The Development of Lie-telling:
The Role of Executive Functioning and
Theory of Mind in Children's Prosocial and Antisocial Lying

Shanna Mary Williams

Department of Educational and Counselling Psychology

PhD in School/Applied Child Psychology

McGill University, Montreal

April 15, 2015

A thesis submitted to the Faculty of Graduate and Postdoctoral Studies of McGill University in partial fulfillment of the requirements of the degree of Doctor of Philosophy in School/Applied Child Psychology

Abstract

Lying is a frequent behaviour in our daily interactions and emerges early in children's development. Deceiving others is a cognitively demanding task, as lie-telling has been found to place greater mental demands upon the individual than truth-telling. Although researchers have highlighted the role of cognitive skills on the capacity to tell a lie, these investigations have been limited in scope. Specifically, the majority of inquiries have focused on antisocial lie-telling of preschool and elementary school-aged children; yet children tell various forms of lies (i.e., prosocial and antisocial). Yet observational accounts of parents and researchers have found that children lie much younger than experimentally observed in laboratory settings. However, little empirical research has been conducted on the emergence of children's lie-telling (i.e., lies told prior to 3 years old). As a result, our understanding of children's lie-telling, both the emergence and use of various forms of lies, remains limited in scope. The current dissertation sought to address these gaps in the empirical research. Two manuscripts are included, which together document the role of executive functioning and Theory of Mind (i.e., ToM) in the development of lie-telling.

The first manuscript of the dissertation examines the contribution of the executive functioning skills of working memory and inhibitory control to children's ability to tell prosocial lies (i.e., lies told for another individual's benefit). Children's ToM was also investigated in relation to prosocial lying through measures of second-order false-belief understanding. The Stroop and Digit Span tasks were used to measure inhibitory control and working memory. A total of 79 children between the ages of 6 and 12 years old completed a disappointing gift paradigm (i.e., DGP), designed to elicit prosocial lies and to measure children's ability to maintain such lies. Results reveal that children who told prosocial lies had significantly higher

scores on measures of working memory and inhibitory control. Those children who were able to maintain their prosocial lies throughout questioning also had significantly higher performance on measures of second-order false-belief. These results provide evidence that prosocial lies are supported through the maturation of both executive functioning and ToM.

The second manuscript examines the relation between preschool aged children's rudimentary lies, executive functioning, ToM and conceptual understanding of lies and truths. A total of 65 children between the ages of 2.5 and 3.5 years old participated in a modified temptation resistance paradigm (TRP). To examine executive functioning, children completed measures of inhibitory control and planning. Children's abilities to identify both truths and lies were also examined in relation to their actual lie-telling behaviour. Overall, a total of 29% of young children lied during the TRP. Results revealed significant differences between lie-tellers and truth-tellers on all measures of executive functioning, with lie-tellers having significantly better scores than truth-tellers. Moreover, lie-tellers also had significantly better accuracy in identifying both truths and lies. No significant differences between truth and lie-tellers were found on measures of ToM. As such, the results provide support for the role of executive functioning skills in the emergence of antisocial lie-telling.

Taken together, the current research program provides support for a developmental model of lie-telling. Notably, results support the argument that children acquire lie-telling in developmental stages, with rudimentary lies being supported by the executive functioning skills of inhibitory control and planning. With age, executive functioning skills and ToM support other forms of lie-telling (i.e., prosocial), as well as improved lie-telling capacities (i.e., maintenance of lies through control of semantic leakage).

Keywords: executive functioning, theory of mind, lie-telling, children

Résumé

Mentir est un comportement fréquent qui émerge tôt dans le développement de l'enfant. Tromper les gens est une tâche demandante au plan cognitif. En effet, il a été établit que mentir est cognitivement plus demandant que de dire la vérité. Bien que des recherches aient mis en lumière le rôle des habiletés cognitives dans l'habileté à mentir, l'étendue de celles-ci était limitée. Spécifiquement, la majorité des recherches s'attardaient au mensonge antisocial chez les enfants d'âge préscolaire et primaire. Toutefois, les enfants utilisent différentes formes de mensonges (c.-à-d., prosocial et antisocial). De plus, peu d'études ont porté sur l'émergence de l'utilisation des mensonges chez l'enfant (c.-à-d., avant l'âge de trois ans). La présente thèse tentait donc d'explorer cette question. Deux articles sont inclus, et ce, afin de documenter le rôle des fonctions exécutives et de la théorie de l'esprit dans le développement de l'utilisation du mensonge chez les enfants durant la petite enfant ainsi qu'à l'âge scolaire.

Le premier article examine la contribution des fonctions exécutives, de la mémoire de travail et de l'inhibition dans l'habileté de l'enfant à utiliser les mensonges prosociaux (c.-à-d., des mensonges dits au bénéfice d'une autre personne). La théorie de l'esprit des enfants a été évaluée en relation avec l'utilisation de mensonges prosociaux par le biais d'une mesure de la compréhension de fausses croyances de deuxième ordre. Soixante-dix-neuf enfants, âgés de 6 à 12 ans, ont participé à un paradigme de cadeau désappointant. Celui-ci est conçu afin d'inciter l'utilisation de mensonges prosociaux et, subséquemment, pour mesurer l'habileté de l'enfant à maintenir ceux-ci durant la réponse à des questions. Les enfants utilisant les mensonges prosociaux ont obtenus des résultats significativement plus élevés en ce qui a trait à la mémoire de travail et à l'inhibition. De plus, les enfants ayant démontré la capacité à maintenir leurs mensonges prosociaux durant la période de questions avaient également une plus grande

compréhension des fausses croyances de deuxième ordre. Ces résultats démontrent que les mensonges prosociaux découlent de la maturation des habiletés cognitives, tel que précédemment démontré dans la littérature concernant l'utilisation des mensonges antisociaux.

Le deuxième article porte sur la relation entre l'utilisation de mensonges rudimentaires chez les enfants d'âge préscolaire, les fonctions exécutives, la théorie de l'esprit et la compréhension conceptuelle des mensonges et de la vérité. Soixante-cinq enfants, âgés de 2,5 à 3,5 ans, ont participé à un paradigme de résistance à la tentation. Afin de mesurer les fonctions exécutives, les enfants ont complété des mesures de planification, d'inhibition et de mémoire de travail. L'habileté des enfants à identifier la vérité et les mensonges a également été mesurée en relation avec leur propre utilisation du mensonge. En somme, 29,31% des enfants ont menti durant le paradigme de résistance à la tentation. Les résultats révèlent une différence significative entre les enfants utilisant le mensonge et ceux ne l'utilisant pas, et ce, sur toutes les mesures des fonctions exécutives. Effectivement, les enfants ayant utilisé le mensonge ont obtenu des résultats significativement plus élevés. De surcroît, ces enfants avaient également une plus grande exactitude dans leur identification des mensonges et de la vérité. Toutefois, aucune différence significative n'a été obtenue entre ces deux groupes en ce qui concerne la théorie de l'esprit. En ce sens, les résultats supportent l'hypothèse du rôle des fonctions exécutives dans l'émergence de l'utilisation de mensonges antisociaux.

Lorsque considérés ensembles, les résultats semblent confirmer le modèle développemental de l'émergence de l'utilisation du mensonge. Globalement, ceux-ci supportent l'hypothèse que les enfants apprennent à mentir selon des étapes développementales. Les mensonges rudimentaires découleraient alors d'habiletés cognitives de base sur le plan de la planification et de l'inhibition. Avec l'âge, ces habiletés cognitives

seraient également impliquées dans différentes formes de mensonges (c.-à-d., prosocial) ainsi que dans la présence de plus grandes capacités d'utilisation de ceux-ci (c.-à-d., maintien du mensonge durant le contrôle de fuites sémantiques).

Mots-clés: fonctionnement exécutif, théorie de l'esprit, mentir, enfants

Acknowledgements

I would first like to thank my supervisor Dr. Victoria Talwar for her continued support and commitment to my graduate research. I began working with Dr. Talwar during my undergraduate studies at McGill University and she supported my inquisitive nature and interest in research from the start. Secondly, I would like to extend my thanks to all my lab members who have assisted with my research and provided support throughout the writing process of my dissertation. Thank you to my writing partner Christine Saykaly for her late night discussions and Kelsey Moore for encouraging me to make deadlines and stick to them. I would like to thank my sister Jasmine Williams for providing edits and Sheldon for supporting me during sleepless nights. Finally, the current research was made possible through a Social Sciences and Humanities Research Council of Canada graduate dissertation grant.

Contribution of Authors

Both studies reported on in this dissertation have been co-authored. However, I am the primary author who completed conceptualization of both studies and writing of the studies. Dr. Victoria Talwar provided assistance and guidance as my primary thesis supervisor and Dr. Angela Crossman provided feedback and suggestions regarding both studies. Karissa Leduc and Kelsey Moore provided editing and help with data collection. The current research was supported through the Social Sciences and Humanities Research Council of Canada.

Table of Contents

List of Tables

List of Appendices

Introduction

The act of lying is common in our everyday interactions. Lying is defined as a verbal statement produced with the intention to deceive another (Bok, 1978). This intention can be motivated by several factors, such as to further one's own goals (i.e., antisocial lies; Lee, 2013; Talwar & Crossman, 2011) or to maintain amicable social relations (i.e., prosocial lies; DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996). Antisocial lies are self-serving in nature and are therefore evaluated negatively (Xu, Luo, Fu, & Lee, 2009). In contrast, prosocial lies are told to spare another's feelings and as such, are evaluated favourably (Cheung, Siu, & Chen, 2015). Thus, certain types of lies can be more useful and important in maintaining interpersonal relationships (Elaad et al., 2012; Ennis, Vrij, & Chance, 2008; Kashy & DePaulo, 1996). For example, Levine and Schweitzer (2015) report adult prosocial lie-telling to increase interpersonal trust, particularly when lies are mutually beneficial to both parties. Although researchers have examined the use of lie-telling within adult relationships (DePaulo et al., 1996), the ability to tell a lie is a developmental process, which emerges early in life (Evans & Lee, 2013a; Talwar & Lee, 2002a, Talwar, Murphy, & Lee, 2007b). However, empirical research examining the maturation of lie-telling in childhood remains limited.

Research examining the development of lie-telling has focused on children's understanding and evaluation of lies (e.g., Bussey, 1992, 1999; Peterson, Peterson, & Seeto, 1983; Siegal & Peterson, 1998; Strichartz & Burton, 1990). In the last three decades researchers have become interested in observing children's actual lie-telling behaviours. Through experimental paradigms and observational studies, researchers have found that the first lies to emerge in childhood are often antisocial (Lewis, Stanger, Sullivan, 1989; Newton, Reddy, & Bull, 2000; Talwar & Lee, 2002a). These are the first to develop as they are performed to

protect oneself from the consequences of committing a transgression (DePaulo et al., 1996). With development, other forms of lie-telling, such as prosocial lies told for others, become more frequent (Popliger, Talwar, & Crossman, 2011; Talwar et al., 2007b). However, the developmental trajectory of lie-telling is not well documented within the current body of empirical research. As a result, the present research program seeks to build on previous research within the field by examining specific cognitive functions associated with the emergence and maturation of children's lie-telling.

The current research program contains two manuscripts, which directly examine the role of executive functioning and Theory of Mind (ToM) in children's lie-telling. The first manuscript, "The role of executive functions and theory of mind in children's prosocial lie-telling" (Williams, Moore, Crossman, & Talwar, under review at the Journal of Experimental Child Psychology), as described in Chapter 2, explores elementary-school aged children's prosocial lying in relation to executive functioning skills (i.e., working memory and inhibitory control) and ToM (i.e., second-order false-belief understanding). Children participated in a disappointing gift paradigm (DGP), which is designed to elicit prosocial lies. Additionally, children completed measures of inhibitory control, working memory, and second-order false-belief understanding. In the second manuscript, "Young deceivers: deception recognition, executive functioning and antisocial lie-telling in preschool aged children" (Williams, Leduc, Crossman, & Talwar, under review at Journal of Infant and Child Development), as described in Chapter 3, very young children's emerging antisocial lie-telling was examined in relation to executive functioning (i.e., inhibitory control and planning) and ToM (i.e., first-order false-belief). Additionally, young children's conceptual understanding of lie-telling in relation to their actual lie-telling was examined. In both studies there is an introduction to the pertinent

literature, methods, results, and discussion sections. Chapter 1 includes a general review of the lie-telling literature, with specific emphasis on children's lie-telling in relation to executive functioning and ToM. Chapter 4 provides an integration of the findings of both manuscripts and a discussion of the implications of these findings to our understanding of children's development of lie-telling.

Chapter One: Literature Review

The current research program aims to examine the development of children's lie-telling across preschool and elementary school-age ranges. Talwar and Lee (2008) highlighted in their developmental model that children's lie-telling matures from the production of false statements during preschool to more elaborate lies in the elementary school-age range. With regard to the development of lie-telling, researchers have pointed to a number of executive functioning skills and the emergence of Theory of Mind (ToM) as important to lie-telling. Arguments have been made that the ability to maintain lies (i.e., throughout successive questioning), is facilitated by children's understanding of another's perspective (i.e., false belief understanding). In their model, Talwar and Lee (2008) have also highlighted the role of executive functioning in the development of lie-telling. Specifically, these researchers argue that lie-telling is supported by such skills as working memory, inhibitory control and planning (Evans & Lee, 2011, 2013b; Talwar & Crossman, 2011; Talwar, Gordon, & Lee, 2007a). Presently, the existing literature has outlined the role of executive functioning and ToM in the acquisition and maturation of children's lie-telling (Lee, 2013; Talwar & Crossman, 2011). However, specific gaps in the research exist. The following chapter provides a review of empirical research on the emergence of lie-telling in the preschool age range and the development of lie-telling during elementary school age ranges. This chapter includes a review of various theoretical models of lie-telling throughout childhood, the influence of ToM to children's lie-telling and finally a review of executive functions which contribute to lie-telling.

Theories of Lie-telling

Lying requires a person to produce a false statement, with the purpose to deceive the lie-recipient (Bok, 1978; Turri & Turri, 2015). Although empirical research has documented that

lie-telling in children and adults occurs frequently in everyday interactions (DePaulo & Kashy, 1998), the use of lies in communication remains paradoxical in nature. Specifically, lie-telling violates several rules of communication. For example, in Grice's (1980) Maxim of Quality, a fundamental rule of communication, a requirement of verbal exchanges between two people is honesty. Thus, all forms of lie-telling violate the Maxim of Quality because lies misinform lie-recipients by design. Kashy and DePaulo's (1996) research supports the Maxim of Quality rule as adults often cite honesty as an important component to the building and maintenance of close interpersonal relationships. Certain forms of lie-telling, such as prosocial lie-telling, are also valued in the building of relationships. For example, prosocial lies are a common form of deception used in partnerships, as they serve to spare the lie-recipient's feelings and to demonstrate empathic understanding of another. As such, the use of prosocial lies in communication falls within another rule of communication, the Meta-maxim of General Cooperation (Sweetser, 1987; Talwar & Crossman, 2011). Based on the Meta-maxim of General Cooperation, individuals should strive to maintain amicable relations (i.e., politeness) within interpersonal communications. Overall, the two fundamental principles of communication (i.e., the Maxim of Quality and the Meta-maxim of General Cooperation) create a paradox within communication, whereby an individual is expected to be both honest, but also helpful and polite in certain cases (Talwar & Crossman, 2011).

There are other theories of communication that further support the paradoxical nature of lie-telling. Austin's (1975) speech act theory posits that words carry more than just descriptions; rather they serve a social function. As such, when an individual tells a lie, there are two purposes: intentionality to deceive and conventionality to maintain polite interactions. The first function posits that the lie-teller must intentionally attempt to deceive their listener by producing

false statements, which in turn conceals the truth. Lies also serve a conventional purpose in conversations, such as being polite to others or avoiding hurting others feelings (Lee, 2013). Thus, to tell a lie, the individual must consider several factors: both the lie-teller's own intention in communicating with the other, and the social necessity of the lie versus the truth (DePaulo & Kashy, 1998; DePaulo et al. 1996). Yet, children's production of lies begins slowly and consideration of both intentionality and conventionality are not immediate. Moreover, the ability to tell lies effectively is shaped by several other factors, such as cognitive maturity and socialization (Hays & Carver, 2014; Lee & Ross, 1997).

Talwar and Lee (2008) proposed a developmental theory of lie-telling. The researchers argue that lie-telling emerges in developmental stages, which are linked to Theory of Mind (ToM) understanding. The researchers argue that children's first lies emerge during the preschool age range and represent rudimentary deceptions. These initial lies or *primary lies* are told for self-serving purposes (i.e., avoiding discovery of a transgression) and are relatively unsophisticated. In contrast, children's *secondary lies* emerge between 3 and 4 years old and signify slightly more developed lie-telling skills, however the ability to maintain these lies is still not present at this age. In contrast, these secondary lies are facilitated by children's ability to attribute first-order false-belief. As children reach 7 to 8 years old they move toward the ability to tell *tertiary lies*, which are lies as well as maintenance of lies during follow-up questioning. This stage of lie-telling is argued by Talwar and Lee (2008) to be enabled by children's second-order false-belief understanding. Although the model provides support for the relationship between ToM and lie-telling development, the researchers only examined children's antisocial lie-telling in relation to ToM. Furthermore, their sample did not include children between 2 and 3 years old, which is the age when primary lies are believed to emerge. As such, the current

dissertation sought to address these gaps in the literature, thus providing more support for the developmental model of lie-telling.

Development of Lie-telling

Children's ability to produce a false statement provides some of the first indications of the emergence of lie-telling (Ahern, Quas, & Lyons, 2011). Until recently, researchers relied on parental reports and observations to record emerging lie-telling in children (Newton et al., 2000; Wilson, Smith, & Ross, 2003). However, researchers have devised methods to experimentally measure children's lie-telling. For example, Lewis et al. (1989) modified the temptation resistance paradigm (TRP; Sears, Rau, & Alpert, 1965) to examine children's antisocial lies. During the TRP, children were instructed not to peek at a toy while a research assistant (RA) left the room. Upon the RA's return, children were asked if they peeked at the toy. The paradigm creates a highly tempting situation for children. Results from TRP studies have shown that the majority of children peek at the toy when the RA left (Polak & Harris, 1999; Talwar & Lee, 2002a, 2008, 2011). When asked if they peeked at the toy, children could choose to tell the truth or to conceal their misdeed. The paradigm provided researchers with the opportunity to observe children's spontaneous lies within a naturalistic yet controlled experimental setting.

Through the TRP, researchers have been able to observe lie-telling in preschool and school-age children. Talwar and Lee (2002a) built upon Lewis et al.'s (1989) paradigm by not only examining children's initial lie-telling, but also maintenance of lies through follow-up questions. Maintenance of a lie is the ability to produce follow-up statements that are consistent with initial false denials, and is referred to as semantic leakage control. To measure semantic leakage, Talwar and Lee (2002a) added to the TRP procedure by asking children follow-up questions regarding the identity of the toy. Results of the modified procedure found that

children's lie-telling improved with age. Notably, only 16% of 3-year old children successfully controlled their semantic leakage during follow-up questioning. In comparison, by the age of 7 years, 60% of children successfully controlled semantic leakage. Overall, children under 6 years of age displayed difficulty maintaining their antisocial lies beyond their initial false denials (Talwar & Lee, 2002a; 2008).

Initial lies. Despite children's difficulty with semantic leakage control before elementary school age, rudimentary lie-telling emerges much younger in development. Newton et al. (2000) examined 2.5 year old children's spontaneous lies within a naturalistic setting over a 6-month longitudinal study. The researchers found that the majority of children demonstrated deception during one of the three periods of observation (96%). The most prevalent forms of deception was denial of wrongdoing to a parental figure or antisocial lies. Although Newton et al.'s observational study provides some of the first evidence of lie-telling before the age of 3, children's deceptions were observed by parents and not examined through a controlled verifiable experimental paradigm like the TRP.

Recently, Ahern et al. (2011) devised an experimental paradigm to examine children's emerging false statement production, which is a necessary precursor to lie-telling. Children were asked to produce false statements when looking at pictures in order to win a game. For example, when shown a picture of a fish, children were asked to say they saw a bird. If children correctly produced a false statement and stated they saw a bird when shown a picture of a fish, they won a sticker. Participants as young as 2.5 years old were able to produce these false statements when prompted, but it was not until 3.5 years old that children were able to maintain these false assertions over questioning. Thus it appears that children between the ages of 2.5 and 3.5 are

able to produce false statements, providing support for the emergence of deceptive abilities during the preschool age range.

Ahern et al. (2011) measured the precursor to lie-telling, and not lie-telling itself. Evans and Lee (2013a) examined the emergence of lie-telling in children between 2 and 3 years old using a modified TRP. Using a modified paradigm, Evans and Lee (2013a) found that children under 2.5 years old will tell an antisocial lie in response to the initial peeking question. Moreover, between the ages of 2 and 3 years old, the rate of children's lie-telling to the initial peeking question increased. The increase and development of lie-telling is linked by researchers to certain executive functioning skills, such as the combined impact of working memory and inhibitory control.

Although Evans and Lee's (2013a) research provided insights into the emerges of lie-telling in preschool-aged children, as well as evidence for the link between lie-telling and executive functioning skills, the researchers did not examine other forms of lie-telling in their sample, such as prosocial lies. Similarly, the majority of empirical research on the development of children`s lie-telling has been focused on antisocial lies (Evans & Lee, 2011, 2013a; Polak & Harris, 1999; Talwar & Lee, 2002a, 2008, 2011). Such focus may be because children are often observed or caught in antisocial lies at young ages. Yet, other forms of deception serve in social functions and may be more important to children as they develop peer groups and interpersonal relationships.

Prosocial lie-telling. Prosocial lies are told for a variety of reasons. Often this form of deception is employed when attempting to conceal a truth that would harm the lie-recipient (DePaulo et al., 1996; Ennis, Vrij, & Chance, 2008). With children, prosocial lies represent an essential social maturity. Specifically, prosocial lies provides evidence of the ability to

understand the necessity of social reciprocity within interpersonal communications and demonstrates perspective taking (Talwar & Crossman, 2011).

Researchers have also devised experimental paradigms in order to simulate naturalistic conditions, to examine children's prosocial lie-telling. For example, Talwar et al. (2007b) modified the disappointing gift paradigm (DGP; Cole, 1986; Saarni, 1984) to measure 3 to 11 year old children's prosocial lie-telling and semantic leakage control. In this paradigm, children were given an undesirable prize by an RA and then asked if they liked the prize the RA had picked for them. To determine whether children found the gift undesirable they were asked to rate a series of gifts at the start of the paradigm (i.e., rating 5 gifts from most to least desirable). The paradigm created a social obligation upon the children to lie to spare the RA's feelings. Talwar et al. (2007b) found that the majority of children told a prosocial lie to spare the RA's feelings. Furthermore, similar to research examining children's antisocial lie-telling (Talwar & Lee, 2002a; Talwar et al., 2007a), there was a developmental trend for older children to lie more frequently than their younger counterparts. Also, children's semantic leakage control improved with age, as older children were more likely to elaborate on their initial lie by naming the qualities that they liked about their disappointing gift.

Other factors have also been found to influence children's use of prosocial lies. For example, Popliger et al. (2011) examined the influence of low verses high cost consequences using the DGP. In the low cost condition, children were given the opportunity to exchange their prize for a more desirable gift regardless of veracity. However, in the high cost condition, if children lied they would spare the RA's feelings, but would also lose the opportunity to exchange their undesirable gift. Overall, the researchers found that preschool children were less

likely to tell prosocial lies compared to elementary school children, particularly when there was a high cost (e.g., losing a prize) for telling the lie.

Although researchers have documented children's use of both prosocial and antisocial lies, several gaps within the literature remain. Specifically, investigations of children's lie-telling prior to 3 years old are limited in scope. To date, only one study has investigated the emergence of lie-telling in 2 year old children (Evans & Lee, 2013a). Likewise, research on antisocial lie-telling has highlighted the role of executive functioning skills in facilitating the development of deception in children (Evans & Lee, 2011; Talwar et al., 2007a; Talwar & Lee, 2008). Moreover, others have demonstrated that ToM influences the emergence and development of children`s lie-telling (Polak & Harris, 1999; Talwar et al., 2007a; 2012). However, similar research examining executive functioning and ToM in relation to prosocial lying has yet to be undertaken.

Lie-telling, Executive Functioning and Theory of Mind

To date, some empirical studies have highlighted the role of executive functioning and ToM in antisocial lie-telling (Evans, Xu, & Lee, 2011; Gombos, 2006; Talwar & Lee, 2002a, 2008). Briefly, ToM has been defined as the ability to understand the mental states of another. Accordingly, ToM involves applying the understanding of mental states to the prediction and explanation of other people's behaviour (Premack & Woodruff, 1978). As such, researchers have examined how ToM supports the development of lie-telling. In contrast, executive functioning skills include a range of abilities such as planning, working memory, inhibitory control and decision-making.

Executive functioning. Researchers have highlighted several executive functioning skills that facilitate the development of children's lie-telling (Evans & Lee, 2013a; Talwar &

Lee, 2008). The majority of this research has been limited to antisocial lies (Evans & Lee, 2013a; Talwar & Lee, 2002a; 2008). Executive functioning encompasses a group of higher-level mental abilities including planning, goal directed behaviours, attention, memory and organization (Welsh, Pennington, & Grosser, 1991). Nevertheless, existing research on antisocial lying suggests that working memory and inhibitory control may facilitate children's lie-telling (Evans & Lee, 2011, 2013a; Talwar & Lee, 2008). Deception researchers have highlighted the mechanisms that are specific to the developmental of lie-telling, which allow children to maintain control over their verbal output and resist the temptation to tell the truth. Inhibitory control and working memory both contribute to these abilities (Carlson & Moses, 2001; Evans & Lee, 2011; Talwar & Lee, 2008). Moreover, others have highlighted in both theoretical models of lie-telling (Walczyck, Roper, Seemann, & Humphrey, 2003; Walczyk, Runco, Tripp, & Smith, 2008), as well as through empirical studies, the importance of planning abilities in formulating and producing lies (Evans & Lee, 2011).

Inhibitory control. Inhibitory control is the ability to control both nonverbal and verbal output (McCall, 1994). When children tell lies, they must simultaneously inhibit their knowledge of the truth while producing their false statements (Bok, 1978). Several researchers have highlighted the role of inhibitory control in lie-telling (Evans & Lee, 2011, 2013a; Talwar et al., 2007a, Talwar & Lee, 2008). For example, Carlson, Moses, and Hix (1998) examined 3 year old children's performance on deceptive tasks, which was manipulated to require either low inhibitory control (i.e., deception via pictures or arrows) or high inhibitory control (i.e., deceptive pointing). Overall, their findings indicated a significant link between deceptive capabilities and inhibitory control as children with difficulties in inhibitory control also

experienced difficulties with deception. Although Carlson et al.'s (1998) study did not examine children's ability to produce lie, they did investigate deceptive acts, such as pointing.

Talwar and Lee (2008) examined the relation between working memory, inhibitory control, and lie-telling. In their study, children 3 to 8 years old completed an inhibitory measure and a lie-telling measure (TRP). These researchers found that children, who lied during the TRP, also displayed greater inhibitory control. Overall, results with young children and school-aged children support the role of inhibitory control in telling initial antisocial lies. Yet, researchers did not examine the relation between inhibitory control and children's prosocial lie-telling, despite the observation that prosocial lying requires children to inhibit their own desires (i.e., to protect another's feelings). As such, it may be argued that prosocial lie-telling would require greater levels of inhibitory control than antisocial lying, as children have the added burden of constraining both emotional and verbal outputs (e.g., concealing disappointment and producing gratitude in response to a disappointing gift).

Working memory. Working memory is the ability to maintain and manipulate information in one's mind (Baddeley, 1986). To tell successful lies, children must not only hold their false statements in their mind but also the truth (Gombos, 2007). There has been limited research on the role of working memory in the development of children's deceptive abilities. Furthermore, the majority of the research examining working memory has used tasks which measure other executive functioning skills along with working memory. For example, Talwar and Lee (2008) found that children with more developed working memory were also more likely to lie during the TRP. However, their measure of working memory also examined inhibitory control (i.e., Stroop task). In another study, Evans and Lee (2013a) examined young children's lie-telling ability in relation to performance on several executive functioning measures, one of

which was working memory. Children between the ages of 2 and 3 years old completed a modified TRP in addition to a Day/Night Stroop task (i.e., inhibitory control and working memory) and a task which measured inhibitory control exclusively (i.e., the Gift Delay task). Although young lie-tellers demonstrated significantly higher performance on the Day/Night task, they did not have significantly higher performance on the Gift Delay task. As a result, Evans and Lee's (2013a) research provides support for the role of working memory in combination with inhibitory control in lie-telling for this young age group.

Planning. Successful lie-tellers must plan their lies, both during initial lie-telling as well as during the maintenance of their lie. To date, few empirical research studies have examined the link between children's lie-telling and the executive functioning skill of planning. One of the few studies to do so measured planning ability using a motor sequencing task in children between the ages of 3 to 5 years old. However, the researchers did not find a significant relation between planning and antisocial lie-telling (Evans & Lee, 2011). Nonetheless, planning is thought to be as important to the construction of lies as other executive functioning skills. For example, Evans and Lee (2011) examined older children and adolescents' lie-telling in relation to planning using the Tower of London Task (Shallice, 1982). The researchers used a modified TRP to elicit antisocial lies from children. Although initial lie-telling was not related to children's performance on the planning task, semantic leakage control improved for children with more advanced planning. As such, some support for the link between planning and the sophistication of lies can be found. However, no research to date has examined the relation between children's lie-telling and planning under 8 years old. Furthermore, Evans and Lee (2011) may not have found a significant relation between initial lie-telling and planning because of the age of their sample (i.e., by age 8 the majority of children lie during the TRP).

Theory of Mind. The most commonly studied component of ToM is false-belief understanding, which is an individual's ability to produce a belief that reflects a known reality and that the producer knows to be false (Wimmer & Perner, 1983). Researchers have begun to examine children's false-belief understanding in relation to lie-telling (Talwar et al., 2007a). Some have argued that those children who lack the ability to attribute false beliefs will also have difficulty manipulating others' behaviours through acts of deception or lie-telling (Perner & Lang, 1999; Talwar & Lee, 2008). Yet despite the developmental link between ToM and deception, only a few empirical studies have examined the relation between lie-telling and ToM. Furthermore, no research to date has examined the role of ToM in children's prosocial lie-telling, even though this form of deception requires the lie-teller to consider the lie-recipients' feelings and emotional state.

Researchers have argued that first-order false belief understanding, a particular aspect of ToM, is related to the emergence of children's lie-telling. First-order false-belief is defined as an attribution of a false belief to a true event. Hala, Chandler, and Fritz (1991) examined the relation between children's first-order false belief understanding and their ability to deceive another. In their study, children were asked to participate in both a change in location task (i.e., measure of false belief) and a hide-and-seek task (i.e., measure of deception). The researchers found that the majority of 3 year old children concealed the location of a treasure through a deceptive act (i.e., pointing to a wrong location). In contrast, the majority (80%) of the 3 year old children had difficulty with the unexpected change-in-location task. Despite this early evidence for the relation between false belief understanding and deception, the researchers did not ask questions of children, which could elicit lies. Rather, children were encouraged to use deceptive pointing in order to deceive another.

Polak and Harris (1999) examined children's spontaneous lie-telling ability using a TRP designed to elicit children's lies. The researchers also measured children's first-order false-belief understanding. The researchers found that the majority of children in their sample lied. Furthermore, when children's performance on the false-belief measures was examined in conjunction with their lie-telling, a correlation was found between lie-telling and understanding of false belief. Therefore, Polak and Harris' (1999) research supports the relation between false belief understanding and lie-telling. The link between false belief and lie-telling has also been replicated by other researchers. For example, children who told antisocial lies in Talwar and Lee's (2008) study also had significantly higher first-order false belief understanding. Moreover, children who were able to maintain their lies during follow-up questioning also had significantly higher scores on second-order false-belief measures. Based on the limited research conducted, ToM, and more precisely false belief understanding, is an important indicator to lie-telling abilities. Yet the role of ToM in children's emerging lie-telling (i.e., under 3-years old) as well as with other types of lies (i.e., prosocial lying) has yet to be investigated empirically.

Principal Aims of the Research Program

Findings from previous research support the argument that changes in children's lie-telling abilities throughout development are related to specific executive functioning skills and ToM understanding. While some studies examined ToM, working memory and inhibitory control in elementary school aged children's antisocial lie-telling (Polak & Harris, 1999; Talwar & Lee, 2011), such investigations have not been conducted with other types of lies. Furthermore, though researchers have investigated preschool aged children's emerging lie-telling, little research has been conducted on lie-telling prior to 3-years old. To date, only one study has examined the lie-telling abilities of children under 3-years of age using experimental

paradigms (Evans & Lee, 2013a). Although the relation between school-aged children's antisocial lie-telling and ToM development has been examined, no empirical research has examined the same in relation to children's emerging lie-telling abilities. Therefore, each of the manuscripts within the current research program contributes to the empirical knowledge of how executive functioning and ToM impact the development of lie-telling. Furthermore, through the current research program Talwar and Lee's developmental model will be tested and the application of the theory will be strengthened. Specifically, the relevance of the theory to different forms of lie-telling (i.e., prosocial) as well as the emergence of lie-telling (i.e., primary stage of development).

In Manuscript 1, the role of executive functioning (i.e., working memory and inhibitory control) and ToM in the development of elementary-school aged children's prosocial lying was examined. Results of the research provides new evidence for the combined role of working memory and inhibitory control in prosocial lying. The findings also provide support for the role of second-order false-belief understanding in children's ability to maintain prosocial lies during questioning (i.e., semantic leakage control).

In Manuscript 2, very young children's antisocial lie-telling was examined in relation to working memory, inhibitory control, planning and ToM. Children's conceptual understanding of both lies and truths were observed in relation to their actual lie-telling behaviours. Overall, results revealed the role of both inhibitory control and planning in the emergence of lie-telling. Moreover, children with greater conceptual understanding of both lies and truths were also more likely to tell antisocial lies. Taken together, the current research program provides new insights into the cognitive abilities that support children's lie-telling, and can be used to further our understanding of children's socialization and development.

CHAPTER 2: MANUSCRIPT 1

The role of executive functions and theory of mind in children's prosocial lie-telling

Shanna Williams[1], Kelsey Moore[1], Angela Crossman[2], and Victoria Talwar[1]

McGill University[1]

John Jay College of Criminal Justice[2]

Author Note: This manuscript has been accepted, pending minor revisions, for publication in the Journal of Experimental Child Psychology.

Abstract

Children's prosocial lying was examined in relation to executive functioning skills and theory of mind development. Prosocial lying was observed using a disappointing gift paradigm (DGP). Of the 79 children (ages 6 to 12) who completed the DGP, 47 (59.50%) told a prosocial lie to a research assistant about liking their prize. Additionally, of those children who told prosocial lies, 25 (53.2%) maintained semantic leakage control during follow-up questioning; thereby demonstrating advanced lie-telling skills. When executive functioning was examined, children who told prosocial lies were found to have significantly higher performance on measures of working memory and inhibitory control. In addition, children who lied and maintained semantic leakage control also displayed more advanced theory of mind understanding. While children's age was not a predictor of lie-telling behaviour (i.e., truth-teller vs. lie-teller), age was a significant predictor of semantic leakage control, as older children were more likely to maintain their lies during follow-up questioning.

The role of executive functions and theory of mind in children's prosocial lie-telling

Over the past three decades, researchers have examined the sophistication of children's early lies through both naturalistic observations and experimental paradigms (Lewis, 1993; Polak & Harris, 1999; Talwar, Gordon, & Lee, 2007a; Wilson, Smith, & Ross, 2003). Primarily, these researchers have focused on antisocial lies, which are told for personal gain or to circumvent punishment (Lewis, 1993; Talwar & Lee, 2002a, 2008). Antisocial lies have been observed in children as young as 2.5 years old (Evans & Lee, 2013a). Yet, children under 8 years of age have difficulty maintaining these lies beyond the initial false denial (Talwar et al., 2007a; Talwar & Lee, 2002a, 2008). As children develop, they begin to use other forms of deception; for example, they are more likely to tell prosocial lies, which are told for the benefit of another (Bok, 1978; DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996). However, few studies to date have examined prosocial lie-telling in children, despite this form of deception having implications for social and moral development (Talwar & Crossman, 2011).

Prosocial Lying

Lies fall on a continuum, ranging from prosocial through socially neutral to antisocial. Antisocial lies, which have been extensively studied in both preschool- and school-aged children (Evans & Lee, 2013a; Talwar & Lee, 2002a, 2008; 2011), represent self-motivated deceptions and therefore hold no gain to the lie-recipient. These lies are told to protect oneself from discovery of a transgression or other self-motivations. In contrast, prosocial lies are told to primarily benefit another individual. In general, lies are evaluated based on the permissibility of the lie and the impact the lie has upon the lie recipient. Lindskold and Han (1986) argued that individuals, and often societies, morally evaluate lies based on the social motivation they serve. As such, prosocial lies are commonly evaluated more favorably than those told for exploitive or

antisocial purposes, as they serve a social function. Specifically, such lies are frequently used to maintain social cohesion by sparing another's feelings or protecting interpersonal relationships (Bok, 1978; DePaulo et al., 1996; DePaulo, Jordan, Irvine, & Laser, 1982; DePaulo & Kashy, 1998; Ennis, Vrij, & Chance, 2008). In children, telling prosocial lies not only demonstrates increasing deceptive abilities, but may reveal their ability to navigate the complexities of social interaction and understanding of reciprocity within interpersonal communications. However, prosocial lying is also a morally conflicting behaviour for children.

Prosocial lying is an example of a behaviour that represents contradictory moral and social rules of communication. On one hand, it violates a fundamental principle of communication, the Maxim of Quality, which requires speakers to be truthful and to inform, not misinform, their communicative partners (Grice, 1980). Based on this principle, listeners tend to expect speakers to be truthful and avoid falsehood. Thus, lying is considered by many to be a serious moral transgression (Bok, 1978). On the other hand, prosocial lies tend to be accepted social conventions and are evaluated less negatively than antisocial lies (Lindskold & Han, 1985; Nyberg, 1993; Sweetser, 1987). Indeed, philosophers have argued that there exists an equally important fundamental rule of conversation, the meta-maxim of General Cooperation (Sweester, 1987), which requires speakers to be amicable and to help, not harm, their communicative partners. In politeness situations, adherence to this rule may require the individual withhold the blunt truth in order to maintain friendly relations and avoid hurting another person's feelings. Thus, prosocial lies are considered a form of communication that both violates and upholds the basic rules of interpersonal communication. Adults seem to resolve this conflict by endorsing *white lies* as appropriate (Camben, Motley, & Wilson, 1984). Similarly, children rate prosocial

lies less negatively than other forms of deception, indicating that they also perceive some positive aspects of telling prosocial lies (Bussey, 1999; Warneken & Orlins, 2015).

These perceptions are reflected in children's behaviour. Talwar, Murphy, and Lee (2007b) examined prosocial lie-telling of 3 to 11 year old children using a modified disappointing gift paradigm (Cole, 1986; Saarni, 1984). In this paradigm, a research assistant gave a child a prize that he or she had previously rated as undesirable. Talwar et al. (2007b) found that the majority of children told a prosocial lie to spare the research assistant's feelings, and that older children were more likely to tell such a lie than younger children. Similarly, Popliger, Talwar, and Crossman (2011) examined children's ability to tell a prosocial lie at a personal cost. In this study, preschool aged children were less likely to tell prosocial lies compared to elementary school aged children, particularly when there was a cost to themselves (e.g., losing a prize) for telling the lie.

Children's ability to sustain lies during follow-up questioning has also been found to improve with age, reflecting their growing capability to maintain semantic leakage control. Semantic leakage control is the skill to ensure that one's deceptive statements remain consistent with one's lies (Talwar & Lee 2002a, 2002b). In a sample of Chinese elementary school-age children, Xu, Bao, Fu, Talwar, and Lee (2010) examined children's lies in politeness situations and found that semantic leakage control improved with age. Together, these findings suggest that as children develop, they use prosocial deception more frequently and effectively.

Given this developmental trend, it is likely that understanding the social conventions surrounding prosocial lie-telling involves children's cognitive and ToM development. Specifically, it has been suggested that the ability to enact moral and prosocial behaviours often requires self-control and the ability to take the perspective of another (Eisenberg et al., 1999),

which might also be related to prosocial lie-telling. This is consistent with findings that these cognitive abilities are related to children's antisocial lie-telling (e.g., Talwar & Lee, 2008). Hence, the purpose of the present study is to examine children's prosocial lie-telling behaviours in relation to their executive functioning and ToM development, which may facilitate the telling of prosocial lies, as well as the maintenance of these lies.

Lying, Theory of Mind, and Executive Functions

Researchers have pointed to several cognitive and executive functioning skills that facilitate children's ability to tell lies (Evans & Lee, 2013a, b; Talwar & Lee, 2008). However, the majority of this research has focused on antisocial lies and there has been little examination of cognitive functioning associated with children's prosocial lying. Nevertheless, existing research on antisocial lying suggests that theory of mind (ToM), working memory, and inhibitory control may facilitate children's lie-telling (Evans & Lee, 2011; Talwar & Lee, 2008). Indeed, prosocial lies may be facilitated by similar cognitive abilities as antisocial lies. Conversely, the conflict between the child's own potential desires (i.e., to have a desirable toy), and the liar's beneficiary interests (i.e., protection of the gift-giver's feelings) might result in greater or different functions being associated with willingness to tell and maintain a prosocial lie. Thus, ToM and executive functions were examined with respect to prosocial lying in the current study.

In addition to research on antisocial lie-telling, predictions about the impact of cognitive abilities on prosocial lying can be informed by research on the development of general prosocial behaviour. Researchers have found support for a link between the development of prosocial behaviour and ToM, as well as executive functioning skills (Svetlova, Nichols, & Brownell, 2010). That is, to act in a prosocial manner, children must learn the following behaviours: (a) to

differentiate another's internal states from their own, (b) to understand another's goals and how to reach them, and (c) to suppress their own emotions and needs to facilitate addressing the other's emotions and needs (Zahn-Waxler & Radke-Yarrow, 1990). Thus, this research suggests that prosocial lies may be related to ToM and executive functioning. Yet Eisenberg, Shea, Carlo, and Knight (2014) suggest that the next wave of research on children's prosocial behaviour should aim to identify when age-related changes in ToM and executive functioning capabilities predict prosocial responding. The same is true for prosocial lie-telling.

Theory of Mind

Lie-telling emerges concurrently with the development of ToM (e.g., Polak & Harris, 1999; Talwar & Lee, 2008). For instance, Polak and Harris (1999) found that children who told antisocial lies during a temptation resistance paradigm were also more likely to pass measures of false-belief understanding. Similarly, Talwar and Lee (2008) found that children's successful antisocial lying during a temptation resistance paradigm was significantly correlated to their first-order false belief understanding (i.e., ability to make attributions about others' thoughts or false beliefs). Semantic leakage control, the capacity to effectively maintain a lie, was also related to second-order false-belief understanding (i.e., ability to make attributions about what one person's thoughts or false beliefs are about another person's thoughts or false beliefs).

The latter ability, second-order false-belief understanding, is a more mature level of ToM development and, as such, researchers have suggested that prosocial lying might be uniquely related to children's second-order false-belief understanding (Broomfield, Robinson, & Robinson, 2002). Arguments can be made that ToM is a prerequisite for both antisocial and prosocial lying, as these lies require an understanding of another's mental state as different from one's own. However, protecting oneself (i.e., antisocial lying) may rely upon a less mature level

of ToM understanding. For example, for children to be convincing in an antisocial context, they must deny a misdeed (e.g., avoid giving obvious clues), while a prosocial lie requires the telling of a lie, inhibition of inconsistent behaviour (e.g., a grimace), and production of consistent behaviour (e.g., a broad smile). To date, there has been little direct examination of executive functions that facilitate prosocial lying among children (ages 6 to 12 years), particularly through the use of experimental paradigms that elicit spontaneous lies, as in the current study. Thus, as suggested by Eisenberg et al. (2014), the current study tests whether ToM, at a specified point in its development (i.e., second-order), is associated with children's prosocial lie-telling.

Working Memory and Inhibitory Control

To tell a successful lie, children must inhibit truthful information, produce false information, and remember the specific components of their lie to avoid contradictions with the truth (Gombos, 2006; Talwar & Lee, 2002a, 2002b). As such, two specific areas of executive functioning are expected to be of importance in prosocial lie-telling: (a) working memory and (b) inhibitory control. Working memory refers to the ability to temporarily hold and process information in one's mind (Baddley, 1986), whereas inhibitory control refers to the ability to suppress interfering thoughts so that one can focus on other processes or actions (Carlson, Moses, & Breton, 2002).

In a study examining antisocial lie-telling in relation to executive functions in late childhood to middle adolescence, Evans and Lee (2011) reported a significant positive relation between children's semantic leakage control when telling antisocial lies and their performance on a measure of working memory (i.e., Digit Span). Similarly, Talwar and Lee (2008) found that better performance on an inhibitory control task (i.e., the Stroop) predicted children's antisocial lie-telling. Carlson and Wang (2007) examined executive functions and children's performance

on the disappointing gift paradigm. Overall, the researchers found that children who performed higher on the disappointing gift paradigm (i.e., by masking their disappointment) also had greater emotion regulation (i.e., a form of executive functioning). However, Carlson and Wang (2007) did not analyze children's responses for semantic leakage control.

To date, few empirical research studies have been conducted on children's executive functions in relation to prosocial lie-telling. Yet, both working memory and inhibitory control have been shown to relate to antisocial lying. Although it seems likely that prosocial lie-telling would also be related to these executive functions, it is possible that these processes might not be necessary or sufficient for effective prosocial lie-telling among school-aged children. Prosocial acts are inherently different from antisocial acts, emerge later, and thus might be supported by different cognitive foundations (Eisenberg, Hofer, Sulik, & Liew, 2014). Thus, the current study further tested the hypothesized relation between executive functions and prosocial lying.

Current Study

The current study examined children's ToM (i.e., second-order false-belief understanding), working memory (i.e., Digit Span) and inhibitory control (i.e., Color-Word Stroop) in relation to prosocial lying among school-aged children. Based on existing research (e.g., Talwar et al., 2007b), it was expected that children would both tell and maintain (i.e., semantic leakage control) prosocial lies increasingly with age ($Hypothesis_1$). In addition, children with greater second-order false-belief understanding were expected to be more likely to tell a prosocial lie ($Hypothesis_2$). Children with greater Digit Span scores were expected to be more likely to tell a prosocial lie ($Hypothesis_3$; e.g., Carlson et al., 1998; Talwar & Lee, 2008). Liars were also predicted to have greater inhibitory control ($Hypothesis_4$; e.g., Carlson et al.,

1998; Talwar & Lee, 2008). Finally, liars who maintained semantic leakage control were expected to have greater scores on all measures (Hypothesis$_5$).

Method

Participants

A total of 79 children (n_{males} = 43; $M_{age\ in\ months}$ = 111.49, SD = 18.55) between 6 and 12 years of age participated in the study. The children were predominately Caucasians, and from middle-income families in a large Canadian city. Parental informed consent was obtained prior to participation in the study.

Procedure

Disappointing gift paradigm. Research assistant 1 (RA1) first asked the child to rank five prizes in order of preference. Prizes ranged from desirable (e.g., colorful slinky) to disappointing (e.g., knitted sock) and were chosen based on pilot data and feedback from children. After ranking prizes, RA1 left the testing room and research assistant 2 (RA2) entered the testing room to administer the cognitive tasks (i.e., ToM tasks, Digit Span, Color-Word Stroop). Following these tasks, the child was given a prize ranked as undesirable, which was concealed in a box. RA2 said to the child, "Here's a prize that I picked out for you myself." RA2 instructed the child to open the box while she left the room to make a phone call. RA2 returned to the room and asked the child, "How do you like the prize?" Children either lied or told the truth.

To examine the child's ability to maintain his or her lie and give plausible explanations, RA2 asked, "What do you like about your prize?" and "What do you plan to do with it?" After this questioning, RA2 left the room and RA1 entered the room. RA1 asked, "How do you like your prize?" and "Would you like to trade your current prize for a different one?" All children

said they preferred to exchange their prize for a different one. If children told both experimenters that they did not like the prize, they were coded as blunt truth-tellers (score of 0). Children were classified as prosocial lie-tellers if they told RA2 that they liked the disappointing prize, but later indicated to RA1 that they did not like the prize and preferred to choose another prize. Among lie-tellers, children's answers to RA2's follow-up questions were coded as being implausible (i.e., not maintaining semantic leakage control), or plausible explanations (i.e., maintaining semantic leakage control). An example of an implausible explanation (score of 1), demonstrating difficulty in maintaining the lie was, "I don't know [what I like about them]" or "I would give them to my brother," whereas a plausible answer (score of 2), demonstrating a child's ability to maintain his or her lie was "I like the color of them," or "I like how soft they are, and I can wear them on a cold day." Inter-coder reliability was 96%.

Theory of Mind. To assess ToM, two second-order false-belief stories, modeled after Hogrefe, Wimmer, and Perner (1986), and Sullivan, Zaitchik, and Tager-Flusberg (1994) were used. These stories involve complex unexpected location events and test children's ability to recognize a character's false beliefs about another character's beliefs (e.g., Where does John think Emma will go to buy the ice cream?). Second-order false-belief scores range from 0 to 4 (2 points per story).

Stroop. The Stroop is a neuropsychological test used to assess various functions, such as selective attention, cognitive flexibility, processing speed, and response to cognitive stressors (Golden, Freshwater, & Golden, 2003). The Color-Word Stroop for elementary-school aged children was used. This Stroop task consists of three trials. On the first trial, the child was asked to read a list of written color names in black ink. On the second trial, the child was asked to read

the color of the ink of non-words. On the final trial, the child was asked to read a list of written color names that were presented in ink that did not correspond with the written words.

Working memory. To assess working memory, the Digit Span subtest from the Wechsler Intelligence Scale for Children–4th Edition was administered (Wechsler, 2003). In this standardized measure, children are asked to repeat a series of numbers either in forward or backward order. The number of digits increases with each successful trial. When children achieve ceiling on each task/order (i.e., two consecutive errors), the task ends. The highest series of digits achieved by each child was recorded. Children received one point for every series of digits correctly repeated (Davis & Pratt, 1996).

Results

No significant gender differences were found across lie and cognitive measures. Thus, results for both genders were combined for all subsequent analyses. To examine children's prosocial lie-telling behaviour in relation to cognitive abilities, a series of hierarchical logistic regressions were performed to measure if executive functions were together or individually predictive of children's lie-telling. To test the linear relationship between the cognitive measures, Pearson product-moment correlation coefficients were calculated. There was a significant positive relation between ToM2 and Digit Span, $r = .235$, between ToM2 and Stroop, $r = .279$, and between Digit Span and Stroop, $r = .275$.

Initial Lie

Of the 79 children who participated in the study, 47 (59.50%) told a prosocial lie to the RA about liking their prize. A hierarchical logistic regression was conducted on children's lie-telling behaviour with child age (continuous variable) on the first step, and executive functions and ToM (second-order false-belief understanding; Digit Span and Color-Word Stroop) scores

entered on the second step. Correlations between measures is displayed in Table 1 and coefficients for the logistic regression are displayed in Table 2. As seen in Table 2, children's prosocial lie-telling did not increase with age ($Hypothesis_1$) and greater second-order false-belief understanding did not predict lie-telling behaviour ($Hypothesis_2$). However, children's higher Digit Span scores and Stroop scores predicted children's prosocial lie-telling behaviour ($Hypothsis_3$ and $Hypothesis_4$, respectively).

Semantic Leakage Control

Of the 47 children who lied about liking the disappointing prize, 25 (53.2%) maintained semantic leakage control during the follow-up questions. All 32 children who were truthful to the RA admitted to disliking the disappointing prize. A logistic regression was conducted on children's semantic leakage control ability among lie-tellers with child age (continuous) on the first step, and executive functions and ToM (second-order false-belief understanding; Digit Span and Color-Word Stroop) scores entered on the second step. Means and standard deviantion for the for the logistic regression are displayed in Table 3. The odds ratio indicated that with each month increase in age, children were 1.03 times more likely to maintain semantic leakage control. As seen in Table 3, children's higher second-order false-belief scores predicted their semantic leakage control of their lies ($Hypothesis_5$). Digit Span and Stroop did not predict semantic leakage control.

Discussion

The current study was the first to examine children's ToM and executive functioning in relation to prosocial lying. Results revealed that children's ability to tell prosocial lies was related to second-order false-belief understanding, working memory, and inhibitory control.

Such findings suggest that children's developing perspective-taking and executive functioning play an important role in the development of prosocial lying.

Specifically, children who told prosocial lies had higher scores on Digit Span and Color-Word Stroop tasks, suggesting that the executive functions of working memory and inhibitory control might play an essential role in children's ability to tell prosocial lies. That is, when telling a prosocial lie, the liar must disguise his or her own true feelings (e.g., disappointment from receiving a low-ranked gift) for the benefit of another (e.g., protecting the researcher's feelings) and therefore mentally hold and manipulate conflicting information simultaneously. Executive functioning skills appear to facilitate this task. These results are consistent with research on antisocial lie-telling and on general prosocial behaviour (Evans & Lee, 2011, 2013a; Talwar & Lee, 2008), suggesting that inhibitory control and working memory play an integral role in children's prosocial and lie-telling abilities.

With age, prosocial liars were more successful at maintaining their lies (i.e., semantic leakage control), a finding reported by Xu et al. (2010), who also examined children's lies in politeness situations. In addition, higher second-order false-belief understanding predicted greater semantic leakage control, suggesting that those children who are good prosocial liars are also better perspective takers. However, whether children initially told a prosocial lie during the disappointing gift paradigm was not related to second-order false-belief understanding. Broomfield et al. (2002) suggested that children's second-order false-belief understanding may be necessary, but not sufficient, to predict children's false responses in a politeness situation. In their study, children were read a vignette and asked to determine whether or not the protagonist would tell a prosocial lie. Children's second-order false-belief understanding was not correlated with their choice of having the protagonist lie or be truthful. In the current study, second-order

false-belief understanding was not found to be a predictor of children's actual lie-telling behaviour, though it did predict their ability to maintain lies. Because children are likely to lie earlier than they can lie effectively, the observation that second-order false-belief understanding typically only emerges around 6 to 7 years old and continues to develop into adolescence could help to explain this dichotomy. Nevertheless, Polak and Harris (1999), as well as Talwar and Lee (2002a), have provided strong arguments for the relation between children's second-order false-belief understanding and their ability to maintain antisocial lies, which can now be applied to prosocial lie-telling.

The current findings can be linked to an existing body of research on children's understanding of display rules (e.g., Gross, & Harris, 1988). Display rules are a set of social conventions and expectations that guide individuals in how they should express their emotions (Saarni, 1979; Zander& Haviland, 1982). For instance, a child who deliberately smiles upon receiving a disappointing gift to conceal their disappointment may use a similar social expression (e.g., smile) to indicate when he or she truly likes a gift. Saarni (1979) states, "display rules appear to be at the center of this differentiation between overt expressive behaviour and covert emotional experience" (p. 424) and that as children develop, they become more aware of these display rules, and develop a more complex understanding of the use of these rules. It is possible that children's evolving recognition and understanding of these culturally-defined display rules (Harris, 1989; Gross & Harris, 1988), perhaps resulting from their executive functions, drives children's growing prosocial lie-telling. Future research will be necessary to tease apart the potential impact of display rule understanding and executive functions more generally, on children's prosocial lie-telling behaviour and skill.

Understanding which executive functions are associated with prosocial lying may provide insight into how individuals who struggle with social skills are impacted by a lack of prosocial lie-telling ability (Sodian & Frith, 1992). For example, Li, Kelley, Evans, and Lee (2011) found that children diagnosed on the autism spectrum were less likely to engage in prosocial lying during the disappointing gift paradigm. Understanding how this lack of prosocial lying affects their interactions and ability to maintain relationships warrants further research.

Limitations and Future Directions

The current study's findings provide significant contributions to the current body of literature on children's development of prosocial lie-telling. However, some limitations should be highlighted. First, although significant relationships were found between lie-telling and children's executive functioning, only a single task measured each of the abilities. The use of multiple measures of each executive functions, rather than relying on a single measure of each construct, would strengthen research examining these relationships. Second, the relation between prosocial lying and emotional competence, specifically a measure of empathy, would be important to consider in future research, as previous studies have found a relation between prosocial behaviours and empathy (Eisenberg & Fabes, 1998; Eisenberg & Miller, 1987). Thus, perhaps children with greater empathetic capabilities develop prosocial lying earlier or their prosocial lies become more sophisticated at a younger age. To date, no research has examined the relationship between the development of prosocial lie-telling and children's capacities for empathy. Finally, a larger sample size would provide greater power to allow for more complex analyses of the predictors of prosocial lie-telling.

Conclusion

In summary, more than half of the children in the current study lied in the disappointing gift paradigm. Approximately half of those children were able to maintain their lies under follow-up questioning (i.e., semantic leakage control). Children's inhibitory control and working memory were predictors of children's prosocial lie-telling. The children who lied and had semantic leakage control were also found to have higher second-order false-belief understanding, and semantic leakage control ability increased with age. Overall, this evidence highlights how specific executive functions and ToM impact children's prosocial lie-telling frequency and capacity, both of which have the potential to influence their interpersonal relationships over time.

References

Baddeley, A. D. (1986). *Working memory*. Oxford, England: Oxford University Press.

Bok, S. (1978). *Lying: Moral choice in public and private life*. New York, NY: Vintage.

Broomfield, K. A., Robinson, E. J. & Robinson, W. P. (2002). Children's understanding about white lies. *British Journal of Developmental Psychology, 20,* 47-65. doi:10.1348/026151002166316

Bussey, K. (1999). Children's categorization and evaluation of different types of lies and truths. *Child Development, 70*, 1338–1347. doi:10.1111/1467-8624.00098

Camden, C., Motley, M. T., & Wilson, A. (1984). White lies in interpersonal communication: A taxonomy and preliminary investigation of social motivations. *Western Journal of Speech Communication*, *48*, 309-325.

Carlson, S. M., Moses, L. J., & Breton, C. (2002). How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. *Infant and Child Development*, *11*, 73-92. doi:10.1002/icd.298

Carlson, S. M., Moses, L. J., & Hix, H. R. (1998). The role of inhibitory processes in young children's difficulties with deception and false belief. *Child Development, 69,* 672-691. doi:10.1111/j.1467-8624.1998.tb06236.x

Cole, P. M. (1986). Children's spontaneous control of facial expression. *Child Development, 57,* 1309-1321. doi:10.1037/0012-1649.30.6.835

Davis, M. H. (1994). *Empathy: A social psychological approach.* Boulder, CO: Westview Press.

Davis H. L. *&* Pratt, C. (1996). The development of children's theory of mind: The working memory explanation. *Australian Journal of Psychology, 47*, 25–31. doi:10.1080%2F00049539508258765

DePaulo, B.M., Jordan, A., Irvine, A., & Laser, P.S. (1982). Age changes in the detection of deception. *Child Development, 53,* 701-709. doi.10.2307/1129383

DePaulo, B. M., & Kashy, D. A. (1998). Everyday lies in close and casual relationships. *Journal of Personality and Social Psychology*, *74*, 63-79. doi: 10.1037//0022-3514.74.1.63

DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology*, *70*, 979-995. doi:10.1037/0022-3514.70.5.979

Eisenberg, N., & Fabes, R. A. (1998). Prosocial development. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 701-778). New York, NY: Wiley.

Eisenberg, N., Guthrie, I. K., Murphy, B. C., Shepard, S. A., Cumberland, A. and Carlo, G. (1999), Consistency and Development of Prosocial Dispositions: A Longitudinal Study. *Child Development, 70*, 1360–1372. doi:10.1111/1467-8624.00100

Eisenberg, N., Hofer, C., Sulik, M. J., & Liew, J. (2014). The development of prosocial moral reasoning and a prosocial orientation in young adulthood: Concurrent and longitudinal correlates. *Developmental Psychology*, *50*, 58-78. doi:10.1037/a0032990

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin*, *101*, 91-119. doi:10.1037/0033-2909.101.1.91

Eisenberg, N., Shea, C. L., Carlo, G., & Knight, G. P. (2014). Empathy-related responding and cognition: A "chicken and the egg" dilemma. In W. Kurtines & J. Gewirtz (Eds.), *Handbook of moral behavior and development: Vol. 2. Research* (pp. 63-88). New York, NY: Psychology Press.

Ennis, E., Vrij, A., & Chance, C. (2008). Individual differences and lying in everyday life. *Journal of Social and Personal Relationships, 25*, 105–118. doi:10.1177/026 5407507086808

Evans, A. & Lee, K. (2011). Verbal deception from late childhood to middle adolescence and its relation to executive functioning skills. *Developmental Psychology, 47,* 1108-1116. doi:10.1037/a0023425

Evans, A. D., & Lee, K. (2013a). Emergence of lying in very young children. *Developmental Psychology*, *49*, 1958. doi :10.1037/a0031409

Evans, A. D., & Lee, K. (2013b). Lying, morality, and development. In M. Killen, & J.G. Smetana (Eds.), *Handbook of Moral Development* (pp.361-384). New York, NY: Psychology Press.

Gombos, V. A. (2006). The cognition of deception: The role of executive processes in producing lies. *Genetic, Social, and General Psychology Monographs, 132,* 197-214. doi: 10.3200/MONO.132.3.197-214

Golden C. J., Freshwater S. M., & Golden Z. (2003). *Stroop color and word test children's version for ages 5–14: A manual for clinical and experimental uses*. Wood Dale, IL: Stoelting.

Grice, H. P. (1980). *Studies in the way of words.* Cambridge, MA: Harvard University Press.

Harris, P. L. (1989). *Children and emotion: The development of psycho-logical understanding.* Oxford, England: Basil Blackwell.

Hogrefe, G. J., Wimmer, H., & Perner, J. (1986). Ignorance versus false belief: A developmental lag in attribution of epistemic states. *Child Development, 57,* 567-582.

Lewis, M. (1993). The development of deception. In M. Lewis & C. Saarni (Eds.), *Lying and deception in everyday life* (pp. 90–105). New York, NY: Guilford.

Li, S. A., Kelley, A. K., Evans, D. E., & Lee, K. (2011). Exploring the ability to deceive in children with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders, 41,* 185-195. doi:10.1007/s10803-010-1045-4

Lindskold, S., & Han, G. (1986). Intent and the judgment of lies. *The Journal of Social Psychology*, *126*, 129-130. doi:10.1080/00224545.1986.9713581

Nyberg, D. (1993). *The varnished truth: Truth telling and deceiving in ordinary life.* Chicago, Il: Chicago University Press.

Polak, A. & Harris, P. L. (1999). Deception by young children following noncompliance. *Developmental Psychology, 35,* 561-568. doi:10.1037/0012-1649.35.2.561

Popliger, M., Talwar, V., & Crossman, A. (2011). Predictors of children's prosocial lie-telling: Motivation, socialization variables, and moral understanding. *Journal of Experimental Child Psychology, 110,* 373-392. doi:10.1016%2Fj.jecp.2011.05.003

Saarni, C. (1979). Childre's understanding of display rules for expressive behavior. *Developmental Psychology, 15,* 424-429. doi:10.1037/0012-1649.15.4.424

Saarni, C. (1984). An observation study of children's attempts to monitor their expressive behaviour. *Child Development, 155,* 1504-1513.

Sodian, B. & Frith, U. (1992). Deception and Sabotage in autistic, retarded and normal children. *The Journal of Child Psychology and Psychiatry, 33,* 591-605. doi:10.1111/j.1469-7610.1992.tb00893.x

Sullivan, K., Zaitchik, D., & Tager-Flusberg, H. (1994). Preschoolers can attribute second-order beliefs. *Developmental Psychology, 30,* 395–402. doi:10.1037/0012-1649.30.3.395

Svetlova, M., Nichols, S. R., & Brownell, C. A. (2010). Toddlers' prosocial behaviour: From instrumental to empathic to altruistic helping. *Child development*, *81*, 1814-1827. doi:10.1111/j.1467-8624.2010.01512.x

Sweetser, E. (1987). The definition of "lie". An examination of the folk models underlying a semantic prototype. In D. Hollard & N. Quinn (Eds.), *Cultural models in language and thought* (pp. 43-66). New York, NY: Cambridge University Press

Talwar, V. & Crossman, A. (2011). From little white lies to filthy liars: The evolution of honesty and deception in young children. *Advances in Child Development and Behaviour, 40,* 139-179. doi: 10.1016%2FB978-0-12-386491-8.00004-9

Talwar, V., Gordon, H., & Lee, K. (2007a). Lying in the elementary school: Verbal deception and its relation to second-order belief understanding. *Developmental Psychology*, *43,* 804–810. doi: 10.1037/0012-1649.43.3.804

Talwar, V., & Lee, K. (2002a). Development of lying to conceal a transgression: Children's control of expressive behaviour during verbal deception. *International Journal of Behavioural Development, 26,* 436-444. doi: 10.1080/01650250143000373

Talwar, V., & Lee, K. (2002b). The emergence of white-lie telling in children between 3 and 7 years. *Merrill-Palmer Quarterly, 48,* 160–181. doi: 10.1353/mpq.2002.0009

Talwar, V., & Lee, K. (2008). Social and cognitive correlates of children's lying. *Child Development, 79*, 866–881. doi: 10.1111/j.1467-8624.2008.02264.x

Talwar, V., & Lee, K. (2011). A punitive environment fosters children's dishonesty: A natural experiment. *Child Development*, *82*, 1751-1758. doi:10.1111/j.1467-8624.2011.01663.x

Talwar, V., Murphy, S., & Lee, K. (2007b). White lie-telling in children for politeness purposes. *International Journal of Behavioural Development*, *31*, 1–11. doi: 10.1177/0165025406073530

Warneken, F., & Orlins, E. (2015). Children tell white lies to make others feel better. *British Journal of Developmental Psychology*. *Advance online publication.* doi:10.1111/bjdp.12083

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children Fourth Edition: Canadian.* Toronto, ON: Hartcourt Assessment, Inc.

Wilson, A.E., Smith, M.D., & Ross, H.S. (2003). The nature and effects of young children's lies. *Social Development, 12*, 21–45. doi:10.1111/1467-9507.00220

Xu, F., Bao, X., Fu, G., Talwar, V. & Lee, K. (2010). Lying and truth-telling in children: From concept to action. *Child Development, 81,* 581-596. doi: 10.1111/j.1467-8624.2009.01417.x

Zahn-Waxler, C., & Radke-Yarrow, M. (1990). The origins of empathic concern. *Motivation and Emotion*, *14*, 107-130. doi: 10.1007/BF00991639

Table 1

Correlations Between Cognitive Measures

	Cognitive Measures	
Cognitive Measures	1	2
1. ToM2	----	----
2. Digit Span	.235*	----
3. Stroop	.279*	.275*

Note. * $p < .05$

Table 2

Logistic Regression Model for Children's Prosocial Lie-telling

	B	S.E.	Wald	OR (95% CI)	χ^2
Step 1					.729
Age	.010	.011	.721	1.010 (.987 -1.032)	
Step 2					14.844**
ToM2	.236	.237	.339	1.226 (.796 -2.104)	
DS	.179	.092	3.78*	1.196 (.998 -1.433)	
Stroop	.060	.300	3.96*	1.062 (1.001 – 1.127)	

Note. * $p < .05$; ** $p < .01$

Step 1: Nagelkerke $R^2 = .012$

Step 1: Nagelkerke $R^2 = .231$

Table 3

Means (Standard Deviations) of Cognitive Measures of Initial Lie-telling and Semantic Leakage Control

	ToM2	DS	Stroop
Lie-tellers	3.57(.77)	15.63 (3.97)	52.25 (9.94)
Truth-tellers	3.06 (1.47)	13.4(2.31)	45.68 (10.22)
With SL	3.88 (.43)	16.24(3.92)	53.88 (9.98)
No SL	3.22 (.92)	14.95 (4.00)	50.40 (9.77)

Note.

SL: Semantic Leakage

DS: Digit Span

Bridging Manuscript 1 and Manuscript 2

Investigations of children's lie-telling has been primarily focused on one of two areas of inquiry. Initially researchers were interested in moral development and lie-telling, with an emphasis placed on children's ethical evaluations of truths and lies (Bussy, 1992; Peterson et al., 1983). With the advancement of experimental paradigms, observations of children's lie-telling began to take place directly (Lewis et al., 1989; Talwar & Lee, 2002a, 2002b; 2008; 2011). Yet, the majority of this research focused on school aged children's antisocial lie-telling. More precisely, the relation between antisocial lie-telling, ToM, and executive functions (e.g., Evans & Lee, 2013a; Talwar & Lee, 2008; Polak & Harris, 1999). The first goal of the current research program was to expand the literature by examining other types of lies (i.e., prosocial).

To date, only a few studies have examined the development of children's lie-telling beyond antisocial motivations (Popliger et al., 2011; Talwar et al, 2007b; Xu, Bao, Fu, Talwar, & Lee, 2010). For example, Talwar et al. (2007b) examined children's prosocial lie-telling between the ages of 3 and 11 years. The researchers found that as children age, their lie-telling abilities and semantic leakage control improve. Both Xu et al. (2010) and Popliger et al. (2011) examined the relation between children's moral evaluation of lies and actual prosocial lie-telling. Yet, cognitive abilities in relation to prosocial lying were not examined in any of these studies. This despite strong arguments within the antisocial lie-telling literature that lie-telling development is supported by a several cognitive factors (Talwar & Lee, 2008). As a result, Manuscript 1 sought to address this gap in the literature by examining the relation between elementary school aged children's prosocial lying and their cognitive abilities. Overall, the results of the first manuscript suggest that inhibitory control and working memory assist in children's prosocial lies. Furthermore, children's second-order false-belief understanding was

related to children's ability to maintain their prosocial lies. Therefore, Manuscript 1 provided support for the relation between specific executive functions and ToM in prosocial lying.

Despite the focus on children within the elementary school age range in Manuscript 1, investigations of younger children's lie-telling has also been overlooked within the literature. Specifically, given the focus of the research program on executive functioning skills and ToM understanding, the support these skills provide in early lie-telling is of particular interest. To date, only one study has examined children's lie-telling prior to 3 years old (Evans & Lee, 2013a), this despite observational accounts of children lying as young as 2-years old (Newton et al., 2000). Thus, Manuscript 2 sought to fill this gap in the literature by examining the relation between executive functions, ToM and lie-telling in preschool aged children.

CHAPTER 3: MANUSCRIPT 2

Young Deceivers: Deception Recognition, Executive Functioning and Antisocial Lie-telling in Preschool Aged Children

Shanna Mary Williams[1], Karissa Leduc[1], Angela Crossman[2], and Victoria Talwar[1]

McGill University[1]

John Jay College of Criminal Justice[2]

Author Note: This study has been accepted, pending minor revisions, to the Journal of Infant and Child Development.

Abstract

The present study examined the emergence of antisocial lie-telling in 2.5 year old children. Lie-telling was studied in relation to executive functioning, Theory of Mind, and children's ability to identify both truths and lies. A total of 65 children ($M_{age\ in\ months}$ = 31.75, *SD* = 1.87) participated in a modified temptation resistance paradigm (TRP; designed to elicit spontaneous antisocial lies). Executive functioning was measured through an inhibitory control task (i.e., Whispers Task) and a forward search planning task (i.e., The Kitten Delivery Task). Children also completed two Theory of Mind (first-order false-belief) measures. The lie/truth identification task was administered to measure children's ability to distinguish truths and lies accurately. During the TRP, a total of 89.23% of children peeked at the toy when left alone in the room, and of those children, 29.31% lied to the research assistant. Significant differences on measures of executive functioning were found between lie-tellers and confessors, as well as for the lie/truth identification task. Lie-tellers had higher scores on measures of inhibitory control and forward search planning. Lie-tellers also had greater accuracy on the lie/truth identification task than confessors. This study provides a unique contribution to the literature by examining 2.5 year old children's emerging lie-telling abilities, a relatively understudied age during which fledgling lie-telling emerges.

Young deceivers: Deception recognition, executive functioning and antisocial lie-telling in preschool aged children

Lie-telling is an important social behaviour, which even very young children learn to use in everyday social interactions. Results of existing studies have shown that young children lie to avoid transgressions being discovered and nascent deceptive abilities improve throughout preschool and school age (Evans & Lee, 2011, 2013b; Perkins & Turiel, 2007; Talwar Gordon, & Lee, 2007a). The age at which children begin to tell lies has been of particular interest to researchers, with some highlighting the role of executive functions in the emergence of lie-telling (Evans & Lee, 2011; Talwar & Lee, 2008). Yet, there have been few research studies examining lie-telling among preschool-aged children (Chandler, Fritz, & Hala, 1989; Evans & Lee, 2013a; Newton, Reddy, & Bull, 2000; Wilson, Smith, & Ross, 2003).

Children's Early Lie-telling Behaviour

Talwar and Lee's (2008) developmental model of lie-telling suggests that children's earliest lies (i.e., primary lies) emerge between 2 and 3 years of age. However, researchers have questioned the intentionality of very young children's lies; with some arguing that initial deceptions of the very young are mistaken utterances or pseudo-lies, rather than truly deliberate instances of deceit (Ahern, Lyon, & Quas, 2011; Talwar & Lee, 2008; Strichartz & Burton, 1990; Wimmer, Gruber, & Perner, 1984;). Very young children's lies have been examined experimentally using the modified temptation resistance paradigm (TRP; see Lewis, Stanger, & Sullivan, 1989; Talwar & Lee, 2002a). During the TRP, children have the opportunity to transgress by peeking at a toy after being instructed not to peek. If children do peek, they can either chose to lie or tell the truth about their behaviour. Such a paradigm provides researchers with the opportunity to elicit children's spontaneous antisocial lie-telling (i.e., a lie told to

conceal a transgression or for other self-serving motivations) through a procedure that is ecologically valid and naturalistic (Lee, 2013; Talwar & Lee, 2002a; Williams, Kirmayer, Simon & Talwar, 2013). Using a TRP, Talwar and Lee (2002a) examined lie-telling in children between 3 and 7 years of age. Results revealed that only half of the children under 4 years of age lied to conceal their transgression (i.e., peeking at toy), while the majority of children aged 4 years and older lied (i.e., 70% to 100%). Also, children's ability to maintain lies improves with age. Maintenance of lies, which is the capacity to make follow-up statements consistent with one's initial lie, is referred to as semantic leakage control (Talwar & Lee, 2002a). Very young children typically produce an initial lie, but are unable to maintain the lie thereafter. Similar results have been verified by other TRP studies (e.g., Evans, Xu, & Lee, 2011; Talwar et al., 2007a). As a result of the significant differences between the lie-telling of 3 and 4 year olds, Talwar and Lee (2002a) argue that a change in children's lie-telling aptitude occurs during the preschool years.

To date, Evans and Lee's (2013a) study is the only to examine lie-telling capabilities of children younger 3 years old. Using a modified TRP, the researchers measured lie-telling in children between 2 and 3 years of age. Of the 2.5 year old children in their sample, 25% lied, thus providing evidence for the emergence of lie-telling before 3 years of age. The researchers also measured executive functions, such as working memory and inhibitory control, which they argue facilitates the emergence of lie-telling in young populations.

Lie-telling and Executive Functioning

Several researchers have emphasized the likely importance of executive functions in the development of lying (Evans et al., 2011; Gombos, 2006; Rasmussen, Talwar, Loomes, & Andrew, 2007). Broadly defined, executive functions "mediate the ability to organize our

thoughts in a goal-directed way and are therefore essential for success in school and work situations, as well as everyday living" (Jurado & Rosselli, 2007, pg. 214). Researchers have highlighted the role of inhibitory control and working memory in both initial lie-telling and lie maintenance (e.g., Carlson, Moses, & Hix, 1998; Talwar et al., 2007a; Talwar & Lee, 2008). Other skills, such as planning, have received less empirical attention (Evans et al., 2011).

Previous research findings suggest that preschool aged children are less likely to tell antisocial lies than their school aged counterparts (Evans & Lee, 2013a). Also, young children's antisocial lies are poorly constructed, as they have difficulty with follow-up questions pertaining to their initial lie. There are several potential reasons for the differences between younger and older children's lie-telling, one of which is executive functioning. First, it is possible that some younger children confess in the TRP because they wish to be honest and admit their transgressions. Developmental research suggests that neither conscience development nor concerns regarding personal image are likely to be sufficiently developed to underlie the high numbers of confessions among children at these young ages (Kochanska & Aksan, 2006; Kochanska, Murray, & Coy, 1997, 2001). Younger children also might misunderstand the situation, considering it appropriate to tell the truth. Yet, Polak and Harris (1999) demonstrated that 3 and 5 year old children confessed to touching a toy only when they had permission to touch, and denied doing so when it was forbidden. Thus, children were able to withhold the truth when it was in their best interest to do so, but confessed when it was safe to do so. Finally, it is possible that high numbers of very young children confess after peeking because they lack the cognitive skills to either inhibit a confession or produce a lie (or to refrain from transgressing in the first place). A strong relationship between executive functioning and children's lie-telling

could further support the notion that these abilities are important gatekeepers to children's lie-telling.

Inhibitory Control

Inhibitory control has been defined as the ability to control one's thoughts or behaviours (McCall, 1994). To tell a convincing lie, a child must not only produce a false belief in another, but they must also inhibit their desire to report their own true belief (Bok, 1978). Carlson et al. (1998) examined 3 year old children's performance on a low inhibitory control (i.e., deception via pictures or arrows) or high inhibitory control task (i.e., deceptive pointing) and their findings largely suggest a significant link between inhibitory control and deceptive capabilities. Talwar and Lee (2008) found that children (i.e., 3 to 8 year olds) who lied during the TRP also performed higher on a measure of inhibitory control. Similarly, Evans and Lee (2013a) examined lie-tellers' (2 to 3 years old) performance on inhibitory control measures. Even among their very young sample of children, lie-tellers displayed higher inhibitory control scores than truth-tellers.

Planning

Planning has been defined as the formulation of a series of steps designed to achieve a goal or solve a problem (Wellman, Fabricius, & Sophian, 1985). Walczyk, Roper, Seemann, and Humphrey's (2003) activation-decision-construction model (i.e., ADCM) outlines the use of planning during lie-telling. Walczyk et al. (2003) argues that the construction of a lie requires greater response time or processing compared to truthful responses. The model posits three components of deception: (1) activation of information, whereby a lie-teller examines previously stored knowledge about the event they are lying about; (2) decision-making, whereby the decision to be truthful or lie is made; and (3) construction, whereby an individual who lies

requires a greater amount of planning and, as a result, response time to prepare the false statement. Thus, the model proposes that children with the ability to engage in such planning would have an advantage; with lie-tellers likely utilizing greater planning during the *construction* phase.

Planning skills emerge during the same developmental period as lie-telling, beginning at 2 years old (Carlson, Moses, & Claxton, 2004; Hudson, Shapiro, & Sosa, 1995; Nelson, 1989). Evans et al. (2011) examined children's use of strategic lying, which entails use of planning abilities. The researchers observed 3 to 5 year olds' strategic lies using a modified TRP and found that more than half of 3 year olds told a strategic antisocial lie to conceal their transgression. With age, children's lie-telling rates increased. As a result, it can be argued that children as young as 3 years old can evaluate the knowledge of the lie recipient, use this knowledge to decide if deception is a good course of action and deploy a strategic lie (Fu, Evans, Xu, & Lee, 2012). However, the researchers did not examine children younger than 3 years of age, nor did they use a separate measure of planning abilities.

Evans et al. (2011) examined lie-telling of 3 to 5 year-old children in relation to their performance on a specific planning measure, the motor sequencing task (Welsh, Pennington, & Groisser, 1991). No significant relation was found. Nonetheless, the researchers noted that the motor sequencing task did not measure the form of planning that might be employed in deception, specifically multi-step, goal-oriented action planning. It is likely that children's verbal deception requires a different form of planning (i.e., goal-oriented and multi-step) than that measured by the motor sequencing task. In contrast, Evans and Lee (2011) examined lie-telling and planning abilities, using a Tower of London task, in older children (i.e., 8 to 16 year olds). Results revealed a significant relation between lie-tellers' performance on a planning task

and the sophistication of their lies. Specifically, those children who had higher planning abilities were also more likely to tell more sophisticated lies than those children with poor planning abilities. To date, there has been no further empirical examination of the relation between lie-telling and planning.

Since deception requires verbal planning, as well as the ability to foresee multiple possible outcomes (i.e., consequences of making different truth versus lie statements), forward search planning is a particularly relevant form of planning. Fabricius (1988) defines forward search planning as, "allowing a problem solver to foresee the consequences of (different) series of moves" (pg. 1473). As a result of forward search planning, an individual is able to avoid initial moves or actions that might be counterproductive to their end goal. In the case of deception, this ability allows children to foresee and plan their responses, allowing for the creation of a lie and subsequently avoiding discovery of a truth (i.e., having peeked at a toy). To date, research has not examined the contribution of forward search planning in the development of lie-telling and accordingly, this domain of executive functioning is a focus of the current research.

Theory of Mind and Lie-telling

Researchers have found a relationship between ToM and children's lie-telling (Talwar et al., 2007a; Talwar & Lee, 2008). Briefly, ToM is defined as the ability to understand the states of mind of another (Premack & Woodruff, 1978). More specifically, these states include beliefs, intentions, emotions, and desires as well as psychological explanations of behaviours (Wellman, Cross, & Watson, 2001). Thus, ToM involves applying the understanding of mental states to the prediction and explanation of other people's behaviour (Premack & Woodruff, 1978). The most commonly studied component of ToM is false-belief understanding, which represents an

individual's ability to produce a belief that does not always reflect reality and that the producer knows to be false (Wimmer & Perner, 1983).

Researchers have begun to examine the relation between children's understanding of theory of mind and how this relates to their lie-telling. A handful of researchers have argued that children who lack the ability to understand false belief will also have difficulty manipulating others behaviours through acts of deception or lie-telling (Evans & Lee, 2011b; Lee, 2013; Talwar & Lee, 2002a; Talwar et al., 2007a). Deceptive acts have also been used as indicators of false belief understanding, one aspect of ToM (Hala, Chandler, & Fritz, 1991). Newton et al. (2000) examined 2.5 year old children's spontaneous lies within the naturalistic setting of the home. In terms of the prevalence of deception, the researchers found that the majority of children demonstrated deception during one of the three periods of observation (96%). Furthermore, the most prevalent form of deception was denial of wrong doing to a parental figure. However, Newton et al. (2000) did not examine the differences between lies and deceptive tactics in a detailed manner. It remains to be seen if a child's ability to lie would be related to their understanding of false belief.

Polak and Harris (1999) assessed children's spontaneous lie-telling abilities using an experimental paradigm designed to elicit children's lies. Furthermore, children's lie-telling abilities were compared to their performance on measures of false belief. Similar to Lewis et al.'s (1989) paradigm, children between the ages of 3 and 5 were left in a room and asked not to touch a toy. When researchers returned to the room, they asked the children if they had touched the toy. The researchers found that over half of the children touched the toy when the experimenter exited the room. Of those who did touch the toy, the majority of children lied about doing so. Furthermore, performance on the false belief measures was examined in conjunction

with lie-telling, the researchers found a correlation between a child's ability to lie about touching the toy and their understanding of false belief.

Although the evidence for a relation between ToM and lie-telling in children appears to be present, the research is limited in scope. Researchers have provided some proof for the importance of ToM in early deceptive acts (Bigelow & Dugas, 2008; Hala et al., 1991). For example, Polak and Harris (1999) found support for a relation between 3-year old children's abilities to attribute first-order false-belief and lie-telling. As well, Ma, Evans, Liu, Luo and Xu (2015) found children who told antisocial lies at 3 years old were also more likely to pass a false-belief understanding task. Furthermore, some researchers have suggested that there is a link between older children's capabilities in lie-telling and second-order false-belief (Talwar et al., 2007). What is known from previous studies of lie-telling, is that these first lies are often told with difficulty as children may be successful in producing initial lies yet fail to continue a lie upon further questioning. It is possible that these early lies are only rudimentary in nature given the age groups limited abilities in terms of first- and second-order false-belief understanding. Conversely, it is possible that other cognitive abilities within this age group also play a role in lie-telling and may contribute to either success or failure of this the act.

Children's Recognition and Identification of Lie-telling and Truth-telling

Along with the study of very young children's lie-telling behaviours, children's ability to recognize, label, and begin to understand the concepts of truth and deception are of importance. Researchers have found that children as young as two years old can identify both truthful and deceptive statements (Bussey, 1992; Lyon, Carrick, & Quas, 2013; Peterson, Peterson, & Seeto, 1983). This ability becomes more accurate and sophisticated with age (Fu, Evans, Wang, & Lee, 2008; Xu, Bao, Fu, Talwar, & Lee, 2010). Researchers have examined children's actual lie-

telling behaviours, as well as their conceptual understanding of lying (Bussey, 1999; Siegel & Peterson, 1998). Still, research on the relation between these two processes is less extensive (Evans & Lee, 2013b; Talwar & Lee, 2008). Much of the current research examining children's understanding of lie-telling focuses on the relation between children's lie-telling and their moral evaluations of lies, rather than the identification of lies (Lee, Cameron, Xu, Fu, & Board, 1997; Lee, Xu, Fu, Cameron & Chen, 2001; Popliger, Talwar, & Crossman 2011; Xu, Luo, Fu, & Lee, 2009). Yet the ability to distinguish and identify truths and lies is likely the first step towards later moral evaluations of veracity.

As children mature, their evaluations of lies become increasingly sophisticated. To further specify, children move from evaluating deception based on the act of lying (i.e., all lying is bad) to more context-specific evaluations (i.e., reasons for lying influence the moral evaluation of the lie). Although the development of moral reasoning provides an opportunity for researchers to observe changes from middle childhood to adolescence, these same developmental changes are not observed in the preschool age ranges (Perkins & Turiel, 2007). While preschool aged children might struggle with the identification of lies and truths, almost all older children correctly categorize truths and lies. Thus, the focus of the current study is not to examine preschool aged children's evaluations of lies but rather, their ability to identify lies and truths and how this ability relates to their actual deceptive behaviours. To date, the current study is the first to examine both the act of lie-telling and identification of lie-telling in very young children.

Findings on the relation between conceptual understanding of lying and actual lie-telling behaviours are mixed. Talwar, Lee, Bala, and Lindsay (2002) examined children's conceptual understanding of lie-telling in relation to their own lie-telling behaviours (i.e., measured through a TRP) and found that preschool and school aged children's conceptual understanding of lie-

telling did not predict their actual lie-telling behaviour. In contrast, Talwar et al. (2004) examined children's conceptual understanding of lie-telling for another (i.e., to conceal a parent's misdeed). Children who had better conceptual knowledge of honesty and deception were more likely to be truthful with a research assistant regarding their parents' actions, and therefore were less likely to lie for their parents. It should be noted that these studies did not examine children under 3 years old and, therefore, the relation between the emergence of lie-telling and conceptual understanding of deception at younger children remains unknown.

Lyon et al. (2010) examined the conceptual understanding of truths and lies in a group of children 4 to 6 years old. Using a series of vignettes, the researchers asked children questions concerning the factuality of a statement (i.e., is this a truth or lie) and to morally evaluate these truthful and deceptive statements (i.e., good or bad). Results revealed that, with age, children become more accurate at distinguishing between a truth and a lie. Still, when asked to simply accept or reject a statement as either a truth or a lie, the majority of young children (i.e., 4 to 5 year-olds, 97%) were accurate in their assessment. Similarly, when the same procedure was administered to children as young as 2 years old, 88% correctly identified both truth and lie vignettes. Yet, while Lyon et al. (2013) examined 2 year old children's ability to distinguish truths and lies, the researchers did not measure children's actual lie-telling behaviours. It is possible that children's emerging ability to distinguish and label statements as lies and truth is related to their early lie-telling behaviours.

Current Study

The current study examined the emergence of lie-telling in 2.5 year old children. First, to elicit lie-telling, children participated in a modified TRP (Evans & Lee, 2013a). Both inhibitory control and forward search planning were examined in relation to early lie-telling. Consistent

with previous research findings (Evans & Lee, 2013a; Talwar & Lee, 2008), we hypothesized those children with greater inhibitory control skills would be more likely to lie (i.e., Whispers Task; $Hypothesis_1$). Although planning abilities have yet to be examined among very young lie-tellers, we hypothesized that children with greater forward search planning skills would be more likely to lie ($Hypothesis_2$). Finally, considering Lyon et al.'s (2013) findings regarding young children's lie/truth identification, we expected the majority of our sample to identify lies and truths correctly ($Hypothesis_3$). To date no research has examined the relation between young children's identification of lies and their actual lie-telling behaviour. Similarly, little research has directly examined children's false belief understanding below the age of 3 years old in relation to lie-telling. As such, the investigation of truth/lie identification and ToM on children's lie-telling is exploratory in nature.

Method

Participants

A total of 65 children (N_{female}: 29, $M_{age\ in\ months}$ = 31.75, SD = 1.87; age range 27 to 35 months) participated in the study. Participants were recruited from a university child development laboratory database. The ethnic breakdown of the sample was 60% Caucasian, 6% African American, 6% Latino, 15% Asian and 13% other.

Materials

Theory of mind measures. Two tasks were used to measure children's abilities to attribute first-order false-belief. The first, The Sally-Ann Task, was initially created by Wimmer and Perner (1983). The task requires children to identify where Sally will look for her marble after her marble has been moved by another puppet (Ann). The test works upon the understanding that Sally is unaware of an unexpected displacement of her marble while she was

not present. Children are required to take this unexpected displacement into account when predicting Sally's actions.

To enact the Sally-Ann task, children were presented with two puppets; Sally and Ann. Both Sally and Ann have a box; Sally's box is pink and Ann's box is blue. Additionally, a marble, which belongs to Sally, is introduced at the beginning of the task. Children were told that Sally has a marble, which she has placed in her box. Children were then posed the control question, "Where is Sally's marble?" This question is asked to ensure children understand the initial location of Sally's marble before the unexpected displacement takes place. Once children responded to the first control question, Sally leaves the room to go to lunch. Sally is placed under the experimental table so that children are unable to see the doll while the story continues. In Sally's absence, Ann takes Sally's marble and moves it to her box (Ann's box). Children are then asked the second control question, "Where is Sally's marble now?" The second control question is asked in order to ensure children continue to understand the movement of the marble. Sally then returns from lunch. Children are then asked the target question, "Where will Sally look for her marble?'' For children to demonstrate an understanding of another person's perspective, they must indicate that Sally will look for her marble in her box, rather than in Ann's, thus demonstrating that they have taken into account the unexpected displacement of Sally's marble when examining the story from Sally's perspective. Children received one point for correctly responding to the target question during the Sally-Ann Task.

Following the Sally-Ann task, children were presented with the Smarties Appearance-Reality Task (Perner, Leekam, & Wimmer, 1987). At the start of the task children were shown a box of Smarties candies and asked, "What do you think is in this box?" Children most often respond Smarties or some variation of Smarties (i.e., candy). The box of Smarties was then

opened and crayons dumped onto the testing table. Children were then asked, "What's really in the box?" Children at this time will most likely indicate crayons. The crayons were then picked up and placed back into the Smarties box. Children were then asked using a puppet, the target question, "Sally hasn't seen inside the box, what will she think is inside?" Children received one point for responding to the target question correctly.

Executive functioning measures. Two executive functioning tasks were administered: The Whispers Task (Kochanska, Murray, Jacques, Koenig, & Vandegeet, 1996) to measure inhibitory control and The Kitten Delivery Task (Fabricius, 1988) to examine forward search planning.

Whispers Task. The Whispers Task was designed to be used with children 3 to 5 years old (Kochanska, Murray, & Harlen, 2000; Murray & Kochanska, 2002; Wiebe, Espy, & Charak, 2008) and had been used in previous research with children as young as 2 years old (Gerardi-Caulton, 2000) as a measure of inhibitory control. The Whispers Task consists of 6 familiar (e.g., Dora the Explorer) and 4 unfamiliar (e.g., a cartoon teddy bear) pictures. Children were first asked "Do you know what a whisper is?" in order to ascertain their understanding of the instructions. If a child could not define or demonstrate a whisper to the RA, a prompt was provided (i.e., the RA would demonstrate by whispering their name). Following children whispering their own name, the RA instructed, "I am going to show you some pictures and ask you to whisper to me what each picture is." Children were asked to whisper, "I don't know," if they were unable to name the character in the picture. Children received three points for each picture for which they were able to whisper a response. If children responded in a normal voice they received two points and if they shouted they received a zero for their response. If children did not whisper but said their response in a mixed voice (i.e., whisper and normal voice) they

received one point for the response. A total of ten pictures were shown, therefore a maximum of thirty points could be accumulated if children whispered responses to all ten pictures.

Kitten Delivery Task. The Kitten Delivery Task is a measure used to evaluate forward search planning in children 2 to 5 years old (Carlson et al., 2004; Fabricius, 1988; McCormack & Atance, 2011; Wellman et al., 1985). To familiarize children with the task, the RA placed two buckets (i.e., Bucket A and Bucket B) in the center of the room with two kittens inside of Bucket A and one kitten inside of Bucket B. A larger cat (i.e., the mother cat) was placed in front of the two buckets. Children started the task by standing four feet from the two buckets and mother cat. Children were asked to bring the kittens to the mother cat. They were successful if they removed the two kittens from both buckets and placed them beside the mother cat on the floor. Following a successful practice phase, children moved to the test phases.

For the first test phase, Buckets A and B were placed on opposite sides of the room with two kittens being used, one in Bucket A and one in Bucket B. The mother cat was placed next to Bucket A. Children were instructed that, "Mama wants her kittens quickly, so you need to get the two kittens to her the quickest way, with the least amount of walking." In order to accommodate for the age of the sample, the procedure was modified by adding, "So you need to collect the kittens from the buckets in the shortest way possible" in order to ensure children understood the purpose of the task. For the next trial of phase one, the mother cat was moved to Bucket B. All instructions remained the same. To successfully complete this task, children had to walk to the bucket farthest from the mother cat, and then to the bucket next to the mother cat. If the participant failed both administrations (trial one and two of phase one), the task was terminated. If the child successfully completed one of the two trials they received 1-point.

For children who successfully completed phase one, phase two was administered. During

phase two, a third bucket (i.e., Bucket C) and kitten were added approximately eight feet away from the child, creating a triangle formation with all three buckets, adding a level of complexity. For the child to complete phase two successfully, they had to walk to the farthest bucket from the mother cat, then to the newly added Bucket C, and end at the bucket closest to the mother cat. Similar to phase one, phase two had two trials (i.e., the mother cat was moved from Bucket A to Bucket B). Children received one point if they successfully completed trial one or two of phase two. Children could receive a maximum total score of two points for The Kitten Task.

Lie-telling Measures

Temptation resistance paradigm. At the start of the TRP children were told that they would be playing a guessing game with the RA. Children were asked to turn around in their chair to face away from the table and the RA. The RA then placed a toy that provided an audio cue (e.g., a duck that made a "quack quack" noise) and asked the child to guess the identity of the toy without turning around. After two practice trials, the RA informed the child that she had to leave the room but, before doing so, she would place the third toy on the table. The child was instructed not to turn around while she was out of the room. The sound emitted from the target toy did not reveal the identity of the toy (i.e., classical music coming from a play wand). Children were left in the room for a period of one minute. The RA was blind to whether the children had peeked at the toy while out of the room. Upon the RA's return, she covered the toy with a cloth and asked the child to turn around. In order to evaluate lie-telling rates, the RA asked the child "While I was gone did you peek at the toy?" The RA then asked the following two questions to evaluate children's semantic leakage control of lie-telling: (1) "What do you think the toy is?" and (2) "Why do you think it's that?" Responses consistent with the child's original lie (e.g., I recognized the music from a commercial) were coded as having good

semantic leakage control. Responses that were inconsistent with their initial lie, or revealed the identity of the toy (e.g., because that's what the toy looked like), were coded as having poor semantic leakage control.

Truth/lie-telling identification. Children completed Lyon et al.'s (2010) lie/truth identification task to examine accuracy at classifying both truthful and deceptive based on a series of short vignettes. Children viewed a series of pictures with a character, an object (e.g., birthday cake, crayons) and a thought bubble with either: (a) the same object or (b) a different object, than the one in the picture. Children were shown a total of 8 pictures (i.e., 4 truthful and 4 deceptive). Upon being shown one picture, children were asked to label the object next to the character. The RA would then affirm the child's label by saying, "ok this is a [child's label]." The RA then named the character and referred to the object with the child's label (i.e., truth-telling) or a different label (i.e., lie-telling). For example, a child was shown a picture of an orange with a person standing next to the orange and a thought bubble with an apple inside it. In half the cases, the RA would use the child's label (i.e., truth) and in the other half the RA used a different label (i.e., lie). The RA would say to the children, "What is this (pointing to the orange)?" If the child responded "orange," the RA would say, "ok this is an orange (pointing*)*." The RA would then say, "This is (character's name), (character) looks at the orange and says it is an apple." The RA would then ask children the target question, "Is (character) telling the truth or a lie?" Children's correct responses were totaled (i.e., for both truth and lie recognition) and a mean for truth and lie recognition was calculated (i.e., range of 0 to 1).

Procedure

Upon their arrival at the laboratory, parents completed a consent form, while an RA provided children with a 5-minute warm-up period. Following the warm-up, each child

completed the experimental tasks. Tasks were randomized, with the modified TRP being administered at the start or end of the testing session.

Hidden cameras recorded the child's actions and responses during the experiment. The cameras were located in three areas of the room (facial view and two lateral views). A second RA controlled the cameras from an adjacent room.

Results

Preliminary analysis revealed no effects for task order and subsequent analyses were collapsed across orders. Analysis of Covariance (ANCOVAs) with age in months as a covariate were conducted to examine differences between children who peeked and who did not peek, and between children who peeked and confessed vs. children who peeked and lied (predictors), on ToM, executive functioning measures and lie/truth identification. See Table 4 executive functioning, ToM and lie/truth identification based on group (i.e., peekers versus nonpeekers and confessors versus lie-tellers). No significant gender differences were found.

Lie-telling Measures

Peeking and lying behaviour. A total of 58 children peeked at the toy (89.23%) when the RA left the room. The average peeking time was 9.48 seconds (*SD* = 12.16) after the RA left the room. To assess for lie-telling, children's responses to the question "While I was gone did you peek at the toy?" were analyzed. Of those children who peeked, 29.31% lied (*n* = 17) to the RA and denied peeking at the toy. Children's responses to the two follow-up peeking questions were examined to assess their ability to monitor semantic leakage. The majority of children who lied (*n* = 11) provided responses that did not maintain semantic leakage control (i.e., I saw it was a baby). Six of the children did not provide a verbal response. Overall, none of the children who lied maintained their lie during follow-up questioning.

Executive Functioning, Theory of Mind and Lie/Truth Identification

Theory of Mind. Children's performance across the two first-order false-belief measures were summed on a score of two and an aggregate score was created. There were no significant differences observed between peekers ($M_{total\ score}$ = .43, SD = .65) and non-peekers ($M_{total\ score}$ = .25, SD = 0.22), $F(1, 64) = .21$, p =.44 . No significant age differences were observed. Furthermore, no significant differences were observed between lie-tellers ($M_{total\ score}$ = .43, SD = .15) and confessors ($M_{total\ score}$ = .42, SD = .25), $F(1, 57) = .002$, p = .96.

Inhibitory control. Three children did not complete the task and were not included in the analyses (2 non-peekers, 1 confessor), resulting in total of 61 children completing the inhibitory control measure ($M_{total\ score}$ = 21.32, SD = 8.58, range: 3 to 30). There was no significant difference on the Whispers Task between peekers ($M_{peekers}$ = 21.05, SD = 8.74) and non-peekers ($M_{non\text{-}peekers}$ = 19.43 SD = 7.81), $F(1, 61) = 0.14$, p =. 71. Age was also not significant, $F(1, 61) = 0.45$, p =. 51. However, children who lied performed significantly better on the Whispers Task ($M_{whispers\ score}$ = 26.63, SD = 3.81) compared to confessors ($M_{whispers\ score}$ = 19.33, SD = 9.51), $F(1, 55) = 6.563$, $p = 0.013$, $\text{eta}^2 = 0.11$.

Planning. As this was the first time The Kitten Task was used with such a young sample, tests for floor and ceiling effects were performed. Overall, no ceiling or floor effects were observed ($M_{kitten\ score}$ = 0.73, SD = 0.71, range: 0 to 2). There was a significant difference between peekers ($M_{kitten\ score}$ = 0.69, SD = 0.77) and non-peekers ($M_{kitten\ score}$ = 1.00, SD = 0.58), $F(1, 64) = .89$, $p = 0.35$. Age was also significant, $F(1, 64) = 7.08$, $p = 0.01$, $\text{eta}^2 = 0.10$. Children's performance improved with age. There was also a significant difference between lie-tellers and confessors, $F(1, 57) = 12.97$, $p = 0.001$, $\text{eta}^2 = 0.19$. Lie-tellers ($M_{kitten\ score}$ = 1.04, SD

= 0.66) scored significantly higher than confessors ($M_{kitten\ score}$ = 0.44, *SD* = 0.59) on The Kitten Task. Age was not significant, $F(1, 57) = 1.92$, p =. 17.

Children's identification of lies and truths. Due to experimental error (n = 2) and the young age of the sample (n = 10), some children did not complete the lie/truth identification task. In total, 12 (1 non-peeker, 6 lie-tellers, 5 confessors) children did not complete the identification task. Children who completed the lie/truth identification task (n = 53) were similar to the main sample, both demographically (23 girls, M_{age} = 31.33 *SD* = 1.31) and with regard to peeking (88.68%, n = 47) and lie-telling behaviours (23.4% lied, n =11).

Approximately half the children correctly identified truths ($M_{truth\ identification}$ = 0.49, *SD* = 0.20, range: 0 to 1) as well as lies ($M_{lie\ identification}$ = 0.52, *SD* = 0.19, range: 0 to 1). There was no significant difference between peekers and non-peekers for lie recognition, $F(1, 52) = 1.03$, p = 0.35, with age also not being significant, $F(1, 52) = .22$, $p = 0.64$. There was also no significant difference between peekers and non-peekers for truth recognition, $F(1, 52) = 0.33$, $p = 0.57$, with age approaching significance, $F(1, 52) = 3.78$, $p = 0.058$. More specifically, for lie-recognition, children who peeked ($M_{peekers}$ = 0.49, *SD* = .22) were similar to children who did not peek ($M_{non\text{-}peekers}$ = 0.41, *SD* = 0.19). For truth recognition as well, children who peeked ($M_{peekers}$ = 0.53, *SD* = 0.21) scored similarly to those who did not ($M_{non\text{-}peekers}$ = 0.50, *SD* = 0.13). However, for truth recognition, there was a trend for children to have higher scores with age.

When comparing lie-tellers and confessors on truth recognition, there were some significant differences observed, $F(1, 46) = 3.42$, $p = 0.07$. Specifically, there was a trend for lie-tellers (M_{liars} = 0.63, *SD* = 0.21) to be somewhat better at identifying truths than confessors ($M_{confessors}$ = 0.49, *SD* = 0.15). A significant difference between lie-tellers and confessors was found for lie-recognition, $F(1, 46) = 11.57$, p = .001, $eta^2 = 0.21$), and age not significant, F(1,

46) = .06, p = 0.94. Lie-tellers had higher levels of lie identification (M_{liars} = .66, SD = .25) than confessors ($M_{confessors}$ = 0.47, SD = .15).

Predictors of Young Children's Lie-telling

A hierarchical logistic regression was conducted with children's lie-telling behaviour (i.e., lie or confess) as the dependent variable and age in months (first step) and scores on The Whispers and The Kitten Task (second step) as predictors. ToM scores were not included in the regression. The first step was significant, χ^2 (1, 56) = 4.34, Nagelkerke R^2 = .106, p = .037. Age was a marginally significant predictor, β = .348, Wald (1) = 3.69, odds ratio = 1.416 (95% confidence interval: .993, 2.021), p = .055. The second step was also significant, χ^2 (2, 56) = 16.24, Nagelkerke R^2 = .435, p < .001. Children's scores on The Kitten Task were significant predictors of their lie-telling behaviour, β = 1.37, Wald (1) = 7.04, odds ratio = 3.946 (95% confidence interval: 1.432, 10.874), p = .008. Children's scores on The Whisper Task were also significant predictors of their lie-telling behaviour, β =.127, Wald (1) = 3.928, odds ratio =1.136 (95% confidence interval: 1.001, 1.228), p = .047.

Discussion

To date, little empirical investigation has been conducted on the emergence of lie-telling in very young children (i.e., between 2- and 3-years old). This is the first study to examine 2.5 year old children's actual lie-telling in relation to their inhibitory control, their forward search planning abilities, as well as their ability to identify lies and truths.

Overall, 89.23% of children peeked at the toy and, of those who peeked, 29.31% lied. The current study's TRP procedure (i.e., RA left the room for one minute to elicit a lie) produced similar peek rates and close to similar lie-telling rates (i.e., 29.31% versus 25%), as Evans and Lee (2013a). The observed rates of lying provide support for Talwar and Lee's (2008)

developmental model of lie-telling. Talwar and Lee (2008) suggested that lying goes through three stages. While a number of studies support the development of the two later stages from childhood into adolescence (e.g., Evans & Lee, 2011; Talwar & Lee, 2002a, 2008, 2011; Talwar et al., 2007a), there has been relatively little examination of children's emerging lie-telling abilities and the first stage of lying. Talwar and Lee (2008) argued that children's primary lies emerge and begin to develop between 2 and 3 years of age and are typically told for self-serving purposes. They suggested that, at this age, children start to tell rudimentary lies about rule violations so as to avoid getting into trouble. However, the researchers noted that the ability to lie is still emerging and these lies are relatively infrequent compared to older children (i.e., 4 years and older). Our findings were consistent with this developmental model.

Compared to studies examining 4 year old and older children's lying, where the majority of children lie in the TRP (e.g., Talwar & Lee, 2002a; 2008; 2011), significantly fewer 2.5 year old children lied. In fact, most children were honest and confessed their transgression. Taken together with Evans and Lee (2011), these findings suggest that children's lie-telling is just emerging and is not a pervasive behaviour in young preschoolers. Furthermore, Talwar and Lee (2008) posit that children's early lie-telling is rudimentary in nature and the current findings support this assertion. None of the children who lied in the current study were able to maintain semantic leakage control. Furthermore, the current results provide support for the relationship between children's ability to identify false statements and their emerging lie-telling; children who could identify false statements and, to a lesser extent, truthful statements, were more likely to lie.

With regard to children's lie-telling and executive functions, there were several notable findings. The results support a relationship between inhibitory control and lie-telling abilities;

children who told lies at this young age performed significantly better on the inhibitory control measure (i.e., Whispers Task), thus supporting Hypothesis$_1$. Additionally, there were differences between children's truth and lie-telling behaviour in relation to their performance on the forward search planning measure. In support of Hypothesis$_2$, children who peeked and lied also had higher planning scores. Those who transgressed may have used their planning abilities to come up with a strategy (i.e., lying) to mitigate the consequences of their peeking behaviour. However, those children who peeked and then truthfully confessed to their misdeed displayed the lowest scores for planning abilities. In other words, children who show the poorest planning are most likely to engage in a tempting behaviour (i.e., peeking) and also fail to conceal this behaviour. Thus, these scores may reflect the inability to plan when confronted with a tempting situation (i.e., plan strategies to resist temptation). Furthermore, once these children were observed to have succumbed to temptation, lack of planning to avoid possible detection of their transgression was also evident. The current study suggests an interesting pattern of results in terms of planning ability and children's transgressive behaviour, and highlights the need to further examine planning abilities in terms of children's developing lie-telling abilities.

It is important to note however that, at any age, not all children lie. Thus, it is likely that factors other than those measured by both inhibitory control and planning influence children's decisions about whether or not to lie. Kochanshka and Aksan (2006) contend that very young children do not have advanced enough development of conscience to morally choose to lie or be truthful in the same manner as adults. However, previous research has found a positive correlation between children's moral evaluations of lies and the advancement of the executive functioning skills, which, in part, reflects a relationship between lie-telling and executive functioning sophistication. Future studies that assess children's motivations (or understanding of

motivations) for lies versus confessions about transgressions or that assess conscience concurrently could help inform this issue.

With regards to children`s first-order false-belief understanding and lie-telling, no significant relation was found. Previous research has demonstrated a link between first- and second-order false-belief understanding and lie-telling (Polak & Harris, 1999; Talwar & Lee, 2007a). However, to date, this is the first study to examine lie-telling and ToM in such a young population. It is possible that children in this young age range do not rely on full first-order false-belief understanding but rather on aspects, which support the emergence of ToM (Ma et al., 2015). Perhaps pre first-order false-belief understanding should be measured in future studies in relation to children's lie-telling. Wellman and Liu (2004) provide a comprehensive review of ToM tasks, some of which may be targeted in future studies to examine with antisocial lie-telling in children under 3 years old.

Finally, children within the sample demonstrated an ability to identify both truths and lies accurately, however not at the high rates that Lyons et al. (2010) observed, thus only partially confirming Hypothesis$_3$. Notably, children who lied during the TRP also displayed significantly higher scores on the lie/truth identification task. These results may also be interpreted developmentally. For instance, the relationship between conceptual knowledge of lie-telling and actual lie-telling behaviour has not been fully supported within the literature for older participants (Talwar, Lee, Bala, & Lindsay, 2002; Talwar & Lee, 2008). Perhaps when children are very young and the emergence of lie-telling is taking place, the ability to recognize and identify lie-telling is necessary for developing deceptive behaviours. In contrast, as children acquire the ability to deceive, the moral interpretations of lie-telling and the results of lie-telling

behaviours (e.g., potential of being caught or believed by lie-recipient) instead play a more critical role in deceptive tendencies.

The current results also may provide support for the intentionality of children's lies at this age. Researchers have argued that children's initial lies during the preschool age range may not represent volitional lie-telling in the same manner as lie-telling when children are older (Ahern et al., 2011; Talwar & Lee, 2008). Yet, we observed a relation between children's emerging lie-telling behaviour and their ability to identify a lie. As such, the current results provide support for the argument that children's lies might indeed be intentional and reflect (or result from) their burgeoning understanding of lies. However, the results should be considered within the larger context of lie-telling and the classification of lies. For example, based on speech act theory, lies are not based solely on their factuality, as was assessed in the current study, but rather are classified as lies based on intention or belief of the speaker (Austin, 1962/1975; Lee, 2013). Yet, researchers have found that very young children first classify and conceptualize lies based on their factuality (e.g., Peterson et al., 1983). Therefore, the current assessment of children's ability to identify lies and truths provides an initial measurement, but does not fully measure children's understanding of the conceptualization of lie-telling. Nor did the current measure allow for the evaluation of children's understanding of statements that are unintentionally false and therefore not lies (i.e., honest mistakes).

Limitations and Future Directions

Despite the notable findings of the current research, several areas of limitation should be highlighted. First, given the apparent developmental differences that have been found within the literature for lie recognition and actual deceptive behaviours, future studies should examine both identification and actual lying longitudinally (i.e., from young children to school age).

Second, the importance of intentionality in the development of lie-telling is an overlooked area of research for children 2 to 3 years of age. To further specify, Ahern et al. (2011) highlight the abilities of 2.5 year old children to produce false statements as a likely contributor to the emergence of lie-telling. Unlike lie-telling, false statements are not told with the intention to deceive another. Young children who are not yet able to produce a lie may be capable of producing a false statement (Ahern et al., 2011). However, the relation between young children's abilities to produce a false statement and their true lie-telling abilities has not been examined directly. Thus, future studies should examine the relationship between the emergence of early lie-telling and false statement production, as the age ranges for these two capabilities appear to overlap.

Third, not all of the children who completed the TRP and executive functioning measures also completed the lie identification task. As such, future studies should examine a larger sample of children based on all measures, which would permit an evaluation of predictive variables in the development of lie-telling. Fourth, researchers have highlighted the relationship between the development of working memory and inhibitory control (Carlson, Moses, & Breton, 2002; Carlson, 2005). Within the current study, the addition of other executive functioning measures was not possible given time constraints of testing such young children. Future research should assess additional executive functioning abilities, such as working memory and inhibitory control (e.g., both delay and conflict tasks), in relation to the emergence of lie-telling in very young children.

Future studies should also examine aspects of ToM which contribute to the emergence of first and second-order false-belief understanding, as these have been shown to contribute to lie-telling in older populations (Polak & Harris, 1999; Talwar & Lee, 2008). Wellman and Lui

(2004) outlined the importance of diverse belief, diverse desires, and knowledge access in facilitating first-order false belief understanding in children. Future studies should examine young children's performance on tasks which measure these pre-first-order false-belief measures in relation to lie-telling.

Finally, the authors acknowledge the limitations of using The Kitten Task as a measure of forward search planning for 2.5 year old children (i.e., in previous literature this measure is predominantly used with slightly older children). Moreover, during The Kitten Task, children must inhibit their response to initially seek the kitten closest to them and instead plan a route, which is limited in distance. As such, the task does require the use of inhibitory control and therefore a larger sample size that would allow for concurrent assessment of these tasks in relation to lie-telling via logistic regression is required. Future research should attempt to replicate the current findings (i.e., relation between lie-telling and forward search planning) using a different measure and a larger sample.

Conclusion

Overall, the current findings suggest that young preschool children's emerging lie-telling abilities are related, not only to their executive functioning skills, but also to their ability to identify lies and, to a lesser extent, truths. Nearly a third of 2.5 year old children told lies to conceal a transgression, although they were unable to maintain those lies in follow-up questioning. In addition, inhibitory control skills were positively related to the ability to produce lies at this young age. Notably, findings also support the importance of forward search planning in the production of lies, an area previously overlooked by researchers. Children who lied at this young age demonstrated greater planning capacities than their truthful counterparts. Overall, the current results provide further support for the young age at which children's lie-telling first

emerges. Based on the results, children's executive functioning, such as inhibitory control, planning and working memory all support initial deceptive abilities.

References

Ahern, E.C., Lyon, T.D., & Quas, J.A. (2011). Young children's emerging ability to make false statements. *Developmental Psychology*, *47*, 61-66. doi:10.1037/a0021272

Austin, J. L. (1962/1975). *How to do things with words.* Cambridge, MA: Harvard University Press.

Bigelow, A. E., & Dugas, K. (2008). Relations among preschool children's understanding of visual perspective taking, false belief, and lying. Journal of Cognition and Development, 9, 411-433. doi:10.1080/15248370802678299

Bok, S. (1978). *Lying: Moral choice in public and private life.* New York, NY: Vintage Books Edition.

Bussey, K. (1999). Children's categorization and evaluation of different types of lies and truths. *Child Development*, *70*, 1338–1347. doi:10.1111/1467-8624.00098

Bussey, K. (1992). Lying and truthfulness: Children's definitions, standards and evaluative reactions. *Child Development*, *63*, 129–137. doi:10.1111/j.1467-8624.1992.tb03601.x

Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. *Developmental Neuropsychology*, *28*, 595-616. doi**:**10.1207/s15326942dn2802_3

Carlson, S. M., Moses, L. J. & Breton, C. (2002). How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. *Infant and Child Development, 11*, 73–92. doi:10.1002/icd.298

Carlson, S. M., Moses, L. J., & Claxton, L. J. (2004). Individual differences in executive functioning and theory of mind: An investigation of inhibitory control and planning ability. *Journal of Experimental Child Psychology*, *87*, 299-319. doi:10.1016/j.jecp.2004.01.002

Carlson, S. M., Moses, L. J., & Hix, H. R. (1998). The role of inhibitory processes in young children's difficulties with deception and false belief. *Child Development, 69*, 672-691. doi:10.1111/j.1467-8624.1998.tb06236.x

Carlson, S.M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. *Cognitive Development*, *22,* 489-510. doi:10.1016/j.cogdev.2007.08.002

Chandler, M., Fritz, A. S., & Hala, S. (1989). Small-scale deceit: Deception as a marker of two-, three-, and four-year-olds' early theories of mind. *Child Development*, *60,* 1263-1277. doi:10.2307/1130919.

Evans, A. & Lee, K. (2011). Verbal deception from late childhood to middle adolescence and its relation to executive functioning skills. *Developmental Psychology, 47,* 1108-1116. doi:10.1037/a0023425

Evans, A.D., & Lee, K. (2013a). Emergence of lying in very young children. *Developmental Psychology, 49*, 1958-1963. doi:10.1037/a0031409

Evans, A. D., & Lee, K. (2013b). Lying, morality, and development. In M. Killen, & J.G. Smetana (Eds.), *Handbook of Moral Development* (pp.361-384). New York, NY: Psychology Press.

Evans, A.D., Xu, F. & Lee, K. (2011). When all signs point to you: Lies told in the face of evidence. *Developmental Psychology*, *47,* 39-49. doi:10.1037/a0020787

Fabricius, W.V. (1988). The development of forward search planning in preschoolers. *Child Development*, *59,* 1473-1488.

Fu, G., Evans, A. D., Wang, L., & Lee, K. (2008). Lying in the name of the collective good: a developmental study. *Developmental Science*, *11*, 495-503. doi:10.1111/j.1467-7687.2008.00695.x

Fu, G., Evans, A. D., Xu, F., & Lee, K. (2012). Young children can tell strategic lies after committing a transgression. *Journal of Experimental Child Psychology*, *113*, 147-158. doi:10.1016/j.jecp.2012.04.003

Gerardi-Caulton, G. (2000). Sensitivity to spatial conflict and the development of self-regulation in children 24–36 months of age. *Developmental Science*, *3*, 397-404. doi:10.1111/1467-7687.00134

Gombos, V.A. (2006). The cognition of deception: The role of executive processes in producing lies. *Genetic, Social, and General Psychology Monographs*, *132*, 197–214. doi**:**10.3200/MONO.132.3.197-214

Hala, S., Chandler, M., & Fritz, A. S. (1991). Fledgling theories of mind: Deception as a marker of three-year-olds' understanding of false belief. *Child Development*, *62*, 83-97. doi:10.1111/j.1467-8624.1991.tb01516.x

Hudson, J. A., Shapiro, L. R., & Sosa, B. B. (1995). Planning in the real world: Preschool Children's scripts and plans for familiar events. *Child Development*, *66*, 984-998. doi: 10.1111/j.1467-8624.1995.tb00917.x

Jurado, M. B., & Rosselli, M. (2007). The elusive nature of executive functions: a review of our current understanding. *Neuropsychology Review*, *17*, 213-233. doi:10.1007/s11065-007-9040-z

Kochanska, G., & Aksan, N. (2006). Children's conscience and self-regulation. *Journal of Personality*, *74*, 1587-1618. doi:10.1111/j.1467-6494.2006.00421.x

Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development*, *72*, 1091-1111. doi:10.1111/1467-8624.00336

Kochanska, G., Murray, K., & Coy, K. C. (1997). Inhibitory control as a contributor to conscience in childhood: From toddler to early school age. *Child Development*, *68*, 263-277. doi:10.1111/j.1467-8624.1997.tb01939.x

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: continuity and change, antecedents, and implications for social development. *Developmental Psychology*, *36*, 220-232. doi:10.1037/0012-1649.36.2.220

Kochanska, G., Murray, K.T., Jacques, T.Y., Koenig, A.L. & Vandegeest, K.A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*, 490-507. doi:10.1111/j.1467-8624.1996.tb01747.x

Lee, K. (2013). Little liars: Development of verbal deception in children. *Child Development Perspectives*, *7*, 91-96. doi:10.1111/cdep.12023

Lee, K., Xu, F., Fu, G., Cameron, C. A., & Chen, S. (2001). Taiwan and Mainland Chinese and Canadian children's categorization and evaluation of lie-and truth-telling: A modesty effect. *British Journal of Developmental Psychology*, *19*, 525-542. doi:10.1348/026151001166236

Lee, K., Cameron, C. A., Xu, F., Fu, G., & Board, J. (1997). Chinese and Canadian children's evaluations of lying and truth telling: Similarities and differences in the context of pro-and antisocial behaviours. *Child Development*, *68*, 924-934. doi:10.1111/j.1467-8624.1997.tb01971.x

Lewis, M., Stanger, C., & Sullivan, M.W. (1989). Deception in 3 year olds. *Developmental Psychology*, *25*, 439-443. doi:10.1037/0012-1649.25.3.439

Lindskold, S., & Han, G. (1986). Intent and the judgment of lies. *The Journal of Social Psychology*, *126*, 129-130. doi:10.1080/00224545.1986.9713581

Lyon, T.D., Carrick, N. & Quas, J.A. (2010). Young children's competency to take the oath: Effects of task, maltreatment, and age. *Law and Human Behaviour, 34*, 141-149. doi:10.1007/s10979-009-9177-9

Lyon, T.D., Carrick, N., & Quas, J.A. (2013). Right and righteous: Children's incipient understanding of true and false statements. *Journal of Cognition and Development*, *14*, 437-454. doi:10.1080/15248372.2012.673187

McCall, R. B. (1994). What process mediates predictions of childhood IQ from habituation and recognition memory? Speculations on the roles of inhibition and rate of information processing. *Intelligence, 18,* 107–125. doi:10.1016/0160-2896(94)90022-1

McCormack, T., & Atance, C. M. (2011). Planning in young children: A review and synthesis. *Developmental Review*, *31*, 1-31. doi:10.1016/j.dr.2011.02.002

Murray, K. T., & Kochanska, G. (2002). Effortful control: Factor structure and relation to externalizing and internalizing behaviours. *Journal of Abnormal Child Psychology*, *30*, 503-514. doi:10.1023/A:1019821031523

Nelson, K. (1989). *Narratives from the crib.* Cambridge, MA: Harvard University Press.

Newton, P., Reddy, V. & Bull, R. (2000). Children's everyday deception and performance on false-belief tasks. *British Journal of Developmental Psychology*, *18*, 297-317. doi:10.1348/026151000165706

Peterson, C. C., Peterson, J.L., & Seeto, D. (1983). Developmental changes in ideas about lying. *Child Development*, *54*, 1529-1535. doi:10.2307/1129816

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology, 5,* 125-137. doi:10.1111/j.2044-835X.1987.tb01048.x

Perkins, S. A., & Turiel, E. (2007). To lie or not to lie: To whom and under what circumstances. *Child Development*, *78*, 609–621. doi:10.1111/j.1467-8624.2007.01017.x

Polak, A. & Harris, P. L. (1999). Deception by young children following noncompliance. *Developmental Psychology, 35,* 561-568. doi:10.1037/0012-1649.35.2.561

Popliger, M., Talwar, V., & Crossman, A. (2011). Predictors of children's prosocial lie-telling: Motivation, socialization variables, and moral understanding. *Journal of Experimental Child Psychology*, *110*, 373-392. doi:10.1016/j.jecp.2011.05.003

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, *1*, 515-526. doi:10.1017/S0140525X00076512

Rasmussen, C., Talwar, V., Loomes, C., & Andrews, G.H. (2007). Lie-telling in children with Fetal Alcohol Spectrum Disorder. *Journal of Pediatric Psychology, 33*, 220-225. doi:10.1093/jpepsy/jsm069

Siegal, M., & Peterson, C. C. (1998). Preschoolers' understanding of lies and innocent and negligent mistakes. *Developmental Psychology*, *34*, 332. doi:10.1037/0012-1649.34.2.332

Strichartz, A. E, & Burton, R. V. (1990). Lies and truth: A study of the development of the concept. *Child Development, 61,* 211-220.

Talwar, V., Gordon, H., & Lee, K. (2007). Lying in the elementary school: Verbal deception and its relation to second-order belief understanding. *Developmental Psychology*, *43,* 804–810. doi:10.1037/0012-1649.43.3.804

Talwar, V., & Lee, K. (2002a). Development of lying to conceal a transgression: Children's control of expressive behaviour during verbal deception. *International Journal of Behavioural Development, 26,* 436-444. doi:10.1080/01650250143000373

Talwar, V., & Lee, K. (2008). Social and cognitive correlates of children's lying. *Child Development, 79*, 866–881. doi:10.1111/j.1467-8624.2008.02264.x

Talwar, V., & Lee, K. (2011). A punitive environment fosters children's dishonesty: A natural experiment. *Child Development*, *82*, 1751-1758. doi:10.1111/j.1467-8624.2011.01663.x

Talwar, V., Lee, K., Bala, N., & Lindsay, R. C. L. (2002). Children's conceptual knowledge of lying and its relation to their actual behaviours: Implications for court competence examinations. *Law and Human Behaviour*, *26*, 395-415. doi:10.1023/A:1016379104959

Turri, A., & Turri, J. (2015). The truth about lying. *Cognition*, *138*, 161-168. doi:10.1016/j.cognition.2015.01.007

Walczyk, J. J., Roper, K. S., Seemann, E., & Humphrey, A. M. (2003). Cognitive mechanisms underlying lying to questions: response time as a cue to deception. *Applied Cognitive Psychology, 17*, 755–774. doi:10.1002/acp.914

Wellman, H. M., Fabricius, W. V., & Sophian, C. (1985). The early development of planning. In H. M. Wellman (Ed.), *Children's searching: The development of search skills and spatial representation* (pp. 123-149). Hillsdale, NJ: Erlbaum.

Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, *75*, 523-541. doi:10.1111/j.1467-8624.2004.00691.x

Welsh, M.C., Pennington, B.F. & Groisser, D.B. (1991). A normative-developmental study of executive function: A window on prefrontal function in children. *Developmental Neuropsychology, 7,* 131–149. doi:10.1080/87565649109540483

Wiebe, S. A., Espy, K. A., & Charak, D. (2008). Using confirmatory factor analysis to understand executive control in preschool children: I. Latent structure. *Developmental Psychology*, *44*, 575-587. doi:10.1037/0012-1649.44.2.575

Williams, S. M., Kirmayer, M., Simon, T., & Talwar, V. (2013). Children's antisocial and prosocial lies to familiar and unfamiliar adults. *Infant and Child Development*, *22*, 430-438. doi:10.1002/icd.1802

Wilson, A. E., Smith, M. D., & Ross, H. S. (2003). The nature and effects of young children's lies. *Social Development, 12*, 21–45. doi:10.1111/1467-9507.00220

Wimmer, H., Gruber, S., *&* Perner, J. (1984). Young children's conception of lying: Lexical realism-moral subjectivism. *Journal of Experimental Child Psychology, 37,* 1 -30.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: representation and the containing function of wrong beliefs in young children's understanding of deception. *Cognition, 13,* 103-128. doi:10.1016/0010-0277(83)90004-5

Xu, F., Bao, X., Fu, G., Talwar, V., & Lee, K. (2010). Lying and truth-telling in children: From concept to action. *Child Development*, *81*, 581-596. doi:10.1111/j.1467-8624.2009.01417.x

Xu, F., Luo, Y. C., Fu, G., & Lee, K. (2009). Children's and adults' conceptualization and evaluation of lying and truth-telling. *Infant and Child Development*, *18*, 307-322. doi:10.1002/icd.631

Table 4

Means (Standard Deviations) of Task Performance as a Function of Children's TRP Behaviour

	Tasks				
Type of Child	Whispers	Kitten	ToM	ID Truth	ID Lie
Peekers	21.05 (8.74)	0.69 (.77)	0.43 (.65)	0.53 (.21)	0.49 (.22)
Non-peekers	19.43 (3.81)	1.00 (.58)	0.25 (.45)	0.50 (.21)	0.41 (.19)
Lie-tellers	26.63 (3.81)	1.04 (.66)	0.43 (.73)	0.63 (.21)	0.66 (.25)
Confessors	19.33 (9.51)	0.44 (.59)	0.42, (.61)	0.49 (.15)	0.47 (.15)

Chapter Four: Discussion

Children are frequently instructed on the importance of honesty. Despite these instructions, lie-telling begins at a young age and these deceptive behaviours improve with age (Lee, 2013; Talwar & Lee, 2002a, 200b). The prevalence of lie-telling in everyday social interactions has prompted a renewed interest by researchers and has encouraged the design of experimental paradigms to observe children's deception from the preschool to adolescent age ranges (Evans & Lee, 2010; Lewis, et al., 1989; Ma, Evans, Liu, Luo & Xu, 2015; Polak & Harris, 1999). Through such paradigms, researchers have outlined the developmental trajectory of deceptive behaviours, compiling evidence for stages of lie-telling (Evans & Lee, 2013b; Lee, 2013; Talwar & Crossman, 2011). However, despite support for a developmental model (Talwar & Lee, 2008), the role of cognitive functions in lie-telling is not well understood. Specifically, although researchers have found evidence for associations between children's lie-telling, executive functions and Theory of Mind (ToM), the majority of these inquiries have been limited to antisocial lie-telling in elementary school age and adolescents. As a result, the general goal of the current dissertation was to examine the relation between lie-telling, executive functions, and ToM.

Summary of Findings

The current dissertation examined two different types of lies told by children, prosocial and antisocial. Prosocial lies are told to spare another's feelings, and therefore the deception is for another's benefit. In contrast, antisocial lies are told for self-serving motivations, such as to avoid discovery of a transgression (Bok, 1978). To date, few researchers have documented children's prosocial lie-telling (Talwar & Lee, 2002b; Talwar et al., 2007; Warneken & Orlins, 2015). Those studies which have measure prosocial lying, have been focused on the frequency

and ability of children to tell this type of lie. However, the development of children's prosocial lying, as well as the cognitive functions which support this form of deception, has received even less empirical attention.

The aim of the first manuscript was to examine children's prosocial lie-telling in relation to executive functions and ToM. To measure prosocial lie-telling and maintenance of lies, children between 6 and 12 years old participated in a disappointing gift paradigm (DGP). Overall, 59.50% of children told a prosocial lie and 53.20% of lie-tellers maintained semantic leakage during follow-up questions. Consistent with previous research, older children told more plausible lies and were better able to maintain semantic leakage control compared to younger children. Children's working memory and inhibitory control was also examined using the Digit-Span and Stroop tasks. Results revealed that children who told prosocial lies also had superior performance on both measures of executive functioning, compared to their truthful counterparts. Such findings are consistent with previous research on children's antisocial lie-telling (e.g., Evans & Lee, 2011; Talwar & Lee, 2008; Talwar et al., 2007). Thus, overall it appears that regardless of the motivations for deception (i.e., self or other), liars rely on a unique set of cognitive abilities to tell and maintain their lies. Although the results of Manuscript 1 provides evidence for the generalization of previous antisocial lie-telling research to prosocial lying, the investigation was limited to elementary school age children.

Another area of investigation frequently overlooked in the lie-telling research is children's initial lies. While observational research has have found evidence for the emergence of lie-telling between 2 to 3 years of age (Newton et al., 2000; Wilson et al., 2003), until now Evans and Lee's (2013a) investigation is the only experimental measurement of very young children's antisocial lie-telling. The relation between cognitive abilities and very young

children's lie-telling has been argued through Talwar and Lee's developmental model of lie-telling. Specifically, that children's first lies begin between 2 and 3 years old. The researchers argue that these early lies, told for antisocial purposes (i.e., to avoid discovery of a wrong doing or transgression), are supported by developing ToM and executive functions. Research examining what facilitates this ability to deceive at a young age is limited. As such, Manuscript 2 sought to examine the relation between very young children's (27 to 35 months) lies and the development of cognitive abilities.

Young children's antisocial lie-telling was measured using the temptation resistance paradigm (TRP). A total of 89.23% children peeked at the toy when a research assistant (RA) left the room. Of those children who peeked, 29.31% lied to the RA. Consistent with previous findings (Evans & Lee, 2013a) over a quarter of children at this young age were capable of telling an antisocial lie. Children also completed measures of planning, inhibitory control and first-order false-belief understanding. Finally children's conceptual understanding of lie-telling was examined using a lie/truth identification task.

Overall, significant differences on executive functioning measures were found between lie-tellers and truth-tellers. Lie-tellers had higher scores on measures of inhibitory control and forward search planning. These results provide further support for the relation between the development of specific executive functions and children's emerging lie-telling. Moreover, the observance of a relation between early antisocial lies and forward search planning is the first within the lie-telling literature.

No significant relation was found between lie-telling and first-order false belief. It may be argued that the current findings indicate executive functions rather than aspects of ToM support children's emerging rudimentary lies. One possible explanation for this result is that

children's early lie-telling may be related to other aspects of ToM, not measured through first-order false-belief tasks. For example, Ma et al. (2015) found that 3 year old children who told antisocial lies were also more likely to pass a measure of knowledge-ignorance, an important precursor to first-order false-belief. Thus, perhaps the primary lie-telling stage is not facilitated by a child's ability to attribute first-order false belief understanding, but rather antecedents. For example, Wellman and Lui (2004) outline several pre-ToM abilities which precede children's false-order false-belief understanding (i.e., knowledge-ignorance, diverse-desires, diverse-belief and knowledge-access). In addition to knowledge-ignorance, these other precursors may also contribute to lie-telling ability.

The present investigation also examined the relation between children's conceptual understanding of truths and lies and their first lies. Several researchers have hypothesized that very young children's lies may not be as intentional in nature as compared to those of older children and adults. Specifically, rudimentary lies told by 2 to 3 year old children may represent wish fulfillment, mistaken utterances or a form of word play (Ahern et al., 2011; Talwar & Lee, 2008). However, similar rates of lie-telling have been observed in previous preschool aged samples (Lewis et al., 1989; Evans & Lee, 2013a).

Original Contributions to Knowledge and Implications

The current dissertation provides several unique contributions to the empirical literature on children's development of lie-telling. The first applies to the application of a developmental model of lie-telling to other forms of deception beyond antisocial lie-telling. If different types of lies are supported by the same cognitive functions then the results of Manuscript 1 furthers the argument of a developmental model of lie-telling. Specifically, that Talwar and Lee's (2008) developmental model of lie-telling is generalizable beyond antisocial lie-telling, to prosocial lies

as well. Results from the first manuscript suggest children's movement from the secondary (i.e., initial lies without maintenance), to the tertiary stage (i.e., the ability to maintain a lie during subsequent questioning) is facilitated by increases in false-belief understanding. As outlined in the model, during the secondary stage, children display the ability to tell initial lies but fail to maintain their lies during follow-up questioning. In contrast, during the tertiary stage, children's ability to attribute second-order false-beliefs improves, resulting in more sophisticated lie-telling (i.e., greater semantic leakage control). Thus, results of Manuscript 1 provide evidence of Talwar and Lee's (2008) stages of lie-telling development for prosocial lies.

Second, while previous research has found a relation between children's antisocial lie-telling, executive functions, and attribution of second-order false-beliefs (Talwar et al., 2007; Talwar & Lee, 2008, Evans & Lee, 2011), there has been little examination of these relationships with other types of lies (i.e., prosocial). As such, the results of Manuscript 1 provide support for the role of working memory, inhibitory control and second-order false-belief in the development children's prosocial lie-telling. Additionally, the same executive functions and ToM support both prosocial lie-telling and antisocial lying, thus providing support for an overarching theory of lie-telling.

The present investigation also found support for the role of executive functions in the emergence of children's lies. To date, Evans and Lee's (2013) study is the only to examine the relation between young children's lie-telling and executive functions, no such studies have investigated planning ability. Prior to this investigation, support for planning in the later stages of children's lie-telling development had been found (Evans & Lee, 2011), yet there was no evidence of such behaviour in young children. Nevertheless, there are strong arguments for a relation between young children's lie-telling and planning capability. Specifically, Walczyk,

Roper, Seeman, and Humphrey's (2003) Activation-Decision-Construction Model posits the role of planning during the construction phase of deception. When children decide to tell a lie, they must then construct their lie to the respondent. Planning is involved in this construction. Although arguments can be made that very young children's rudimentary lies are impulsive, the significant relation between forward search planning in these young lie-tellers provides support for the role of planning.

The current dissertation also examined the relation between children's conceptual understanding of truths and lies and their rudimentary lie-telling abilities. Several researchers have hypothesized that very young children's lies may not be as intentional in nature as compared to those of older children and adults. Specifically, rudimentary lies told by 2 to 3 year old children may represent wish fulfillment, mistaken utterances or a form of word play (Ahern et al., 2011; Talwar & Lee, 2008). However, similar rates of lie-telling have been observed in previous preschool aged samples (Lewis et al., 1989; Evans & Lee, 2013a). Children's accuracy for identifying truths and lies provides support for a link between the understanding of lies and the abilities to tell a lie.

Limitations and Future Directions

The current dissertation provides several unique contributions to the literature, however there are notable limitations which offer potential avenues for future research. First, across both manuscripts the measurement of executive functions was limited to singular tasks. In both manuscripts, significant relations were found between lie-telling and executive functions; however, in each manuscript only a single task was used to measure the separate components of executive function. Given the developmental nature of the research and the various ages examined, more than one measure would provide a developmentally sensitive observation of

executive functions. As a result, future studies should measure executive functioning ability with multiple developmentally appropriate measures, to strengthen the argument of the role of each process.

Future studies that examine the role of motivation and how it may influence children's lie-telling ability is also of interest. For instance, Popliger et al. (2011) suggests that children's lie-telling behaviour may differ according to low and high stakes situations. In both manuscripts of the current dissertation, children's lies were examined in relatively low stakes situations. Differences in types of lies may emerge when motivational context are manipulated. For example, in the prosocial situation, children were telling a lie to be polite. However, it may be that some children were also lying for self-interest reasons. Xu et al. (2010) found that some children will tell a politeness lie because they are concerned the gift-giver will be upset with them. Thus, future research should investigate the motivations behind children's lie-telling in prosocial situations and how cognitive ability are related to their motivations. Research is needed to compare children's lie-telling, for different types of lies, in different motivational contexts and their performance on measures of executive functioning and ToM.

Implications for professionals

Lie-telling is not only interesting to empirical researchers, as the behaviour also has significant implications for teachers, parents and clinicians. In the case of parents, how children lie is of interest, as they are frequently tasked with educating children on the virtues of honesty (Heyman, Luu, & Lee, 2009). Moreover, at what age parents should expect to observe lie-telling in their children is relevant, as parents are frequently concerned with their children's initial lie-telling. Furthermore, the current dissertation provides educators and clinicians with the opportunity to understand the developmental trajectory of children's lie-telling and its relation to

normative cognitive development. Gaining insights into the development of lying will allow teachers and parents alike to understand why their children may initially begin to lie and how they progress from the preschool years (i.e., as relatively poor liars) to more sophisticated school aged lie-tellers.

Given the prevalence of deceptive behaviours in clinical populations (i.e., oppositional defiant disorder, conduct disorder, and psychopathic traits) (Lyons-Ruth, 1996), as well as the importance of the development of lie-telling in terms of socio-emotional (Talwar & Crossman, 2011) and cognitive development (Talwar & Lee, 2008), the current topic has implications for school psychologists. Frequently, children display problematic lying as well as other externalizing behaviours within the classroom environment (Bergin & Bergin, 2009). While lying is adaptive in certain social relationships (i.e., to maintain social cohesion), inappropriate or excessive lie-telling may hamper a child's ability to form meaningful connections with others. As Magda Stouthamer-Loeber (1986) writes, "Relationships are built on trust which cannot develop when individuals repeatedly violate such trust through lies" (p. 268). Researchers have discovered significant correlations between lie-telling and other delinquent behaviours in youth (Stouthamer-Loeber, 1986; Loeber & Dishion, 1983). For example, clinical samples of children with conduct problems are two and a half times more likely to display problematic lying (Stouthamer-Loeber, 1986). As such, lie-telling is not only a typical behaviour for children but problematic lie-telling can indicate more serious behavioural problems.

According to Talwar and Crossman (2011), children who display behaviour problems may come to rely on lie-telling as a strategy within interpersonal communication, at the expense of developing other strategies (i.e., inhibitory control or effective communication of emotion). Thus, an analysis of how and why children come to use lies can inform our treatment approaches

with atypical populations. For example, children diagnosed with Attention Deficit and Hyperactivity Disorders (ADHD) have also been found to have weaknesses in executive functioning skills such as working memory, planning and inhibitory control (Mullane & Corkum, 2007). These children also frequently struggle socially. The impact on social abilities for these populations is also likely due to the impact deficits in executive functions have on their lie-telling skills. Based on the results of the current dissertation, these children may also have more difficulty telling sophisticated prosocial lies, which are important in the maintenance of cohesive interpersonal relationships.

Children diagnosed with specific neurodevelopmental disorders have also been found to display either higher rates of lie-telling (FASD; Rasmussen, Talwar, Loomes, & Andrew, 2008) or lower rates (autism spectrum disorder, ASD; Talwar et al., 2012). Moreover, children diagnosed with learning disabilities have been found to have more difficulty recognizing the deceptive statements of others (Pearl, Bryan, Fallon, & Herzog, 1991). Understanding the trajectory of lie-telling development in typical populations can also inform our interventions with these atypical populations. For instance, children diagnosed with ASD may benefit from understanding the role of prosocial lie-telling in social situations and explicit explanations of the ToM components to lie-telling. Given the role of second-order false-belief understanding, as well as executive functioning skills, children within the ASD population may need greater explicit explanations regarding why prosocial lies may be appropriate or the role these lies have in interpersonal relationships.

Summary

The current research program examined the contributions of executive functioning and ToM to the development of both antisocial and prosocial lie-telling. Results from Manuscript 1

suggest that prosocial lie-telling is supported through the unique influence of both working memory and inhibitory control. Furthermore, second-order false-belief understanding supports the sophistication of children's prosocial lies. Thus, children's ability to maintain lies or control for semantic leakage is related to their ability to understand another's perspective. Manuscript 2 examined the role of executive functioning and ToM in the emergence of deception. Manuscript 2 also examined the rates of lie-telling in children under 3 years old as well as how this related to children's conceptual understanding of lie-telling. Overall, children who told lies at this young age were supported by executive functioning skills. Children who displayed greater accuracy for identifying both truths and lies were more likely to tell lies at this young age. The current research program served to support and expand our knowledge of the development of children's lie-telling.

Bibliography

Ahern, E.C., Lyon, T.D., & Quas, J.A. (2011). Young children's emerging ability to make false statements. *Developmental Psychology*, *47*, 61-66. doi:10.1037/a0021272

Austin, J. L. (1975). *How to do things with words*. Oxford, England: Oxford University Press.

Baddeley, A. D. (1986). *Working memory*. Oxford, England: Oxford University Press.

Bergin, C., & Bergin, D. (2009). Attachment in the classroom. *Educational Psychology Review*, *21*, 141-170. doi:10.1007/s10648-009-9104-0

Bok, S. *(*1978*). Lying: Moral choice in public and private life.* New York, NY: Vintage.

Broomfield, K. A., Robinson, E. J. & Robinson, W. P. (2002). Children's understanding about white lies. *British Journal of Developmental Psychology, 20,* 47-65. doi:10.1348/026151002166316

Bussey, K. (1992). Lying and truthfulness: Children's definitions, standards and evaluative reactions. *Child Development*, *63*, 129–137. doi:10.1111/j.1467-8624.1992.tb03601.x

Bussey, K. (1999). Children's categorization and evaluation of different types of lies and truths. *Child Development, 70*, 1338–1347. doi:10.1111/1467-8624.00098

Camden, C., Motley, M. T., & Wilson, A. (1984). White lies in interpersonal communication: A taxonomy and preliminary investigation of social motivations. *Western Journal of Speech Communication*, *48*, 309-325.

Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. *Developmental Neuropsychology*, *28*, 595-616. doi:10.1207/s15326942dn2802_3

Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child Development*, *72*, 1032-1053. doi:10.1111/1467-8624.00333

Carlson, S. M., Moses, L. J. & Breton, C. (2002). How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. *Infant and Child Development, 11*, 73–92. doi:10.1002/icd.298

Carlson, S. M., Moses, L. J., & Claxton, L. J. (2004). Individual differences in executive functioning and theory of mind: An investigation of inhibitory control and planning ability. *Journal of Experimental Child Psychology*, *87*, 299-319. doi:10.1016/j.jecp.2004.01.002

Carlson, S. M., Moses, L. J., & Hix, H. R. (1998). The role of inhibitory processes in young children's difficulties with deception and false belief. *Child Development, 69*, 672-691. doi: 10.1111/j.1467-8624.1998.tb06236.x

Carlson, S.M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. *Cognitive Development*, *22,* 489-510. doi:10.1016/j.cogdev.2007.08.002

Chandler, M., Fritz, A. S., & Hala, S. (1989). Small-scale deceit: Deception as a marker of two-, three-, and four-year-olds' early theories of mind. *Child Development*, *60,* 1263-1277. doi:10.2307/1130919.

Cheung, H., Siu, T. S. C., & Chen, L. (2015). The roles of liar intention, lie content, and theory of mind in children's evaluation of lies. *Journal of Experimental Child Psychology*, *132*, 1-13. doi:10.1016/j.jecp.2014.12.002

Cole, P. M. (1986). Children's spontaneous control of facial expression. *Child Development, 57,* 1309-1321. doi:10.1037/0012-1649.30.6.835

Davis H. L. *&* Pratt, C. (1996). The development of children's theory of mind: The working memory explanation. *Australian Journal of Psychology, 47*, 25–31. doi:10.1080%2F00049539508258765

DePaulo, B.M., Jordan, A., Irvine, A., & Laser, P.S. (1982). Age changes in the detection of deception. *Child Development, 53,* 701-709. doi.10.2307/1129383

DePaulo, B. M., & Kashy, D. A. (1998). Everyday lies in close and casual relationships. *Journal of Personality and Social Psychology*, *74*, 63-79. doi:10.1037/0022-3514.74.1.63

DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology*, *70*, 979-995. doi:10.1037/0022-3514.70.5.979

Eisenberg, N., & Fabes, R. A. (1998). Prosocial development. In W. Damon & N. Eisenberg (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 701-778). New York, NY: Wiley.

Eisenberg, N., Guthrie, I. K., Murphy, B. C., Shepard, S. A., Cumberland, A., & Carlo, G. (1999), Consistency and Development of Prosocial Dispositions: A Longitudinal Study. *Child Development, 70*, 1360–1372. doi:10.1111/1467-8624.00100

Eisenberg, N., Hofer, C., Sulik, M. J., & Liew, J. (2014). The development of prosocial moral reasoning and a prosocial orientation in young adulthood: Concurrent and longitudinal correlates. *Developmental Psychology*, *50*, 58-78. doi:10.1037/a0032990

Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin*, *101*, 91-119. doi:10.1037/0033-2909.101.1.91

Eisenberg, N., Shea, C. L., Carlo, G., & Knight, G. P. (2014). Empathy-related responding and cognition: A "chicken and the egg" dilemma. In W. Kurtines & J. Gewirtz (Eds.), *Handbook of moral behavior and development: Vol. 2. Research* (pp. 63-88). New York, NY: Psychology Press.

Elaad, E., Lavy, S., Cohenca, D., Berholz, E., Thee, P., & Ben-Gigi, Y. (2012). Lies, truths, and attachment orientations in late adolescence. *Personality and Individual Differences*, *52*, 670–673. doi:10.1016/j.paid.2011.12.018

Ennis, E., Vrij, A., & Chance, C. (2008). Individual differences and lying in everyday life. *Journal of Social and Personal Relationships, 25*, 105–118. doi:10.1177/0265407507086808

Evans, A. D., & Lee, K. (2011). Verbal deception from late childhood to middle adolescence and its relation to executive functioning skills. *Developmental Psychology, 47,* 1108-1116. doi:10.1037/a0023425

Evans, A.D., & Lee, K. (2013a). Emergence of lying in very young children. *Developmental Psychology, 49*, 1958-1963. doi:10.1037/a0031409

Evans, A. D., & Lee, K. (2013b). Lying, morality, and development. In M. Killen, & J.G. Smetana (Eds.), *Handbook of Moral Development* (pp.361-384). New York, NY: Psychology Press.

Evans, A. D., Xu, F., & Lee, K. (2011). When all signs point to you: Lies told in the face of evidence. *Developmental Psychology*, *47,* 39-49. doi:10.1037/a0020787

Fabricius, W.V. (1988). The development of forward search planning in preschoolers. *Child Development*, *59,* 1473-1488.

Fu, G., Evans, A. D., Wang, L., & Lee, K. (2008). Lying in the name of the collective good: a developmental study. *Developmental Science*, *11*, 495-503. doi:10.1111/j.1467-7687.2008.00695.x

Fu, G., Evans, A. D., Xu, F., & Lee, K. (2012). Young children can tell strategic lies after committing a transgression. *Journal of Experimental Child Psychology*, *113*, 147-158. doi:10.1016/j.jecp.2012.04.003

Gerardi-Caulton, G. (2000). Sensitivity to spatial conflict and the development of self-regulation in children 24–36 months of age. *Developmental Science*, *3*, 397-404. doi:10.1111/1467-7687.00134

Golden C. J., Freshwater S. M., & Golden Z. (2003). *Stroop color and word test children's version for ages 5–14: A manual for clinical and experimental uses*. Wood Dale, IL: Stoelting.

Gombos, V. A. (2006). The cognition of deception: The role of executive processes in producing lies. *Genetic, Social, and General Psychology Monographs*, *132*, 197-214. doi:10.3200/MONO.132.3.197-214

Grice, H. P. (1980). *Studies in the way of words.* Cambridge, MA: Harvard University Press.

Gross, D., & Harris, P. L. (1988). False beliefs about emotion: Children's understanding of misleading emotional displays. *International Journal of Behavioral Development*, *11*, 475-488. doi:10.1177/016502548801100406

Hala, S., Chandler, M., & Fritz, A. S. (1991). Fledgling theories of mind: Deception as a marker of three-year-olds' understanding of false belief. *Child Development*, *62*, 83-97. doi:10.1111/j.1467-8624.1991.tb01516.x

Harris, P. L. (1989). *Children and emotion: The development of psycho-logical understanding.* Oxford, England: Basil Blackwell.

Heyman, G. D., Luu, D. H., & Lee, K. (2009). Parenting by lying. *Journal of Moral Education*, *38*, 353-369. doi:10.1080/03057240903101630

Hays, C., & Carver, L. J. (2014). Follow the liar: the effects of adult lies on children's honesty. *Developmental Science*, *17*, 977-983. doi:10.1111/desc.12171

Hogrefe, G. J., Wimmer, H., & Perner, J. (1986). Ignorance versus false belief: A developmental lag in attribution of epistemic states. *Child Development, 57,* 567-582. doi:10.2307%2F1130337

Hudson, J. A., Shapiro, L. R., & Sosa, B. B. (1995). Planning in the real world: Preschool Children's scripts and plans for familiar events. *Child Development*, *66*, 984-998. doi:10.1111/j.1467-8624.1995.tb00917.x

Jurado, M. B., & Rosselli, M. (2007). The elusive nature of executive functions: a review of our current understanding. *Neuropsychology Review*, *17*, 213-233. doi:10.1007/s11065-007-9040-z

Kashy, D. A., & DePaulo, B. M. (1996). Who lies? *Journal of Personality and Social Psychology, 70*, 1037-1051. doi:10.1037/0022-3514.70.5.1037

Kochanska, G., & Aksan, N. (2006). Children's conscience and self-regulation. *Journal of Personality*, *74*, 1587-1618. doi:10.1111/j.1467-6494.2006.00421.x

Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development*, *72*, 1091-1111. doi: 10.1111/1467-8624.00336

Kochanska, G., Murray, K., & Coy, K. C. (1997). Inhibitory control as a contributor to conscience in childhood: From toddler to early school age. *Child Development*, *68*, 263-277. doi:10.1111/j.1467-8624.1997.tb01939.x

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: continuity and change, antecedents, and implications for social development. *Developmental Psychology*, *36*, 220-232. doi:10.1037/0012-1649.36.2.220

Kochanska, G., Murray, K.T., Jacques, T.Y., Koenig, A.L. & Vandegeest, K.A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development*, *67*, 490-507. doi:10.1111/j.1467-8624.1996.tb01747.x

Lee, K. (2013). Little liars: Development of verbal deception in children. *Child Development Perspectives*, *7*, 91-96. doi:10.1111/cdep.12023

Lee, K., Cameron, C. A., Xu, F., Fu, G., & Board, J. (1997). Chinese and Canadian children's evaluations of lying and truth telling: Similarities and differences in the context of pro-and antisocial behaviours. *Child Development*, *68*, 924-934. doi:10.1111/j.1467-8624.1997.tb01971.x

Lee, K., & Ross, H. J. (1997). The concept of lying in adolescents and young adults: Testing Sweetser's folkloristic model. *Merrill-Palmer Quarterly*, *43,* 255-270.

Lee, K., Xu, F., Fu, G., Cameron, C. A., & Chen, S. (2001). Taiwan and Mainland Chinese and Canadian children's categorization and evaluation of lie-and truth-telling: A modesty effect. *British Journal of Developmental Psychology*, *19*, 525-542. doi:10.1348/026151001166236

Levine, E. E., & Schweitzer, M. E. (2015). Prosocial lies: When deception breeds trust. *Organizational Behavior and Human Decision Processes*, *126*, 88-106. doi:10.1016/j.obhdp.2014.10.007

Lewis, M. (1993). The development of deception. In M. Lewis & C. Saarni (Eds.), *Lying and deception in everyday life* (pp. 90–105). New York, NY: Guilford.

Lewis, M., Stanger, C. & Sullivan, M.W. (1989). Deception in 3 year olds. *Developmental Psychology*, *25*, 439-443. doi:10.1037/0012-1649.25.3.439

Li, S. A., Kelley, A. K., Evans, D. E., & Lee, K. (2011). Exploring the ability to deceive in children with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders, 41,* 185-195. doi:10.1007/s10803-010-1045-4

Loeber, R., & Dishion, T. (1983). Early predictors of male delinquency: a review. *Psychological Bulletin*, *94*, 68.

Lyon, T.D., Carrick, N. & Quas, J.A. (2010). Young children's competency to take the oath: Effects of task, maltreatment, and age. *Law and Human Behaviour, 34*, 141-149. doi:10.1007/s10979-009-9177-9

Lyon, T.D., Carrick, N., & Quas, J.A. (2013). Right and righteous: Children's incipient understanding of true and false statements. *Journal of Cognition and Development*, *14*, 437-454. doi: 10.1080/15248372.2012.673187

Lyons-Ruth, K. (1996). Attachment relationships among children with aggressive behavior problems: The role of disorganized early attachment patterns. *Journal of consulting and clinical psychology*, *64*, 64-73. doi:10.1037/0022-006X.64.1.64

Ma, F., Evans, A. D., Liu, Y., Luo, X., & Xu, F. (2015). To lie or not to lie? The influence of parenting and theory-of-mind understanding on three-year-old children's honesty. *Journal of Moral Education*, Advance online publication. 1-15. doi:10.1080/03057240.2015.1023182

McCall, R. B. (1994). What process mediates predictions of childhood IQ from habituation and recognition memory? Speculations on the roles of inhibition and rate of information processing. *Intelligence, 18,* 107–125. doi:10.1016/0160-2896(94)90022-1

McCormack, T., & Atance, C. M. (2011). Planning in young children: A review and synthesis. *Developmental Review*, *31*, 1-31. doi: 10.1016/j.dr.2011.02.002

Mullane, J. C., & Corkum, P. V. (2007). The relationship between working memory, inhibition, and performance on the Wisconsin Card Sorting Test in children with and without ADHD. *Journal of Psychoeducational Assessment*, 1, 1-11. doi:10.1177/0734282906297627

Murray, K. T., & Kochanska, G. (2002). Effortful control: Factor structure and relation to externalizing and internalizing behaviours. *Journal of Abnormal Child Psychology*, *30*, 503-514. doi:10.1023/A:1019821031523

Nelson, K. (1989). Narratives from the crib. Cambridge, MA: Harvard University Press.

Newton, P., Reddy, V. & Bull, R. (2000). Children's everyday deception and performance on false-belief tasks. *British Journal of Developmental Psychology*, *18*, 297-317. doi:10.1348/026151000165706

Nyberg, D. (1993). *The varnished truth: Truth telling and deceiving in ordinary life.* Chicago, Il: Chicago University Press.

Pearl, R., Bryan, T., Fallon, P., & Herzog, A. (1991). Learning disabled students' detection of deception. *Learning Disabilities Research & Practice, 6,* 12-16.

Penner, L. A., Fritzsche, B. A., Craiger, J. P., & Freifeld, T. S. (1995). Measuring the prosocial personality. In J. Butcher & C. D. Spielberger (Eds.), *Advances in personality assessment* (pp. 147–163). Hillsdale, NJ: Erlbaum.

Perkins, S. A*., &* Turiel, E. (2007). To lie or not to lie: To whom and under what circumstances. *Child Development*, *78*, 609–621. doi:10.1111/j.1467-8624.2007.01017.x

Perner, J., & Lang, B. (1999). Development of theory of mind and executive control. *Trends in Cognitive Sciences*, *3*, 337-344. doi:10.1016/S1364-6613(99)01362-5

Perner, J., Leekam, S. R., & Wimmer, H. (1987). Three-year-olds' difficulty with false belief: The case for a conceptual deficit. *British Journal of Developmental Psychology, 5,* 125-137. doi:10.1111/j.2044-835X.1987.tb01048.x

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, *1*, 515-526. doi:10.1017/S0140525X00076512

Peterson, C. C., Peterson, J.L., & Seeto, D. (1983). Developmental changes in ideas about lying. *Child Development*, *54*, 1529-1535. doi:10.2307/1129816

Polak, A. & Harris, P. L. (1999). Deception by young children following noncompliance. *Developmental Psychology, 35,* 561-568. doi:10.1037/0012-1649.35.2.561

Popliger, M., Talwar, V., & Crossman, A. (2011). Predictors of children's prosocial lie-telling: Motivation, socialization variables, and moral understanding. *Journal of Experimental Child Psychology*, *110*, 373-392. doi:10.1016/j.jecp.2011.05.003

Rasmussen, C., Talwar, V., Loomes, C., & Andrew, G. (2008). Brief report: Lie-telling in children with fetal alcohol spectrum disorder. *Journal of Pediatric Psychology, 33*, 220-225. doi:10.1093%2Fjpepsy%2Fjsm069

Saarni, C. (1979). Children's understanding of display rules for expressive behavior. *Developmental Psychology*, *15*, 424-429. doi:10.1037/0012-1649.15.4.424

Saarni, C. (1984). An observation study of children's attempts to monitor their expressive behaviour. *Child Development, 155,* 1504-1513.

Sears, R. R., Rau, L., & Alpert, R. (1965). *Identification and child rearing*. New York, NY: John Wiley.

Shallice, T. (1982). Specific impairments of planning. *Philosophical Transactions of the Royal Society of London. B, Biological Sciences*, *298*, 199-209.doi: 10.1098/rstb.1982.0082

Siegal, M., & Peterson, C. C. (1998). Preschoolers' understanding of lies and innocent and negligent mistakes. *Developmental Psychology*, *34*, 332. doi:10.1037/0012-1649.34.2.332

Sodian, B., & Frith, U. (1992). Deception and sabotage in autistic, retarded and normal children. *Journal of Child Psychology and Psychiatry*, *33*, 591-605. doi: 10.1111/j.1469-7610.1992.tb00893.x

Stouthamer-Loeber, M. (1986). Lying as a problem behavior in children: A review. *Clinical Psychology Review*, *6*, 267-289.

Strichartz, A. E, & Burton, R. V. (1990). Lies and truth: A study of the development of the concept. *Child Development, 61,* 211-220. doi:10.1111/j.1467-8624.1990.tb02773.x

Sullivan, K., Zaitchik, D., & Tager-Flusberg, H. (1994). Preschoolers can attribute second-order beliefs. *Developmental Psychology, 30,* 395–402. doi:10.1037/0012-1649.30.3.395

Svetlova, M., Nichols, S. R., & Brownell, C. A. (2010). Toddlers' prosocial behaviour: From instrumental to empathic to altruistic helping. *Child Development*, *81*, 1814-1827. doi:10.1111/j.1467-8624.2010.01512.x

Sweetser, E. (1987). The definition of "lie." An examination of the folk models underlying a semantic prototype. In D. Hollard & N. Quinn (Eds.), *Cultural models in language and thought* (pp. 43-66). New York, NY: Cambridge University Press.

Talwar, V., & Crossman, A. (2011). From little white lies to filthy liars: The evolution of honesty and deception in young children. *Advances in Child Development and Behavior, 40,* 139- 179. doi:10.1016%2FB978-0-12-386491-8.00004-9

Talwar, V., Gordon, H., & Lee, K. (2007a). Lying in the elementary school: Verbal deception and its relation to second-order belief understanding. *Developmental Psychology*, *43,* 804–810. doi: 10.1037/0012-1649.43.3.804

Talwar, V., & Lee, K. (2002a). Development of lying to conceal a transgression: Children's control of expressive behaviour during verbal deception. *International Journal of Behavioural Development, 26,* 436-444. doi:10.1080/01650250143000373

Talwar, V., & Lee, K. (2002b). The emergence of white-lie telling in children between 3 and 7 years. *Merrill-Palmer Quarterly, 48,* 160–181. doi: 10.1353/mpq.2002.0009

Talwar, V., & Lee, K. (2008). Social and cognitive correlates of children's lying. *Child Development, 79*, 866–881. doi:10.1111/j.1467-8624.2008.02264.x

Talwar, V., & Lee, K. (2011). A punitive environment fosters children's dishonesty: A natural experiment. *Child Development*, *82*, 1751-1758. doi:10.1111/j.1467-8624.2011.01663.x

Talwar, V., Lee, K., Bala, N., & Lindsay, R.C.L. (2004). Children's lie-telling to conceal a parent's transgression: Legal implications. *Law & Human Behaviour, 28*, 411-435. doi:10.1023/B:LAHU.0000039333.51399.f6

Talwar, V., Murphy, S., & Lee, K. (2007b). White lie-telling in children for politeness purposes. *International Journal of Behavioural Development*, *31*, 1–11. doi:10.1177/0165025406073530

Talwar, V., Zwaigenbaum, L., Goulden, K. J., Manji, S., Loomes, C., & Rasmussen, C. (2012). Lie-telling behavior in children with autism and its relation to false-belief understanding. *Focus on Autism and Other Developmental Disabilities*, *27*, 122-129. doi:10.1177/1088357612441828

Walczyk, J. J., Roper, K. S., Seemann, E. & Humphrey, A. M. (2003). Cognitive mechanisms

underlying lying to questions: response time as a cue to deception. *Applied Cognitive Psychology, 17*, 755–774. doi:10.1002/acp.914

Walczyk, J. J., Runco, M. A., Tripp, S. M., & Smith, C. E. (2008). The creativity of lying: Divergent thinking and ideational correlates of the resolution of social dilemmas. *Creativity Research Journal*, *20*, 328-342. doi:10.1080/10400410802355152

Warneken, F., & Orlins, E. (2015). Children tell white lies to make others feel better. *British Journal of Developmental Psychology*. Advance online publication. doi:10.1111/bjdp.12083

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children Fourth Edition: Canadian.* Toronto, ON: Hartcourt Assessment, Inc.

Wellman, H. M., Fabricius, W. V., & Sophian, C. (1985). The early development of planning. In H. M. Wellman (Ed.), *Children's searching: The development of search skills and spatial representation* (pp. 123-149). Hillsdale, NJ: Erlbaum.

Wellman, H. M., & Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Development*, *75*, 523-541. doi:10.1111/j.1467-8624.2004.00691.x

Welsh, M.C., Pennington, B.F. & Groisser, D.B. (1991). A normative-developmental study of executive function: A window on prefrontal function in children. *Developmental Neuropsychology, 7,* 131–149. doi:10.1080/87565649109540483

Wiebe, S. A., Espy, K. A., & Charak, D. (2008). Using confirmatory factor analysis to understand executive control in preschool children: I. Latent structure. *Developmental Psychology*, *44*, 575. doi:10.1037/0012-1649.44.2.575

Williams, S. M., Kirmayer, M., Simon, T., & Talwar, V. (2013). Children's antisocial and prosocial lies to familiar and unfamiliar adults. *Infant and Child Development*, *22*, 430-438. doi:10.1002/icd.1802

Wilson, A.E., Smith, M.D., & Ross, H.S. (2003). The nature and effects of young children's lies. *Social Development, 12*, 21–45. doi:10.1111/1467-9507.00220

Wimmer, H., Gruber, S., *&* Perner, J. (1984). Young children's conception of lying: Lexical realism-moral subjectivism. *Journal of Experimental Child Psychology, 37,* 1 -30.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: representation and the containing function of wrong beliefs in young children's understanding of deception. *Cognition, 13,* 103-128. doi:10.1016/0010-0277(83)90004-5

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, *13*, 103-128. doi:10.1016/0010-0277(83)90004-5

Xu, F., Bao, X., Fu, G., Talwar, V. & Lee, K. (2010). Lying and truth-telling in children: From concept to action. *Child Development, 81,* 581-596. doi:10.1111/j.1467-8624.2009.01417.x

Xu, F., Luo, Y.C., Fu, G., & Lee, K. (2009). Children's and adults' conceptualization and evaluation of lying and truth-telling. *Infant and Child Development*, *18*, 307-322. doi:10.1002/icd.631

Zahn-Waxler, C., & Radke-Yarrow, M. (1990). The origins of empathic concern. *Motivation and Emotion*, *14*, 107-130. doi:10.1007/BF00991639

Appendix A

Dear Parent/Guardians,

We are members of a child development research team in the Educational and Counselling Psychology Department at McGill University. We are presently conducting a follow-up to the study that your child participated in approximately two years ago. The purpose of the study is to learn more about when children develop social rules such as being polite to protect the feelings of others, obeying instructions, keeping promises and telling the truth. We want to continue our investigation on when children employ such rules, how successful they are in their attempts, and family factors that are thought to play a role in the development of truth- and lie-telling.

What would I/my child have to do?

Similar to the previous sessions, the current phase of this study involves several different activities, including stories and games, where your child will be interacting with a research assistant. For example, your child will play a guessing game. They will be told not to peek at responses when they are left alone for a minute. Afterwards, they will be asked if they peeked. In another game, your child will be asked to conceal the transgression of one of our research assistants. Our intention is to have a better understanding of the different lies children may tell (e.g., altruistic lies, lies for personal gain). Other aspects of the study include telling your child playing card games, being asked a variety of questions, asked to play with blocks, and watch some videos, designed to examine their abilities to recall information and follow rule changes. While the researcher is playing the games with your child, you will be given several questionnaires to fill out about your child's behaviour, your family and your child rearing practices.

Is there anything else?

Participation in this study is completely voluntary and you or your child may withdraw from the session at any time. Most children enjoy participating in this type of research and risks to participants are minimal. However, there is a very small chance that your child may experience negative feelings during the procedure, such as becoming concerned that they may have answered a question "incorrectly" or about having denied a transgression or told a white lie. After the game, we will explain to your child about the nature of the study. We will discuss with your child about what a lie and the truth are and the importance of truth-telling.

The purpose of this study is to explore general patterns of responses among groups of children of different ages rather than the response of any particular child. In all cases, the responses of individual children will be kept confidential and anonymous. All information and data collected will be protected for confidentiality by assigning a random identification code to each participant. The session will be videotaped and will only be viewed by members of our research team as well as other adult subjects as part of our studies. We will not show the videotape to anyone else without your written permission.

If you have any concerns or questions, please contact us at (514) 398-8059. Thank you for your cooperation.

Sincerely,

Victoria Talwar
Associate Professor
Victoria.talwar@mcgill.ca

_____

Yes. I, _____, agree to participate in the study and give permission for my child _____ to participate in the research as described above.

Birth date of child: _____ Phone #_____
DD / MM / YYYY

Address: _____ Cell Phone #_____

_____

_____ Email:_____

Signature of Parent/Guardian: _____ Date: _____
DD / MM / YYYY

Appendix B

McGill University
ETHICS REVIEW
RENEWAL REQUEST/STUDY CLOSURE FORM

Continuing review of research involving humans requires, at a minimum, the submission of an annual status report to the REB. This form must be completed to request renewal of ethics approval. If a renewal is not received before the expiry date, the project is not considered to be approved and no further research activity may be conducted. When a project has been completed, this form can also be used to officially close the study. To avoid expired approvals and, in the case of funded projects, the freezing of funds, this form should be returned 2-3 weeks before the current approval expires.

REB File #: REB #658-0506 –
Project Title: The development of children's lie-telling
Principal Investigator/Department: V. Talwar
Email: victoria.talwar@mcgill.ca
Faculty Supervisor (if student is the PI):

1. Were there any significant changes made to this research project that have any ethical implications? ___Yes _x__No
   If yes, and these have not already been reported to the REB, describe these changes and append any relevant documents that have been revised.

2. Are there any ethical concerns that arose during the course of this research? ___ Yes _x_ No
   If yes, please describe.

3. Have any participants experienced any unanticipated issues or adverse events in connection with this research project?
   ___ Yes _x_ No
   If yes, please describe.

4. Is this a funded study? ___Yes __xNo.
   If yes, list the agency name and project title and the Principal Investigator of the award if not yourself. This information is necessary to ensure compliance with agency requirements and that there is no interruption in funds.

5. Did this project require REB approval from another Institution/Board? ___Yes _x_No
   If yes, and the project is continuing, attach a copy of the current approval.

_x__ Check here if this is a **request for renewal** of ethics approval.

_____ Check here if the **study is to be closed** and continuing ethics approval is no longer required. A study can be closed when all data collection has been completed and there will be no further contact with participants.

Principal Investigator Signature: _____ Date: _____Jan 21 2015_____

Faculty Supervisor Signature: _____ Date:_____
(if PI is a student)

Submit to Lynda McNeil(lynda.mcneil@mcgill.ca), Research Ethics Officer, James Administration Building, 845 Sherbrooke Street West suite 429, Mtl., QC H3A0G4; fax: 398-4644 tel: 398-6831. Electronic submissions with scanned signatures are accepted but must come from the PI's McGill email.

(version July 2013)

For Administrative Use **REB:** ____REB-I X REB-II ____REB-III

____ The closing report of this terminated project has been reviewed.

X The continuing review for this project has been reviewed and approved. X Delegated Review ____ Full Review

Signature of REB Chair or designate: L McNeil Date: Feb. 5, 2015

Approval Renewal Period: Feb. 5, 2015 to Feb. 4, 2016

Submit to Lynda McNeil(lynda.mcneil@megill.ca), Research Ethics Officer, James Administration Building, 845 Sherbrooke Street West suite 429, Mtl., QC H3A0G4; fax: 398-4644 tel: 398-6831. Electronic submissions with scanned signatures are accepted but must come from the PI's McGill email.

(version July 2013)

Appendix C

Dear Parent/Legal Tutor,

We are members of a child development research team in the Educational and Counselling Psychology Department at McGill University. We are presently conducting a study and wonder if you would give permission for your child to participate. The purpose of the study is to learn more about when children develop social and cognitive abilities to understand and manipulate beliefs in other people and their subsequent lie and truth-telling behaviour.

What would I/my child have to do?

First, this study involves one visit to our lab, where your child will be interacting with a research assistant doing several different activities, including playing games and listening to stories. The session involves tasks designed to measure children's memory, perspective taking, and inhibitory control. The children are not evaluated based on their answers, but rather it is to ensure that differing performance on some tasks are not due to natural differences in verbal/non verbal or executive functioning skills. Your child will also play a guessing game where they will have to guess the names of different toys. They will be told not to peek at the last toy while they are left alone for a minute. While the researcher is playing the games with your child, you will be given a demographic questionnaire to complete. Your responses are completely voluntary (i.e. you may choose to skip any or all sections).

Is there anything else?

Participation in this study is completely voluntary and you or your child may withdraw from the session at any time and if the child becomes upset/bored we will not continue the session. Most children enjoy participating in this type of research and risks to participants are minimal. However, there is a very small chance that your child may experience negative feelings during the procedure, such as becoming concerned that they may have answered a question "incorrectly" or about having denied a transgression. If this occurs, then at the end of the entire study, we will explain to your child about the nature of the study and discuss with them what a lie is and the importance of truth-telling.

The purpose of this study is to explore general patterns of responses among groups of children of different ages rather than the response of any particular child. In all cases, the responses of individual children will be kept confidential and anonymous. All information and data collected will be protected for confidentiality by assigning a random identification code to each participant. The session will be videotaped to help us code for behaviour that we cannot keep track of when we are interacting with the child (e.g., nonverbal cues, facial expression, etc). In addition these videotapes are only used for data coding and analysis only and are accessible to authorized research personnel. We will not show the videotape to anyone else without your written permission.

If you have any concerns or questions, please contact Shanna Williams at (514) 398-8059.

Thank you for your cooperation,

Shanna Williams and Dr. Victoria Talwar

Consent to Participate

Yes. I, _____, agree to participate in the study and give permission for my child _____ to participate in the research as described above.
Birth date of child: _____Child's Gender: M F
Phone #_____

Email:_____

Signature of Parent/Guardian: _____ Date: _____

Consent to Videotape: I agree to have my child videotaped throughout the research session. I have been informed that these videos will only be used for research purposes.

_____
Signature of Parent/Legal Guardian

Appendix D

McGill

Research Ethics Board Office
James Administration Bldg.
845 Sherbrooke Street West. Rm 429
Montreal, QC H3A 2T5

Tel: (514) 398-6831
Fax: (514) 398-4644
Website: www.mcgill.ca/research/researchers/compliance/human/

Research Ethics Board III
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 16-0611

Project Title: Early lies : a study of preschool aged children's lie-telling, theory of mind and executive functioning

Principal Investigator: Shanna Williams **Department:** Educational&Counselling Psychology

Status: Ph.D. student **Supervisor:** Prof. Victoria Talwar

This project was reviewed by delegated review.

Debra Titone, Ph.D.
Chair, REB III

Approval Period: June 23, 2011 **to** June 22, 2012

This project was reviewed and approved in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Subjects and with the Tri-Council Policy Statement: Ethical Conduct For Research Involving Humans.

---

* All research involving human subjects requires review on an annual basis. A Request for Renewal form should be submitted 2-3 weeks before the above expiry date.
* When a project has been completed or terminated a Study Closure form must be submitted.
* Should any modification or other unanticipated development occur before the next required review, the REB must be informed and any modification can't be initiated until approval is received.