whereas children in the *prohibition* condition were asked not to touch the toy while the experimenter was gone. When the experimenter returned, he asked all children whether they had touched the guitar in his absence.

The researchers sought to investigate whether children's denials were indeed *intentional denials* by comparing the proportion of denials in the two conditions. They argued that if it was the case that children simply forgot they had touched the guitar, or that they denied touching the guitar since their behaviour was unintentional (as in a failure of inhibition), similar proportions of children would deny touching the toy in the permission and prohibition conditions (Polak & Harris, 1999). Children also completed

measures of false-belief understanding, including a change of location and unexpected contents.

In the permission condition, 100% of children touched the guitar and all children admitted to having done so when questioned by the experimenter. In contrast, in the prohibition condition, 54% of children touched the guitar and 82% of these children falsely denied having done so (18% confessed). All of the children who refrained from touching the guitar in the experimenter's absence truthfully denied having done so. Based on the proportions of children who falsely denied touching the toy in the two conditions, children's false denials did not appear to result from a failure to remember their own behaviour, or to consider it unintentional – if this were the case, at least some children in the permission condition would have denied their actions as well.

However, in terms of their false-belief understanding, children with high false-belief understanding were no more likely to make false denials than those with low false-belief understanding, nor were five-year-olds more likely than three-year-olds to do so. Thus, although children's false denials did not appear to result from poor memory or misinterpretation of the experimenter's question, neither did this study find support for the role of children's false-belief understanding in their tendency to make such denials. Although this finding does not *refute* the possibility that young children's denials are indeed 'intentional lies,' it does not support it.

In their second experiment, Polak and Harris (1999) made an important modification to the temptation resistance paradigm in order to examine whether children's false denials were indeed intentional and strategic. Children additionally completed measures of false-belief understanding, as in their first study. Three- and five-

year-old children were introduced to a guessing game in which the experimenter had hidden toy animals inside of a toy house, and children were to guess the animals' identities based on the noise the animals made (e.g., 'woof woof' when a dog was hidden). In the first three trials, the experimenter made animal noises that corresponded to the animal's identity, and after children correctly guessed the animal they were allowed to look inside the house to see if they were correct. On the critical trial, however, the animal noise that the experimenter made ('quack quack') did not correspond to the animal hidden inside the house (a pig).

After making the noise, but before children were asked to guess the animal's identity, the experimenter explained that she had to leave the room for a few minutes. Children in the *permission* condition ($n = 20$) were told that they could look in the house while she was away, and children in the *prohibition* condition ($n = 60$) were asked not to look inside the house in the experimenter's absence. Upon her return, the experimenter asked children the standard 'peek' question ("Did you look inside the house while I was gone?") and also asked children about the animal's identity ("So what animal do you think is inside the house?"). The goal of this question was to provide children with the opportunity to *intentionally* and *strategically* tell a lie to the experimenter: if children guessed that a duck was inside the house (which would be expected from the sound the animal made), even after seeing that the animal was a pig, they would be telling a strategic lie, and taking into account the experimenter's mental state in doing so. After the questions were asked, all children were then prompted to look inside the house and then completed the change of location and unexpected contents false-belief measures.

As in their first study, 100% of children in the permission condition looked inside the house in the experimenter's absence and all of them admitted to having done so in response to the peek question. In response to the question about the animal's identity, all but one of these children (95%) correctly identified a pig as being inside the house (the other identified a duck). In contrast to their first experiment, however, the vast majority of children in the prohibition condition peeked inside the house (95%; 57 of 60 children) in the experimenter's absence, suggesting that most children will peek when they are motivated to do so (e.g., to confirm their guess). As in their first study, the majority of peekers denied having done so (84%). In response to the question about the animal's identity, 65% of the children who falsely denied peeking incriminated themselves by 'guessing' that there was a pig inside the house, but 35% (17 children) 'feigned ignorance' by either 'guessing' that there was a duck inside the house (11 children), 'guessing' another animal (2 children), or stating that they 'didn't know' what was in the house (4 children).

Again, the proportion of children who denied peeking in the prohibition condition as compared to the permission condition demonstrated that children's false denials were intentional (and not the result of forgetting or misinterpreting the question). Further, at least some children feigned ignorance to the questions about the animal's identity, suggesting that they were sensitive to what they *ought* to guess, if they had not peeked. Additionally, and in contrast to their first experiment, children with higher false-belief understanding were more likely to deny having peeked, though there was no relation between children's false-belief understanding and their likelihood to feign ignorance to the questions about the animal's identity. The authors suggested that while children's

initial denials may relate to their first-order false-belief understanding, as demonstrated, their ability to feign ignorance may be more indicative of their second-order false-belief understanding, though this ability was not measured. That is, in order to feign ignorance in this task, a child needs to consider what the experimenter would think that the child would think was in the house, had he or she not looked inside. Taken together, the disproportionate number of children who denied peeking in the prohibition condition as compared to the permission condition, the relation between children's false-belief understanding and their tendency to deny peeking, and the tendency for some children to feign ignorance about the toy's true identity are all suggestive that children's false denials (or at least those of some children) are intentional self-serving lies, in the full sense of the term.

Together these studies demonstrated that preschoolers will spontaneously deny a minor transgression, as in the temptation resistance paradigm (Lewis et al., 1989; Polak & Harris, 1999), and that their denials appear to be 'lies' in the full sense of the term (Polak & Harris, 1999). Many other studies have supported these findings and have shown that children's tendency to tell self-serving lies following a minor transgression begins very early in the preschool period (as young as two years of age; Evans & Lee, 2013) and increases throughout the preschool years (e.g., Evans et al., 2011; Talwar & Lee, 2002a; Talwar et al., 2002, Study 1) and into childhood (Talwar & Lee, 2002a). Further, children become more sophisticated lie-tellers with age as their likelihood to feign ignorance to follow-up questioning increases (e.g., Evans et al., 2011; Talwar & Lee, 2002a; Talwar, Gordon & Lee, 2007; Talwar & Lee, 2008). Consistent with Polak and Harris' (1999) findings, several other studies have supported the relation between

preschoolers' false-belief understanding and their ability to produce self-serving lies for story characters (e.g., Bigelow & Dugas, 2008; Hsu & Cheung, 2013; Sodian, Taylor, Harris & Perner, 1991) and for themselves (e.g., Evans et al., 2011; Talwar & Lee, 2008). Beyond false-belief understanding, other social-cognitive and cognitive abilities have also been implicated in children's self-serving lie telling.

In the most comprehensive study of children's ability to tell self-serving lies to date, Talwar and Lee (2008) examined three- to eight-year-olds' ability to tell self-serving lies in relation to a number of social-cognitive and cognitive skills hypothesized to be important for lie telling, including: first-order false-belief understanding, second-order false-belief understanding, inhibitory control, working memory, and children's conceptual understanding of lies. In the lying task, children were seated with their backs to the experimenter and played a guessing game (as in Polak & Harris, 1999) using familiar toys that are associated with highly recognizable voices and sounds (e.g., the characters *Buzz Lightyear* and *Elmo*) to indicate their identities. After two correct trials, the experimenter placed a third toy on the table (Barney, the then-popular purple dinosaur) and played a sound byte that was *not* associated with Barney (the song from a musical greeting card). Children were instructed not to turn around and peek at the toy while the experimenter left the room for one minute.

When the experimenter returned, children were asked to promise to tell the truth before they were questioned about peeking or the toy's identity. Having children promise to tell the truth has been shown to reduce the number of children that lie in this paradigm (e.g., Evans & Lee, 2010; Talwar & Lee, 2002a) and the authors hoped this would produce more variability in lie telling and thereby a greater chance at statistically

capturing individual differences between children who lied and those who confessed. Children were then asked the standard peek question (“When I was gone did you peek at the toy?”) and a follow-up ‘maintenance’ question (“Who do you think the toy is?”). Children who correctly identified the toy as Barney were asked an additional maintenance question (“How did you know who the toy was?”).

Children also completed a battery of measures of inhibitory control, working memory, first- and second-order false-belief understanding and nine stories in which characters made various ‘false’ or true statements to measure their conceptual understanding of lies. Children were asked to identify the statements as truths or lies and to provide moral judgments of the speakers who made them, ranging from very, very bad to very, very good. However, it is important to note that the majority of these stories were not just simple, intended lies and truths, but were other kinds of false statements, including an exaggeration, an honest mistake, a trick, and a broken promise. The heterogeneity among the kinds of statements presented is somewhat problematic, as children’s ability to distinguish between lies and other kinds of false statements develops later (around age seven or eight; e.g., Peterson et al., 1983; Piaget, 1932/1965) than their ability to distinguish between simple lies and truths, as discussed in Chapter Two. Thus, the findings from this study do not speak directly to how children’s conceptual understanding of the differences between lies and *truths* relates to their telling of self-serving lies.

The authors predicted that older children would be more likely than younger children to lie after peeking at the toy, and that this lie would also be associated with higher first-order false-belief understanding and lower conceptual understanding of lies

and truths (on the story-based tasks). The authors also predicted that older children would be more likely than younger children to conceal their initial transgression in response to the follow-up questions, and that this ability would relate to their second-order false-belief understanding (as put forth by Polak & Harris, 1999) and their inhibitory control and working memory.

While the experimenter was away, 82% of children peeked at the toy (within 11 seconds, on average) though there was no effect of age or gender on children's peeking behaviour. Consistent with the authors' goal in having children promise to tell the truth, only 64% of peekers denied peeking and 36% confessed. Again there was no effect of age or gender on children's telling of the initial lie. Of the children who peeked and told the initial lie, 28% feigned ignorance by incorrectly 'guessing' the identity of the toy. The remaining 72% betrayed their initial lies by correctly 'guessing' the toy's identity, however, half of them were able to provide plausible explanations for their knowledge (e.g., 'I heard the music before and knew it was Barney') while the other half implicated themselves further (e.g., 'I saw purple,'). Although the tendencies to peek, lie, and feign ignorance were not related to age, older children (six- to eight-year-olds) were significantly more likely to provide plausible explanations for their knowledge than were preschoolers (three- to five-year-olds).

In order to compare children on the cognitive and social-cognitive measures based on their answers to the initial lie question (the peek question), they were classified as: non-peekers, confessors, and lie-tellers, and ANOVAs were conducted on each of the cognitive and social-cognitive measures. Lie-tellers and non-peekers outperformed confessors on one of the measures of inhibitory control, indicating that both children who

refrained from *peeking* and children who refrained from *confessing* were better able to inhibit themselves (i.e., to override or avoid peeking, or to override telling the truth) than children who confessed to peeking. Lie-tellers also outperformed both confessors and non-peekers on measures of false-belief understanding, as predicted, indicating that children who told lies outperformed those who did not (and those who did not peek) in their understanding of beliefs. However, contrary to predictions, these children did not differ from one another in terms of their identification accuracy of characters' statements in the eight stories. Again though, the stories used were largely modeled on those used by Peterson et al., (1983) and involved more complex distinctions than between simple, intended lies and truths.

To analyze children's moral judgment scores from the stories, a factor analysis was performed on these scores that grouped them into three factors (perhaps due to the heterogeneity in the content of the stories themselves): *factuality* stories, which involved a trick, a white lie, and a self-serving lie (these stories were most akin to simple, intended lies and truths); *promise* stories, which involved a kept promise and a broken promise; and *motivation* stories, which involved exaggerations, mistakes, lying for a friend, and an inadvertent lie.

In their moral judgments, confessors morally judged speakers who told the truth in *factuality* stories more positively than did lie-tellers and non-peekers, suggesting that children who had a better understanding of the moral implications of lies and truths were less likely to lie. Further, non-peekers morally judged speakers who broke promises more harshly than did confessors and lie-tellers, suggesting that children with a better understanding of the moral implications of breaking promises were less likely to peek in

the first place. Surprisingly, confessors (who kept their own promises to tell the truth) did not differ from lie-tellers in their moral judgments of speakers who broke promises. The three groups of children did not differ in terms of their moral judgments for the *motivation* stories, though given the kinds of statements included in the motivation factor (exaggerations, mistakes and lies for others), it would be difficult to predict a meaningful pattern of responses from the three groups of children. However, the heterogeneity of the story content, the nature of the statements themselves, and the ensuing factor analysis suggest that these findings be taken with heed.

Their final set of analyses tested whether the cognitive and social-cognitive measures were independently predictive of children's tendency to peek, to lie, to feign ignorance (about the toy's identity), and to give plausible explanations for their knowledge (for children who did not feign ignorance). Largely, these analyses supported the findings from the comparison of the different groups of children. Tendency to peek was not independently predicted by any of the measures. Tendency to lie was independently predicted by both inhibitory control and first-order false-belief scores, such that children who lied had higher scores on both measures than those who confessed. Tendency to feign ignorance was independently predicted only by inhibitory control, such that children who feigned ignorance had higher inhibitory control scores than those who implicated themselves, again suggesting that inhibitory control allows children to override the tendency to blurt out the truth, and instead feign ignorance about the toy's identity. Finally, tendency to give plausible explanations for their knowledge was predicted by second-order false-belief understanding.

These findings again supported the argument that while first-order false-belief understanding contributes to children's ability to produce lies, second-order false-belief understanding contributes to children's ability to maintain such lies, as suggested by Polak and Harris (1999). These results also suggested that inhibitory control supported children's ability to lie and feign ignorance, which is consistent with findings from studies of children's non-verbal deception (Carlson, Moses, & Hix, 1998; Hala & Russell, 2001) and other studies on self-serving lie telling with younger (Evans & Lee, 2013) and older (Evans & Lee, 2011) children.

Talwar and Lee's (2008) findings made several important contributions to our understanding of children's ability to tell self-serving lies, clarifying the role of children's first- and second-order false-belief understanding, and presenting evidence for the role of inhibitory control in children's ability to tell and maintain lies. These findings are consistent with earlier work by Polak and Harris (1999) in terms of the role of false-belief understanding in children's self-serving lie telling and work by Talwar and colleagues (2007b) on the role of second-order false-belief understanding in children's maintenance of self-serving lies. These findings are also consistent with research conducted with younger children (Evans & Lee, 2013) and older children (Evans & Lee, 2011) on the role of inhibitory control in self-serving lie telling.

Although the measures used to assess children's conceptual understanding of lies were somewhat problematic, they offered some support for a relation between children's moral judgments of lies (and other falsehoods) and their actual lie-telling behaviour. In the only other studies to investigate the relation between children's conceptual understanding of lies and their own self-serving lie telling behaviour, Talwar and others

(2002) reported mixed results. In three experiments, three- to seven-year-olds completed measures of their own conceptual understanding of lies (two story-based tasks) and the temptation resistance paradigm. In the second of three studies, children's identification of a story character's lie was related to their own lie telling behaviour, wherein children who told self-serving lies (after promising to tell the truth) were more likely to correctly identify a story character's statement as a lie (Talwar et al., 2002, Study 2). However, in experiments one and three of the same paper, no such relation was found, though children in these two experiments had not promised to tell the truth. Interestingly, in all three experiments, although most children reported that the story character *should* tell the truth and that they themselves *would* tell the truth in a hypothetical scenario, the majority of these children went on to lie in the temptation resistance paradigm.

Thus, although there is some support for the hypothesis that children's conceptual understanding of lies may relate to their own lie telling behaviour, the evidence is mixed. Further, the stories included in these two studies differed significantly. While Talwar and Lee (2008) used eight stories involving various kinds of statements, Talwar and colleagues (2002) used only two stories, one about a story character and one hypothetical story about the children themselves. These stories were modeled on those used in actual court competence exams, and the questions were embedded in the stories themselves (e.g., after the character ate a prohibited candy, children were asked what she should tell her teacher about the candy, and then the story continued and the character told a lie). Therefore, it is difficult to draw conclusions about the findings of these two studies and more work is needed to clarify the role of children's conceptual understanding of lies in their actual lie-telling behaviour.

Following Talwar and Lee (2008), Evans and colleagues (2011) utilized the temptation resistance paradigm to elicit self-serving lies in two experiments conducted with preschoolers in China. These authors added a further constraint to the paradigm, making it an even more stringent test of children's lie telling, by setting up a situation in which there was evidence that children had peeked. The guessing game they played involved small toys hidden under overturned cups for which the experimenter provided clues to help children guess the toys' identities. On the critical trial, the experimenter told children that they would get a prize if they guessed the toy correctly, and children were left alone with an overturned cup that was secretly filled with candies. When children peeked under the cup, the candies spilled out onto the table, and were evident to the experimenter upon his return. Children were asked if they had peeked, and if they denied peeking, they were asked how the candies had spilled out from under the cup. Thus, children's lies were told in the face of evidence – requiring a greater commitment to lie, and more savvy verbal explanations in order to maintain their lies. These verbal explanations were classified as implausible (e.g., 'the candies came out themselves'), logical but unlikely (e.g., 'other children came in and knocked over the cup...') or sophisticated (e.g., 'my elbow knocked the cup accidentally').

In their first experiment, in order to investigate the degree to which preschoolers could tell strategic lies following a minor transgression, 247 three- to five-year-olds participated in the paradigm. Though this paradigm required children to lift a cup in order to peek, rather than simply glance at a toy behind them as in earlier work (e.g., Lewis et al., 1989; Talwar et al., 2002; Talwar & Lee, 2008), 58% of children peeked under the cup when the experimenter left the room, and peeking increased with age: 49%

of three-year-olds, 53% of four-year-olds and 70% of five-year-olds did so. Of the 142 children who peeked, 75% of children denied having done so and only 25% confessed – despite the candies having been visible to the experimenter upon his return! Telling this initial lie also increased with age: 56% of three-year-olds, 76% of four-year-olds, and 87% of five-year-olds who had peeked went on to deny it. Of the 106 children who denied peeking, 21 children made some attempt to hide the candies (by piling them in the corner, hiding them in their pockets, or eating them!) and the remaining 85 children were asked how the candies had ended up on the table.

Age was a significant factor in predicting the sophistication of children's explanations for the candy on the table, wherein older children tended to tell more sophisticated lies than younger children. Though the difference between three-year-olds' and four-year-olds' explanations did not reach significance overall, the sophistication of children's lies were reported by age group: three-year-olds tended to give implausible explanations for the candies on the table, four-year-olds tended to give either implausible or logical explanations, and five-year-olds tended to give sophisticated explanations. Thus, the findings of their first experiment not only supported that preschoolers will tell self-serving lies, and that they will do so even in the face of evidence, but that children as young as four or five can maintain those lies with some sophistication.

In their second experiment, with 250 four-year-olds using the same paradigm, children's initial lies and verbal explanations for the spilled candy were examined in relation to their verbal ability, first-order false-belief understanding and a battery of Executive Function measures. Consistent with their first experiment, 59% of children peeked under the cup in the experimenter's absence, and peeking was not predicted by

any of the cognitive or social-cognitive skills measured, as was the case in Talwar and Lee (2008). Of the 144 children who peeked under the cup, 69% told the initial lie to deny peeking and this tendency increased with age. However, in contrast to Talwar and Lee (2008) who found a relation between children's initial lies and both their first-order false-belief understanding and inhibitory control, children's initial lies were not related to any of the cognitive or social-cognitive measures included (Evans et al., 2011). Because the candy remained on the table when children were asked the peek question, however, the authors argued that Theory of Mind and Executive Function requirements of the initial lie may have been reduced.

Finally, of the 100 children who told the initial lie, 93 children were asked how the candy was spilled on the table (seven children removed the evidence and hence were not asked): 41% gave implausible explanations, 38% gave logical explanations, and 21% told sophisticated lies. The sophistication of children's verbal explanations was independently predicted by their Executive Function and first-order false-belief understanding. Specifically, children who gave sophisticated explanations had higher false-belief understanding and inhibitory control scores than children who gave implausible or logical explanations (Evans et al., 2011).

Although this study also found support for the roles of false-belief understanding and inhibitory control in children's self-serving lie telling, consistent with Talwar and Lee (2008), the findings are somewhat inconsistent in terms of the precise role of false-belief understanding and inhibitory control in children's lie-telling abilities. While Talwar and Lee (2008) found that first-order false-belief understanding and inhibitory control were related to children's initial lies (answers to the peek question), Evans and

others (2011) found no such relations. Instead, they found these skills to relate to children's verbal explanations – a measure much more akin to Talwar and Lee's (2008) maintenance questions, which related only to children's second-order false-belief understanding, which Evans and others did not measure, given their younger participants (2011). However, the variations in the paradigms themselves, the participants' ages and culture, or the measures included may account for some of the differences in the relations reported in these studies. Regardless, subsequent work is need to clarify the role of these skills in children's self-serving lie telling.

Children's Telling of Prosocial Lies

In comparison to the work on children's self-serving lie telling, research on children's prosocial lie telling is scarce: only a handful of studies have investigated children's ability to tell prosocial lies, and only two of these considered the role of children's conceptual understanding of lies in this ability. Research on the roles of Theory of Mind and Executive Function has not been reported in relation to prosocial lie telling, at all.

The first empirical study of prosocial lie telling examined whether 3- to 7-year-olds would tell a prosocial lie to spare an experimenter's feelings, and whether children's facial expressions and body language revealed to others that they were telling a prosocial lie (Talwar & Lee, 2002b). To elicit prosocial lie telling, the authors designed a reverse-rouge task, in which children were asked to take a Polaroid picture of a confederate, who had a conspicuous mark of lipstick on his nose. Before taking the picture, the confederate asked children if he 'looked okay' to have his picture taken. The confederate then left before his picture had developed, and a familiar experimenter (who had already

been playing with children) asked them if the confederate had *really* looked okay for the picture. Children were coded as telling a prosocial lie if they told the confederate that he looked okay for the picture, but told the familiar experimenter that the confederate had not looked okay, referring to the mark on his nose. Children who told the prosocial lie were also asked why they hadn't told the confederate that he did not look okay. Children in a control condition participated in the identical procedure, only the confederate had no mark on his nose (and presumably 'looked okay' for the picture).

To examine whether children's nonverbal behaviour revealed that they were lying, naïve undergraduate students then watched videos of children's answers to the 'look okay' question, and were asked to determine which children had told lies. A group of control children's answers were also included, such that a balanced number of truths and lies were presented. A second group of graduate students was trained to code the same video clips for specific facial expressions associated with lying (e.g., smiles, blank stares, averted eye contact) to examine whether there were differences in the expressive behaviour of children who told lies and those who told truths (Talwar & Lee, 2002b).

The vast majority of children, 89%, told prosocial lies, telling the confederate that he looked okay for the picture, but telling the familiar experimenter that the confederate had not, in fact, looked okay. The remaining children told the confederate that he did not look okay (7 children) or told both the confederate and the experimenter that the confederate looked okay (3 children). All but one child in the control condition told the confederate that he looked okay (this child cited the confederate's hair colour). There were no effects of age in children's prosocial lie telling. Children's explanations of their lies were largely uninformative: 51% either said they forgot to tell the confederate, or

gave no explanation (e.g. 'I don't know'); 17% suggested that the mark may have been permanent; 11% cited that they did not want to embarrass the confederate; and the remaining appealed to 'other' reasons, including getting in trouble, wanting to take the picture anyway, and the confederate having a cut or a nose-ring. Naïve undergraduates could not differentiate between children's true and dishonest responses based on their facial expressions, and even the trained coders found few differences in expressive behaviour between lie-tellers and truth-tellers: lie-tellers looked more serious/concerned; smiled less; and looked less confident/relaxed than truth-tellers (Talwar & Lee, 2002b).

Although this study demonstrated that preschool and early-school-aged children are capable of telling prosocial lies, it did not shed light on children's motives for making such statements. The majority of children gave explanations that did not suggest *any* motive for their lies, and only 28% of children gave reasons that can be interpreted as prosocial (e.g., to avoid embarrassment or because the mark may have been permanent), but even these reasons were somewhat ambiguous (Talwar & Lee, 2002b). Since children were not personally invested in the outcome of the paradigm (i.e., whether or not the confederate looked okay for his picture), they may even have told such lies for somewhat unsociable reasons (i.e., finding it amusing that the confederate had a mark on his nose and would take a silly picture).

Talwar and colleagues (2007a) simulated a more familiar situation to elicit prosocial lies that increased children's investment in the outcome of the situation (and the cost of telling the truth), as when children receive disappointing gifts. In their study with 323 three- to 11-year-olds, children took part in one of five conditions in which either the children or their parents received a gift from the experimenter after playing a game. In

two of these conditions parents coached their children to tell a prosocial lie to the experimenter, and in the remaining conditions children were not coached.

In all conditions, the experimenter explained that children (or their parents) would play a game with the experimenter, and that if they won, they would receive a gift. A basket of very appealing unwrapped toys was placed next to children (e.g., slinkies and other colourful toys), so that they would anticipate receiving one of these. When the game was complete (all children/parents won), the experimenter presented children/parents with a wrapped gift, and left the room while it was opened. Children's reactions to the gift were recorded while the experimenter was out of the room. In disappointing gift conditions, the gift was a plain, white bar of soap and in the desirable gift control conditions the gift was a colourful slinky. Upon the experimenter's return, children were asked if they themselves, or their parents, liked the gift, to elicit a prosocial lie. Children's facial expressions were also coded to examine their expressive behaviour in relation to their lie telling, though these results will not be discussed in detail.

In the *child disappointing gift – no coaching* condition, children played the game alone with the experimenter, and were alone when the experimenter returned and asked "Do you like your gift?" After asking this question, the experimenter left the room and children's parents entered and asked children if they truly liked their gifts. Children were coded as telling a prosocial lie if they told the experimenter that they liked the gift but told their parent that they did not. In the *child disappointing gift – coaching* condition, a parent was present while the game was played and when the gift was opened. Parents had been asked to find out if their children liked the gift, and if not, to coach their children to lie and tell the experimenter that they liked it. When the experimenter

returned, she asked the parent to leave the room to fill out a form, and the experimenter asked children if they liked their gift. In the *parent disappointing gift – coaching* condition, the procedure was the same, only the parent played the game, won the gift, and opened it in front of their child. Parents were asked to express their disappointment with the gift to their children and to coach children to lie to the experimenter to say that they had liked the gift. When the experimenter returned, she asked the parent to leave the room to fill out a form, and the experimenter asked children if their parents liked their gift. The *child desirable gift – control* condition was identical to the *child disappointing gift – no coaching* condition, only children were given a desirable gift (a slinky). And finally, the *parent desirable gift – control* condition was identical to the parent undesirable gift condition, only parents won a desirable gift (a slinky), expressed pleasure with it, and did not coach children to respond to the experimenter in any way.

In both control conditions (child and parent receiving the slinky) all children told both the experimenter and their parent that they liked the gift. In comparison, 68% of children in the *child disappointing gift – no coaching condition*, and 87% in both the *child disappointing gift - coaching* and *parent disappointing gift – coaching* conditions told prosocial lies, telling the experimenter that they/their parent liked the soap, even though they/their parent did not. Both condition and age were significant factors in children's prosocial lie telling. Significantly more children lied in the *coaching* and *parent* conditions than in the *child – no coaching* condition, demonstrating that when parents encouraged children to lie (and when the disappointing prize wasn't their own), they were more likely to do so than spontaneously, as in the *child – no coaching* condition. While 72% of three- to five-year-olds told a prosocial lie, 80% of six- to

eight-year-olds and 84% of nine- to 11-year-olds did so. Though children were not asked a ‘maintenance’ or follow-up question (as in the self-serving lie-telling paradigms), 36% of children spontaneously elaborated on their lies, saying things like “We collect soap!” and this tendency increased with age as well. Using a specialized scale for detecting and coding facial expressions, small but significant differences were observed between lie-tellers’ and truth-tellers’ facial expressions when lying, but children were not identifiable as lie-tellers or truth-tellers on this basis (Talwar et al., 2007a).

Both of these studies demonstrated that preschoolers and young children will spontaneously tell prosocial lies in slightly different contexts: when an individual has a potentially embarrassing mark on his face, and when receiving a disappointing gift. Though age was not a factor in children’s lie telling in Talwar and Lee’s (2002b) study with three- to seven-year-olds, children’s prosocial lie telling did increase with age in Talwar and colleagues’ (2007a) work, perhaps simply as a result of the wider age range studied, or perhaps due to differences in the paradigms. However, neither study investigated children’s prosocial lie telling in relation to other skills, such as their conceptual understanding of lies, Theory of Mind or Executive Function. Indeed, only two studies have examined any of the skills that support children’s prosocial lie telling (Popliger et al., 2011; Xu et al., 2010), and only one of these studies included preschoolers in their sample (Popliger et al., 2011).

In two studies, Popliger and colleagues (2011) examined children’s prosocial lie telling in two conditions with different levels of motivation for telling prosocial lies. In their paradigm, children played a game with the first experimenter (E1) and all children won an attractive gift (a colourful slinky or silly putty). E1 left the room while children

opened the gift and then returned and asked them if they liked their gift and what they would do with it. Next, all children played another game with the second experimenter (E2) and were told that they could earn another gift – this time, a ‘special’ gift that E2 really liked. Children were then assigned to one of two conditions (between-subjects). In the *high-cost* condition, E2 explained that children could keep only one gift and that if they wanted to keep the second gift, they would have to trade the slinky/silly putty for it. In the *low-cost* condition, children were told that they could keep both gifts. E2 then gave children the second wrapped gift (a disappointing pair of grey, hand-knit socks or a plain, white bar of soap) and children were left alone to open it. When E2 returned, she asked all children the initial lie question (if they liked the socks/soap), and two maintenance questions (what they liked about the socks/soap and what they would do with them). After asking these questions, E2 left the room and E1 returned. When E1 returned she ‘noticed’ the socks/soap and asked children if they liked the gift or if they would rather have another gift.

Children were coded as having told a prosocial lie if they told E2 that they liked the socks/soap, but told E1 that they did not and chose a different gift instead. The authors predicted that children in the *low-cost* condition would be more likely to tell a prosocial lie, since telling this lie would not jeopardize their slinky, whereas children in the *high-cost* condition would have to trade the attractive gift for the disappointing one if they told the prosocial lie. The authors also suggested that if children in the *high-cost* condition told prosocial lies, they were likely doing so for truly prosocial reasons, since telling a lie in this case came at a cost to themselves (losing the attractive prize).

In their first experiment with seven- and nine-year-olds, 83% of children told a prosocial lie overall, and this was more frequent in the *low-cost* condition (94%) as compared to the *high-cost* condition (72%). All children who told E2 that they liked the socks/soap told E1 that they did not and chose another prize. There was no effect of age on children's likelihood to tell the initial prosocial lie. However, both age and gender were significant predictors of children's ability to maintain their lies: nine-year-olds (79%) were more likely to do so than seven-year-olds (56%), and girls (83%) were more likely to do so than boys (52%).

In their second experiment, four- to six-year-olds, seven- to nine-year-olds, and ten- to twelve-year-olds participated in either the *high-cost* or the *low-cost* paradigm. Children also completed story measures of their conceptual understanding of prosocial lies, wherein characters told either lies or truths in prosocial situations and children were asked to identify their statements as lies or truths, to morally judge them, and to provide affective evaluations of both the speakers and recipients (as reviewed in Chapter 2). Children's parents also completed two self-report questionnaires to examine the role of family socialization factors on children's prosocial lying behaviour. The parenting style questionnaire measured the degree to which parents were *authoritative* (e.g., 'explains consequences of child's behaviour'), *authoritarian* (e.g., 'uses physical punishment as a way of disciplining child') and *permissive* (e.g., 'states punishments to child and does not actually do them'). The family expressiveness scale measured emotional expressiveness within the family, grouped into two subscales: positive expressiveness (e.g., 'praising someone for good work') and negative expressiveness (e.g., 'blaming one another for family troubles').

Children's prosocial lie telling was predicted by both condition and age, and these factors interacted in their influence on the number of children who told lies: 78% of four- to six-year-olds lied in the *low-cost* condition compared to only 20% in the *high-cost* condition; 62% of seven- to nine-year-olds lied in the *low-cost* condition, compared to 40% in the *high-cost* condition, and; 65% of ten- to twelve-year-olds lied in both conditions. As in their first study, the majority of children lied in the *low-cost* condition, whereas lying in the *high-cost* condition increased with age. If prosocial lie telling in the *high-cost* condition was more likely to be done for truly prosocial reasons, as the authors suggested, then it appears to increase throughout childhood (Popliger et al., 2011). After controlling for the age and condition effects, the parental measures were also significant, independent predictors of children's prosocial lie telling: prosocial liars had parents with higher scores on authoritative parenting, and lower scores on positive emotional expressiveness. Parental scores on the other scales did not differ between children who did or did not lie.

Though children who told lies and truths in the paradigms did not differ in their identification or moral judgment of story characters, they did differ in their evaluations of the characters' feelings. Children who themselves told the truth thought that speakers who told truths would feel better than those who told lies, though children who themselves told lies thought that all speakers would feel good, regardless of the statements they made. In terms of the recipients feelings, children who told the truth thought that the recipients who were told the truth would feel better than those who were told lies, and lie-tellers thought that recipients who were told lies would feel better than those that were told the truth. Children's maintenance of their prosocial lies during the

follow-up questioning was predicted only by age, wherein older children were better at maintaining their prosocial lies than younger children.

These studies confirm and extend earlier research on children's prosocial lie telling, again demonstrating that children will spontaneously tell prosocial lies when receiving a disappointing gift, and that as age increases, children are more likely to do so, even at a cost to themselves (as in the *high-cost* condition). As in Talwar and Lee's (2002b) study, prosocial lying in the *low-cost* condition did not increase with age in either experiment, suggesting that preschoolers are as likely as older children to tell prosocial lies when it is of little cost to themselves, but again, these lies are not necessarily told for prosocial reasons. These authors also presented the first evidence that socialization factors, such as parenting style and emotional expressiveness in the family related to children's prosocial lie telling. These may prove to be important factors in predicting children's lie telling in self-serving contexts as well.

Popliger and colleagues (2011) also provided some evidence that children's conceptual understanding of lies and truths, specifically their assessments of how the speakers and recipients would feel after lies and truths were told, related to their own lie telling behaviour. Overall, children tended to think that speakers and recipients would feel better when the statements made were consistent with their own behaviour in the disappointing gift paradigm. Though this is an interesting finding, all children completed the story-based tasks in the second session, after they had participated in the lie-telling paradigms, so it is possible that children simply responded in a way that was consistent with their earlier behaviour.

In a study examining prosocial lies with seven-, nine-, and 11-year-old children in China, Xu and colleagues (2010) presented children with an undesirable gift paradigm as well as story-based tasks to measure children's conceptual understanding of prosocial lies. Half of the children participated in the story-based tasks first, and the other half in the undesirable gift paradigm first. In the story-based tasks, children were asked to identify the characters' statements as lies or truths, to morally judge the characters for making their statements, and to provide justifications for their moral judgments. Children's justifications for their moral judgments were coded as: referring to politeness, referring to the need to be truthful, referring to both of these notions, or 'other' responses (including 'I don't know'). In the undesirable gift paradigm, children were also asked to justify their responses to the experimenter after they told a lie or the truth to the gift-giver (their classroom teacher). Their justifications were coded as: referring to prosocial reasons (politeness) or referring to self-motivated reasons (to avoid negative consequences) and children who told lies were categorized based on their justifications as either 'prosocial' or 'non-prosocial' lie-tellers.

Somewhat fewer children told lies to their teachers in the disappointing gift paradigm than reported by other researchers: 40% of seven-year-olds, 50% of nine-year-olds and 60% of 11-year-olds did so, and age was a significant factor in lie telling. It is possible that fewer children lied than reported in other work because their classroom teacher was the recipient of their lies and not an unfamiliar experimenter. Williams, Kirmayer, Simon, and Talwar (2013) reported, for example, that six- to nine-year-old children were more likely to lie to a research assistant than to their own parent in both self-serving and prosocial contexts.

When children's justifications for lying were taken into account, just over half of seven-year-old lie-tellers, half of nine-year-old lie-tellers and one quarter of 11-year-old lie-tellers reported having done so for self-motivated reasons (e.g., to avoid getting trouble) rather than prosocial reasons (e.g., politeness). That being said, children who did not specifically give justifications for their lies (e.g., those who said 'I don't know' or 'I can use the gift anyway') were counted as non-prosocial lie-tellers, and so, this is a stringent estimate. It is possible that some children may have told a lie for prosocial reasons that they were not able to articulate when asked to justify their statements.

In terms of children's conceptual understanding of prosocial lies, as measured by the story-based tasks, prosocial lie-tellers rated characters that told prosocial lies more positively than did truth-tellers or non-prosocial lie-tellers. Similarly, children who told prosocial lies rated characters who told the truth in prosocial situations more negatively than did children who told the truth or told non-prosocial lies. Surprisingly, children who referred to *both* politeness *and* truthfulness in their justifications for their moral judgments of the story characters were more likely to tell a prosocial lie themselves than were other children, including those who only cited politeness. There was no effect of the order of the paradigms (conceptual understanding or lie telling first) on children's performance on the story measures or the lying paradigms. These findings support the role of children's moral understanding of prosocial lies and truths in their own behaviour; though in contrast to the findings of Popliger and colleagues (2011) who found no such effect, it is possible that by classifying children as prosocial versus non-prosocial lie-tellers, Xu and others (2010) were better able to capture these relations. However, it is

also possible that differences in the paradigms themselves or cultural differences between the samples tested led to these different patterns.

Taken together, the research on children's prosocial lie telling has shown that children as young as three or four will tell lies in prosocial situations (Talwar & Lee, 2002b; Talwar et al., 2007a; Popliger et al., 2011). Though children's motivation for telling such lies may not always be prosocial, lying in the *high-cost* condition of Popliger and colleagues' study (2011) and the justifications provided for lies by children in Xu and others' study (2010) suggest that at least some children do tell lies for prosocial reasons, and that doing so appears to increase with age (Popliger et al., 2011; Xu et al., 2010). Further, these studies have shown some support for a relation between children's conceptual understanding of prosocial lies and their own lie-telling behaviour (Popliger et al., 2011; Xu et al., 2010), though the specific nature of this relation is somewhat unclear. Further, the roles of Theory of Mind and Executive Function have not been investigated in children's prosocial lie telling. Given the role of these abilities in children's telling of self-serving lies, these abilities are likely to play a role in children's prosocial lie telling as well.

Thus, our understanding of children's lie telling, in both self-serving and prosocial contexts is not complete. Though we know that both begin early in childhood, as early as age two for self-serving lies (Evans & Lee, 2013) and age three for prosocial lies (Talwar & Lee, 2002b; Talwar et al., 2007a), and appear to increase through childhood (Evans et al., 2011; Talwar & Lee, 2002a; Talwar et al., 2002, Study 1; Talwar et al., 2007a; Popliger et al., 2011, Study 2; Xu et al., 2010), though others have not found age-related increases (Talwar et al., 2007b; Talwar et al., 2002, Studies 2 & 3;

Polak & Harris, 1999; Popliger et al., 2011; Talwar & Lee, 2002b; Talwar & Lee, 2008), less is known about the development of these behaviours *within* the preschool period.

Similarly, the role of children's conceptual understanding of lies in their actual lie-telling behaviour is somewhat unclear: in the few studies that have investigated this (in either context), the results have been mixed (Popliger et al., 2011; Talwar & Lee, 2008; Talwar et al., 2002; Xu et al., 2010). Although there is some evidence for the role of different aspects of Theory of Mind understanding (Polak & Harris, 1999; Talwar & Lee, 2008; Evans et al., 2011) and Executive Function (Talwar & Lee, 2008; Evans & Lee, 2011; Evans et al., 2011) in children's telling of self-serving lies, these findings are also somewhat inconsistent across studies, and these abilities have not been reported in relation to prosocial lie telling at all.

Only one study to date has investigated self-serving and prosocial lie telling within the same sample of children. Li and others presented 30 typically developing children (TD; six- to ten-year-olds) and 19 children with high-functioning Autism Spectrum Disorder (ASD; five- to twelve-year-olds) with the temptation resistance paradigm (as in Talwar & Lee, 2008) and the disappointing gift paradigm (modified from Talwar et al., 2007), as well as measures of first- and second-order false-belief understanding, and verbal ability. The authors sought to investigate the skills related to lie telling in children with ASD, and included the TD children as a comparison group. However, due to changes in the disappointing gift paradigm partway through the experiment and the small sample size overall, only 14 ASD children and eight TD children *both* had complete data on the disappointing gift paradigm *and* peeked in the temptation resistance paradigm. Although the authors report a correspondence between

lie telling in the two contexts for children with ASD, wherein children who told one kind of lie were likely to tell both, lie telling across the two contexts was not related in the group of typically developing children. However, given the very small number of children, this null result is not informative. Therefore, it remains unknown whether the same children are likely to tell both kinds of lies, or whether different children are more likely to tell one kind of lie or the other.

The Present Study

In the present study, I investigated four- and five-year-olds' telling of self-serving and prosocial lies and the role of children's conceptual understanding of lies (the story-based tasks from Study One), Theory of Mind (first- and second-order false-belief understanding and affective perspective taking) and Executive Function (inhibitory control and working memory) in these abilities. My goals were three-fold. The first was to confirm previous research on preschoolers' telling of self-serving and prosocial lies, examining the frequency of this behaviour in four- and five-year-old children, and to extend previous research by examining the correspondence between children's lie telling in these two different contexts. My second goal was to examine the skills that support children's lie telling in both contexts: clarifying the role that children's conceptual understanding of lies may play in their own lie telling, confirming previous research on the roles of different aspects of Theory of Mind and Executive Function in children's self-serving lie telling, and, investigating the roles of Theory of Mind and Executive Function in children's prosocial lie telling for the first time. My third goal was to confirm and extend the findings of Study One, investigating the roles of Theory of Mind and Executive Function in children's conceptual understanding of self-serving and

prosocial lies and truths, and additionally, the role of a different aspect of Theory of Mind understanding (affective perspective taking) in these abilities.

I invited four- and five-year-old children to participate in both the temptation resistance paradigm (modeled on Evans et al., 2011; Polak & Harris, 1999; and Talwar & Lee, 2008) and the disappointing gift paradigm (modeled on Talwar et al., 2007a; Popliger et al., 2011). Children also completed: the story-based measures of their conceptual understanding of lies (as used in Study One); measures of first- and second-order false-belief understanding; a measure of affective perspective taking (which involved predicting the emotions of story characters who experienced various events, for example, breaking a favourite toy or winning a game); measures of inhibitory control and working memory; and a measure of receptive vocabulary as a control variable. All measures were also used in Study One, except for the two lie-telling paradigms, the measure of affective perspective taking, and an additional measure of second-order false-belief understanding. Half of the children participated in the lie-telling paradigms first and half participated in the conceptual understanding stories first, to control for order effects of these factors.

My first set of hypotheses follows from my first goal, to examine the frequency of self-serving and prosocial lie telling in four- and five-year-old children, and the correspondence between them. In the temptation resistance paradigm used to elicit self-serving lies, I expected between 60% and 75% of four- and five-year-olds to peek during the guessing game. This estimate was based on the number of peekers reported in other studies wherein children had to do more than look over their shoulders to peek (e.g., to look inside a house, as in Polak & Harris, 1999; or to overturn a cup, as in Evans et al.,

2011). Of the children who peeked, I expected the majority to deny peeking (approximately 75%), and of those who told this initial lie, I expected a minority to feign ignorance (approximately 25%) or provide plausible explanations for their knowledge if they did not feign ignorance (approximately 25%). These estimates were based on the percentages reported in the literature for four- and five-year-olds in similar paradigms (Evans et al., 2011; Polak & Harris, 1999, Study 2; Talwar & Lee, 2008).

In the disappointing gift paradigm used to elicit prosocial lies, I expected that at most, very few children would like the disappointing gift (a plain, white bar of soap), as reported in the literature (Talwar et al., 2007a; Popliger et al., 2011). Of these children, I expected the majority of children to tell a prosocial lie, telling the experimenter that they liked the soap (approximately 75%), and a minority of these children (approximately 25%) to plausibly maintain this lie by producing reasonable answers to the maintenance questions. The estimate of the rate of lie telling was based on the percentages reported in the literature for four- and five-year-olds (e.g., Popliger et al., 2011, *low-cost* condition; Talwar et al., 2007a, *child – no coaching* condition). However, only Popliger and colleagues (2011, Study 2) have investigated four- and five-year-olds' maintenance of prosocial lies, and they did not report the percentage of children that maintained their lies. Following Xu and colleagues (2010), I did not expect the order of the paradigms (*lie telling first* or *conceptual understanding first*) to influence children's behaviour on the lie telling paradigms, though it was counterbalanced and tested.

With regard to the correspondence between children's lie telling in these two contexts, the present study was largely exploratory, as no previous work has addressed this topic. However, similar proportions of children tell lies in either context, similar

relations between children's conceptual understanding of lies and their own lie-telling behaviour have been reported in each context, and similar processes ought to be involved in both kinds of lie telling (e.g., Theory of Mind and Executive Function). Based on these similarities, I expected a strong correspondence between children's telling of these different kinds of lies. That is, I expected that if children told one kind of lie, they were likely to tell both kinds. Therefore, I expected that many children would tell both self-serving *and* prosocial lies, that a smaller number of children would tell *neither* kind of lie, and that a few children would tell only one kind of lie or the other.

My second set of hypotheses follows from my second goal, to confirm and extend previous work on the role of children's conceptual understanding of lies, Theory of Mind, and Executive Function in their lie-telling behaviour. Within each context, I predicted differences between children who told lies and those who did not in their performance on these other measures.

In terms of children's conceptual understanding, I expected that children's identification, moral judgment and punishment, and affective evaluations of speakers would play the same role in their lie telling in both contexts. Specifically, I predicted that children who themselves told lies would demonstrate greater identification accuracy (following Talwar et al., 2002), milder moral judgments and punishments of lie-tellers (e.g., following Talwar & Lee, 2008; Xu et al., 2010), and more positive affective evaluations of lie-tellers than children who themselves told the truth (following Popliger et al., 2011).

In terms of Theory of Mind, I expected first- and second-order false-belief understanding to play a similar role in children's lie telling in both contexts, but that

children's affective perspective taking would be differentially involved in their lie telling in self-serving and prosocial contexts. Based on the hypotheses put forth by Polak and Harris (1999) and Talwar and Lee (2008) I predicted that children's first-order false belief understanding would relate to their initial lies (denying having peeked and liking the soap). Some research has found support for the role of children's first-order false-belief understanding in their initial lies in self-serving contexts (e.g., Polak & Harris, 1999, Study 2; Talwar & Lee, 2008), but other studies have found no such relation (e.g., Evans et al., 2011). The role of false-belief understanding has not been investigated in children's prosocial lie telling, but I expected children's initial prosocial lies (saying that they like a disappointing gift) to rely on the same skills as their initial self-serving lies.

Again, based on the hypotheses put forth by Polak and Harris (1999) and Talwar and Lee (2008), I also predicted that children's second-order false-belief understanding would relate to their maintenance of lies during follow-up questioning in both contexts. Though some support has been found for the role of second-order false-belief understanding in children's maintenance of their self-serving lies (Talwar & Lee, 2008; Talwar et al., 2007b), it has not been investigated in children's prosocial lie telling. Finally, I expected children who told self-serving lies to have lower affective perspective taking scores than those who confessed, but children who told prosocial lies to have higher affective perspective taking scores than those who confessed. These predictions were made because children better able to consider the feelings and perspective of another ought to be more likely to tell the truth in self-serving contexts and a lie in prosocial ones.

In terms of Executive Function, I predicted that children who told the initial lie would have higher inhibitory control and higher working memory than those who told the truth, in both contexts, following the work of Talwar and Lee (2008) on self-serving lie telling. I also predicted that children who were better able to maintain their lies would have better inhibitory control and working memory than those who were not able to maintain their lies in follow-up questioning, following the work of Evans and colleagues (2011) on self-serving lie telling.

My final set of hypotheses follows from my third goal, to replicate and extend the findings of Study One. In terms of replication, I expected that children would be above chance in their identification of both self-serving and prosocial lies and truths and that older children would outperform younger children in their identification accuracy. I also predicted that children would consider context and statement type when making moral judgments and assigning punishment. Specifically, I predicted that children would morally judge lies more negatively, and assign them more punishment, than their respective truths (in both self-serving and prosocial contexts). I also predicted that children would morally judge self-serving lies more negatively than prosocial lies, and assign them more punishment, but that their treatment of self-serving and prosocial truths would be similar. I expected age to be a factor in each of these effects, wherein five-year-olds would make greater distinctions than four-year-olds. All of these predictions were based on the findings of Study One.

Extending the findings of Study One, in terms of their affective evaluations of the speakers, I expected children to rate speakers that told self-serving lies as feeling less happy than those who told both self-serving truths and prosocial lies, but that children

would rate speakers that told prosocial lies and truths similarly. Again, following Xu and colleagues (2010), I did not expect the order of the paradigms (*lie telling first* or *conceptual understanding first*) to influence children's performance on any of the conceptual understanding measures.

In terms of the relation between children's performance on the story measures and the other social-cognitive and cognitive measures, I predicted that children's first-order false-belief understanding would relate to their identification of lies and truths, and that children's second-order false-belief understanding would relate to their moral judgment and punishment of lies, but not truths, consistent with the findings of Study One.

Extending the findings of Study One, expected children's affective perspective taking to relate to their affective evaluations of the speakers who told both lies and truths, since reasoning about the speakers' feelings is, in effect, affective perspective taking. Again, I expected all these relations to hold after controlling for the contributions of age and receptive vocabulary. I did not expect children's Executive Function to play a role in their conceptual understanding of lies and truths, given the findings of Study One.

Method

Participants

Participants were 81 children: 58 four-year-olds ($M = 53.5$ months, $SD = 3.89$, 33 girls) and 23 five-year-olds ($M = 64.1$ months, $SD = 3.10$, 8 girls). Four of the 81 children failed to complete one or both of the lie-telling paradigms and seven of the 81 children failed to complete the affective perspective taking measure (four due to experimenter error). These children were excluded from the analyses involving these measures. An additional ten children participated and were completely excluded from

the study: eight failed to complete most of the measures (quitting partway through the session or refusing to complete several tasks) and two demonstrated significant English language barriers.

Participants were recruited from a database of families that have participated in previous studies conducted by the Children's Representational Development Lab or from advertisements in a local parenting magazine, in neighbourhood storefronts, on parent-interest groups on Facebook, and on local parenting blogs. None of the participants had previously participated in Study One. Parents were asked to provide information on family income and parental education to give an indication of the socio-economic status of the sample.

Parents or guardians provided written informed consent for children's participation and for video recording of the testing sessions, and children provided verbal assent for their participation. Four parents or guardians did not consent to video recording and these sessions were observed *via* the closed-circuit camera by a second researcher who scribed and documented children's behaviour when the primary experimenter left the room. The video camera was hidden from children (hidden amidst a collection of stuffed toys arranged in a hammock, as shown in Appendix C), and parents or guardians were given the option to reveal to children (with the help of the experimenter) that they had been watching the session *via* the closed-circuit camera from the reception room. Few parents chose to do so in the experimenter's presence. At the end of the session, children were offered a storybook as thanks for their participation, in addition to the prize(s) they won during the disappointing gift paradigm.

Procedure

Testing took place at the Children's Representational Development Laboratory at Carleton University. The lab is a closed set of rooms, including a reception room and several testing rooms, all off of a private, adjoining hallway. Testing took place during two, 35-minute sessions separated by a 20-minute break, during which children were offered a snack and a drink in the reception room with their parents. Otherwise, all tasks were administered in a closed testing room (equipped with the hidden camera) at one end of the hallway while parents remained in the closed reception room at the other end of the hallway, watching the session over the closed-circuit television (unbeknownst to their children). When children were brought back to the reception room to see their parents, the experimenter always entered first and ensured the television had been turned off. If children asked about the television, they were told that their parents were watching 'something funny on TV' while they waited.

Children were randomly assigned to one of two paradigm order conditions: *lie telling first* or *stories first*. The paradigm order condition counterbalanced *both* the order that children received the lie telling and conceptual understanding paradigms, as well as the order of the self-serving and prosocial lie-telling paradigms. That is, in the *lie telling first* condition, children received the disappointing gift paradigm first, followed by the temptation resistance paradigm and finally the stories. In the *stories first* condition, children heard the stories first, followed by the temptation resistance paradigm and the disappointing gift paradigm. Therefore, any order effect arising from the paradigm order condition would conflate these two different factors. However, there was no empirical or theoretical reason to predict an order effect for the order of the self-serving and prosocial

lie-telling paradigms. The order of tasks in the two paradigm order conditions appears in Table 3.1. The order of the story questions (identification questions vs. moral judgment and punishment questions) was also counterbalanced (between-subjects), as in Study One.

Table 3.1

Task Order in each of the Paradigm Order Conditions

| Lie-telling Paradigms First | Stories First |
|-------------------------------------|-------------------------------------|
| Warm-up activities | Warm-up activities |
| Disappointing Gift Paradigm | 2 Lying Stories* |
| Backward Word Span | Change of Location |
| Change of Location | Unexpected Contents |
| Unexpected Contents | 2 Lying Stories* |
| Corsi Span | Black/White Stroop |
| Temptation Resistance Paradigm | Forward Digit Span |
| Affective Perspective Taking | 2 Lying Stories* |
| --- break and snack --- | Second-Order False-Belief (book) |
| 2 Lying Stories* | 2 Lying Stories* |
| Second-Order False-Belief (cookies) | --- break and snack --- |
| 2 Lying Stories* | Affective Perspective Taking |
| Black/White Stroop | Temptation Resistance Paradigm |
| Forward Digit Span | Backward Word Span |
| 2 Lying Stories* | Second-Order False-Belief (cookies) |
| Second-Order False-Belief (book) | Corsi Span |
| 2 Lying Stories* | Disappointing Gift Paradigm |
| PPVT - III | PPVT - III |

* The order of the lying stories was random, as in Study One.

Tasks

The majority of the measures were also included in Study One, with the exception of the two lie telling paradigms (disappointing gift and temptation resistance paradigm), the affective perspective taking measure, and one additional measure of second-order false-belief understanding. Though all measures are listed here, only the measures new to Study Two are described in detail.

Self-serving Lie Telling: Temptation Resistance Paradigm. In this task (adapted from Polak & Harris, 1999; Talwar & Lee, 2008; Evans et al., 2011) children were introduced to a guessing game in which the experimenter had hidden four toys in opaque cardboard boxes and children had to guess the identity of each toy based on the sound that it made. There were four large cardboard boxes stacked at the experimenter's side. The toys were hidden in boxes so that children were required to intentionally act in order to peek (by lifting the box lid), rather than to simply glance over their shoulders at the toy. The boxes were 12" by 12" cake boxes and the lids (which were attached at the back of the boxes) were modified so that the edges were flat and overhung the sides of the boxes, making them very easy for children to open (see Appendix D). By making the act of peeking itself require more of an intentional action, children's answers to the peek question were more easily interpreted as intentional lies, precluding the account that children's denials are more akin to 'I didn't mean to glance over my shoulder and therefore I didn't peek'.

In Polak and Harris' (1999) study, children had to look inside the door of a small toy house in order to peek at the toy inside, and 95% of three- and five-year-olds in the study did so (though it is not clear from the description in the paper whether this required

much more than a glance). In Evans and colleagues' work (2011), children had to look under an overturned cup in order to peek, and 53% of four-year-olds (experiment one), 70% of five-year-olds (experiment one) and 59% of four-year-olds (experiment two) did so. I expected that peeking would be *easier* in the present study than in Evans et al., (2011), wherein children had to pick up an overturned cup, and therefore expected at least as many children to peek as reported by these authors.

The experimenter explained to children that for each trial, she would place the box on the table, make the toy make its noise (by pushing a noise button hidden inside of each toy), and then ask children to guess what the toy was. Children were specifically asked not to guess what the toy was until they were asked, so that the experimenter could write their guess down on an answer sheet. A clipboard with four blank lines (one corresponding to each box) was sitting adjacent to children for the experimenter to record their guesses. The aim of this answer sheet was to discourage children from blurting out the toy's identity on the critical trial, before they had been asked if they had peeked.

The experimenter placed the first box on the table, while saying, "no peeking," to discourage children from opening the box, and to set the stage for the critical trial. Then, the experimenter made the toy make its sound ("mooo") through the door cut in the back of the box. Children could not see the opening in the back of the box from where they were seated. As the toy made its sound, the experimenter put her finger to her mouth in a hush gesture to remind children not to guess, while she picked up the clipboard with the answer sheet. Children were then asked to guess what the toy was. Once the guess was recorded on the answer sheet, the experimenter told the children to look inside the box to see if they were correct. Children were prompted to open the boxes themselves after their

guesses to ensure their comfort and competence with opening them. A second trial proceeded, exactly as the first, in which a toy train made a “choo choo” sound. If children were incorrect on either of the first two trials (very few were), they were told, “Oh, it is really a cow/train inside!” and the toy’s sound was made again. Then the experimenter told them, “You could tell it was a cow/train because of the noise it made!”

On the third and critical trial, the experimenter placed the third box on the table and then, as though she had only just remembered, said, “You know what? I just remembered, I have to make a phone call. So I’ll make the next toy make its sound and then I’ll go make my phone call while you think about your guess, okay?” All children agreed, though some inquired as to whom the experimenter had to call, but were satisfied when she replied, “my mum.” The experimenter made the last toy make its sound, which was a short nine-note melody that was unlikely to have any association for children, and put her finger to her mouth making the hush gesture. She then stood, saying, “I’m going to make my phone call while you think about your guess. No peeking!” and left the room for sixty seconds, from the time she closed the door. Children’s behaviour was recorded *via* the hidden camera, but the experimenter was not able to see whether or not children had peeked while she was away.

Upon her return, the experimenter jiggled the door handle several times before entering, so that if children were mid-peek, they had time to close the box before she entered. When she entered the room, the experimenter said, “I’m back. Did you peek at the toy while I was gone?” If children did not answer this question, or if they guessed what was in the box without answering it, the peek question was repeated. Next, children were prompted to guess, “Okay, guess what kind of toy is in the box.” Children’s

answers were recorded on the answer sheet and then children were prompted to open the box to see if they had guessed correctly. The box contained a small, yellow teapot.

Children who correctly 'guessed' that the box contained a teapot (or equivalent) were asked, "How did you know it was a teapot?" If children were caught peeking when the experimenter returned, or if children confessed to peeking in response to the peek question or the follow-up question, the experimenter said, "It's okay that you peeked. I was gone for a really long time, and this is just a game." All other children (those that did not peek and those that peeked but did not confess) were told at the end of the trial, "You know what? Lots of kids peek at that game if I have to leave the room. But that's okay because it is just a game." After the critical trial was complete, one final trial was conducted exactly as trials one and two, in which a frog made a "ribbit ribbit" sound. This trial was conducted so that all children ended the game on a positive note.

Children's behaviour was counted as peeking if they lifted the box lid and looked inside the box, or if they got out of their chairs and walked around to peek through the door cut in the back of the box. Three children were excluded because it was unclear whether they had peeked or not, and so, their answers to the peek question were not interpretable: one child lifted the corner of the box so slightly that he likely did not see the toy inside, and two children walked around the back of the box and looked towards the door cut in it, but may not have seen the toy. Although all three of these children denied having peeked, and did not correctly guess the toy's identity, given their *attempts* to peek, their answers could not be interpreted.

Children's answers to the peek question were considered self-serving lies if they had peeked and then denied having done so by either saying 'no' or shaking their heads.

Children's answers to the guess question were counted as correct if they 'guessed' that the box contained a "teapot," "tea" or a "teacup." One child responded in French (théière) and the experimenter responded, "That's right, a teapot!" in English, once the box was opened. Children's answers to the follow-up question ("How did you know it was a teapot?") were coded as belonging to one of five categories: appealing to some reason for their knowledge (e.g., "I could hear the water inside" or "It just sounded like a teapot"); acknowledging luck (e.g., "a lucky guess," or "I just knew it/thought about it"); incriminating themselves (e.g., "because I saw the [points to spout]"); not answering (including 'I don't know' responses) and; confessing (e.g., "Just kidding, I looked inside!").

Prosocial Lie Telling: Disappointing Gift Paradigm. In this task (adapted from Popliger et al., 2011; Talwar et al., 2007a) children were told that they were going to play a game with the experimenter, and that if they won, that they would win "a cool prize!" A basket of bright and colourful children's toys (coloured Slinkies, sets of Play-Doh, yo-yos etc.) was sitting near the doorway, directly in children's line of sight. Next to the prize basket, one prize was wrapped in bright paper, and children were told, "Do you see that prize that's all wrapped up? I wrapped that one up just for you!" The experimenter and children then played a game of memory, in which they took turns trying to find matching sets of pictures in an array of eight cards that were face-down on the table. All children won the game. Once the game was over, the experimenter told children, "Great job! You won! Now you get a prize! I wrapped this up just for you – I hope you like it!"

The experimenter then explained that she had to get something from the other room for their next game and left children alone for one minute, or until they had opened the prize and reacted to it. The experimenter left while children opened the prize so she was not present to witness their initial reaction. The disappointing prize was a plain, white bar of soap as used in previous research (Popliger et al., 2011; Talwar et al., 2007a). Upon her return, the experimenter said, "I'm excited about your prize! Do you like it?" If children responded 'yes,' they were asked two follow-up questions: "What do you like about it?" and "What are you going to do with it?" A few children did not respond directly to the initial question, instead saying things like "it's soap," or "it isn't a toy," and for these children, the initial question ("Do you like it?") was repeated.

If children responded 'no,' to the like question, they experimenter said, "That's okay. I guess soap isn't a very cool prize, is it? Would you like to choose one of these prizes instead?" and children were offered their choice of prizes from the basket. If children answered 'yes' to the like question, after the follow-up questions, the experimenter said, "Let's go show your prize to mum/dad!" and children were led down the hall to the reception room. After entering the room, and ensuring that the television had been switched off, the experimenter said, "Look! [Child] just won a prize! You guys check it out while I go set up our next game." The experimenter then closed the door and walked back to the testing room and closed that door loudly, so that children had the expectation of privacy when speaking with their parents. Parents had been previously instructed to ask their children if they liked the soap and to record their responses on a form. After one minute passed, or once the children or their parents opened the reception room door, the experimenter approached the reception room and said, "I was thinking,

would you prefer one of these prizes instead of the soap?” and presented children with the basket of attractive prizes and allowed them to choose one.

Children’s answers to the like question were coded as being affirmative if they said ‘yes’ or nodded their heads, or as negative if they said ‘no’ or shook their heads, or clearly indicated that they did not like the soap (e.g., one child said “I want one of those ones instead,” and helped herself to one of the slinkies from the basket). Children’s were coded as having told a prosocial lie if they told the experimenter that they did like the soap and either clearly indicated on camera (before the experimenter returned) that they did not like the soap (e.g., “Soap? Why did she give me soap? I’m not a mom!”) or told their parent(s) that they did not like the soap. Children’s answers to the follow-up questions were coded as either: incriminating themselves by indicating their dislike of the soap (e.g., “It smells disgusting!” or “We already have lots of soap at home.”); as maintaining their lie by citing plausible things they liked/would do with it (e.g., “It smells really clean!” or “I’m going to wash my hands with it!”); or as not answering.

Conceptual Understanding Stories. The same stories and questions as used in Study One were administered, in precisely the same way with one exception: the affective evaluations of the recipients questions were not administered, given the methodological issue raised in Study One. The counterbalancing described in Study One was also retained, such that there were eight possible question orders.

Theory of Mind: First-order false-belief understanding. Children completed the same two measures of first-order false-belief understanding from Study One (Change of Location and Unexpected Contents) and scores were summed for a composite score, ranging from 0 to 3.

Theory of Mind: Second-order false-belief understanding. In addition to the measure used in Study One (the story about John's book) an additional second-order false-belief story was included in Study Two. The second story was modeled very closely on the first, and was about two characters who had a plate of cookies to share. The first character put the cookies in the fridge and left the scene, but returned to witness the second character moving the cookies to the cupboard. Children were then questioned about where the second character would think that the first character would look for the cookies. Children's scores on the two second-order false-belief stories (scoring described in Study One) were summed for a composite score ranging from 0 to 2.

Theory of Mind: Affective Perspective Taking. In this task (adapted from Harwood & Farrar, 2006) children were told 12 very short, hypothetical stories about themselves and their best friend, and were asked how each person would feel. Children were provided with a response card featuring gender-matched illustrations of a child with a happy expression in one picture and a sad expression in another picture to remind them of the response options throughout the task. The physical order of the happy and sad faces (left or right) was counterbalanced between-subjects. Children were first required to label how each character was feeling (e.g., happy or sad) and to then point to the happy face and the sad face before testing began. Next, children were asked to name their best friend (or any friend with whom they liked to play, if they did not immediately answer the best friend question). The experimenter then explained that she would tell children some pretend stories about themselves and their friend, and that after each story, she would ask them how both of them would feel, using the response card (either verbal or pointing responses were acceptable).

Children were first required to respond to two hypothetical stories (with feedback) about only the friend character, one in which the friend was expected to feel happy (after being treated to ice cream) and one in which the friend was expected to feel sad (after a favourite toy was broken). Children were then presented with the twelve test trials: in six trials, both characters were expected to feel the same way: both happy (e.g., they were both praised by their teacher); or both sad (e.g., they were both punished by their teacher). In the other six trials, the characters' feelings were expected to be in conflict: the child's own character happy and the friend's character sad (e.g., the child character won a game, and the friend lost); or vice versa (e.g., the child character's painting got ruined, but the friend's was spared). Children were randomly assigned to one of two fixed-orders for the test trials: in which the order of the stories themselves varied, as well as the order that the two characters' feelings were asked about (child character first or friend first). Children received a point for each of the trials in which they correctly identified the emotions of *both* characters, for scores ranging from 0 to 12.

Executive Function: Inhibitory Control. Black/White Stroop. This measure was administered exactly as described in Study One. The internal consistency of the Black/White Stroop was high, demonstrating the adequate reliability of this scale (Cronbach's $\alpha = .841$).

Executive Function: Working Memory. Children completed three measures of working memory: forward digit span (Spearman-Brown's correlation coefficient for split-half reliability, $r = .800$), corsi span (Spearman-Brown's correlation coefficient for split-half reliability, $r = .732$), and backward word span (Spearman-Brown's correlation coefficient for split-half reliability, $r = .760$). As described in Study One, a principal

components analysis was again used to create a component score reflecting their common variance, as summarized in the Results section.

Receptive vocabulary: Peabody Picture Vocabulary Task – 3rd Edition (PPVT – III). This measure was administered exactly as described in Study One.

Results

Preliminary examination of the data ensured that the assumptions were met for the analyses conducted, including: normality of the sampling distribution, homogeneity of variance, independence of errors and an absence of outliers. See Appendix E for details.

Frequency of Lie Telling in Self-Serving and Prosocial Contexts

To address my first set of hypotheses, concerning the frequency of children's self-serving and prosocial lie telling, and the correspondence between them, the frequency of children's initial lies (denying peeking and liking the soap) and their lie maintenance (in follow-up questioning) was examined within each context. Chi-square tests revealed that neither paradigm order nor age were significant factors in children's initial lie telling or lie maintenance, in either context. Therefore, these findings are reported collapsing across these factors. To investigate the correspondence between children's lie telling in the two paradigms, McNemar's test of change had been planned to examine whether children most frequently told both self-serving and prosocial lies, as predicted. As mentioned, four children's performance on these measures was excluded, leaving data for 77 children.

Self-serving lie telling: Performance on the temptation resistance paradigm.

Contrary to my predictions, only 30 of 77 children (39%) peeked at the toy in the experimenter's absence: 27 did so without the experimenter's knowledge (35%) and three

children were caught in the act and were handling the teapot when the experimenter returned (despite the rattling of the door handle). Consistent with my predictions, however, of the 27 children who peeked (and were not caught), the majority told a self-serving lie denying having done so (24 children; 89%) and only three children confessed. When these 24 children were asked to guess the toy's identity, most children (21; 87.5%) incriminated themselves (guessing that the box contained a teapot), and only three children feigned ignorance (responding 'a monkey,' 'a choo-choo train' and 'I don't know'). Finally, of the 21 children who 'guessed' that a teapot was in the box, 10 children failed to provide a plausible justification for their knowledge (most responding, "I don't know") and 11 children provided a more plausible justification for their knowledge: five claimed that they could tell by the sound it made and six appealed to a lucky guess or having thought about it.

Prosocial lie telling: Performance on the disappointing gift paradigm. Of the 77 children, 86% (66 children) told the experimenter that they liked the soap and 11 children told the blunt truth, admitting to the experimenter that they did not like the soap. However, only 30 of these children could be counted as telling a prosocial lie when applying the criteria listed above: 19 told their parents that they did not like the soap, and 11 of them verbalized (on camera) that they did not like the soap when they were alone (though these children maintained that they did like the soap to their parents). The other 36 children told their parents that they *did* like the soap. It had not been expected that many (or any) children would maintain to parents that they liked the soap – a problem similar to the unexpectedly low number of children who peeked in the temptation resistance paradigm.

Considering only the 41 children who did not like the soap (the blunt truth-tellers and the children who indicated their dislike to parents or on camera), 30 (73%) told a prosocial lie to the experimenter, consistent with my predictions. Contrary to my predictions, however, the vast majority of these children also provided plausible answers to the two follow-up questions: 87% (26 children) came up with a plausible thing to like about the soap (most often ‘the smell’) and 77% (23 children) stated something plausible that they would do with the soap (most commonly ‘wash with it’). All children opted to take one of the attractive prizes when they were offered to them, though they were not explicitly asked to trade their soap for this prize.

It was rather unexpected that 36 children (47% of children overall) told both the experimenter and their parents that they liked the soap. Although it was not intended to be a variable of interest (and was therefore not controlled in the protocol), the experimenter also recorded whether or not children took the soap at the end of the experiment. Of the 36 children who claimed to like the soap, 17 of them left it behind, suggesting that they did not *really* like it. Although 19 children did take the soap, often parents explicitly prompted this decision, or took the soap themselves. As a comparison, of the 30 children who told *did* tell a prosocial lie, eight children took the soap as well.

Given the unexpected number of children who maintained to their parents’ that they liked the soap, an addition to the methodology was made beginning with the 17th participant. When the experimenter and children returned to the testing room (and after the child chose an attractive prize from the basket), the experimenter told children that she would be playing the very same game with another child ‘tomorrow’ and asked them, “What kind of prize should I wrap up for him/her?” This question was added to

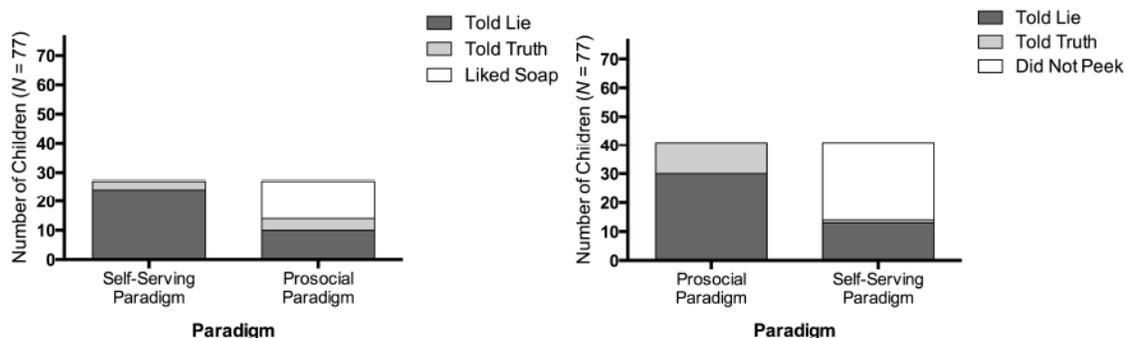
determine whether children *actually* thought that soap was a good prize, since so many of them maintained to their parents that they liked it. Of the 36 children who told their parents that they liked the soap, 33 of them were asked this question by the experimenter and 24 of them told the experimenter that she should wrap up one of the toys for the next child instead of the soap. Though children's responses to this question provide some insight regarding their preference for bar soap overall, indicating that children at least seem to prefer toys to soap, their responses were not considered in the analyses in any way.

Correspondence between children's self-serving and prosocial lie telling. Due to the unexpectedly low number of children who peeked in the temptation resistance paradigm and who did not like the soap in the disappointing gift paradigm, it was not possible to directly test the correspondence between children's self-serving and prosocial lie telling. Only 14 children *both* peeked *and* indicated that they disliked the soap, and hence had the *opportunity* to tell both kinds of lies. Of these children, nine told both self-serving and prosocial lies, four told only the self-serving lie, one told only the prosocial lie, and none told the truth in both situations. Although this pattern suggests that children who told one kind of lie were likely to tell the other, testing the statistical significance of this pattern was not possible.

Further descriptive support for the contingency between children's lie telling comes from examining the number of children who told lies in one context *within* the subset of children who had the opportunity to tell a lie in the other context. For instance, of the 27 children who peeked in the temptation resistance paradigm, 24 (89%) told the self-serving lie. Fourteen of the 27 children did not like the soap, and therefore had the

opportunity to tell the prosocial lie as well – of these 14 children, 10 (71%) did so.

Similarly, of the 41 children who truly did not like the soap, 30 told a prosocial lie to the experimenter (73%) and 14 children peeked during the temptation resistance paradigm, giving them the opportunity to tell a self-serving lie – and of these children, 13 (93%) did so (See Figures 3.1 and 3.2).



Figures 3.1 and 3.2. Frequency of prosocial lie telling in the subset of children who told peeked in the self-serving paradigm (left) and frequency of self-serving lie telling in the subset of children who disliked the soap in the prosocial paradigm (right).

Skills Related to Children's Lie Telling

My second set of hypotheses concerned the roles of children's conceptual understanding of lies, Theory of Mind, and Executive Function in their telling of self-serving and prosocial lies. However, due to the unexpectedly low number of children who peeked and who did not like the soap, these hypotheses were largely untestable.

Recall that a principal components analysis was used to compute a factor score for the three working memory measures, as in Study One. The three working memory measures were significantly correlated with one another ($r_s \geq .278$, $p < .012$) and the principal components analysis extracted a single factor ($\lambda = 1.67$) that accounted for 55.56% of the variance in children's performance on the three measures. A working memory component score was computed and used for the analyses.

Self-serving Lie Telling. Only 27 children peeked in the temptation resistance paradigm, and 24 of them told the self-serving lie (only three confessed), making comparisons between self-serving lie-tellers and confessors impossible. Similarly, of the 24 children who told the initial lie, 21 of them incriminated themselves and only three feigned ignorance, making comparisons between these two groups impossible as well. However, of the 21 children who ‘guessed’ that a teapot was in the box, ten children failed to provide a plausible justification for their knowledge and 11 children provided a plausible one. Though I predicted that children who were able to maintain their lies during follow-up questioning would outperform those who were not in terms of second-order false-belief understanding, inhibitory control, and working memory, these comparisons all failed to reach significance – likely due to the very small groups. However, examination of the means does suggest some support for these predictions, (see Table 3.2).

Table 3.2

Comparison of Children who Maintained Self-Serving Lies to Children who Incriminated Themselves

| | Maintained Self-Serving Lie (N=11) | Incriminated Themselves (N=10) |
|-----------------------------|---------------------------------------|-----------------------------------|
| | Mean (SD) | Mean (SD) |
| Second-order false-belief | 1.18 (.75) | .60 (.84) |
| Inhibitory Control | 16.82 (2.18) | 14.20 (5.01) |
| Working Memory Factor Score | 0.04 (.70) | -.48 (1.12) |

Prosocial Lie Telling. Only 41 children indicated that they did not like the soap in the disappointing gift paradigm: 30 of these children told the prosocial lie and 11 confessed, making a statistical comparison of these groups unsound (due to such unequal

and small groups). I had predicted that children who told the initial prosocial lie would differ from those who confessed in several ways: demonstrating greater identification accuracy, milder moral judgments and punishments, and more positive affective evaluations of prosocial lie-tellers, and greater first-order false-belief understanding, affective perspective taking, inhibitory control and working memory than confessors. Though these groups were largely unequal, visual examination of the means does not suggest any support for these predictions (see Table 3.3). Of the children who told the initial prosocial lie, the vast majority maintained it in follow-up questioning: 26 of 30 gave plausible answers when asked what they liked about the soap, and 23 of 30 gave plausible answers when asked what they would do with the soap. Therefore, the hypotheses concerning the skills related to children's maintenance of prosocial lies could not be tested either.

Table 3.3

Comparison of Children who Told Prosocial Lies to Children who Told Blunt Truths

| | Told Prosocial Lie (N=30) | Told Blunt Truth (N=11) |
|------------------------------|-------------------------------|----------------------------|
| Identification Accuracy | 2.73 (1.36) | 2.63 (1.29) |
| Moral Judgment | -1.33 (2.41) | -1.27 (2.20) |
| Punishment | 1.53 (1.48) | 1.27 (1.62) |
| Affective Evaluations | .87 (2.76) | 1.09 (2.59) |
| First-order False-Belief | 2.33 (0.99) | 2.09 (1.22) |
| Affective Perspective Taking | 4.79 (1.81) | 5.71 (.49) |
| Inhibitory Control | 16.77 (4.93) | 16.55 (4.30) |
| Working Memory Factor Score | .20 (1.04) | -.42 (1.15) |

Children's Conceptual Understanding of Self-serving and Prosocial Lies and Truths

My third set of hypotheses related to replicating and extending the findings of Study One with respect to children's identification, moral judgment and punishment and affective evaluations of story characters who told self-serving and prosocial lies or truths and relations to Theory of Mind and Executive Function.

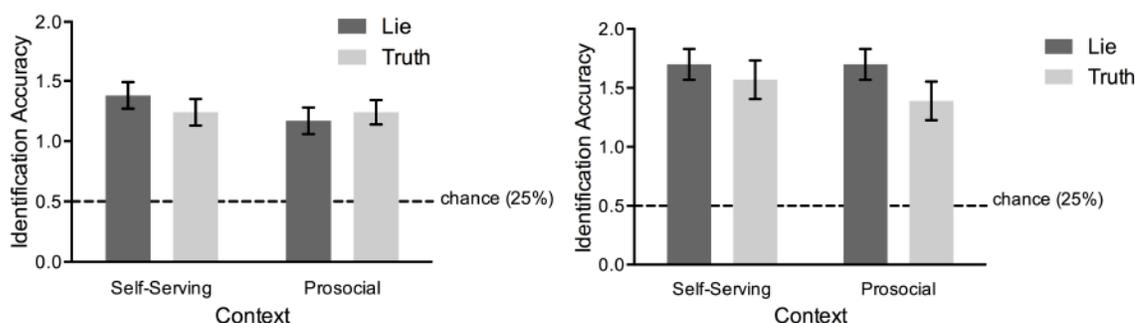
Recall that within the story measures, there were three fully counterbalanced orders (between-subjects): question order (the order of the identification and moral judgment and punishment questions); the order of the lie and truth questions (within identification); and the order of the good and bad questions (within moral judgment). These three order factors resulted in eight possible orders, and there were between 10 and 11 children in each cell. In Study Two, children were additionally assigned to one of two between-subjects paradigm orders (*lie telling first* or *stories first*) and this factor was completely crossed with the question orders (leading to 16 possible between-subjects orders). Although the effects of these orders were not tested (since there were only five or six children in each cell), any effects were distributed randomly across participants. Only paradigm order was considered in children's performance on the story-based measures.

The final analyses consisted of separate mixed ANOVAs for each of the dependent measures with age (4- vs. 5-year-olds) and paradigm order (*lie telling first* or *stories first*) as between-subjects factors, and context (self-serving vs. prosocial) and statement type (lie vs. truth) as within-subjects factors. Significant effects were followed by comparisons of the relevant means, when justified. Recall that children were required to correctly answer three comprehension questions for each story in order for their scores

for each dependent measure to be included for that story. Therefore, the number of children in each cell varies slightly, depending on the number of children who were excluded (never more than one child per story).

Identification. A 2 (age) x 2 (paradigm order) x 2 (context) x 2 (statement) mixed ANOVA was performed on children's identification accuracy. For each story, children received a score of 1 for correct identification of the speaker's statement, and the level of chance was 25%. There were eight stories in total, two of each: self-serving lie, self-serving truth, prosocial lie and prosocial truth. Therefore, children's scores ranged from 0 to 2 in each cell and chance performance was 0.5.

Only age was a significant factor in children's identification accuracy, $F(1, 77) = 4.02, p = .049, \eta_p^2 = .05$. Collapsing across statement and context, older children ($M = 6.35$) outperformed younger children ($M = 5.03$) in their identification of statements as lies or truths, $t(79) = 2.13, p = .036, d = 0.53$. As predicted, both four- and five-year-olds' accuracy was greater than chance for each story type (all p s = .0001, for each comparison to chance), see Figures 3.3 and 3.4.



Figures 3.3 and 3.4. Four-year-olds' (left) and five-year-olds' (right) identification accuracy compared to chance, grouped by statement and context (though accuracy did not differ across these factors). Scores are collapsed across paradigm order. Error bars represent standard errors and chance performance (25%) is marked with the dashed line.

Moral Judgment. A second 2 (age) x 2 (paradigm order) x 2 (context) x 2 (statement) mixed ANOVA was performed, this time on children's moral judgments. For each story, children's judgments ranged from a score of -2 ('a lot' bad) to +2 ('a lot' good). Therefore, in each of the four cells, summed scores ranged from -4 to +4.

There was a main effect of paradigm order, qualified by a significant context by paradigm order interaction, $F(1, 77) = 4.76, p = .032, \eta_p^2 = .06$. Following the interaction (see Figure 3.5), collapsing across statement type, post-hoc comparisons revealed that children who received the lie-telling paradigms first ($M = -3.23$) judged statements made in self-serving contexts significantly more negatively than children who received the conceptual understanding stories first ($M = -0.80$), $t(79) = 3.03, p = .003, d = 0.69$. There was also a significant context by age interaction, $F(1, 77) = 7.03, p = .010, \eta_p^2 = .08$. Following this interaction (see Figure 3.6), planned comparisons demonstrated that four-year-olds rated statements told in self-serving contexts ($M = -2.15$) more negatively than those told in prosocial contexts ($M = -.26$), $t(57) = 4.05, p = .0001, d = 0.53$. Five-year-olds rated statements made in self-serving and prosocial contexts similarly ($M = -1.61$ and $M = -2.13$, respectively); and similarly to four-year-olds ratings of statements made in self-serving contexts. Keep in mind, however, that these ratings were collapsed across statement type (lies and truths).

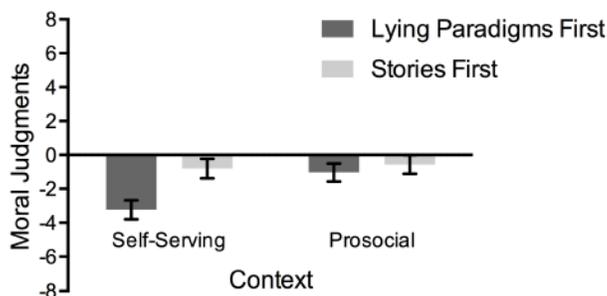


Figure 3.5. Children's moral judgments of statements made in self-serving and prosocial contexts. The context by paradigm order interaction is depicted, and scores are collapsed across statement and age. Error bars represent standard errors.

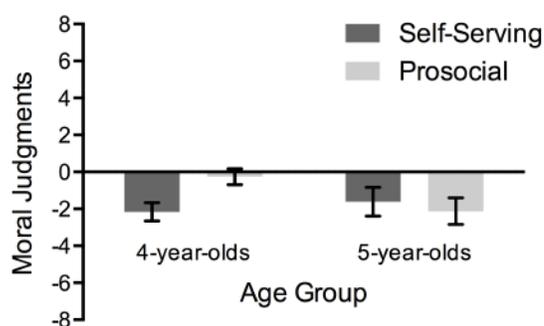


Figure 3.6. Four- and five-year-olds' moral judgments of statements made in self-serving and prosocial contexts. The context by age interaction is depicted, and scores are collapsed across statement and paradigm order. Error bars represent standard errors.

The ANOVA also revealed a main effect of statement, qualified by a near-significant statement by age interaction, $F(1, 77) = 3.83, p = .054, \eta_p^2 = .05$. Following the interaction (see Figure 3.7), collapsing across context, planned comparisons demonstrated that five-year-olds ($M = -4.65$) tended to rate lies more negatively than four-year-olds ($M = -2.86$), $t(79) = 1.94, p = .056, d = 0.48$, though this contrast was only approaching significance. Four- and five-year-olds rated truths similarly.

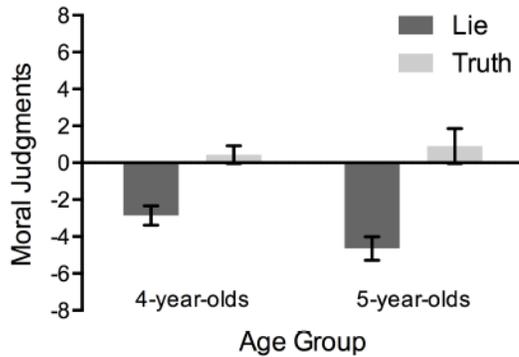


Figure 3.7. Four- and five-year-olds' moral judgments of lies and truths. The statement by age interaction (approaching significance, $p = .054$) is depicted, and scores are collapsed across context and paradigm order. Error bars represent standard errors.

Punishment. A third 2 (age) x 2 (paradigm order) x 2 (context) x 2 (statement) mixed ANOVA was performed, this time on children's assignment of punishment. For each story, children's punishment assignments ranged from 0 (*no trouble*) to +2 (*'a lot' of trouble*). Therefore, in each of the four cells (summed across two stories of a type), scores ranged from 0 to 4.

The ANOVA revealed a significant effect of statement, qualified by a significant statement by context interaction, $F(1, 77) = 4.60, p = .035, \eta_p^2 = .06$. Following the interaction, (see Figure 3.8), collapsing across age, planned comparisons demonstrated that, as predicted, children assigned more punishment to self-serving lies ($M = 2.05$) than self-serving truths ($M = 1.09$), $t(80) = 4.86, p = .0001, d = 0.61$, and to prosocial lies ($M = 1.52$) than prosocial truths ($M = 1.09$), $t(80) = 2.58, p = .012, d = 0.30$. Also consistent with my predictions, self-serving lies were assigned more punishment than prosocial lies, $t(80) = 3.26, p = .002, d = 0.33$, although self-serving and prosocial truths did not differ.

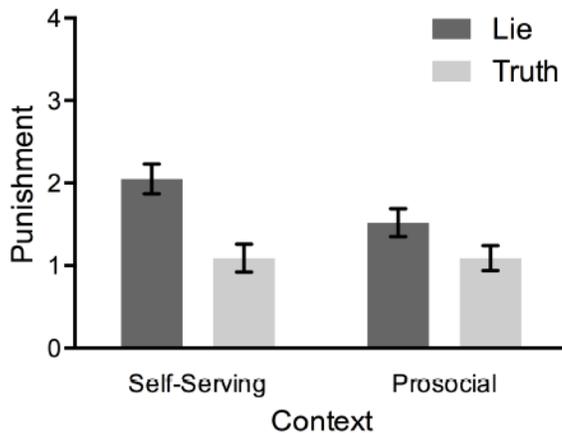
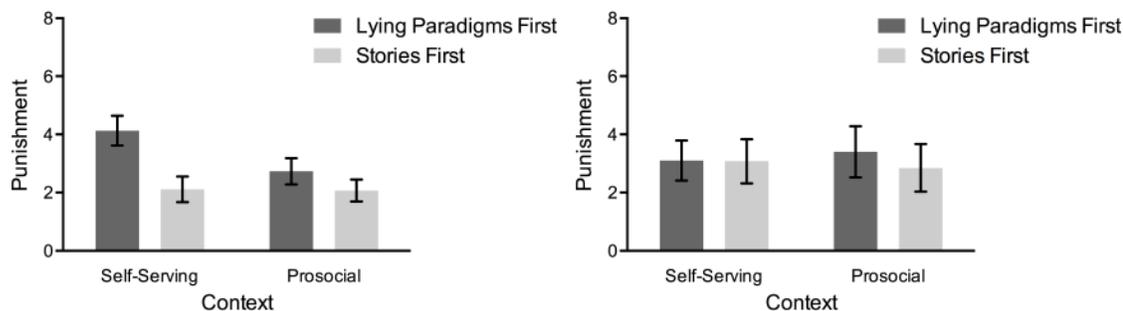


Figure 3.8. Children's punishment of lies and truths. The context by statement interaction is depicted, and scores are collapsed across age and paradigm order. Error bars represent standard errors.

The ANOVA also revealed a significant three-way interaction between context, paradigm order and age (see Figures 3.9 and 3.10). Following the interaction, collapsing across statement, post-hoc comparisons revealed that four-year-olds who participated in the lie telling paradigms first assigned significantly more punishment in the self-serving context ($M = 4.13$) than did four-year-olds who heard the stories first ($M = 2.11$), $t(56) = 3.01$, $p = .004$, $d = 0.80$, however, their assignment of punishment in prosocial contexts did not differ. In contrast, five-year-olds assigned similar amounts of punishment whether they participated in the lie-telling paradigms first or heard the stories first, in both contexts.



Figures 3.9 and 3.10. Four-year-olds' (left) and five-year-olds' (right) punishment of statements made in self-serving and prosocial contexts. Across the two figures, the three-way interaction between age, context and paradigm order is depicted, and scores are collapsed across statement. Error bars represent standard errors.

Affective Evaluation of Speakers. A final 2 (age) x 2 (context) x 2 (statement) mixed ANOVA was performed on children's affective evaluations of the speakers. For each story, children's affective evaluations ranged from -2 (*a lot sad*) to +2 (*a lot happy*). Therefore, in each of the four cells (summed across two stories of a type), scores ranged from -4 to +4.

The ANOVA revealed significant context by paradigm order interaction, $F(1, 76) = 5.93, p = .017, \eta_p^2 = .07$, as well as a significant statement by paradigm order interaction, $F(1, 76) = 8.03, p = .006, \eta_p^2 = .10$. Following the context by paradigm order interaction (see Figure 3.11), collapsing across statement type, post-hoc comparisons suggested that in self-serving contexts, children who heard the stories first tended to rate speakers as feeling more positive than those who participated in the lie telling paradigms first ($M = 2.9$ and $M = 1.05$, respectively), though this contrast was not significant, $t(79) = 1.85, p = .068, d = 0.41$. In prosocial contexts, speakers were rated similarly, whether children heard the stories first or participated in the lie-telling paradigms first, driving the interaction.

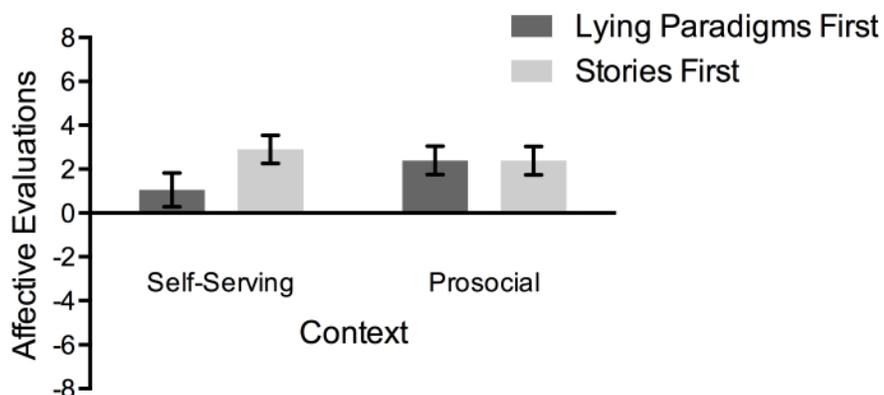


Figure 3.11. Children's affective evaluations of speakers who told lies and truths in self-serving and prosocial contexts. The context by paradigm order interaction is depicted, and scores are collapsed across age and statement. Error bars represent standard errors.

Following the statement by paradigm order interaction (see Figure 3.12), collapsing across context, post-hoc comparisons revealed that children who heard the stories first rated speakers who told truths ($M = 3.56$) more positively than those who participated in the lie-telling paradigms first ($M = 1.38$), $t(79) = 2.43$, $p = .017$, $d = 0.55$. In contrast, both groups of children rated speakers who told lies similarly.

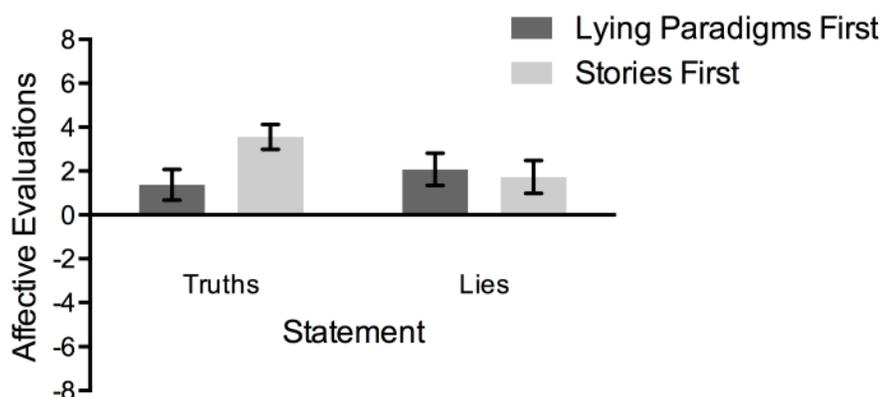


Figure 3.12. Children's affective evaluations of speakers who told lies and truths in self-serving and prosocial contexts. The statement by paradigm order interaction is depicted, and scores are collapsed across age and context. Error bars represent standard errors.

Relations to Theory of Mind and Executive Function. Recall that children also completed measures of first- and second-order false-belief understanding, affective perspective taking, inhibitory control, working memory and receptive vocabulary (see

Table 3.4 for descriptive statistics). To test my hypotheses, I examined the partial correlations between children's identification accuracy, moral judgments and punishments, affective evaluations of speakers and their first- and second-order false-belief understanding and affective perspective taking, inhibitory control and the working memory component score, after controlling for age (in months) and receptive vocabulary (see Table 3.5 for correlation matrix). As in Study One, these comparisons were made collapsing across context (whether self-serving or prosocial), but not statement type, since context was not predicted to influence the relation between children's Theory of Mind and Executive Function and the story variables (as discussed in Chapter 2).

As can be seen in Table 3.5, children's first-order false-belief understanding was significantly correlated with their identification of lies, $pr(77) = .318, p = .004$, and truths, $pr(77) = .341, p = .002$, as predicted. However, children's first-order false-belief understanding was also significantly correlated with their moral judgments of lies, $pr(77) = -.347, p = .002$, and their punishment of lies, $pr(77) = .346, p = .002$, though *these* relations were not predicted for their first-order false-belief understanding. Similarly, children's second-order false-belief understanding was significantly correlated to their moral judgments, $pr(77) = -.340, p = .002$, and punishments, $pr(77) = .250, p = .026$, of lies, but not truths (all $ps > 0.05$), as predicted. However, second-order false-belief understanding also significantly related to their identification of lies, $pr(77) = .355, p = .001$, and truths, $pr(77) = .266, p = .018$, though again, *these* relations were not predicted. Thus, both first- and second-order false-belief understanding related to children's identification of lies and truths, and their moral judgments and punishments of lies.

Table 3.4

Descriptive Statistics for the Major Study Variables for the Full Sample and by Age

| Variable | <i>Full Sample</i> | | <i>4-year-olds</i> | | <i>5-year-olds</i> | |
|--|--------------------|---------------|--------------------|---------------|--------------------|---------------|
| | <i>N</i> | <i>M (SD)</i> | <i>N</i> | <i>M (SD)</i> | <i>N</i> | <i>M (SD)</i> |
| Age (in months) | 81 | 56.52 (6.03) | 58 | 53.52 (3.89) | 23 | 64.09 (3.10) |
| First-order False-Belief (out of 3) | 81 | 2.16 (1.05) | 58 | 1.98 (1.13) | 23 | 2.61 (.66) |
| Second-order False-belief (out of 2) | 81 | .64 (.78) | 58 | .50 (.73) | 23 | 1.00 (.80) |
| Affect. Perspective Taking (out of 12) | 73 | 9.64 (2.37) | 50 | 9.36 (2.56) | 23 | 10.26 (1.76) |
| Black/White Stroop (out of 21) | 81 | 16.72 (4.1) | 58 | 16.81 (4.26) | 23 | 16.48 (3.75) |
| Forward Digit Span (max of 10) | 81 | 5.72 (1.65) | 58 | 5.59 (1.64) | 23 | 6.04 (1.66) |
| Backward Word Span (max of 8) | 81 | 2.02 (1.26) | 58 | 1.76 (1.26) | 23 | 2.70 (1.02) |
| Corsi Span (max of 10) | 81 | 4.52 (1.49) | 58 | 4.24 (1.48) | 23 | 5.22 (1.31) |
| Working Memory Component Score | 81 | .0001 (1.00) | 58 | -.21 (1.01) | 23 | .53 (.77) |
| PPVT – III | 81 | 73.22 (17.47) | 58 | 69.00 (15.07) | 23 | 83.87 (18.86) |

Note. Eight children were missing scores for Affective Perspective Taking.

Table 3.5

Partial Correlations between Children's Identification, Moral Judgment and Punishment, and Speaker Affective Evaluations of Lies and Truths and Theory of Mind Measures Controlling for Age (in months) and Receptive Vocabulary

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---------------------------------------|---|--------|----------|--------|----------|----------|--------|----------|---------|---------|--------|-------|---------|
| 1 Lie Identification | - | .314** | -.402*** | .020 | .318** | .018 | -.139 | -.020 | .318** | .355** | .058 | -.058 | .022 |
| 2 Truth Identification | | - | -.158 | .309** | .168 | -.141 | -.023 | .148 | .341** | .266* | .123 | .232* | .206 |
| 3 Lie Moral Judgment | | | - | .371** | -.744*** | -.386*** | .316** | .242* | -.347** | -.340** | -.033 | .047 | .039 |
| 4 Truth Moral Judgment | | | | - | -.361** | -.678*** | .186 | .672*** | -.099 | -.042 | .118 | .109 | .168 |
| 5 Lie Punish. | | | | | - | .577*** | -.246* | -.293** | .346** | .250* | .031 | -.023 | -.045 |
| 6 Truth Punish. | | | | | | - | -.106 | -.463*** | -.140 | .075 | -.151 | -.102 | -.239* |
| 7 Lie Affective Evaluation | | | | | | | - | .553*** | -.051 | -.053 | -.241* | .102 | .050 |
| 8 Truth Affective Evaluation | | | | | | | | - | -.010 | .008 | .164 | .186 | .148 |
| 9 First-Order False Belief | | | | | | | | | - | .404*** | .055 | .163 | .107 |
| 10 Second-Order False Belief | | | | | | | | | | - | .127 | -.028 | .118 |
| 11 Affective Perspective [†] | | | | | | | | | | | - | .190 | .463*** |
| 12 Inhibitory Control | | | | | | | | | | | | - | .225* |
| 13 WM | | | | | | | | | | | | | - |

Note: * $p < .05$. ** $p < .01$. *** $p < .001$. $N = 81$ for all comparisons, unless otherwise indicated, [†] $N=73$

Children's affective perspective taking scores related to their affective evaluations of the speakers who told lies, $pr(77) = .241, p = .043$, but not those who told truths, though I predicted that affective perspective taking would relate to children's affective evaluations of speakers that told lies and truths. Finally, in terms of relations to Executive Function, though none were predicted, children's inhibitory control significantly related to their identification of truths, $pr(77) = .232, p = .039$, and children's working memory composite score was negatively correlated to their punishment of truths, $pr(77) = -.239, p = .034$.

Discussion

The first goal of this study was to examine the frequency of four- and five-year-olds' self-serving and prosocial lie telling, and the contingency between them. Rather unexpectedly, far fewer children peeked in the temptation resistance paradigm (only 35% successfully peeked) or indicated dislike for the soap in the disappointing gift paradigm (53%) than reported in the literature (typically around 80 - 90% and 100%, respectively). Consequently, the number of children who had the *opportunity* to tell both self-serving and prosocial lies was much smaller than expected.

Of the 27 children who did successfully peek, however, 89% denied having done so, telling a self-serving lie, a percentage slightly higher than predicted and somewhat higher than the rates reported in the literature (e.g., 64% reported by Talwar & Lee, 2008; 69% - 87% reported by Evans et al., 2011). Of the children who told this initial lie, as predicted, most incriminated themselves (87.5%) and guessed that the box contained a teapot, though more children than expected (52%) provided a plausible explanation for their knowledge. It is possible that since fewer children peeked overall, the children who

did peek in the present study were more committed to peeking than in previous studies, and were therefore somewhat more likely to lie or to provide plausible explanations for their knowledge. Given the small numbers of children considered, however, these explanations are speculative.

Of the children who did indicate that they disliked the soap (either to parents or on camera before the experimenter returned), 73% told a prosocial lie to the experimenter, consistent with predictions and with the rates reported in the literature. Contrary to my predictions, most children maintained their prosocial lies in their answers to the two follow-up questions (77% and 87% to the two follow-up questions, respectively). Though the rate of preschoolers' maintenance of prosocial lies has not been explicitly reported in the literature (Popliger et al., 2011 reported mean scores instead), Popliger and colleagues (2011) did report that only 56% of seven-year-olds and 79% of nine-year-olds were able to provide plausible answers to the same maintenance questions that were asked in the present study. In comparison, the younger children in this sample seem to have done so at a higher rate than would be expected. It is possible, here too, that the children who *did* indicate their dislike of the soap and went on to tell a prosocial lie were perhaps more committed to telling a prosocial lie than children in the literature, and therefore more skilled at providing plausible answers to the maintenance questions. Again, given the small number of children, this explanation is speculative.

The chief goal of the present study was to examine the correspondence between children's lie telling in self-serving and prosocial contexts. I predicted that most children would tell both kinds of lies, some children would not tell either kind of lie, and that few children would tell only one lie or the other. Unfortunately, given the small number of

children who had the opportunity to tell both lies, this hypothesis was not testable. However, the data do offer some, albeit limited, support that when children lie, they tend to tell both kinds of lies. Of the 14 children who both peeked and disliked the soap, nine of them told both lies, four told only the self-serving lie, one told only the prosocial lie and none told the truth in both contexts. Although this is a very small number of children, and a small subset of the overall sample, it does suggest that children tend to tell both kinds of lies, when given the chance.

Similarly, when first considering only the children who had the opportunity to tell one kind of lie (the 27 peekers), and then considering the children who *could* tell the other kind of lie (that is, the 14 soap dislikers *among* the peekers), 89% told the self-serving lie and 73% told the prosocial lie. This result again suggests that children who lie in one context are *likely* to lie in the other. If it is the case that children who lied in either context in the present study were *more committed* or *the most likely to lie* in comparison to work reported in the literature, as I have suggested, the possible correspondence between children's lie telling in these two contexts may be an artifact of the present sample rather than a description of children in general. Future work is needed to address this important research question.

The second goal of this study was to investigate the roles of children's conceptual understanding of lies, Theory of Mind, and Executive Function in their actual lie-telling behaviour, extending findings from the work on children's self-serving lie telling, and investigating the role of these abilities in children's prosocial lie telling, largely for the first time. Again, given the small number of children who had the opportunity to tell these lies, and given the high rates of lie telling within these small groups, these

hypotheses were untestable. The few comparisons that were made were done so between very small groups of children, and though significant differences were not found between them, they were unlikely to be found given the group sizes.

The low frequency of children's peeking and disliking the soap is a major limitation of the present study, and is a particularly difficult one to explain. The paradigms were planned carefully based on those used in the existing literature, and the sample size chosen was based on the rates reported in the literature. Based on these estimates, an adequate number of children should have peeked and disliked the soap in order to test my hypotheses. Regardless, these estimates were not met, potentially due to characteristics of the sample or to features of the paradigms themselves.

Although recruitment took place through a variety of methods, including a database of families who had participated in previous research conducted at daycare centres throughout diverse areas of the community, posters in community storefronts, and advertisements in a free parenting magazine, on parent-interest Facebook groups and on local parenting blogs, the sample was still quite stratified. Of the 76 families who provided information on annual household income, 67 families (83% of the sample) reported annual household incomes greater than \$60 000, with 51 families (63% of the sample) exceeding \$100 000. Parental education was also very high: of the 80 families who reported on education for one parent, 65 (80% of the sample) reported university or graduate level education; and of the 77 families who reported on education for a second parent, 53 (65% of the sample) reported university or graduate level education.

However, the sample in the present study may not be overwhelmingly different from those in the literature, though demographic information in these studies is

infrequently reported. Several studies reported that participants were largely from ‘middle income’ families in a ‘medium-sized’ North American city (e.g., Popliger et al., 2011; Talwar & Lee, 2008; Talwar et al., 2007b). Talwar and colleagues (2007a) reported that participants were largely from ‘middle and upper-middle’ income families in a ‘large’ North American city; and Evans and colleagues (2011) reported that participants were from families in which 50% of parents had a college (i.e., university) education in Beijing, China. Like the present study, most of the work reviewed here (other than the two studies conducted in China) took place at university laboratories in mid-sized cities, meaning that parents volunteered to bring their children to the laboratory for one to two hours to participate in the research. None of the studies reviewed here reported parental incentives for participation. These two factors alone suggest that children were from families who could afford the time, transportation, and investment to participate. It is also possible, however, that fewer children may have peeked and/or disliked the soap in the present study because of specific features of the paradigms used.

In the temptation resistance paradigm, children were required to lift the lid of a modified cake box in order to peek at the toy. This modification was made in order to ensure that children’s peeking behaviour was indeed *intentional* peeking that resulted from a more deliberate action than simply glancing over their shoulders to peek, as in many of the reported studies (e.g., Lewis et al., 1989; Talwar & Lee, 2008; Talwar et al., 2002). However, care was taken to ensure that children were competent and capable of opening the boxes easily, since they did so on both trials that preceded the critical trial (and no child demonstrated any difficulty or reluctance to do so). On the critical trial, children were left alone with the box for one minute, the same time interval used by most

researchers (Evans et al., 2011; Talwar & Lee, 2008; Talwar et al., 2002), and the majority of children in the present study peeked within the first 15 seconds.

Other researchers have reported higher frequencies of peeking behaviour in paradigms that required children to do more than simply glance at the toy, as in the present study. Polak and Harris (1999, Study 2), for instance, required children to look through the door of a toy house and reported that 95% of three- and five-year-old children did so in the experimenter's absence, though it is unclear whether children could accomplish this without moving in their chairs (i.e., by glancing). Presumably, these children peeked in order to confirm their guess (that the toy which made a 'quack quack' noise was indeed a duck, when in fact, it was really a pig). Children in Polak and Harris' (1999) study would have had less motivation to peek at the toy than children in the present study, since the noise made by the toy was informative ('quack quack'), and children had no reason to *doubt* that the animal was a duck. In contrast, the noise made by the toy in the present study was *uninformative* and did not suggest any particular identity for the toy, a feature that should have increased children's motivation to peek.

In another study, Evans and colleagues (2011) required children to lift an overturned cup in order to peek on the critical trial, though it was not specified whether children had been given an informative or uninformative clue before the experimenter left the room. In their first study, 53% of four-year-olds and 70% of five-year-olds peeked at the toy, and in their second study, 59% of four-year-olds did so. Though it was only speculation, I expected that peeking in the present study would be somewhat *easier* than in Evans and colleagues' (2011) study: first, because children could raise the lid of the box very slightly (as most peekers did) without any risk of upsetting the box or making a

sound (and they had practice doing so); second, because lifting the lid of the box seemingly required less coordination and did not risk upsetting the toy inside (as would be a possible risk with the overturned cup); and third, because children additionally had the option of walking around the box to peek through the door cut in the back (as several did). Regardless, fewer children peeked in the present study, and as a result, many of my hypotheses could not be tested.

In the disappointing gift paradigm, only 53% of children indicated that they actually disliked their disappointing gift – a plain white bar of soap. This finding is also in stark contrast to findings reported in the literature. Two relatively recent studies have used a plain, white bar of soap as a disappointing gift with samples of children that included four- and five-year-olds, and both studies reported that *all children* indicated to their parents that they did not like the soap (e.g., Popliger et al., 2011; Talwar et al., 2007a). While it cannot be ruled out that 47% of children in the present study truly liked the soap, this seems very unlikely (though four children did appear to be genuinely happy with it). Half of these children left their soap behind at the end of the session, and two thirds of children who were asked what the experimenter should wrap for another child indicated that she should wrap one of the toys instead of the soap.

That being said, it remains unclear why nearly half of the participants maintained to their parents that they liked the soap. It is possible that these children have been taught to be grateful for any gift they receive, and so maintained that they liked the soap to their parents. Again though, it is unlikely that participants in the present study differed that greatly in this respect from the participants in other recent studies using the same paradigm in similar cities. It is also possible that children simply *repeated* to their

parents what they had already said to the experimenter, when their parents asked them if they liked the soap. Indeed, many parents recorded children's answers to the maintenance questions (what children liked about the soap and what they would do with it) on their response forms, even though they were only instructed to ask children "Do you really like the soap?" suggesting that children had repeated to their parents what they had just said to the experimenter. However, this account still does not explain why children in the present study behaved so differently from the studies reported in the literature – the parental question is always asked following the paradigm. In a very recent study using the disappointing gift paradigm, Williams and colleagues (2013) had children rank order a number of prizes from least attractive to most attractive *before* participating in the paradigm. When children were then given the prize that they had deemed least attractive during the paradigm, the researchers already had an indication that children did not *like* their gift. A similar procedure would have been very beneficial in the present study.

Given these limitations, future work is needed to address both the first and second goals of the present study: to determine the correspondence between children's lying in these different contexts, and to determine whether the same skills contribute to children's lie telling in both contexts (and what skills contribute to children's prosocial lie telling). Perhaps this work should be conducted with a more representative sample of children, with a much larger sample of children, and/or with modifications to the paradigms to ensure that a higher proportion of children both peek and dislike the disappointing gift.

Modifications to the temptation resistance paradigm could include increasing children's motivation to peek by offering a reward for correct answers, or by making it

somewhat easier for children to peek at the toy, perhaps by requiring children to stand up in order to see a toy that is in the bottom of a deep box (which would still be a more intentional action than glancing). Modifications to the disappointing gift paradigm could include using gifts that children have already rated as unattractive at the outset of the experiment (as in Williams et al., 2013), or requiring children to choose between the attractive and unattractive gift (as in the high-cost condition of Popliger et al., 2011), or adding a delay between the experimenter's question about liking the gift and the parental confirmation.

The third goal of the present study was to replicate and extend the findings of Study One on children's identification, moral judgments and punishments, and affective evaluations of speakers who told self-serving and prosocial lies and truths, and their relation to different aspects of Theory of Mind (first- and second-order false-belief understanding and affective perspective taking) and Executive Function (inhibitory control and working memory).

Consistent with Study One, and with my predictions, both four- and five-year-olds were above chance in their identification accuracy for both kinds of lies and truths, and five-year-olds outperformed four-year-olds, overall. Four-year-olds accurately identified statements just over half the time and five-year-olds did so three-quarters of the time, consistent with the accuracy rates reported in Study One. This finding confirms that developmental differences in children's identification of lies and truths exist *within* the preschool period, as discussed in Chapter 2. Though in Study One children were better at identifying statements in self-serving contexts than in prosocial ones, context was not a factor in their identification accuracy in Study Two. Similarly, in Study One,

the difference between four- and five-year-olds' accuracy was greater for truths than for lies (manifesting in a statement by age interaction), but this was not the case in Study Two. However, previous research has found both of these effects, albeit in much smaller groups of preschoolers and using different question formats (e.g., Bussey, 1999; Popliger et al., 2011). Future research with large samples of preschoolers should address this question.

Between Studies One and Two, children's moral judgments were somewhat dissimilar. In Study One, children's moral judgments were affected by both statement and context: children rated lies negatively and truths positively within both contexts, and their discriminations were greater in self-serving contexts. Children also rated self-serving lies more negatively than prosocial ones, but rated both truths equally. These findings were driven by five-year-olds: four-year-olds did not discriminate between lies and truths, but five-year-olds did. In Study Two, however, children's moral judgments did not demonstrate a statement by context interaction, but instead, each factor was involved in a *separate* two-way interaction: one between statement and age, and one between context and age. The statement by age interaction revealed that both four- and five-year-olds discriminated between lies and truths, but that five-year-olds made greater distinctions than four-year-olds between lies (but not truths). Thus, four-year-olds in the present study were somewhat more sensitive to the moral implications of lies than were four-year-olds in Study One.

The context by age interaction revealed that although four-year-olds judged statements (collapsed across statement type) made in prosocial contexts more positively than those made in self-serving ones, five-year-olds judged statements similarly,

regardless of context (and similarly to four-year-olds judgments of self-serving statements). This finding suggests some developmental differences in children's sensitivity to context, though since this comparison was made collapsed across statement type, it is somewhat difficult to interpret exactly what this sensitivity means; some aspect of the prosocial stories seemed less negative to four-year-olds, apparently whether lies or truths were told by the speakers.

Children's moral judgments were also influenced by paradigm order in Study Two. Recall that half of the participants received the lie-telling paradigms first and the stories second, while half received them in the other order. Children who participated in the lie-telling paradigms first judged statements made in self-serving stories more negatively (collapsed across statement type) than the children who heard the stories before participating the lie-telling paradigms. This finding, which was not predicted, suggests that children who had already been faced with the decision about telling a self-serving lie (or committing the minor transgression of peeking) judged the characters in self-serving stories more harshly than children who had not already had such experience. However, children's experience with the prosocial paradigm (receiving a disappointing gift) did not influence their judgments of characters in prosocial stories. Perhaps having experienced the lie-telling paradigms made the transgressions that the characters had made in self-serving stories more salient to children (many of whom chose *not* to peek themselves), driving their more negative moral judgments as compared to children who had not already experienced the paradigms (and had not faced the decision about whether or not to peek).

In terms of punishment, however, the results of Study Two were quite similar to those of Study One. In both studies, children's punishment ratings were affected by statement type and context: they assigned more punishment to speakers who told lies than to those who told truths in both contexts, and more punishment to speakers who told lies in self-serving contexts than to those who told lies in prosocial ones. Speakers who told truths were assigned similar levels of punishment in both contexts. Further, visual examination of the means reveals that children's punishment scores for each statement type were very similar across the two studies. This finding suggests that children's assignment of punishment may be more sensitive than their moral judgments. Though in Study One children's moral judgments and punishments were very similar, in Study Two children's moral judgments were less sensitive than their assignment of punishment to the different contexts that lies and truths were told in.

It is also possible that punishment assignment (which ranged from 0 to 2 for each story) was less likely to be 'neutral' than moral judgments (in which children rated both the 'goodness' and 'badness' of each speaker's statement, on scales from 0 to ± 2) allowing for neutral scores (e.g., a score of +1 on the 'good' question and -1 on the 'bad' question would be summed to a score of 0). That is, children may have been less likely to assign 'no punishment' than to assign equivalent 'good' and 'bad' moral judgments, thereby resulting in greater discrimination between speakers who told lies and truths in the different contexts in children's punishment scores.

Children's assignment of punishment in Study Two was also jointly influenced by context, age, and paradigm order, as demonstrated by the three-way interaction of these factors. As was the case for children's moral judgments, four-year-olds who participated

in the lying paradigms first assigned more punishment to speakers in self-serving stories (collapsed across statement type) than did four-year-olds who heard the stories first. Again, four-year-olds assigned similar punishment to speakers in prosocial stories whether they had participated in the lying paradigms or the stories first, suggesting that previous experience in the prosocial lie-telling paradigm did not influence their assignment of punishment to characters in similar contexts. This finding again suggests that children who had been given the opportunity to tell a self-serving lie (or to transgress in the paradigm) considered characters more harshly than those who had not already had this experience. As with their moral judgments, it may be the case here too that experiencing the paradigms made the transgressions committed by the story characters more salient to children, driving their harsher judgments of them. Five-year-olds assigned similar levels of punishment to speakers in self-serving and prosocial contexts (again, collapsed across statement type), regardless of paradigm order.

Children's affective evaluations of speakers in Study One demonstrated sensitivity to both context and age: they rated speakers who told self-serving lies as feeling more negative than those who told self-serving truths and those who told prosocial lies, and they rated speakers who told prosocial lies and truths similarly (and similar to those who told self-serving truths). In Study Two, however, children's affective evaluations were not influenced by the same context by statement interaction. However, paradigm order did interact with context and with statement type (separately) to influence children's affective evaluations of the speakers. Children who participated in the lying paradigms first tended to rate the speakers in self-serving stories more negatively than those who heard the stories first (though this contrast did not reach

significance), again suggesting that children's experience with the lie-telling paradigms influenced their evaluations of the speakers in self-serving stories by making the transgressions these characters committed more salient.

Children who participated in the lying paradigms first also rated speakers who told truths as feeling *less happy* than did children who heard the stories first, though speakers who told lies were rated similarly. This finding is somewhat counterintuitive, as one might expect children who participated in the lying paradigms first to rate speakers who had told truths as feeling *more happy* than children who had not yet experienced the paradigms. However, it is important to consider that most children in the sample did *not* peek and did *not* indicate a dislike for the soap. It may be the case that children's experience with the lie-telling paradigms influenced their assessment of the story characters' *actions*, which differed from their own actions (most children did not transgress and claimed to like the soap) than by the statements the characters made, as I have suggested.

This difference may have manifested in their affective evaluations of the speakers that told truths. Speakers who told lies were rated as feeling equally bad by children (regardless of paradigm order); children know that telling a lie makes you feel bad, and they do not need experience with these particular *kinds* of lies to know that (and most children did not gain this experience in the paradigms, since they had nothing to lie about!). However, in reasoning about the speakers who told truths, the children who experienced the lie-telling paradigms first may have been more likely to consider the speakers' actions (transgressing and disliking things) when reasoning about how the speakers would feel than children who had not already experienced the paradigms.

The findings of Study Two supported the relations between children's first-order false-belief understanding and their identification of lies and truths, and children's second-order false-belief understanding and their moral judgments and punishments of lies, but not truths, as found in Study One. However, in Study One, children's first-order false-belief understanding only related to their identification of lies and truths and children's second-order false-belief understanding only related to their moral judgments and punishments of lies. In Study Two these relations were more widespread: children's first-order false-belief understanding also related to their moral judgments and punishments of speakers that told lies, and children's second-order false-belief understanding also related to their identification of lies and truths.

This finding suggests that children's identification of lies and truths, and moral judgments and punishments of lies, *all* relate to *both* first- and second-order false-belief understanding, in contrast to the findings of Study One. At the very least, it demonstrates that children in the *current sample* used both of these skills when reasoning about these different aspects of the speakers' statements. Thus, from Study Two, it seems that both kinds of tasks (first- and second-order false-belief measures) are tapping into the kinds of reasoning needed for children to identify speakers' statements as lies or truths and to morally judge and assign punishment to speakers that told lies.

However, other differences between Study One and Study Two may also account for these discrepant findings. First, in Study Two, two measures of second-order false-belief were included to provide a more sensitive assessment of children's understanding (recall only one measure was used in Study One). As such, this more sensitive assessment could have revealed the role of second-order mental state reasoning in

children's identification of lies and truths. This difference, however, does not account for the finding that children's first-order false-belief understanding related to their moral judgments and punishments of lies. Second, the sample of Study Two was likely more stratified than that of Study One, and this factor could have contributed to a sample of children more adept at both kinds of mental state reasoning. However, children's mean performance on these measures across the two studies was quite similar, making this an unlikely explanation for the discrepant findings.

Third, half of the children in Study Two participated in the lie-telling paradigms before the conceptual understanding stories. Children's experience in the lie-telling paradigms was found to influence their moral judgments, punishments and affective evaluations of speakers in self-serving contexts. It seems possible, then, that participation in the lie-telling paradigms may also have influenced the *kinds* of reasoning that children engaged in when thinking about the speakers' statements. That is, children who had already had the opportunity to transgress and/or lie may have been more likely to engage in both first- and second-order mental state reasoning (reflecting on the mental states of both speakers and recipients) when considering speakers' statements in the stories.

However, as it stands, these three possible accounts cannot be teased apart. Regardless, more work is needed to elucidate the role of children's first- and second-order false-belief understanding in their identification and moral judgments of truths and lies, and specifically, whether these abilities play a differential role in the different aspects of children's conceptual understanding of lies, as suggested by Study One, or a dual role, as suggested by Study Two. This work should be conducted in a large,

representative sample of children, without the extra noise introduced by participation in lie-telling paradigms.

I also predicted that children's affective perspective taking performance would relate to their affective evaluations of speakers who told both lies and truths, though only a relation to their evaluations of speakers who told lies was found. It is possible that children did not *need* to take the perspective of speakers who told truths to reason about how they would feel, but did need to take the perspective of speakers who told lies to understand how they might feel. Just as children's belief understanding only relates to their moral judgments and punishments of speakers that told lies, it may be the case that children are only inclined to take the *perspective* of speakers who have told lies, perhaps reflecting on their motives or their feelings about what they have said or done.

Finally, I had predicted that children's inhibitory control and working memory would not relate to their performance on any of the story measures, as suggested by the findings of Study One. Contrary to this prediction, however, children's inhibitory control was related to only their identification of truths, and their working memory was related to only their punishment of truths (negatively; i.e., children with higher working memory assigned less punishment to speakers who told truths). These findings are difficult to account for, even speculatively. Though quite exploratory, in Study One I had predicted that children's inhibitory control would relate to their identification of lies only, since children may need to inhibit their own knowledge of the speakers' actions to reason about their untrue statements. I had also predicted that children's working memory would relate to their performance on all the story variables, since children better able to track the story details would be more proficient in reasoning about various aspects of their

statements. Neither of the relations found are in line with these predictions either, and it is puzzling that children's reasoning about speakers who told truths would require Executive Function, while reasoning about speakers who told lies would not. Truths should require less inhibition and working memory to consider, since speakers' statements are in line with their actions (and with children's own knowledge of their actions) in these cases.

In sum, the findings of Study Two are fairly consistent with those of Study One, overall: the major differences in the findings of the two studies stem largely from the influence of paradigm order on children's moral judgments and affective evaluations in Study Two. Children in both studies were above chance in their identification of all statements, five-year-olds outperformed four-year-olds in their identification accuracy, and children's mean accuracy was similar across the two studies. In their moral judgments, though children were sensitive to both context and statement in Study One, children in the present study were sensitive only to statement type in their moral judgments. However, both four- and five-year-olds made these distinctions, though only five-year-olds did so in Study One. Children's punishment assignment was very similar across both studies, influenced by both context and statement type, suggesting that children's assignment of punishment is perhaps a more sensitive measure of their moral understanding than the more abstract moral judgments. Children's affective evaluations of the speakers were less consistent across the two studies: though children in Study One considered both context and statement type in their evaluations of how the speakers would feel, children in Study Two seemed to rate speakers as feeling somewhat similar

across contexts and statements and the only differences in their evaluations were attributable to paradigm order.

Finally, Study Two offered some additional support for the relation between children's first-order false-belief understanding and their identification of both lies and truths, and between children's second-order false-belief understanding and their moral judgments and punishments of lies, which was a novel finding of Study One. However, Study Two did not support the differential role of these abilities in children's identification and moral considerations of speakers' statements. Study Two also demonstrated relations between children's affective perspective taking (a measure that was not included in Study One) and their affective evaluations of speakers who told lies. Finally, in Study Two children's inhibitory control related to their identification of truths, and working memory related to their punishment of truths; these findings are difficult to account for and are inconsistent with Study One.

A novel contribution of Study Two was that children's moral judgments, punishments and affective evaluations of the speakers were additionally influenced by the order of the paradigms. In all cases, children who had participated in the lie-telling paradigms first evaluated characters in self-serving contexts differently than children who heard the stories first: they made more negative moral judgments, assigned more punishment, and ascribed more negative emotions to characters in self-serving contexts. This is a novel finding that suggests that children's experience in the lie-telling paradigms carries into their evaluation of story characters in similar situations. More interesting, is that the paradigm effect consistently influenced children's consideration of speakers in self-serving, but not prosocial, contexts. This finding potentially suggests

that the self-serving lie-telling paradigm is more salient to children, or alternatively, that children have a clearer sense of what constitutes appropriate behaviour in self-serving contexts, but less so in prosocial ones.

Though a few other researchers have examined the relation between children's conceptual understanding and their lie telling in self-serving contexts, most have not counterbalanced the order of the paradigms, and hence, have reported no effect of order on children's conceptual understanding (e.g., Talwar & Lee, 2002a, Studies 2 & 3; Talwar & Lee, 2008). However, Talwar and Lee (2002a, Study 1) and Xu and colleagues (2010) are the only researchers to counterbalance the order in which children completed measures of conceptual understanding and lie telling, and both reported that no effects of order were found. Future research should be conducted to fully investigate the role of children's own experience in lie-telling paradigms on their conceptual understanding of speaker's lies and truths in different contexts, given the small number of children who had the opportunity to lie in the present study. It is possible that the effects reported here may differ in a sample of children that predominantly transgressed and lied in the temptation resistance paradigm.

Conclusion

The findings presented here make three important contributions to our knowledge about children's telling and conceptual understanding of self-serving and prosocial lies. First, although only suggestive, I have presented data showing that children who had the opportunity to tell both kinds of lies, tended to tell both kinds of lies. This finding needs to be replicated, but does suggest a strong correspondence between preschoolers' lie telling across two different contexts. Second, I have supported many of the findings of

Study One, demonstrating developmental changes in preschoolers' ability to identify statements as lies or truths, to consider the truthfulness of statements in their moral judgments, and to consider both statement and context in their punishment of speakers, suggesting that punishment assignment may be a more sensitive measure of preschoolers' moral reasoning about lies and truths. I also presented further support for the roles of children's first- and second-order false-belief understanding in their conceptual understanding of lies and truths, though the data did not replicate the differential role of these abilities in children's identification, moral judgments and punishments, and so, further research on this topic is needed. Third, I presented evidence that children's participation in lie-telling paradigms influenced their moral judgments, punishments and affective evaluations of speakers who told self-serving (but not prosocial) lies. This is a novel finding that suggests that children's previous (laboratory) experience with lie telling contributes to their conceptual understanding of the moral and emotional implications of telling such lies.

Chapter 4: General Discussion

The studies presented here were designed to further our understanding of preschoolers' *conceptual understanding* and *telling* of self-serving and prosocial lies, and to examine the roles of different aspects of Theory of Mind and Executive Function in these abilities. Lying is an intentional act that violates the social pragmatics of conversation (e.g., Grice, 1980) and has most often been studied from the perspective of Speech Act Theory (e.g., Lee, 2000; Lee, 2013). The approach taken here considered both the *intentionality* component of lying (via the role of Theory of Mind) and the *conventionality* component (via the moral implications of lying in these different social contexts). Thus, beyond being informative about preschoolers' conceptual understanding and telling of different kinds of lies, the findings presented are also informative about the role of Theory of Mind in aspects of preschoolers' moral development, broadly speaking. That is, examining children's conceptual understanding and telling of lies offers us the ability to observe how they *use* Theory of Mind and moral reasoning to consider relatively complex speech acts, and to make decisions about whether to lie or be truthful in self-serving and prosocial contexts.

The goal of Study One was to examine four- and five-year-olds' conceptual understanding (identification, moral judgments and punishments, and affective evaluations) of self-serving and prosocial lies and truths, and the role of Theory of Mind (first- and second-order false-belief understanding) and Executive Function (inhibitory control and working memory) in these abilities. Though some previous work has examined children's conceptual understanding of lies within one context or the other, only one other study examined children's conceptual understanding of lies across self-

serving and prosocial contexts, and did so within a wide age-range of children (Bussey, 1999). As such, little is known about the development of children's conceptual understanding of lies *within* the preschool period. Further, no previous work has directly examined the roles of Theory of Mind or Executive Function in these abilities.

The findings I presented in Study One demonstrated that important developmental differences exist, between the ages of four and five years, in children's conceptual understanding of lies and truths. Though both four- and five-year-olds were above chance in their identification of speakers' statements as lies and truths, only five-year-olds considered *both* the intentional component (i.e., whether they told lies or truths) and conventional component (i.e., whether the context was self-serving or prosocial) in their moral judgments and punishments of the speakers. That is, though four-year-olds were beginning to discriminate between lies and truths in the lexical/definitional sense of the term, accurately doing so about half the time, they did not fully consider the moral implications of those statements when making moral judgments or assigning punishment to speakers. Five-year-olds, in contrast, consistently rated lies more harshly than truths in both self-serving and prosocial contexts, and further rated self-serving lies more harshly than prosocial ones (in both their moral judgments and punishments of the speakers who told them). That being said, both four- and five-year-olds demonstrated some sensitivity to the emotional consequences of telling lies, rating speakers who told lies as feeling less happy than those who told truths, and rating speakers who told self-serving lies as feeling less happy than those who told prosocial ones.

The developmental patterns of performance on these measures suggests that children first begin to reason about the lexical differences between lies and truths

(considering only the intentionality component of the act) as demonstrated by four-year-olds, then become sensitive to the emotional consequences for lying (considering both the intentional and conventional components of the act) as demonstrated by both four- and five-year-olds, and finally to the differential moral implications of lies within self-serving and prosocial contexts (again considering both the intentional and conventional components), demonstrated only by five-year-olds.

Indeed, the differential roles of different aspects of Theory of Mind understanding demonstrated in Study One, support this account as well. Children's first-order false-belief understanding was related to their identification of statements as lies and truths, whereas their second-order false-belief understanding was related to their moral judgments and punishments of lies. It has been well documented that children's false-belief understanding undergoes significant developments around age four (e.g., Wellman et al., 2001), and that children's second-order false-belief understanding begins to emerge shortly afterward, around age five or six (e.g., Miller, 2009). If children's first- and second-order false-belief understanding are respectively driving developments in their lexical versus moral considerations of lies and truths, then development ought to proceed in the direction observed: first lexically discriminating between lies and truths in their identification (driven by first-order belief understanding) and then morally discriminating between lies and truths in their judgments of speakers (driven by second-order belief understanding). This fits with the pattern observed.

The primary goals of Study Two were to examine four- and five-year-olds' telling of self-serving and prosocial lies, the correspondence between them, and the roles of children's conceptual understanding of lies (identification, moral judgments and

punishment and affective evaluations), Theory of Mind (first- and second-order false-belief understanding and affective perspective taking), and Executive Function (inhibitory control and working memory) in these abilities. Though previous work has examined children's telling of self-serving lies and examined the roles of their conceptual understanding of lies, Theory of Mind and Executive Function, the precise roles of these abilities remains somewhat unclear. Other research has examined children's telling of prosocial lies, and the role of children's conceptual understanding of lies in their prosocial lie telling, but has not investigated how Theory of Mind or Executive Function contribute to prosocial lie telling. Further, no research has focused on developmental differences *within* the preschool period (instead focusing on larger age ranges) and the correspondence between children's lie telling in these two different contexts is not understood.

Because far fewer children had the opportunity to lie than expected in either context than was expected, many of my goals were not met. For instance, I was not able to examine the skills that contribute to children's lie telling in either context. However, I did present some preliminary evidence in support of a correspondence between children's lie telling in self-serving and prosocial contexts, though these findings need to be replicated given the small number of children considered, and the possibility that the sample was not representative of the general population. Since previous work has not considered children's lie telling across contexts, this is an important first step that merits further investigation. If supported by future research, the correspondence between children's lying in these two different contexts will provide insight into children's understanding of the conventional aspect of lie telling (i.e., whether they are sensitive to

the different moral implications of telling lies in self-serving versus prosocial contexts). Based on the extant research (within each context), preschoolers seem to have a fair understanding of the intentional aspect of lie telling, since they are able to tell and maintain lies, thereby creating a false belief in the mind of another.

A secondary goal of Study Two was to replicate and extend the findings of Study One, using some additional Theory of Mind measures. Although not a perfect replication, many of the findings of Study One were supported. Children again demonstrated greater-than-chance identification accuracy, and five-year-olds again outperformed four-year-olds in the identification of statements. Though children's moral judgments did not demonstrate their sensitivity to the intentional and conventional components of lies, their punishments did: children again assigned more punishment to speakers who told lies than those who told truths in both contexts, and more punishment to self-serving lie tellers than prosocial ones. Their affective evaluations of the speakers, however, did not demonstrate sensitivity to the intentional or conventional components of lies.

Interestingly, children's own experience in the lie-telling paradigms influenced their moral judgments, punishments and affective evaluations. Children who participated in the lie-telling paradigms first judged speakers in self-serving contexts more harshly than did children who heard the stories first. That is, after facing the decision about whether or not to peek in the temptation resistance paradigm (and the decision about whether or not to lie about it, for those who *did* peek), children's considerations of the moral and emotional implications of transgressing were changed. This is a novel finding in the lie-telling literature that demonstrates that children's personal experience in the

paradigms carries over and impacts their reasoning about the consequences of others' actions.

The findings of Study Two also demonstrated a relation between children's first- and second-order false-belief understanding and their identification of lies and truths, and their moral judgments and punishments of lies. However, unlike the findings of Study One, both kinds of belief understanding appeared to be involved in children's lexical *and* moral reasoning about the speakers' statements. Despite these discrepancies, however, it may still be the case that children's reasoning progresses from a lexical one, considering only the intentional aspects of lying, to a moral one, considering the conventional aspects as well. In both studies, children were able to accurately identify statements as lies or truths, reasoning about the intentional aspects of the acts (five-year-olds more so than four-year-olds), but were not fully able to appreciate the conventional aspects of the acts. Though in Study Two, contributions from first- and second-order false-belief understanding did not *differentially* relate to these different kinds of reasoning, other factors may have influenced these findings, including additional measures of second-order false-belief, characteristics of the sample, or children's participation in the lie-telling paradigms. Replication of these findings will shed more light on the developmental progression of children's conceptual understanding of lies, and the skills driving these abilities.

Finally, the findings of Study Two also suggest some relations between children's inhibitory control and working memory, and their performance on some of the story measures (relations which were not found in Study One), though these relations were not predicted and were difficult to account for. Therefore, future research is needed to

investigate the precise role of Theory of Mind and Executive Function in children's conceptual understanding of lies.

Although important, the present findings are not without limitations (as discussed in Chapters Two and Three) and several important questions remain open for future research. First, though many of the findings of Study One were supported in Study Two, further replication is needed to explain the developmental progression of children's conceptual understanding of lies, and the precise roles of first- and second-order false-belief understanding in these abilities. This research should be conducted with a large, representative sample of four- to six-year-olds (to capture further developments in second-order false-belief understanding), without the extra noise introduced by children's participation in lie-telling paradigms (as in Study Two). Further, though one of the goals of Study Two was to investigate another aspect of Theory of Mind understanding, affective perspective taking, in relation to children's conceptual understanding of lies, this measure related only to children's affective evaluations of speakers who told lies. Other aspects of Theory of Mind understanding, such as interpretive Theory of Mind (as investigated by Hsu & Cheung, 2013) may also be important, and may play different roles in children's reasoning about lies told in different contexts.

Second, the correspondence between children's telling of lies in self-serving and prosocial contexts needs to be investigated. Though the present findings do suggest that preschoolers tend to tell lies in both contexts, stronger evidence in a larger, representative sample of children is needed, perhaps with modifications to the lie-telling paradigms to increase the proportion of children who peek and who dislike the prize! This question needs to be investigated among preschoolers and older children alike. It may be the case

that once children are able to tell lies (with the development of Theory of Mind understanding) they begin by telling lies in both contexts, but become sensitive to the moral implications of lying in self-serving versus prosocial context with time or experience. Thus, both the correspondence between young children's lie telling in these contexts, and the developmental trajectory of this correspondence are important questions that remain.

Third, further work needs to investigate the skills that are related to children's lie telling in both contexts, to clarify the precise roles that children's conceptual understanding of lies, Theory of Mind, and Executive Function play in children's self-serving lie telling, and to investigate their roles in children's prosocial lie telling. Though I predicted that Theory of Mind and Executive Function would play similar roles in both kinds of lie telling, this question remains open. Further, other skills, such as other aspects of Theory of Mind, or socialization variables (as investigated by Popliger et al., 2011) may differentially contribute to lie telling in self-serving and prosocial contexts. In conjunction with the work that needs to be done on the developmental trajectory of children's lie telling in both contexts, the skills that drive children's lie telling in either or both contexts should also be explored throughout preschool and childhood. An exploration of each of these questions will further our understanding of children's conceptual understanding and telling of these different kinds of lies, and ultimately of the factors that contribute to children's lie telling.

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Appendix A: Stories and Panel Examples

Self-Serving Lie – Jenny (male character Ethan)

1. Jenny's dad was helping her get ready for bed.



2. It was time to brush her teeth.



3. Her dad went downstairs to get her teddy bear.



4. Jenny left the bathroom without brushing her teeth. Even though she was supposed to brush her teeth, she didn't.



5. When her dad got back, he asked Jenny, "Did you brush your teeth?" Jenny said, "Yes, I did brush my teeth."



Prosocial Lie – Danny (female character Chloe)

1. Danny was helping his dad in the yard.



2. When they were all done, his dad gave him a special gift for all his help.



3. It was a new book.



4. Danny did not like the book at all. Even though his dad liked it, Danny did not.



5. His dad asked Danny, “Do you like the book?” Danny said, “Yes, I do like the book.”



Remaining Self-Serving Stories

| | Panel 1 | Panel 2 | Panel 3 | Panel 4 | Panel 5 |
|---|---|---|--|---|--|
| Self-Serving Lie: Marcus/Sida | Marcus was playing a game with his mum. | Marcus just finished his turn. | The telephone rang and Marcus' mum left to answer it. | Marcus took an extra turn. It wasn't his turn to play anymore, but he took an extra turn anyway. | When his mum got back, she asked Marcus, "Did you take an extra turn?" Marcus said, "No, I didn't take an extra turn." |
| Self-Serving Truth: Kira/Quinn | Kira and her brother were tidying up. | Kira had to put away her books. | Her brother went downstairs to put away his ball. | Kira did not put away her books. Even though she was supposed to put them away, she didn't. | When Kira went downstairs, her brother asked her, "Did you put away your books?" Kira said, "No, I didn't put away my books." |
| Self-Serving Truth: Alexandre/Amélie | Alexandre and his friend were playing with some blocks. | Alexandre was making different piles of blocks. | His friend went to get some more blocks from his room. | Alexandre took a block from his friend's tower. He didn't ask if he could take a block, but he took one anyway. | When his friend got back, he asked Alexandre, "Did you take a block from my tower?" Alexandre said, "Yes, I did take a block from your tower." |

Remaining Prosocial Stories

| | | | | | |
|----------------------------------|---|--|-------------------------------|---|---|
| Prosocial Lie: Maya/Simon | Maya and her sister were choosing a game to play. | Her sister found a game that she wanted to play and took it off the shelf. | They play that game a lot. | Maya wanted to play a different game instead. Her sister wanted to play this game, but Maya wanted to play a different one. | Her sister asked Maya, "Would you like to play a different game?" Maya said, "No, I don't want to play a different game." |
| Prosocial Truth: James/Grace | James was waiting for the bus with his friend. | His friend had a new backpack that she was bringing to school. | It was bright green and pink. | James did not like his friend's new backpack. Even though his friend liked it, James did not. | His friend asked James, "Do you like my new backpack?" James said, "No, I don't like your backpack." |
| Prosocial Truth: Payton/Blake | Payton was having a friend over for a visit. | Her friend gave her a present to thank her for the visit. | It was a teddy bear. | Payton already had the very same teddy bear. Her friend gave it to her as a present, but Payton already had the same one. | Her friend asked Payton, "Do you already have the same teddy bear?" Payton said, "Yes, I do have the same teddy bear." |

Appendix B: Study One Statistical Assumptions

Assumptions of mixed-design ANOVA

Normality of Sampling Distributions. This assumption is met in mixed-design ANOVA if sample sizes are roughly equal (in this case, $N = 54$ for 4-year-olds and $N = 45$ for 5-year-olds), if there are at least 20 df for the between-subjects error term (in this case, df for the error term of the between-subjects factor is 96), and if two-tailed tests are used (Tabachnick & Fidell, 2007, p. 373). All of these conditions were met for each of the dependent measures, and thus, this assumption was met.

Homogeneity of Variance. This assumption is met if the ratio of the largest to smallest sample size is no greater than four to one, and if the ratio of the largest to the smallest variance (F_{max}) is no greater than ten to one for case totals (collapsing across the within-subjects factors), and within each cell (crossing the two within-subjects factors; Tabachnick & Fidell, 2007, p. 373). These conditions were met for each of the dependent measures ($F_{max} < 2.3$ for each).

Independence of Errors. This assumption is met for between-subjects factors based on the control of extraneous factors that could influence the different levels of the between-subjects variable (Tabachnick & Fidell, 2007, p. 373). Since the between-subjects factor was age in all analyses, this assumption was inherently met. This assumption does not apply to within-subjects factors with only 1 df (as in the present study).

Absence of Outliers. This assumption is met for mixed-design ANOVAs if there are no outliers within each cell of the design at both levels of the between-subjects factor

(Tabachnick & Fidell, 2007, p. 373). For each of the dependent measures, no outliers were found, and therefore this assumption was also met.

Assumptions of Pearson Correlation and Partial Correlation

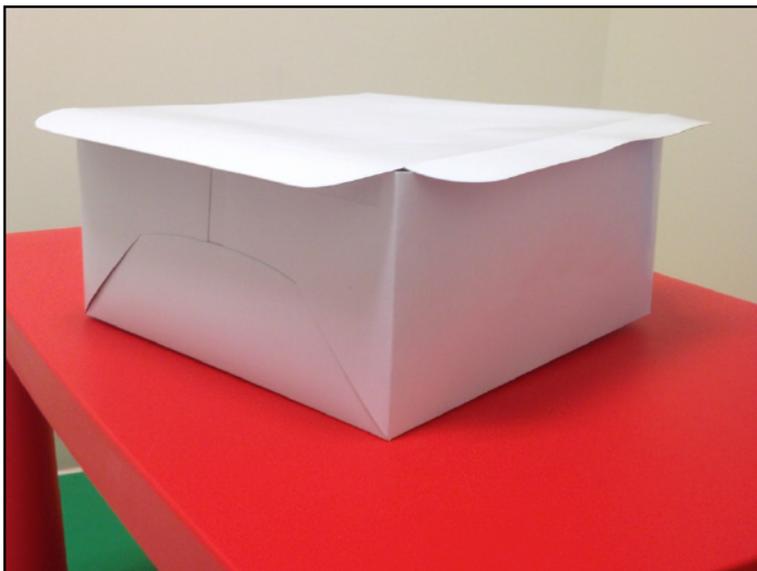
Normality of the Sampling Distribution. In order to test the significance of correlation coefficients, the variables tested must be normally distributed or from samples larger than 40 without the presence of outliers (e.g., Field, 2009; Tabachnick & Fidell, 2007), with the exception that one categorical variable can be included in the correlation matrix (e.g. Field, 2009). The variables included in the partial correlation analyses met these assumptions.

Appendix C: Hidden Camera



Note. The camera is hidden inside the black spot on the cow's belly.

Appendix D: Example of Box for Temptation Resistance Paradigm



Note. The edges of the boxes were modified (folded straight and reinforced) to make them very easy to open.



Note. The hole cut in the back of the box allowed the experimenter to make the toy make its noise. The toy was visible through this hole from the back of the box.

Appendix E: Study Two Statistical Assumptions

Assumptions of mixed-design ANOVA

Normality of Sampling Distributions. This assumption is met in mixed-design ANOVA if sample sizes are roughly equal (which they are not, in this case, if there are at least 20 *df* for the between-subjects error term (in this case, *df* for the error terms of the between-subjects factor is 77), and if two-tailed tests are used (Tabachnick & Fidell, 2007, p. 373). Though the sample size for the two paradigm order conditions were roughly equal, the sample size for the two different age groups were not ($N = 58$ for 4-year-olds and $N = 23$ for 5-year-olds). Therefore, skewness and kurtosis were examined within each of the cells on each of the story measures (for each age group separately) and did not demonstrate any significant departures from normality (all $z_s < 3.3$).

Homogeneity of Variance. This assumption is met if the ratio of the largest to smallest sample size is no greater than four to one (which is the case here), and if the ratio of the largest to the smallest variance (F_{\max}) is no greater than ten to one for case totals (collapsing across the within-subjects factors), and within each cell (crossing the two within-subjects factors; Tabachnick & Fidell, 2007, p. 373). These conditions were met for each of the dependent measures ($F_{\max} < 3.62$ for each).

Independence of Errors. This assumption is met for between-subjects factors based on the control of extraneous factors that could influence the different levels of the between-subjects variable (Tabachnick & Fidell, 2007, p. 373). Since the between-subjects factors were paradigm order (randomly assigned) and age in all analyses, this assumption was met. This assumption does not apply to within-subjects factors with only 1 *df* (as in the present study).

Absence of Outliers. This assumption is met for mixed-design ANOVAs if there are no outliers within each cell of the design at both levels of the between-subjects factor (Tabachnick & Fidell, 2007, p. 373). For each of the dependent measures, no outliers were found, and therefore this assumption was also met.

Assumptions of Pearson Correlation and Partial Correlation

Normality of the Sampling Distribution. In order to test the significance of correlation coefficients, the variables tested must be normally distributed or from samples larger than 40 without the presence of outliers (e.g., Field, 2009; Tabachnick & Fidell, 2007), with the exception that one categorical variable can be included in the correlation matrix (e.g. Field, 2009). The variables included in the partial correlation analyses met these assumptions and there were no categorical variables.